



C/015/009. Incoming  
C/015/017  
C/015/018  
C/015/019

P.O. Box 310  
15 North Main Street  
Huntington, Utah 84528

March 22, 2010

Utah Coal Regulatory Program  
Division of Oil, Gas and Mining  
1594 West North Temple, Suite 121 0  
Box 145801  
Salt Lake City, Utah 84114-5801

**Re: Submittal of Annual and Subsidence Reports for 2012, PacifiCorp, Trail Mountain Mine, C/015/009, Cottonwood Mine, C/015/019, Deer Creek Mine, C/015/018, Des-Bee-Dove, C/015/017, Emery County, Utah.**

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company as mine operator, herewith submits the Annual, Hydrology, and Subsidence Reports for 2012.

Two hard copies of the reports are included with this submittal. Additionally, the Raptor Survey Report is also included and attached as "CONFIDENTIAL".

If there are any questions or concerns please call Dennis Oakley at 687-4825.

Sincerely,

Ken Fleck  
Geology and Environmental Affairs Manager

cc: (File)

Cover3\_2012

RECEIVED

MAR 22 2013

DIV. OF OIL, GAS & MINING

Print Form

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# Annual Report

This Annual Report shows information the Division has for your mine. Submit the completed document and any additional information identified in the Appendices to the Division by the date specified in the cover letter. During a complete inspection an inspector will check and verify the information.

## GENERAL INFORMATION

Company Name	PacifiCorp	Mine Name	Trail Mountain Mine
Permit Number	C/015/0009	Permit expiration Date	2015-02-20
Operator Name	Energy West Mining Co	Phone Number	+1 (435) 687-9821
Mailing Address	PO Box 310	Email	
City	Huntington		
State	Utah	Zip Code	84528

## DOGM File Location or Annual Report Location

Excess Spoil Piles	<input type="checkbox"/> Required <input checked="" type="checkbox"/> Not Required	
Refuse Piles	<input checked="" type="checkbox"/> Required <input type="checkbox"/> Not Required	
Impoundments	<input checked="" type="checkbox"/> Required <input type="checkbox"/> Not Required	
Other:		

## OPERATOR COMMENTS

Mine has been in cessation since 2001

## REVIEWER COMMENTS

Met Requirements       Did Not meet Requirements

## REPORTING OF OTHER TECHNICAL DATA

Please list other technical data or information that was not included in the form above, but is required under the approved plan, which must be periodically submitted to the Division.

Please list attachments:

Mine has been in cessation since 2001

Reviewer Comments

# MAPS

Copies of mine maps, current and up-to-date, are to be provided to the Division as an attachment to this report in accordance with the requirements of R645-301-525.240. The map copies shall be made in accordance with 30 CFR 75.1200 as required by MSHA. Mine maps are not considered confidential.

Map Name	Map Number	Included		Confidential	
		Yes	No	Yes	No
NA		<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"/>	<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"/>	<input type="checkbox"/>	<input type="checkbox"/>

Reviewer Comments  Met Requirements  Did Not Meet Requirements

# Impoundment Quarterly Reports

# 2012

The enclosed reports herein are from the Cottonwood, Deer Creek, and Trail Mountain impoundments

Energy West  
Mining  
Company

# Waste Rock Site Quarterly Reports

Energy West Mining Company

1<sup>st</sup> Quarter – 2012

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE		Page 1 of 1	
Permit Number	ACT/015/017/ACT/015/019	Report Date	March 27, 2012
Mine Name	Cottonwood/Wilberg/Des-Bee-Dove/Trail Mountain		
Company Name	Energy West Mining Company		
Excess Spoil Pile or Refuse Pile I.D.	File Name	Cottonwood Waste Rock Site	
	File Number	1211-UT-09-01211-03	
Inspection Date	March 15, 2012		
Inspected By	Mark Reynolds/Rick Cullum		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	2012 1st Quarter Inspection Attachments to Report? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes		
<b>Field Evaluation</b>			
Foundation preparation, including the removal of all organic material and topsoil.			
Foundation was prepared according to the approved plan.			
Placement of underdrains and protective filter systems.			
Not applicable.			
Installation of final surface drainage systems.			
The out slopes of the containment berms are at their final configuration and have been revegetated. The inlet ditch to the pond has been lined with rip rap and is extended as the pile changes elevation.			
Placement and compaction of fill materials.			
The Trail Mountain Mine has ceased production. Mine refuse will no longer be hauled to this site. The site will remain active to accommodate future pond cleanings at Trail Mountain and Cottonwood Mines.			
Final grading and revegetation of fill.			
The out slopes of each containment/lift berm have had final grading and vegetation completed.			
Appearances of instability, structural weakness, and other hazardous conditions.			
None seen.			
<b>Other Comments.</b> Describe any changes in the geometry of the Excess Spoil/Refuse Pile structure, instrumentation, average and maximum lifts of materials placed in the pile, elevations of active benches, total and remaining storage capacity of the structure, evidence of fires in the pile and abatement of such fires, volumes of materials placed in the structure during the year, and any other aspect of the structure affecting its stability or function which has occurred during the reporting period.			
The total storage capacity of the site is a 784,000 cubic yards. The elevation of the current lift varies with the required drainage slope. The surveyed elevation at the center of the active lift is 6,803.31 ft. The final design elevation will be 6,850 ft. The entire site is approximately 36% capacity. The useable area of the present lift is approximately 97%. The site was partially covered with snow at the time of inspection.			
Certification Statement	<p>I hereby certify that; I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability.</p> <p>By: <u>Mark Reynolds, Sr. Construction Engineer</u> (Full Name and Title)</p> <p>Signature: <u><i>Mark Reynolds</i></u>                      Date: <u>5-1-12</u></p> <p>P.E. Number &amp; State: <u>5049079-2202, Utah</u></p>		



INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE		Page 1 of 2	
Permit Number	ACT/015/018	Report Date	March 27, 2012
Mine Name	Deer Creek		
Company Name	Energy West Mining Company		
Excess Spoil Pile or Refuse Pile Identification	File Name	Waste Rock Disposal Site	
	File Number		
	MSHA ID Number	1211-UT-09-00121-02	
Inspection Date	March 15, 2012		
Inspected By	Mark Reynolds/Rick Cullum		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)		2012 First Quarter Inspection	
		Attachments to Report? X No Yes	
<b>Field Evaluation</b>			
<p>1.Foundation preparation, including the removal of all organic material and topsoil.</p> <p>All construction was done according to the permitted, professional engineered design specifications.</p>			
<p>2.Placement of underdrains and protective filter systems.</p> <p>An under-drain was installed when the site was constructed in 1989. The drain had a small amount of flow coming through it at the time of the inspection.</p>			
<p>3.Installation of final surface drainage systems.</p> <p>All interim slopes are maintained at their proper grade. The final slopes are surveyed to assure they are correct. Also the two final designed rip-rap ditches were installed as per the permitted plan and are extended as more lifts are added.</p>			
<p>4.Placement and compaction of fill materials.</p> <p>The site is leveled as they reach capacity. Trash and extraneous material are removed from the piles shortly after they are placed.</p>			
<p>5.Final grading and revegetation of fill.</p> <p>See No. 3.</p> <p>The sub-soil berm surrounding the site was seeded shortly after construction. The total capacity of Phase I is 468,215 yd3, this includes both cells 1 and 2.</p>			

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

No weakness or instabilities are evident at this time.

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.

CELL	ELEVATION *	DESIGN ELEV.	CAPACITY**
1 (Upper, northern)	6365.72	6369.2	87%
2 (Lower, southern)	6338.32	6369.2	44%

\*The elevations are taken on top of the last compacted lift. The elevation of the dumped piles will not be surveyed until the active lift is compacted and leveled. The survey location is approximately the center of each cell.

\*\* The capacity is based on the last survey elevation compared to available height of waste rock in each cell. To figure the available height an approximate elevation of the original ground was determined based on pre-construction ground contours. The capacity will be updated when a new elevation is survey. The capacity is not based on material hauled to site, as described below.

As of Feb. 1, 2012 there were 1414.56 cu yd<sup>3</sup> of material hauled YTD. This estimate is based on invoices from the trucking company of truckloads hauled to the site. Each truckload is assumed to be full at 15 tons and a density of 88 pcf. This estimate could lag actual haul dates by 1 to 3 months, depending of invoicing and accounting.

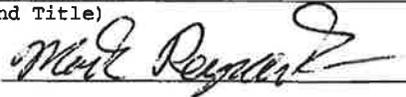
Berms were constructed to hold pond cleaning sediment from the Deer Creek Mine. These berms and sediment will be spread over the site after it has dried out.

**Certification Statement**

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

By: Mark Reynolds, Sr. Construction Engineer  
(Full Name and Title)

Signature:



Date: 5-1-12

P.E. Number & State: 5049079-2202, Utah



INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE			
Permit Number	ACT/015/018	Report Date	March 27, 2012
Mine Name	Deer Creek		
Company Name	Energy West Mining Company		
Excess Spoil Pile or Refuse Pile I.D.	Pile Name	ELK CANYON/ORIGINAL SITE	
	Pile Number		
	MSHA ID Number	1211-UT-09-00121-01	
Inspection Date	March 15, 2012		
Inspected By	Mark Reynolds/Rick Cullum		
Reason for Inspection <small>(Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)</small>	2012 1st Quarter Inspection		
	Attachments to Report? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes		
<b>Field Evaluation</b>			
Foundation preparation, including the removal of all organic material and topsoil.			
The construction of both sites have been complete for some time in excess of 18 years. The foundations appear to be stable.			
Placement of underdrains and protective filter systems.			
None			
Installation of final surface drainage systems.			
The slopes of both sites have no rills, gullies or sloughage present.			
Placement and compaction of fill materials.			
No fill material is being placed at either site, since both are at their designed capacity. The Elk Canyon site contains approximately 24,000 yd <sup>3</sup> original site 90,000 yd <sup>3</sup> of fill material.			
Final grading and revegetation of fill.			
The sites are at capacity. The final grades are established and are re-vegetated.			
Appearances of instability, structural weakness, and other hazardous conditions.			
None were observed.			
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.			
There was approximately 2000 tons coal temporarily stacked at the Elk Canyon pad at the time of inspection.			
<b>Certification Statement</b> I hereby certify that; I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability.			
By: <u>Mark Reynolds, Sr. Construction Engineer</u>			
<small>(Full Name and Title)</small>			
Signature:	<u><i>Mark Reynolds</i></u>	Date:	<u>5-1-12</u>
P.E. Number & State: <u>5049079-2202, Utah</u>			



# Waste Rock Site Quarterly Reports

Energy West Mining Company

2<sup>nd</sup> Quarter – 2012

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE		Page 1 of 1	
Permit Number	ACT/015/017/ACT/015/019	Report Date	June 27, 2012
Mine Name	Cottonwood/Wilberg/Des-Bee-Dove/Trail Mountain		
Company Name	Energy West Mining Company		
Excess Spoil Pile or Refuse Pile I.D.	File Name	Cottonwood Waste Rock Site	
	File Number	1211-UT-09-01211-03	
Inspection Date	June 18, 2012		
Inspected By	Mark Reynolds/Rick Cullum		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	2012 2nd Quarter Inspection		Attachments to Report?    x No    Yes
<b>Field Evaluation</b>			
Foundation preparation, including the removal of all organic material and topsoil.			
Foundation was prepared according to the approved plan.			
Placement of underdrains and protective filter systems.			
Not applicable.			
Installation of final surface drainage systems.			
The out slopes of the containment berms are at their final configuration and have been revegetated. The inlet ditch to the pond has been lined with rip rap and is extended as the pile changes elevation.			
Placement and compaction of fill materials.			
The Trail Mountain Mine has ceased production. Mine refuse will no longer be hauled to this site. The site will remain active to accommodate future pond cleanings at Trail Mountain and Cottonwood Mines.			
Final grading and revegetation of fill.			
The outlopes of each containment/lift berm have had final grading and vegetation completed.			
Appearances of instability, structural weakness, and other hazardous conditions.			
None seen.			
Other Comments. Describe any changes in the geometry of the Excess Spoil/Refuse Pile structure, instrumentation, average and maximum lifts of materials placed in the pile, elevations of active benches, total and remaining storage capacity of the structure, evidence of fires in the pile and abatement of such fires, volumes of materials placed in the structure during the year, and any other aspect of the structure affecting its stability or function which has occurred during the reporting period.			
The total storage capacity of the site is a 784,000 cubic yards. The elevation of the current lift varies with the required drainage slope. The surveyed elevation at the center of the active lift is 6,803.31 ft. The final design elevation will be 6,850 ft. The entire site is approximately 36% capacity. The useable area of the present lift is approximately 97%. The site was partially covered with snow at the time of inspection.			
Certification Statement  	I hereby certify that; I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability.		
	By: <u>Mark Reynolds, Sr. Construction Engineer</u> (Full Name and Title)		
Signature: <u><i>Mark Reynolds</i></u>		Date: <u>6-27-12</u>	
P.E. Number & State: <u>5049079-2202, Utah</u>			

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE		Page 1 of 2	
Permit Number	ACT/015/018	Report Date	June 27, 2012
Mine Name	Deer Creek		
Company Name	Energy West Mining Company		
Excess Spoil Pile or Refuse Pile Identification	Pile Name	Waste Rock Disposal Site	
	Pile Number		
	MSHA ID Number	1211-UT-09-00121-02	
Inspection Date	June 18, 2012		
Inspected By	Mark Reynolds/Rick Cullum		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)		2012 Second Quarter Inspection	
		Attachments to Report? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	
<b>Field Evaluation</b>			
<p>1.Foundation preparation, including the removal of all organic material and topsoil.</p> <p>All construction was done according to the permitted, professional engineered design specifications.</p>			
<p>2.Placement of underdrains and protective filter systems.</p> <p>An under-drain was installed when the site was constructed in 1989. The drain had a small amount of flow coming through it at the time of the inspection.</p>			
<p>3.Installation of final surface drainage systems.</p> <p>All interim slopes are maintained at their proper grade. The final slopes are surveyed to assure they are correct. Also the two final designed rip-rap ditches were installed as per the permitted plan and are extended as more lifts are added.</p>			
<p>4.Placement and compaction of fill materials.</p> <p>The site is leveled as they reach capacity. Trash and extraneous material are removed from the piles shortly after they are placed.</p>			
<p>5.Final grading and revegetation of fill.</p> <p>See No. 3.</p> <p>The sub-soil berm surrounding the site was seeded shortly after construction. The total capacity of Phase I is 468,215 yd3, this includes both cells 1 and 2.</p>			

6. Appearances of instability, structural weakness, and other hazardous conditions.  
No weakness or instabilities are evident at this time.

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.

CELL	ELEVATION *	DESIGN ELEV.	CAPACITY**
1 (Upper, northern)	6365.72	6369.2	87%
2 (Lower, southern)	6341.31	6369.2	44%

\*The elevations are taken on top of the last compacted lift. The elevation of the dumped piles will not be surveyed until the active lift is compacted and leveled. The survey location is approximately the center of each cell.

\*\* The capacity is based on the last survey elevation compared to available height of waste rock in each cell. To figure the available height an approximate elevation of the original ground was determined based on pre-construction ground contours. The capacity will be updated when a new elevation is survey. The capacity is not based on material hauled to site, as described below.

As of APRIL 1, 2012 there were 5254.08 cu yd<sup>3</sup> of material hauled YTD. This estimate is based on invoices from the trucking company of truckloads hauled to the site. Each truckload is assumed to be full at 15 tons and a density of 88 pcf. This estimate could lag actual haul dates by 1 to 3 months, depending of invoicing and accounting.

Berms were constructed to hold pond cleaning sediment from the Deer Creek Mine. These berms and sediment will be spread over the site after it has dried out.

**Certification Statement**

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

By: Mark Reynolds, Sr. Construction Engineer  
(Full Name and Title)

Signature: *Mark Reynolds* Date: 6-27-12

P.E. Number & State: 5049079-2202, Utah



<b>INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE</b>			
<b>Permit Number</b>	ACT/015/018	<b>Report Date</b>	June 27, 2012
<b>Mine Name</b>	Deer Creek		
<b>Company Name</b>	Energy West Mining Company		
<b>Excess Spoil Pile or Refuse Pile I.D.</b>	<b>Pile Name</b>	ELK CANYON/ORIGINAL SITE	
	<b>Pile Number</b>		
	<b>MSHA ID Number</b>	1211-UT-09-00121-01	
<b>Inspection Date</b>	June 18, 2012		
<b>Inspected By</b>	Mark Reynolds/Rick Cullum		
<b>Reason for Inspection</b> (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)		2012 2nd Quarter Inspection	
		<b>Attachments to Report?</b> <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	
<b>Field Evaluation</b>			
Foundation preparation, including the removal of all organic material and topsoil. The construction of both sites have been complete for some time in excess of 18 years. The foundations appear to be stable.			
Placement of underdrains and protective filter systems. None			
Installation of final surface drainage systems. The slopes of both sites have no rills, gullies or sloughage present.			
Placement and compaction of fill materials. No fill material is being placed at either site, since both are at their designed capacity. The Elk Canyon site contains approximately 24,000 yd <sup>3</sup> original site 90,000 yd <sup>3</sup> of fill material.			
Final grading and revegetation of fill. The sites are at capacity. The final grades are established and are re-vegetated.			
Appearances of instability, structural weakness, and other hazardous conditions. None were observed.			
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. There was approximately 2000 tons coal temporarily stacked at the Elk Canyon pad at the time of inspection.			
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By: <u>Mark Reynolds, Sr. Construction Engineer</u>			
(Full Name and Title)			
Signature: <u></u>		Date: <u>6-27-12</u>	
P.E. Number & State: <u>5049079-2202, Utah</u>			



# Waste Rock Site Quarterly Reports

Energy West Mining Company

3<sup>rd</sup> Quarter – 2012

Permit Number	ACT/015/017/ACT/015/019	Report Date	Sept. 27, 2012
Mine Name	Cottonwood/Wilberg/Des-Bee-Dove/Trail Mountain		
Company Name	Energy West Mining Company		
Excess Spoil Pile or Refuse Pile I.D.	File Name	Cottonwood Waste Rock Site	
	File Number	1211-UT-09-01211-03	
Inspection Date	Sept. 18, 2012		
Inspected By	Mark Reynolds/Rick Cullum		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	2012 3rd Quarter Inspection		
	Attachments to Report?	x No	Yes

**Field Evaluation**

Foundation preparation, including the removal of all organic material and topsoil.  
 Foundation was prepared according to the approved plan.  
 Placement of underdrains and protective filter systems.  
 Not applicable.  
 Installation of final surface drainage systems.  
 The out slopes of the containment berms are at their final configuration and have been revegetated. The inlet ditch to the pond has been lined with rip rap and is extended as the pile changes elevation.  
 Placement and compaction of fill materials.  
 The Trail Mountain Mine has ceased production. Mine refuse will no longer be hauled to this site. The site will remain active to accommodate future pond cleanings at Trail Mountain and Cottonwood Mines.  
 Final grading and revegetation of fill.  
 The out slopes of each containment/lift berm have had final grading and vegetation completed.  
 Appearances of instability, structural weakness, and other hazardous conditions.  
 None seen.

**Other Comments.** Describe any changes in the geometry of the Excess Spoil/Refuse Pile structure, instrumentation, average and maximum lifts of materials placed in the pile, elevations of active benches, total and remaining storage capacity of the structure, evidence of fires in the pile and abatement of such fires, volumes of materials placed in the structure during the year, and any other aspect of the structure affecting its stability or function which has occurred during the reporting period.  
 The total storage capacity of the site is a 784,000 cubic yards. The elevation of the current lift varies with the required drainage slope. The surveyed elevation at the center of the active lift is 6,803.31 ft. The final design elevation will be 6,850 ft. The entire site is approximately 36% capacity. The useable area of the present lift is approximately 97%.

**Certification Statement**

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

By: Mark Reynolds, Sr. Construction Engineer  
 (Full Name and Title)

Signature: *Mark Reynolds* Date: 9-27-12

P.E. Number & State: 5049079-2202, Utah



INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE		Page 1 of 2	
Permit Number	ACT/015/018	Report Date	Sept. 27, 2012
Mine Name	Deer Creek		
Company Name	Energy West Mining Company		
Excess Spoil Pile or Refuse Pile Identification	File Name	Waste Rock Disposal Site	
	File Number		
	MSHA ID Number	1211-UT-09-00121-02	
Inspection Date	Sept. 12, 2012		
Inspected By	Mark Reynolds/Rick Cullum		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)		2012 Third Quarter Inspection	
		Attachments to Report? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	
<b>Field Evaluation</b>			
<p>1.Foundation preparation, including the removal of all organic material and topsoil.</p> <p>All construction was done according to the permitted, professional engineered design specifications.</p>			
<p>2.Placement of underdrains and protective filter systems.</p> <p>An under-drain was installed when the site was constructed in 1989. The drain had a small amount of flow coming through it at the time of the inspection.</p>			
<p>3.Installation of final surface drainage systems.</p> <p>All interim slopes are maintained at their proper grade. The final slopes are surveyed to assure they are correct. Also the two final designed rip-rap ditches were installed as per the permitted plan and are extended as more lifts are added.</p>			
<p>4.Placement and compaction of fill materials.</p> <p>The site is leveled as they reach capacity. Trash and extraneous material are removed from the piles shortly after they are placed.</p>			
<p>5.Final grading and revegetation of fill.</p> <p>See No. 3.</p> <p>The sub-soil berm surrounding the site was seeded shortly after construction. The total capacity of Phase I is 468,215 yd<sup>3</sup>, this includes both cells 1 and 2.</p>			

6. Appearances of instability, structural weakness, and other hazardous conditions.  
No weakness or instabilities are evident at this time.

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.

CELL	ELEVATION *	DESIGN ELEV.	CAPACITY**
1 (Upper, northern)	6365.72	6369.2	87%
2 (Lower, southern)	6341.45	6369.2	44%

\*The elevations are taken on top of the last compacted lift. The elevation of the dumped piles will not be surveyed until the active lift is compacted and leveled. The survey location is approximately the center of each cell.

\*\* The capacity is based on the last survey elevation compared to available height of waste rock in each cell. To figure the available height an approximate elevation of the original ground was determined based on pre-construction ground contours. The capacity will be updated when a new elevation is survey. The capacity is not based on material hauled to site, as described below.

As of July 1, 2012 there were 9649.32 cu yd<sup>3</sup> of material hauled YTD. This estimate is based on invoices from the trucking company of truckloads hauled to the site. Each truckload is assumed to be full at 15 tons and a density of 88 pcf. This estimate could lag actual haul dates by 1 to 3 months, depending of invoicing and accounting.

Berms were constructed to hold pond cleaning sediment from the Deer Creek Mine. These berms and sediment will be spread over the site after it has dried out.

**Certification Statement**

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

By: Mark Reynolds, Sr. Construction Engineer  
(Full Name and Title)

Signature: *Mark Reynolds* Date: 9-27-12

P.E. Number & State: 5049079-2202, Utah



INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE			
Permit Number	ACT/015/018	Report Date	Sept. 27, 2012
Mine Name	Deer Creek		
Company Name	Energy West Mining Company		
Excess Spoil File or Refuse File I.D.	File Name	ELK CANYON/ORIGINAL SITE	
	File Number		
	MSHA ID Number	1211-UT-09-00121-01	
Inspection Date	Sept. 12, 2012		
Inspected By	Mark Reynolds/Rick Cullum		
Reason for Inspection <small>(Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)</small>	2012 3rd Quarter Inspection		
	Attachments to Report? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes		

**Field Evaluation**

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

The construction of both sites have been complete for some time in excess of 18 years. The foundations appear to be stable.

Placement of underdrains and protective filter systems.

None

Installation of final surface drainage systems.

The slopes of both sites have no rills, gullies or sloughage present.

Placement and compaction of fill materials.

No fill material is being placed at either site, since both are at their designed capacity. The Elk Canyon site contains approximately 24,000 yd<sup>3</sup> original site 90,000 yd<sup>3</sup> of fill material.

Final grading and revegetation of fill.

The sites are at capacity. The final grades are established and are re-vegetated.

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

None were observed.

Other Comments. Describe any changes in the geometry of the Excess Spoil/Refuse File 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.

There was approximately 2000 tons coal temporarily stacked at the Elk Canyon pad at the time of inspection.

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

By: Mark Reynolds, Sr. Construction Engineer

(Full Name and Title)

Signature: *Mark Reynolds*

Date: 9-27-12

P.E. Number & State: 5049079-2202, Utah



Waste Rock Site Quarterly Reports

Energy West Mining Company

4<sup>th</sup> Quarter – 2012

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE		Page 1 of 1	
Permit Number	ACT/015/017/ACT/015/019	Report Date	Dec. 20, 2012
Mine Name	Cottonwood/Wilberg/Des-Bee-Dove/Trail Mountain		
Company Name	Energy West Mining Company		
Excess Spoil File or Refuse Pile I.D.	File Name	Cottonwood Waste Rock Site	
	File Number	1211-UT-09-01211-03	
Inspection Date	Dec. 7, 2012		
Inspected By	Mark Reynolds/Rick Cullum		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)		2012 4th Quarter Inspection	
		Attachments to Report?    x No    Yes	
<b>Field Evaluation</b>			
Foundation preparation, including the removal of all organic material and topsoil.			
Foundation was prepared according to the approved plan.			
Placement of underdrains and protective filter systems. Not applicable.			
Installation of final surface drainage systems. The out slopes of the containment berms are at their final configuration and have been revegetated. The inlet ditch to the pond has been lined with rip rap and is extended as the pile changes elevation.			
Placement and compaction of fill materials. The Trail Mountain Mine has ceased production. Mine refuse will no longer be hauled to this site. The site will remain active to accommodate future pond cleanings at Trail Mountain and Cottonwood Mines.			
Final grading and revegetation of fill. The out slopes of each containment/lift berm have had final grading and vegetation completed.			
Appearances of instability, structural weakness, and other hazardous conditions. None seen.			
Other Comments. Describe any changes in the geometry of the Excess Spoil/Refuse File structure, instrumentation, average and maximum lifts of materials placed in the pile, elevations of active benches, total and remaining storage capacity of the structure, evidence of fires in the pile and abatement of such fires, volumes of materials placed in the structure during the year, and any other aspect of the structure affecting its stability or function which has occurred during the reporting period. The total storage capacity of the site is a 784,000 cubic yards. The elevation of the current lift varies with the required drainage slope. The surveyed elevation at the center of the active lift is 6,803.31 ft. The final design elevation will be 6,850 ft. The entire site is approximately 36% capacity. The useable area of the present lift is approximately 97%.			
Certification Statement	<p>I hereby certify that; I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability.</p> <p>By: <u>Mark Reynolds, Sr. Construction Engineer</u> (Full Name and Title)</p> <p>Signature: <u><i>Mark Reynolds</i></u>      Date: <u>12-20-12</u></p> <p>P.E. Number &amp; State: <u>5049079-2202, Utah</u></p>		



INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE		Page 1 of 2	
Permit Number	ACT/015/018	Report Date	Dec. 20, 2012
Mine Name	Deer Creek		
Company Name	Energy West Mining Company		
Excess Spoil Pile or Refuse Pile Identification	File Name	Waste Rock Disposal Site	
	File Number		
	MSHA ID Number	1211-UT-09-00121-02	
Inspection Date	Dec. 6, 2012		
Inspected By	Mark Reynolds/Rick Cullum		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)		2012 Fourth Quarter Inspection	
		Attachments to Report? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	
<b>Field Evaluation</b>			
<p style="text-align: center;">1.Foundation preparation, including the removal of all organic material and topsoil.</p> <p>All construction was done according to the permitted, professional engineered design specifications.</p>			
<p style="text-align: center;">2.Placement of underdrains and protective filter systems.</p> <p>An under-drain was installed when the site was constructed in 1989. The drain had a small amount of flow coming through it at the time of the inspection.</p>			
<p style="text-align: center;">3.Installation of final surface drainage systems.</p> <p>All interim slopes are maintained at their proper grade. The final slopes are surveyed to assure they are correct. Also the two final designed rip-rap ditches were installed as per the permitted plan and are extended as more lifts are added.</p>			
<p style="text-align: center;">4.Placement and compaction of fill materials.</p> <p>The site is leveled as they reach capacity. Trash and extraneous material are removed from the piles shortly after they are placed.</p>			
<p style="text-align: center;">5.Final grading and revegetation of fill.</p> <p>See No. 3. The sub-soil berm surrounding the site was seeded shortly after construction. The total capacity of Phase I is 468,215 yd<sup>3</sup>, this includes both cells 1 and 2.</p>			

6. Appearances of instability, structural weakness, and other hazardous conditions.  
No weakness or instabilities are evident at this time.

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.

CELL	ELEVATION *	DESIGN ELEV.	CAPACITY**
1 (Upper, northern)	6365.72	6369.2	87%
2 (Lower, southern)	6341.45	6369.2	44%

\*The elevations are taken on top of the last compacted lift. The elevation of the dumped piles will not be surveyed until the active lift is compacted and leveled. The survey location is approximately the center of each cell.

\*\* The capacity is based on the last survey elevation compared to available height of waste rock in each cell. To figure the available height an approximate elevation of the original ground was determined based on pre-construction ground contours. The capacity will be updated when a new elevation is survey. The capacity is not based on material hauled to site, as described below.

As of Sept. 1, 2012 there were 12,377.4 cu yd<sup>3</sup> of material hauled YTD. This estimate is based on invoices from the trucking company of truckloads hauled to the site. Each truckload is assumed to be full at 15 tons and a density of 88 pcf. This estimate could lag actual haul dates by 1 to 3 months, depending of invoicing and accounting.

Berms were constructed to hold pond cleaning sediment from the Deer Creek Mine. These berms and sediment will be spread over the site after it has dried out.

**Certification Statement**



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

By: Mark Reynolds, Sr. Construction Engineer  
(Full Name and Title)

Signature: *[Handwritten Signature]* Date: 12-20-12

P.E. Number & State: 5049079-2202, Utah

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE			
Permit Number	ACT/015/018	Report Date	Dec. 20, 2012
Mine Name	Deer Creek		
Company Name	Energy West Mining Company		
Excess Spoil Pile or Refuse Pile I.D.	Pile Name	ELK CANYON/ORIGINAL SITE	
	Pile Number		
	MSHA ID Number	1211-UT-09-00121-01	
Inspection Date	Dec. 6, 2012		
Inspected By	Mark Reynolds/Rick Cullum		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	2012 4th Quarter Inspection		
	Attachments to Report? X No Yes		
<b>Field Evaluation</b>			
Foundation preparation, including the removal of all organic material and topsoil. The construction of both sites have been complete for some time in excess of 18 years. The foundations appear to be stable.			
Placement of underdrains and protective filter systems. None			
Installation of final surface drainage systems. The slopes of both sites have no rills, gullies or sloughage present.			
Placement and compaction of fill materials. No fill material is being placed at either site, since both are at their designed capacity. The Elk Canyon site contains approximately 24,000 yd <sup>3</sup> original site 90,000 yd <sup>3</sup> of fill material.			
Final grading and revegetation of fill. The sites are at capacity. The final grades are established and are re-vegetated.			
Appearances of instability, structural weakness, and other hazardous conditions. None were observed.			
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. There was approximately 2000 tons coal temporarily stacked at the Elk Canyon pad at the time of inspection.			
<b>Certification Statement</b> I hereby certify that, I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability.			
By: <u>Mark Reynolds, Sr. Construction Engineer</u>			
(Full Name and Title)			
Signature:		Date:	<u>12-20-12</u>
P.E. Number & State: <u>5049079-2202, Utah</u>			



# Impoundment Quarterly Reports

# 2012

The enclosed reports herein are from the Cottonwood, Deer Creek, and Trail Mountain impoundments

Energy West  
Mining  
Company

# Impoundment Quarterly Reports

Energy West Mining Company

1<sup>st</sup> Quarter – 2012

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT		Page 1 of 2	
Permit Number	C/015/0019	Report Date	March 27, 2012
Mine Name	Cottonwood/Wilberg		
Company Name	PacifiCorp		
Impoundment Name...	North Pond	South Pond	Waste Rock Pond
Impoundment Number.			
UPDES Permit Number		UT 0022896-003A	UT 0022896-005
MSHA ID NUMBER.....	1211-UT-09-02052-02	1211-UT-09-02052-03	

<b>IMPOUNDMENT INSPECTION</b>	
Inspection Date	March 15, 2012
Inspected By	Rick Cullum/ Mark Reynolds
	1st Quarter Inspection 2012

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

North Pond: No instabilities or weaknesses observed.

South Pond: No instabilities or weaknesses observed.

Waste Rock Site Pond: No instabilities observed.

Required for an impoundment which functions as a SEDIMENTATION POND.	Sediment storage capacity, including elevation of 50% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.			
		<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock</u>
	<u>Pond</u>			
	60% Design Storage Capacity	.34 A.F. at 7351.0 ft.	.19 A.F. at 7322.3 ft.	1.45 A.F. at 6761.5 ft.
	100% Sediment Capacity	.56 A.F. at 7354.83 ft.	.32 A.F. at 7325.33 ft.	2.42 A.F. at 6765.3 ft.
	Principle and emergency spillway elevations.			
		<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock Pond</u>
	Principal Spillway Elevation	7354.83	7325.33	6766.3
	Emergency Spillway Elevation	7363.33	7334.2	6770.0

**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 out slopes of embankments, etc.

	<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock Pond</u>
Water Elevation	7347.65	DRY	6762.07
Discharging	NO	NO	No
Inlet/Outlet Condition	Good	Good	Good
Slope conditions	Good	Good	Good

\*See "Hydrologic Monitoring Data" report submitted to DOGM quarterly for monitoring information.

**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.

	<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock Pond</u>
Sediment Volume	0.10 AF @7348 ft.	0.00 AF	1.31 AF @6760.7 ft.
Remaining Sediment Storage Capacity	0.24 AF	0.19 AF	.14 AF
Water Impounded	0.07 AF	0.00 AF	0.24 AF

**Changes, Comments,**

THE COTTONWOOD MINE WAS IDLED IN 2001, SO THE ONLY WATER THAT REPORTS TO THE PONDS ARE RUN-OFF DURING A STORM EVENT. REPAIRS TO THE BASE OF THE STANDPIPE AREA WERE COMPLETED.

**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: *Mark A. Reynolds* Date: 5-1-12

Signature: *Richard Cullen* Date: 5/2/12

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT		Page 1 of 2	
Permit Number	C/015/0018	Report Date	March 27, 2012
Mine Name	Deer Creek Mine		
Company Name	Energy West Mining		
Impoundment Identification	Impoundment Name	Mine Site Pond:	Waste Rock Pond:
	Impoundment Number		
	UPDES Permit Number	UT-0023604-001	
	MSHA ID Number	N/A	N/A
0			
Inspection Date	3/15/12	Waste Rock Pond	3/15/12
Inspected By	Rick Cullum / Mark Reynolds		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	1st Quarter 2012 Inspection		
1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.			
	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>	
Conditions, Comments Etc.	No hazards observed.	No hazards observed.	
Required for an impoundment which functions as a SEDIMENTATION POND.	Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.		
		<u>Mine Site Pond:</u>	<u>Waste Rock Pond:</u>
	60% Design Storage Capacity	1.87 A.F. at 7213.1 ft.	.59 A.F. at 6312.7 ft.
	100% Sediment Capacity	3.12 A.F. at 7216.0 ft.	.98 A.F. at 6313.45 ft.
	Principle and emergency spillway elevations.		
		<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>
	Principle Spillway Elevation (F.A.S.L.):	7218.64	6318.0
	Emergency Spillway Elevation	7232.03	6318.0

**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 outlopes of embankments, etc.

	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>
Water Elevation	7225.81 Top of ice	None
Discharging	Yes	Never
Inlet, Outlet, Spillway Conditions	Good	Good
Out slope Conditions	No Change	No Change

\*See "Hydrologic Monitoring Data" report submitted quarterly to DOGM for monitoring information.

	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>
Sediment Volume	A.F. (see Note)	None
Remaining Sediment	.0 A.F.	0.59 A.F.
Water impounded	8.6 A.F.	

Changes, Comments,  
etc.

The pond was cleaned in the 4<sup>th</sup> quarter and will be surveyed in May of 2012.

**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: Mark Reynolds Date: 5-1-12

Signature: Richard Cullum Date: 5/2/12

**IMPOUNDMENT INSPECTION AND CERTIFIED REPORT**

Permit Number	C/015/0018	Report Date	March 27, 2012
Mine Name	Deer Creek Mine		
Company Name	Energy West Mining		
Impoundment Identification	Impoundment Name	Rilda Canyon Pond	
	Impoundment Number		
	UPDES Permit Number	N/A	
	MSHA ID Number	N/A	N/A

Inspection Date	March 15, 2012
Inspected By	Rick Cullum / Mark Reynolds

Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	1st Quarter 2012 Inspection
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1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.  
POND  
 Conditions, Comments Etc. No hazards observed. Snow covered the site.

Required for an impoundment which functions as a SEDIMENTATION POND.	Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment. <u>POND:</u> 60% Design Storage Capacity ----- .076 A.F. 100% Sediment Capacity ----- .126 A.F.
	Principle and emergency spillway elevations. <u>POND</u> Principle Spillway Elevation (F.A.S.L.): 7516.5 Emergency Spillway Elevation 7516.5

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	<u>POND</u> small amount of water from melted snow
Discharging	no
Inlet, Outlet, Spillway Conditions	Good
Out slope Conditions	Good

Sediment A. Volume Remaining Sediment	0.00 A.F.
Storage Capacity	.126 A.F.
Water impounded	0.05 A.F.
Changes, Comments, etc.	The construction of the pond was completed in early 4 <sup>th</sup> quarter 2008. The pond is functioning as designed.

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: Mark Reynolds Date: 5-1-12  
 Signature: Rick Cullum Date: 5/2/12

Permit Number	C/015/0009	Report Date	March 27, 2012
Mine Name	Trail Mountain Mine Company Name: Energy West Mining		
Impoundment Identification	Impoundment Name	Trail Mountain Mine Pond:	
	Impoundment Number		
	UPDES Permit Number	UT-G04003-001	
	MSHA ID Number	N/A	

**IMPOUNDMENT INSPECTION 1<sup>st</sup> Quarter 2012 Inspection**

Inspection Date	March 15, 2012
Inspected By	Mark Reynolds / Rick Cullum

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.  
No unstable or structural weaknesses found.

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.
	60% Design Storage Capacity                      0.282 A.F. at 7182 100% Sediment Capacity                                      0.47 A.F. at 7183.6
	3. Principle and emergency spillway elevations. Principle Spillway Elevation (F.A.S.L.):                      7186.6 Emergency Spillway Elevation: (F.A.S.L.):                      7194.6

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**                                      7181.74  
**Discharging**    No  
**Inlet, Outlet Conditions**                              Good  
**Slope conditions**    Good  
 \*See "Hydrologic Monitoring Data" report submitted quarterly to DOGM for monitoring information.

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.

**Sediment Volume**                                      0.25 A.F. @7181.9 ft.  
**Remaining Sediment Storage Capacity**      0.03 A.F. The pond will be cleaned in April 2012  
**Water Impounded**    0.03  
**Changes, comments, etc.**                              Mining has seized at Trail Mtn. operations, only storm run off will run into the pond. The pond was cleaned in 4th Quarter 2005.

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: Mark Reynolds Date: 5-1-12

Signature: Rick Cullum Date: 5/2/12

# Impoundment Quarterly Reports

Energy West Mining Company

2<sup>nd</sup> Quarter – 2012

Page 1

<b>IMPOUNDMENT INSPECTION AND CERTIFIED REPORT</b>		<b>Page 1 of 2</b>	
<b>Permit Number</b>	C/015/0019	<b>Report Date</b>	June 27, 2012
<b>Mine Name</b>	Cottonwood/Wilberg		
<b>Company Name</b>	PacifiCorp		
<b>Impoundment Name...</b>	<b>North Pond</b>	<b>South Pond</b>	<b>Waste Rock Pond</b>
<b>Impoundment Number.</b>			
<b>UPDES Permit Number</b>		UT 0022896-003A	UT 0022896-005
<b>MSHA ID NUMBER.....</b>	1211-UT-09-02052-02	1211-UT-09-02052-03	

<b>IMPOUNDMENT INSPECTION</b>	
<b>Inspection Date</b>	June 18, 2012
<b>Inspected By</b>	Rick Cullum/ Mark Reynolds
	<b>2nd Quarter Inspection 2012</b>

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

**North Pond:** No instabilities or weaknesses observed.

**South Pond:** No instabilities or weaknesses observed.

**Waste Rock Site Pond:** No instabilities observed.

<b>Required for an impoundment which functions as a SEDIMENTATION POND.</b>	<b>Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.</b>			
		<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock</u>
	<u>Pond</u>			
	<b>60% Design Storage Capacity</b>	.34 A.F. at 7351.0 ft.	.19 A.F. at 7322.3 ft.	1.45 A.F. at 6761.5 ft.
	<b>100% Sediment Capacity</b>	.56 A.F. at 7354.83 ft.	.32 A.F. at 7325.33 ft.	2.42 A.F. at 6765.3 ft.
	<b>Principle and emergency spillway elevations.</b>			
		<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock Pond</u>
	<b>Principal Spillway Elevation</b>	7354.83	7325.33	6766.3
	<b>Emergency Spillway Elevation</b>	7363.33	7334.2	6770.0

**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 out slopes of embankments, etc.

	<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock Pond</u>
<b>Water Elevation</b>	Dry	DRY	Dry
<b>Discharging</b>	NO	NO	No
<b>Inlet/Outlet Condition</b>	Good	Good	Good
<b>Slope conditions</b>	Good	Good	Good

\*See "Hydrologic Monitoring Data" report submitted to DOGM quarterly for monitoring information.

**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.

	<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock Pond</u>
<b>Sediment Volume</b>	0.10 AF @7348 ft.	0.00 AF	1.31 AF @6760.7 ft
<b>Remaining Sediment Storage Capacity</b>	0.24 AF	0.19 AF	.14 AF
<b>Water Impounded</b>	0.00 AF	0.00 AF	0.0 AF

**Changes, Comments,**

THE COTTONWOOD MINE WAS IDLED IN 2001, SO THE ONLY WATER THAT REPORTS TO THE PONDS ARE RUN-OFF DURING A STORM EVENT. REPAIRS TO THE BASE OF THE STANDPIPE AREA WERE COMPLETED.

**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: *Mark Reynolds* Date: 6-27-12

Signature: *Richard Cullum* Date: 6/29/12



**IMPOUNDMENT INSPECTION AND CERTIFIED REPORT**

**Permit Number** C/015/0018 **Report Date** July 6, 2012

**Mine Name** Deer Creek Mine

**Company Name** Energy West Mining

<b>Impoundment Identification</b>	<b>Impoundment Name</b>	<b>Mine Site Pond:</b>	<b>Waste Rock Pond:</b>
	<b>Impoundment Number</b>		
	<b>UPDES Permit Number</b>	UT-0023604-001	
	<b>MSHA ID Number</b>	N/A	N/A

0

**Inspection Date** 6/18/12 **Waste Rock Pond** 6/18/12

**Inspected By** Rick Cullum / Mark Reynolds

**Reason for Inspection** 2nd Quarter 2012 Inspection  
 (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)

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

Mine Site Pond Waste Rock Pond

**Conditions, Comments Etc.**

No hazards observed. No hazards observed.

Required for an impoundment which functions as a **SEDIMENTATION POND.**

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

	<u>Mine Site Pond:</u>	<u>Waste Rock Pond:</u>
<b>60% Design Storage Capacity</b>	1.87 A.F. at 7213.1 ft.	.59 A.F. at 6312.7 ft.
<b>100% Sediment Capacity</b>	3.12 A.F. at 7216.0 ft.	.98 A.F. at 6313.45 ft.

Principle and emergency spillway elevations.

	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>
<b>Principle Spillway Elevation (F.A.S.L.):</b>	7218.64	6318.0
<b>Emergency Spillway Elevation</b>	7232.03	6318.0

**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.

	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>
Water Elevation	7222.99	None
Discharging	Yes	Never
Inlet, Outlet, Spillway Conditions	Good	Good
Out slope Conditions	No Change	No Change

\*See "Hydrologic Monitoring Data" report submitted quarterly to DOGM for monitoring information.

	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>
Sediment Volume	1.79 A.F. @ 7213.5	None
Remaining Sediment	1.05 A.F.	0.59 A.F.
Water impounded	6.58 A.F.	

**Changes, Comments, etc.**

The pond was surveyed in May of 2012. The sediment is close the 60% cleanout volume. The pond will be surveyed again in the 3<sup>rd</sup> quarter of 2012 and a cleanout date will be set based on that survey.

**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: *Mark Reynolds*

Date: 7-6-12

Signature: *Richard Cullen*

Date: 7/10/12



<b>IMPOUNDMENT INSPECTION AND CERTIFIED REPORT</b>			
Permit Number	C/015/0018	Report Date	June 27, 2012
Mine Name	Deer Creek Mine		
Company Name	Energy West Mining		
Impoundment Identification	Impoundment Name	Rilda Canyon Pond	
	Impoundment Number		
	UPDES Permit Number	N/A	
	MSHA ID Number	N/A	N/A

Inspection Date	June 18, 2012
Inspected By	Rick Cullum / Mark Reynolds
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	2nd Quarter 2012 Inspection

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.  
POND  
Conditions, Comments Etc. No hazards observed. Snow covered the site.

Required for an impoundment which functions as a SEDIMENTATION POND.	Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment. <u>POND:</u> 60% Design Storage Capacity ----- .076 A.F. 100% Sediment Capacity ----- .126 A.F.
	Principle and emergency spillway elevations. <u>POND</u> Principle Spillway Elevation (F.A.S.L.): 7516.5 Emergency Spillway Elevation 7516.5

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 out slopes of embankments, etc.

Water Elevation	<u>POND</u> Dry
Discharging	no
Inlet, Outlet, Spillway Conditions	Good
Out slope Conditions	Good

Sediment A. Volume Remaining Sediment	0.00 A.F.
Storage Capacity	.126 A.F.
Water impounded	0.00 A.F.

Changes, Comments, etc. The construction of the pond was completed in early 4<sup>th</sup> quarter 2008. The pond is functioning as designed.

Qualification Statement	<p>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.</p> <p>Signature: <u>Mark Reynolds</u> Date: <u>6-27-12</u></p> <p>Signature: <u>Rickard Cullum</u> Date: <u>6/29/12</u></p>
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# Impoundment Quarterly Reports

Energy West Mining Company

3<sup>rd</sup> Quarter – 2012

<b>IMPOUNDMENT INSPECTION AND CERTIFIED REPORT</b>		Page 1 of 2	
Permit Number	C/015/0019	Report Date	Sept. 27, 2012
Mine Name	Cottonwood/Wilberg		
Company Name	PacifiCorp		
Impoundment Name...	North Pond	South Pond	Waste Rock Pond
Impoundment Number.			
UPDES Permit Number		UT 0022896-003A	UT 0022896-005
MSHA ID NUMBER.....	1211-UT-09-02052-02	1211-UT-09-02052-03	

**IMPOUNDMENT INSPECTION**

Inspection Date	Sept. 14, 2012
Inspected By	Rick Cullum/ Mark Reynolds
<b>3rd Quarter Inspection 2012</b>	

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

**North Pond:** No instabilities or weaknesses observed.

**South Pond:** No instabilities or weaknesses observed.

**Waste Rock Site Pond:** No instabilities observed.

Required for an impoundment which functions as a **SEDIMENTATION POND.**

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

<u>Pond</u>	<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock</u>
<b>60% Design Storage Capacity</b>	.34 A.F. at 7351.0 ft.	.19 A.F. at 7322.3 ft.	1.45 A.F. at 6761.5 ft.
<b>100% Sediment Capacity</b>	.56 A.F. at 7354.83 ft.	.32 A.F. at 7325.33 ft.	2.42 A.F. at 6765.3 ft.

Principle and emergency spillway elevations.

	<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock Pond</u>
<b>Principal Spillway Elevation</b>	7354.83	7325.33	6766.3
<b>Emergency Spillway Elevation</b>	7363.33	7334.2	6770.0

**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 out slopes of embankments, etc.

	<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock Pond</u>
Water Elevation	Dry	DRY	Dry
Discharging	NO	NO	No
Inlet/Outlet Condition	Good	Good	Good
Slope conditions	Good	Good	Good

\*See "Hydrologic Monitoring Data" report submitted to DOGM quarterly for monitoring information.

**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.

	<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock Pond</u>
Sediment Volume	0.10 AF @7348 ft.	0.00 AF	1.31 AF @6760.7 ft
Remaining Sediment Storage Capacity	0.24 AF	0.19 AF	.14 AF
Water Impounded	0.00 AF	0.00 AF	0.0 AF

**Changes, Comments,**

THE COTTONWOOD MINE WAS IDLED IN 2001, SO THE ONLY WATER THAT REPORTS TO THE PONDS ARE RUN-OFF DURING A STORM EVENT. REPAIRS TO THE BASE OF THE STANDPIPE AREA WERE COMPLETED.

**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: Richard Cullen Date: 10/2/12

Signature: Mark Reynolds Date: 9-27-12



**IMPOUNDMENT INSPECTION AND CERTIFIED REPORT**

Page 1 of 2

**Permit Number** C/015/0018 **Report Date** Sept. 27, 2012

**Mine Name** Deer Creek Mine

**Company Name** Energy West Mining

<b>Impoundment Identification</b>	<b>Impoundment Name</b>	<b>Mine Site Pond:</b>	<b>Waste Rock Pond:</b>
	<b>Impoundment Number</b>		
	<b>UPDES Permit Number</b>	UT-0023604-001	
	<b>MSEA ID Number</b>	N/A	N/A

**Inspection Date** 9/12/12 **Waste Rock Pond** 9/12/12

**Inspected By** Rick Cullum / Mark Reynolds

**Reason for Inspection** (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction) 3rd Quarter 2012 Inspection

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

	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>
<b>Conditions, Comments</b>		
<b>Etc.</b>	No hazards observed.	No hazards observed.

Required for an impoundment which functions as a **SEDIMENTATION POND.** Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.

	<u>Mine Site Pond:</u>	<u>Waste Rock Pond:</u>
<b>60% Design Storage Capacity</b>	1.87 A.F. at 7213.1 ft. ft.	.59 A.F. at 6312.7 ft.
<b>100% Sediment Capacity</b>	3.12 A.F. at 7216.0 ft. ft.	.98 A.F. at 6313.45 ft.

Principle and emergency spillway elevations.

	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>
<b>Principle Spillway Elevation (F.A.S.L.):</b>	7218.64	6318.0
<b>Emergency Spillway Elevation</b>	7232.03	6318.0

**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 out slopes of embankments, etc.

	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>
Water Elevation	7223.96	None
Discharging	Yes	Never
Inlet, Outlet, Spillway Conditions	Good	Good
Out slope Conditions	No Change	No Change

\*See "Hydrologic Monitoring Data" report submitted quarterly to DOGM for monitoring information.

	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>
Sediment Volume	2.32 A.F. @ 7214.53	None
Remaining Sediment	0.8 A.F.	0.59 A.F.
Water impounded	5.13 A.F.	

**Changes, Comments, etc.**

The pond was surveyed in May of 2012. The sediment exceeds the 60% cleanout volume. The pond will be cleaned during the 1<sup>st</sup> part of the 4<sup>th</sup> quarter.

**Qualification Statement**

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

Signature: Richard C. Culcher Date: 10/2/12

Signature: Mark Reynolds Date: 9-27-12



**IMPOUNDMENT INSPECTION AND CERTIFIED REPORT**

Permit Number	C/015/0018	Report Date	Sept. 27, 2012
Mine Name	Deer Creek Mine		
Company Name	Energy West Mining		
Impoundment Identification	Impoundment Name	Rilda Canyon Pond	
	Impoundment Number		
	UPDES Permit Number	N/A	
	MSHA ID Number	N/A	N/A

Inspection Date	Sept. 10, 2012
Inspected By	Rick Cullum / Mark Reynolds

Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction) 3rd Quarter 2012 Inspection

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.  
 Conditions, Comments Etc. POND  
 No hazards observed. Small amount of water from recent rain storms.

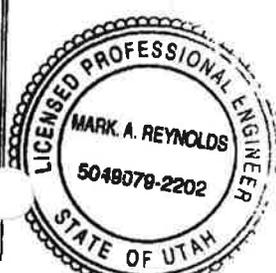
Required for an impoundment which functions as a SEDIMENTATION POND.	Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment. <u>POND:</u> 60% Design Storage Capacity ----- .076 A.F. 100% Sediment Capacity ----- .126 A.F.
	Principle and emergency spillway elevations. <u>POND</u> Principle Spillway Elevation (F.A.S.L.): 7516.5 Emergency Spillway Elevation 7516.5

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	<u>POND</u> Dry
Discharging	no
Inlet, Outlet, Spillway Conditions	Good
Out slope Conditions	Good

Sediment A. Volume 0.00 A.F.  
 Remaining Sediment Storage Capacity .126 A.F.  
 Water impounded 0.00 A.F.  
 Changes, Comments, etc. The construction of the pond was completed in early 4<sup>th</sup> quarter 2008. The pond is functioning as designed.

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: Rick Cullum Date: 10-2-12  
 Signature: Mark Reynolds Date: 9-27-12

Permit Number	C/015/0009	Report Date	Sept. 27, 2012
Mine Name	Trail Mountain Mine Company Name: Energy West Mining		
Impoundment Identification	Impoundment Name	Trail Mountain Mine Pond:	
	Impoundment Number		
	UPDES Permit Number	UT-G04003-001	
	MSHA ID Number	N/A	

**IMPOUNDMENT INSPECTION 3rd Quarter 2012 Inspection**

Inspection Date	Sept. 13, 2012
Inspected By	Mark Reynolds / Rick Cullum

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.  
 No unstable or structural weaknesses found.

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.

60% Design  
 Storage Capacity 0.282 A.F. at 7182  
 100% Sediment  
 Capacity 0.47 A.F. at 7183.6

3. Principle and emergency spillway elevations.

Principle Spillway  
 Elevation (F.A.S.L.): 7186.6  
 Emergency Spillway  
 Elevation: (F.A.S.L.): 7194.6

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 out slopes of embankments, etc.

Water Elevation 7182.94  
 Discharging No  
 Inlet, Outlet Conditions Good  
 Slope conditions Good

\*See "Hydrologic Monitoring Data" report submitted quarterly to DOGM for monitoring information.

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.

Sediment Volume 0.0 A.F.  
 Remaining Sediment Storage Capacity The pond was cleaned in April 2012  
 Water Impounded 0.41  
 Changes, comments, etc. Mining has seized at Trail Mtn. operations, only storm run off will run into the pond. The pond was cleaned in 2nd Quarter 2012.

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: *Richard Cullum* Date: 10/2/12

Signature: *Mark Reynolds* Date: 9-27-12



# Impoundment Quarterly Reports

Energy West Mining Company

4<sup>th</sup> Quarter – 2012

<b>IMPOUNDMENT INSPECTION AND CERTIFIED REPORT</b>		<b>Page 1 of 2</b>	
<b>Permit Number</b>	C/015/0019	<b>Report Date</b>	Dec. 20, 2012
<b>Mine Name</b>	Cottonwood/Wilberg		
<b>Company Name</b>	PacifiCorp		
<b>Impoundment Name...</b>	<b>North Pond</b>	<b>South Pond</b>	<b>Waste Rock Pond</b>
<b>Impoundment Number.</b>			
<b>UPDES Permit Number</b>		UT 0022896-003A	UT 0022896-005
<b>MSHA ID NUMBER.....</b>	1211-UT-09-02052-02	1211-UT-09-02052-03	

**IMPOUNDMENT INSPECTION**

<b>Inspection Date</b>	Dec. 7, 2012
<b>Inspected By</b>	Rick Cullum/ Mark Reynolds
<b>4th Quarter Inspection 2012</b>	

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

**North Pond:** No instabilities or weaknesses observed.

**South Pond:** No instabilities or weaknesses observed.

**Waste Rock Site Pond:** No instabilities observed.

Required for an impoundment which functions as a **SEDIMENTATION POND.**

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

	<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock</u>
<b>Pond</b>			
<b>60% Design Storage Capacity</b>	.34 A.F. at 7351.0 ft.	.19 A.F. at 7322.3 ft.	1.45 A.F. at 6761.5 ft.
<b>100% Sediment Capacity</b>	.56 A.F. at 7354.83 ft.	.32 A.F. at 7325.33 ft.	2.42 A.F. at 6765.3 ft.

Principle and emergency spillway elevations.

	<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock Pond</u>
<b>Principal Spillway Elevation</b>	7354.83	7325.33	6766.3
<b>Emergency Spillway Elevation</b>	7363.33	7334.2	6770.0

**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 out slopes of embankments, etc.

	<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock Pond</u>
Water Elevation	Dry	DRY	Dry
Discharging	NO	NO	No
Inlet/Outlet Condition	Good	Good	Good
Slope conditions	Good	Good	Good

\*See "Hydrologic Monitoring Data" report submitted to DOGM quarterly for monitoring information.

**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.

	<u>North Pond</u>	<u>South Pond</u>	<u>Waste Rock Pond</u>
Sediment Volume	0.10 AF @7348 ft.	0.00 AF	1.31 AF @6760.7 ft
Remaining Sediment Storage Capacity	0.24 AF	0.19 AF	.14 AF
Water Impounded	0.00 AF	0.00 AF	0.0 AF

**Changes, Comments,**

THE COTTONWOOD MINE WAS IDLED IN 2001, SO THE ONLY WATER THAT REPORTS TO THE PONDS ARE RUN-OFF DURING A STORM EVENT. REPAIRS TO THE BASE OF THE STANDPIPE AREA WERE COMPLETED.

**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: *Mark Reynolds* Date: 12-20-12  
 Signature: \_\_\_\_\_ Date: \_\_\_\_\_

<b>IMPOUNDMENT INSPECTION AND CERTIFIED REPORT</b>			<b>Page 1 of 2</b>						
<b>Permit Number</b>	C/015/0018	<b>Report Date</b>	Dec. 20, 2012						
<b>Mine Name</b>	Deer Creek Mine								
<b>Company Name</b>	Energy West Mining								
<b>Impoundment Identification</b>	<b>Impoundment Name</b>	<b>Mine Site Pond:</b>	<b>Waste Rock Pond:</b>						
	<b>Impoundment Number</b>								
	<b>UPDES Permit Number</b>	UT-0023604-001							
	<b>MSHA ID Number</b>	N/A	N/A						
<b>Inspection Date</b>	12/6/12	<b>Waste Rock Pond</b> 12/6/12							
<b>Inspected By</b>	Rick Cullum / Mark Reynolds								
<b>Reason for Inspection</b> (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	4th Quarter 2012 Inspection								
<p>1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 30%;"></td> <td style="text-align: center;"><u>Mine Site Pond</u></td> <td style="text-align: center;"><u>Waste Rock Pond</u></td> </tr> <tr> <td><b>Conditions, Comments</b> Etc.</td> <td style="text-align: center;">No hazards observed.</td> <td style="text-align: center;">No hazards observed.</td> </tr> </table>					<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>	<b>Conditions, Comments</b> Etc.	No hazards observed.	No hazards observed.
	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>							
<b>Conditions, Comments</b> Etc.	No hazards observed.	No hazards observed.							
<b>Required for an impoundment which functions as a SEDIMENTATION POND.</b>	Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.								
		<u>Mine Site Pond:</u>	<u>Waste Rock Pond:</u>						
	<b>60% Design</b> <b>Storage Capacity</b> 1.87 A.F. at 7213.1 ft. ft.		.59 A.F. at 6312.7 ft.						
	<b>100% Sediment</b> <b>Capacity</b> 3.12 A.F. at 7216.0 ft. ft.		.98 A.F. at 6313.45 ft.						
	Principle and emergency spillway elevations.								
	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>							
	<b>Principle Spillway</b> <b>Elevation (F.A.S.L.):</b> 7218.64	6318.0							
	<b>Emergency Spillway</b> <b>Elevation</b> 7232.03	6318.0							

**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.

	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>
Water Elevation	7218.41	None
Discharging	Yes	Never
Inlet, Outlet, Spillway Conditions	Good	Good
Out slope Conditions	No Change	No Change

\*See "Hydrologic Monitoring Data" report submitted quarterly to DOGM for monitoring information.

	<u>Mine Site Pond</u>	<u>Waste Rock Pond</u>
Sediment Volume	pond was cleaned in Oct.	None
Remaining Sediment	3.12 A.F.	0.59 A.F.
Water impounded	4.4 A.F.	

**Changes, Comments, etc.**

The pond was surveyed in May of 2012. The sediment exceeds the 60% cleanout volume. The pond will be cleaned during the 1<sup>st</sup> part of the 4<sup>th</sup> quarter.

**Qualification Statement**

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



Signature: *Mark Reynolds* Date: 12-20-12

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**IMPOUNDMENT INSPECTION AND CERTIFIED REPORT**

Permit Number	C/015/0018	Report Date	Dec. 20, 2012
Mine Name	Deer Creek Mine		
Company Name	Energy West Mining		
Impoundment Identification	Impoundment Name	Rilda Canyon Pond	
	Impoundment Number		
	UPDES Permit Number	N/A	
	MSHA ID Number	N/A	N/A

Inspection Date	Dec. 7, 2012
Inspected By	Rick Cullum / Mark Reynolds

Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction) 4th Quarter 2012 Inspection

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition. **Conditions, Comments Etc.** POND No hazards observed. Small amount of water from recent rain storms.

Required for an impoundment which functions as a SEDIMENTATION POND.	Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment. <u>POND:</u> 60% Design Storage Capacity ----- .076 A.F. 100% Sediment Capacity ----- .126 A.F.
	Principle and emergency spillway elevations. <u>POND</u> Principle Spillway Elevation (F.A.S.L.): 7516.5 Emergency Spillway Elevation 7516.5

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	<u>POND</u> Dry
Discharging	no
Inlet, Outlet, Spillway Conditions	Good
Out slope Conditions	Good

Sediment A. Volume Remaining Sediment Storage Capacity Water impounded  
0.00 A.F.  
.126 A.F.  
0.00 A.F.

Changes, Comments, etc. The construction of the pond was completed in early 4<sup>th</sup> quarter 2008. The pond is functioning as designed.

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: Mark Reynolds Date: 12-20-12

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Permit Number	C/015/0009	Report Date	Dec. 20, 2012
Mine Name	Trail Mountain Mine      Company Name: Energy West Mining		
Impoundment Identification	Impoundment Name	Trail Mountain Mine Pond:	
	Impoundment Number		
	UPDES Permit Number	UT-G04003-001	
	MSHA ID Number	N/A	

**IMPOUNDMENT INSPECTION    4th Quarter 2012 Inspection**

Inspection Date	Dec. 7, 2012
Inspected By	Mark Reynolds / Rick Cullum

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.  
 No unstable or structural weaknesses found.

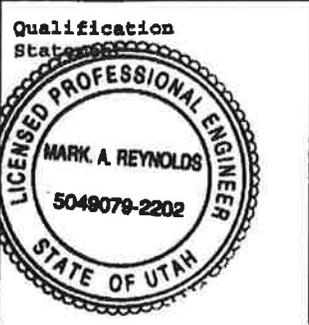
Required for an impoundment which functions as a <b>SEDIMENTATION POND.</b>	2. Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.  <b>60% Design Storage Capacity</b> 0.282 A.F. at 7182 <b>100% Sediment Capacity</b> 0.47 A.F. at 7183.6
	3. Principle and emergency spillway elevations.  <b>Principle Spillway Elevation (F.A.S.L.):</b> 7186.6 <b>Emergency Spillway Elevation: (F.A.S.L.):</b> 7194.6

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**    7181.04  
**Discharging**    No  
**Inlet, Outlet Conditions**                                      Good  
**Slope conditions**    Good  
 \*See "Hydrologic Monitoring Data" report submitted quarterly to DOGM for monitoring information.

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.

**Sediment Volume**    0.0 A.F.  
**Remaining Sediment Storage Capacity**                      The pond was cleaned in April 2012  
**Water Impounded**    0.28  
**Changes, comments, etc.**                                      Mining has seized at Trail Mtn. operations, only storm run off will run into the pond. The pond was cleaned in 2nd Quarter 2012.



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: *Mark A. Reynolds*                      Date: 12-20-12

Signature: \_\_\_\_\_                      Date: \_\_\_\_\_

**Energy West Mining Company**  
**Annual Subsidence Monitoring Report**  
**East and Trail Mountain Properties – 2012**

**INTRODUCTION**

Energy West's East Mountain/Trail Mountain subsidence monitoring study is an ongoing project designed to detect, observe, and report the effects of mining-induced subsidence above the Deer Creek, Trail Mountain, Wilberg/Cottonwood, and Des-Bee-Dove Mines (see Figure 1). This is the thirtieth such annual report submitted, and covers the period between September 1, 2011 and September 30, 2012.

The initial report submitted in 1982 details the monitoring methods used in the study; therefore, they are not discussed in depth here. Energy West uses aerial stereo photogrammetric survey methods and annual helicopter reconnaissance flights to monitor subsidence.

The aerial stereo photogrammetry work is contracted to a commercial mapping company. Contracts for the work are bid and awarded for three-year periods. Between 1982 and 1987 the work was contracted through Intermountain Aerial Surveys. IAS established reading points on generally a 200-foot grid but adjusted the location of each point to be on easily reproducible locations. Between 1988 and 1990 the work was contracted to Maps Inc. Maps, Inc. used a 200-foot uniformly spaced grid. In 1991 the

work was contracted to MapCon mapping consultants. The owners of this company were previously employed by Intermountain Aerial Surveys and felt that better results could be obtained by using the original grid established by Intermountain Aerial Surveys.

Using the aerial photographs derived from the flight conducted on October 1, 2012, elevations were measured at 7,470 different points. These elevations were then compared with the baseline survey elevations measured from the aerial photos collected in 1980, 1986, 1987, 1994 and 2000. The difference in elevation between the original surveys and the 2012 survey constitutes the total amount of subsidence that has occurred. A reconnaissance helicopter overflight on October 4, 2012, did not reveal any new surface effects from subsidence since 2011.

Raw data is included as an appendix to this report in an Excel file called 2012-sub.xls. The aerial reconnaissance flight in October of 2012 revealed no new fracturing or visible signs of subsidence in any of the other monitored areas.

Prior to PacifiCorp's acquisition of the Trail Mountain Mine from ARCO Coal Co. in 1992, subsidence was monitored with conventional ground monuments and transit surveys. Between 1992 and 2001, when the mine was closed, photogrammetric methods were used. Longwall mining was completed in the Trail Mountain Mine in 2001, and the mine was closed shortly thereafter. Subsidence at Trail Mountain has been documented in previous reports.

## Location

Figure 2 shows areas above current mining areas at Energy West's mines that have potential for mining-induced subsidence. In 2012 two areas of potential subsidence were monitored and mapped. In areas where subsidence has been detected, data is shown in the form of contour maps and profiles.

## Lease Relinquishment and Reduction in Subsidence Monitoring

Several portions of the original mine leases have been relinquished on East and Trail Mountains, which means that subsidence in those areas has been shown to be complete enough for the relinquishment to take place. Having relinquished these areas, or in the case of area 12, where no measurable subsidence has occurred, Energy West will no longer report on the subsidence conditions for those areas. Three of the original twenty-five areas chosen for subsidence monitoring were either incorporated into other maps (Areas 9 and 10) or not been represented on an individual map (Area 12) due to complete lack of subsidence over time. These areas are still mentioned in the report, but are not shown on individual maps or profiles. Other areas where mining has not occurred for 5 years or more are considered to be completely subsided. They are: 1-7, 9-12, and 14-26, covering the old mine areas including Rilda Canyon Ridge. Also, all areas above the Des-Bee-Dove mines (areas 8 and 13) are considered to be completely subsided. Of the original 25 areas that have been chosen for subsidence monitoring, 2 are detailed in this report: 27

and 28. Area 27 covers the first district of Hiawatha seam longwall panels in the Mill Fork Lease, and Area 28 covers the district of Blind Canyon seam longwall panels and the second district of Hiawatha seam panels (District 2) in the Mill Fork Lease. Mining in these areas has been from 2003 to present. Future lease relinquishments will result in further reduction in monitoring of the older areas.

Since June 1998, four survey points have been monitored annually for subsidence in the right fork of Rilda Canyon directly above the 5<sup>th</sup> North Mains in the Blind Canyon seam where 5<sup>th</sup> North crosses under the stream bed in the right fork (Figure 3). This is an area of first mining only, with longer pillars and offset crosscuts specifically designed to prevent subsidence. One of the points has disappeared, but the others are still being surveyed. As of the last survey date in August, 2012, no significant movement of any of the points has ever occurred. A tabulation of the point surveys is attached to this report.

## Area 27

### Deer Creek Mine Mill Fork Lease Area – 12<sup>th</sup>, 14<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup> and 17<sup>th</sup> West Longwall

#### Panels (“District 1”)

The Mill Fork State Lease (ML-48258) and the Mill Fork Lease Extension (UTU-84285) form a large lease area to the northwest of the original Deer Creek Mine workings. This lease will be the primary mining area for the Deer Creek Mine for the next several years. Reserves exist in both the Blind Canyon and Hiawatha seams, and a sizeable area of dual-seam mining is projected for the central part of the lease. Overburden is very deep in the Mill Fork Lease, ranging from about 1,000 feet up to over 2,600 feet. The first longwall mining was in the Hiawatha seam, in the deepest area, from south to north for 5 panels in the southern end of the Mill Fork Lease (called District 1). Only single-seam mining will take place in the District 1 area.

The first longwall mining in District 1 in the Hiawatha seam took place in August of 2005. By the date of the 2012 survey, the mineable portions of five (5) panels had been completely extracted: 12<sup>th</sup>, 14<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, and 17<sup>th</sup> West.

Noticeable subsidence has occurred above the combined areas of 12<sup>th</sup> through 17<sup>th</sup> West panels (District 1) as of the date of this report; just over 6 feet total so far (Figure 3, Profile Charts 1 and 2). Subsidence has increased in the area of the profiles to just over 5 feet.

Area 28 (Present Mining Area)

Deer Creek Mine Mill Fork Lease Area – 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup>, and 7<sup>th</sup> Left Longwall Panels (Blind Canyon Seam, “District 2”), 21<sup>st</sup>, 22<sup>nd</sup>, 23<sup>rd</sup>, 25<sup>th</sup> West Longwall Panels (Hiawatha Seam, “District 2”)

The Mill Fork Lease UTU-88554 (changed from State Lease ML-48258 on September 1, 2011) and the Mill Fork Lease Extension (UTU-84285) form a large lease area to the northwest of the original Deer Creek Mine workings. This lease is the primary mining area for the Deer Creek Mine for the next several years. Reserves exist in both the Blind Canyon and Hiawatha seams, and a sizeable area of dual-seam mining is projected for the central part of the lease. Overburden is very deep in the Mill Fork Lease, ranging from about 1,000 feet up to over 2,600 feet. Area 28 covers the second panel “district” in the Blind Canyon seam (called District 2), just to the north of the 1<sup>st</sup> Hiawatha panel district (described as Area 27) in the lease. The first longwall mining in Mill Fork District 2 in the Blind Canyon seam took place in February of 2008. By the date of the 2010 survey, all 6 of the Blind Canyon panels had been extracted: 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> Left. Only a small portion of 4<sup>th</sup> Left panel was actually mined; the majority of the panel was left in place as a protective support barrier under the highest cover. (Figure 4, Profile Charts 3 and 4). In the Hiawatha Seam, the narrow 21<sup>st</sup> West panel was completely extracted in 2011; this is the first dual-seam mining area in the Mill Fork Lease to be mined. 21<sup>st</sup> West panel is located entirely within the gob shadow of the 5<sup>th</sup> Left Blind Canyon panel. Small but noticeable

subsidence had occurred in 2011. During 2012, five longwall panel areas were mined: 22<sup>nd</sup> West Inby, 22<sup>nd</sup> West Outby, 23<sup>rd</sup> West Inby, 23<sup>rd</sup> West Outby and part of 25<sup>th</sup> West Inby. Maximum subsidence so far over this area has been just over 10 feet. The increase from 3 feet to 10 feet is certainly due to the larger area of dual seam mining that has been created in the 22<sup>nd</sup> – 23<sup>rd</sup> West outby region. Reasons for less than expected subsidence and inconsistent profiles even in the dual seam mining area from year to year may include: irregular mining pattern, very thick overburden, up to 2,600 feet, abundant clay strata in the upper formations, especially the North Horn formation, and very steep topography, which decreases monitoring point accuracy. A second set of profiles, Area 28 N-S New and Area 28 W-E New (Profile Charts 5 and 6), were added to better measure the subsidence in 5<sup>th</sup>, 6<sup>th</sup>, and 7<sup>th</sup> Left panels. Dual-seam longwall mining in this area began in December, 2010, with the startup of 21<sup>st</sup> West longwall panel in the Hiawatha seam. 21<sup>st</sup> West panel was probably too narrow, at 450 feet, to have contributed to the overall subsidence in this dual seam area. The addition of 22<sup>nd</sup> West Outby and 23<sup>rd</sup> West Outby have opened this area to critical width.

### Predicted Maximum Subsidence

A comparison between observed and predicted maximum subsidence for the various areas on Energy West's property has been made using a method developed by the British National Coal Board (NCB). The NCB method utilizes graphs compiled from numerous field observations and takes into consideration the length and width of the mined-out area, thickness of coal extracted, and depth of cover. The method is claimed to be correct to  $\pm 10\%$  in the majority of cases, assuming certain limiting conditions are met. The table below compares predicted maximum subsidence with observed subsidence for areas on East Mountain.

Area	Subsidence (feet)		
	Predicted Maximum	Observed	% of Predicted
1* DC 9E/W 1R	15.2	28.0	184
2 DC 5-8E/W, 3-13R	13.8	13.1	95
3 DC 1N Area	7.7	5.5	71
4 DC 2-17R	13.6	13.5	99
5 DC 2-5L	13.5	15.5	114
6 W 1-2W	5.0	4.5	90
7 Beehive 2N off 8W	6.6	7.4	112
8 Bee/Des E&W Sections	6.8	4.8	104
9 Little Dove 1N	4.3	3.5	81
10 Old American Fuel Mine	7.0	6.1	87

Area	Subsidence (feet)		
	Predicted Maximum	Observed	% of Predicted
11 DC C&D N	13.7	13.2	96
12 W 2L	1.5	0.0	0
13 Des-Bee-Dove Southern Areas	2.0	1.8	90
14 Cottonwood 6-7E	7.6	4.7	62
15 Cottonwood 9-12W	7.2	5.0	69
16 Cottonwood 8-11E	7.4	4.5	61
17 Cottonwood 16-15 W	8.1	7.2	89
18 Deer Creek 2nd-7th R	7.7	7.2	94
19 Deer Creek 7th & 8th E	7.9	4.5	57
20 Deer Creek 1st & 2nd L	7.8	6.1	79
21 Deer Creek 2nd- 7th E	7.5	7.5	100
22 Deer Creek 2nd-8th W	7.5	8.1	108
23 Trail Mountain 2nd-5th E	7.8	8.1	104
24 Trail Mountain 1 <sup>st</sup> - 10 <sup>th</sup> Right	7.5	7.0	93
25 Deer Cr. 8-15 <sup>th</sup> East B.C. Seam	8.6	7.5	87
25 Deer Cr. N. Rilda Both Seams	17.1	17.1	100
26 Deer Cr. 1,2,3L B.C. Seam	7.1	8.4	118
26 Deer Cr. 2 <sup>nd</sup> West BC Seam	3.2	3.0	94
27 Deer Cr. Mill Fork 12-16W Hia.	7.6	6.5	86
28 Deer Cr. Mill Fork 2- 7L B.C., 21W, 22W, 23W Hia.-Dual Seam	16	10.0	41

\* This area does not fit the NCB prediction model.

In most areas subsidence is less than the maximum predicted by the NCB model. The average of the 30 areas is 88.8% of the predicted values for those areas. The observed subsidence shown here represents the actual maximum subsidence for the particular geologic conditions -- probably the case in some areas since subsidence appears to have ceased in several areas where the NCB predicted maxima were not reached. In areas showing greater than expected subsidence, chain pillars or barriers between sections are probably crushing so that strata above the workings cave as it would if a wider zone had been mined.

### Mitigation of Surface Effects

Prior to mining in an area, Energy West notifies the land owner that mining will be in progress beneath his property. The land owners within the permit boundary are as follows:

Karl A. Seely, Inc.

LDS Church

USDA Forest Service

Elk Springs Property Users Association

Kent Barton

PacifiCorp

State of Utah Institutional Trust Lands Administration

McKinnon Estate

Lavar Jensen & Phyllis Jensen

Energy West will continue to notify those owners prior to undermining their properties.

Over most areas where subsidence has been observed on East Mountain, present land use has not been affected in any way. Areas 2, 5, 6, 8, 9, 10, 12, 13, 15, 16, 17, 18, 19, 20, 23, 24, and 26 are good examples of subsidence without visible surface disturbance or adverse hydrologic effects. In such areas no mitigation is necessary.

In a few areas, such as Areas 1, 3, 4, 7, 10, 11, 14, 21 and 22, 24, and 25, surface

fractures have been detected. In order to protect livestock PacifiCorp erected a fence around Area 1 (since removed) where fractures are of sufficient magnitude to pose a threat to wandering cattle. In the regions where the fractures could be reclaimed they have been filled in with heavy equipment and the escarpments have been evenly contoured and reseeded. In Area 4, the small tension fractures that formed were reclaimed by filling in the fractures using a motor-grader and reseeding the area. In Area 14, where cracks have also been observed, these were filled in by hand in 1998 and reseeded. The U. S. D. A. Forest Service accepted this mitigation as being sufficient and complete. In area 25, a large fracture above the Castlegate Sandstone was filled to prevent hazardous conditions at the surface.

In Areas 3, 7, 10, 11, 21, 22, 24, and 25, where only minor fracturing has occurred on remote ridges and/or where land use has not been affected, more damage would be done by gaining access to and repairing or fencing fractures than can be justified. Therefore, mitigation is counterproductive in those areas and is not planned.

## Summary

As of September 2012, PacifiCorp has identified two (2) areas for continuing study of mining-induced subsidence on the East Mountain/Trail Mountain property. Terrain in the subsidence study areas ranges from relatively flat mountain tops with thick overburden of up to 2,600 feet to steep slopes and cliffs with overburden of less than 800 feet. The mine plan for the 2 study areas has been designed to avoid cliff areas with second mining or 2-seam second mining. Second mining areas are kept outside of a 15 degree angle of draw from any Castlegate Sandstone cliff areas. This generally corresponds to 1,000 feet of overburden or greater above the projected second mining areas.

In areas where overburden is thicker and other more clay-rich formations are present above the mine workings, longwall and room-and-pillar mining methods have allowed the multiple seam mining of large quantities of coal without apparent impact on the surface environment because the overburden yields through plastic deformation. More than eighty percent (80%) of the East Mountain property has conditions similar to those areas; therefore, the mining methods being utilized are well suited to the geologic conditions, allowing subsidence to occur without impacting the hydrology or present land use of the area.

An effort was made again this year to predict maximum possible subsidence for the various areas where subsidence has been detected. The prediction was then compared with observed subsidence for each area. It appears that the actual subsidence occurring on East

Mountain/Trail Mountain is slightly less than that predicted by the NCB model.

## Professional Certification of Subsidence Data

I, Kenneth S. Fleck, being a Licensed Professional Geologist in the State of Utah (#5224883-2250), with significant experience in subsidence monitoring, certify that the subsidence data contained in this document was collected under my direction, and the attached subsidence materials were prepared by me using industry-accepted methods. I further certify that the interpretations contained herein are an accurate representation of the subsidence that has occurred.

Dated this 13<sup>th</sup> day of February 2013.



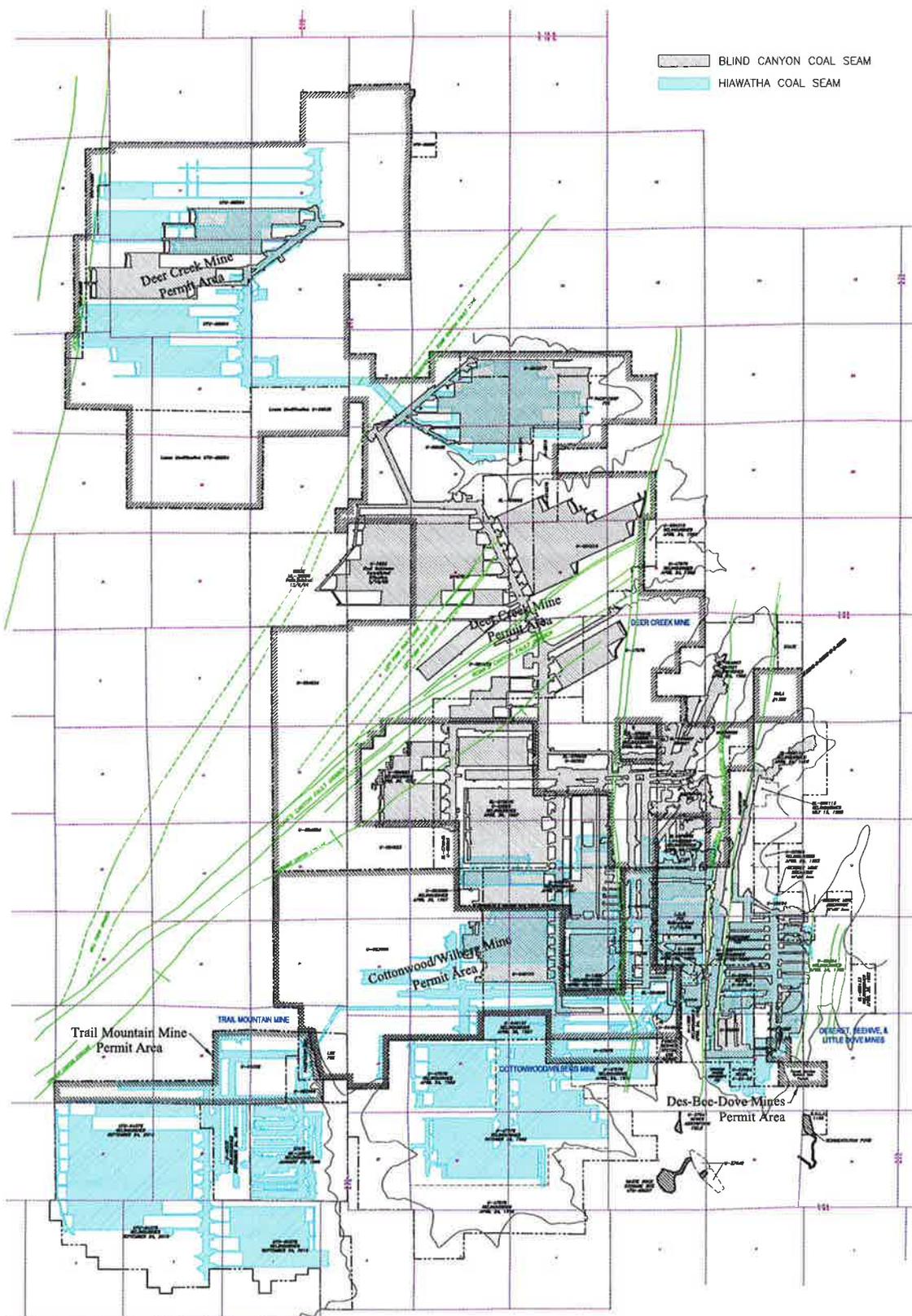
*Kenneth S. Fleck*

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Kenneth S. Fleck

Professional Geologist

License No. 5224883-2250



BLIND CANYON COAL SEAM  
 HIAWATHA COAL SEAM

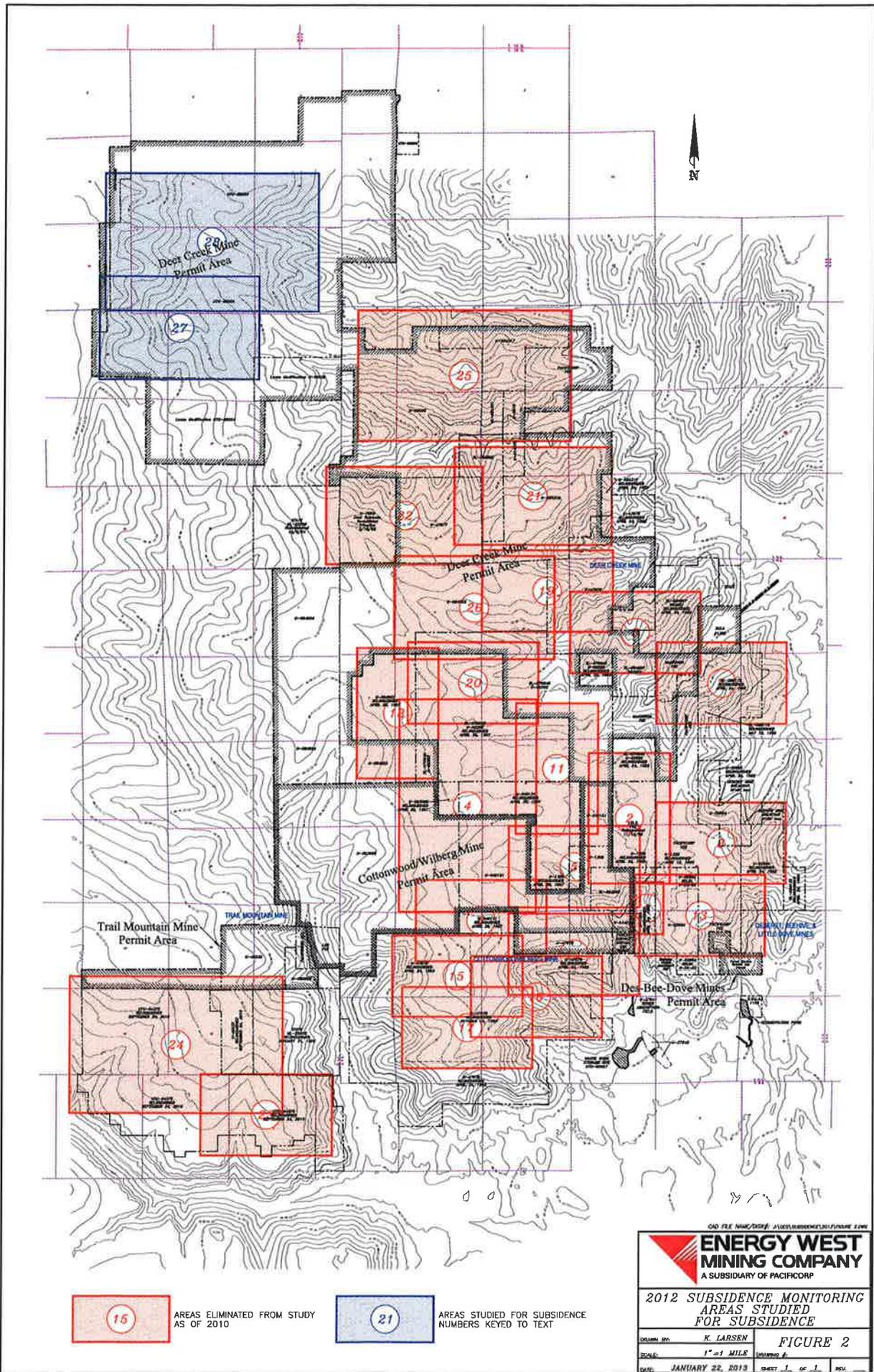
SAD FILE 1000/1000 4510101000000101010000 1.000



EAST/TRAIL MOUNTAINS,  
MINE AREAS AS OF 9/30/12

DESIGNED BY:	KJL	FIGURE 1
SCALE:	1" = 1 MILE	DRAWING #:
DATE:	JANUARY 22, 2013	SHEET 1 OF 1 REV.





15

AREAS ELIMINATED FROM STUDY AS OF 2010

21

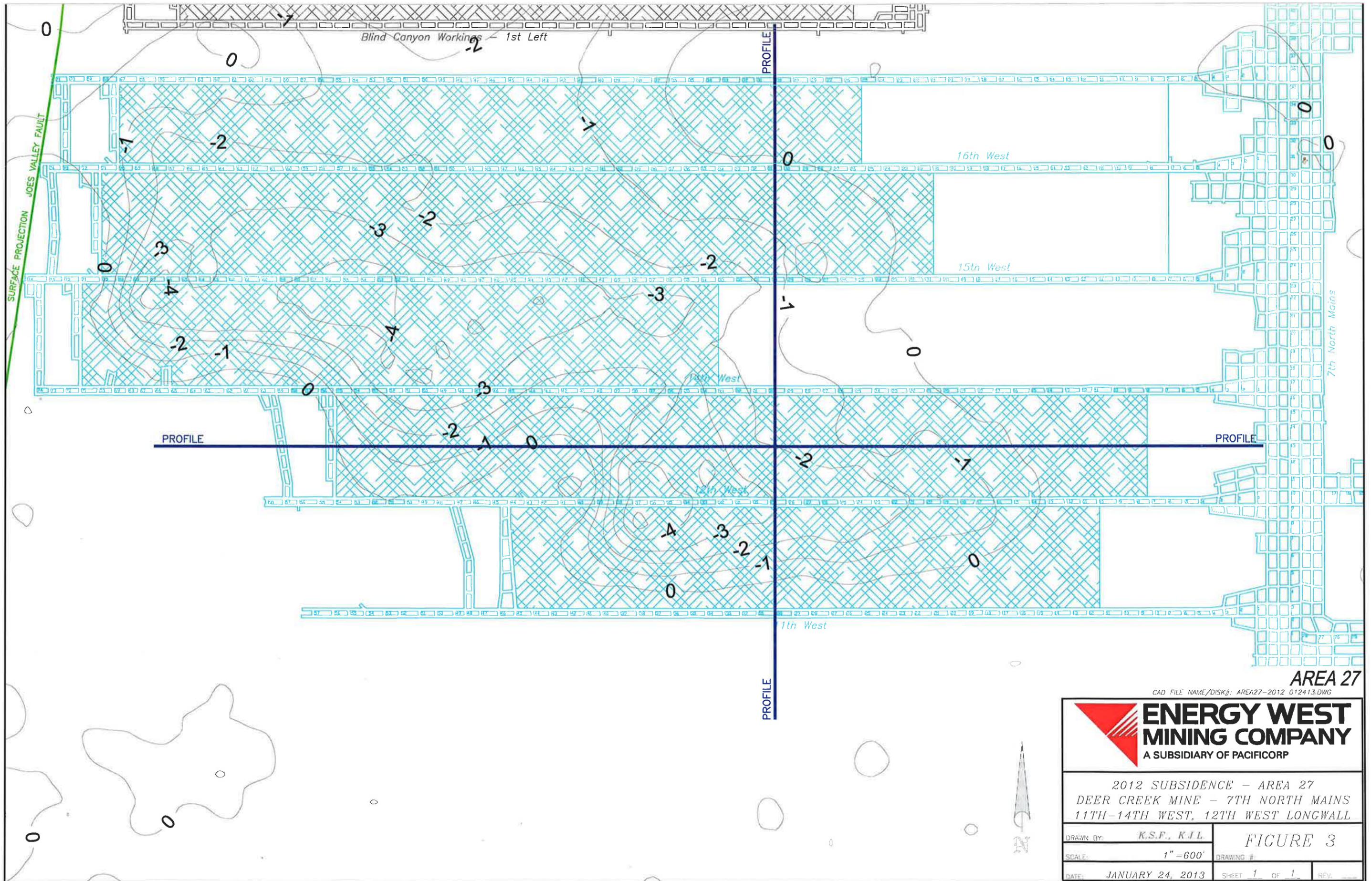
AREAS STUDIED FOR SUBSIDENCE NUMBERS KEYED TO TEXT

CAD FILE NAME/PATH: J:\ENR\2012\SUBSIDENCE\FIGURE 2.DWG

**ENERGY WEST MINING COMPANY**  
A SUBSIDIARY OF PACIFICORP

**2012 SUBSIDENCE MONITORING AREAS STUDIED FOR SUBSIDENCE**

DRAWN BY: K. LARSEN	FIGURE 2
SCALE: 1" = 1 MILE	SHEET #:
DATE: JANUARY 22, 2013	SHEET 1 OF 1 REV:



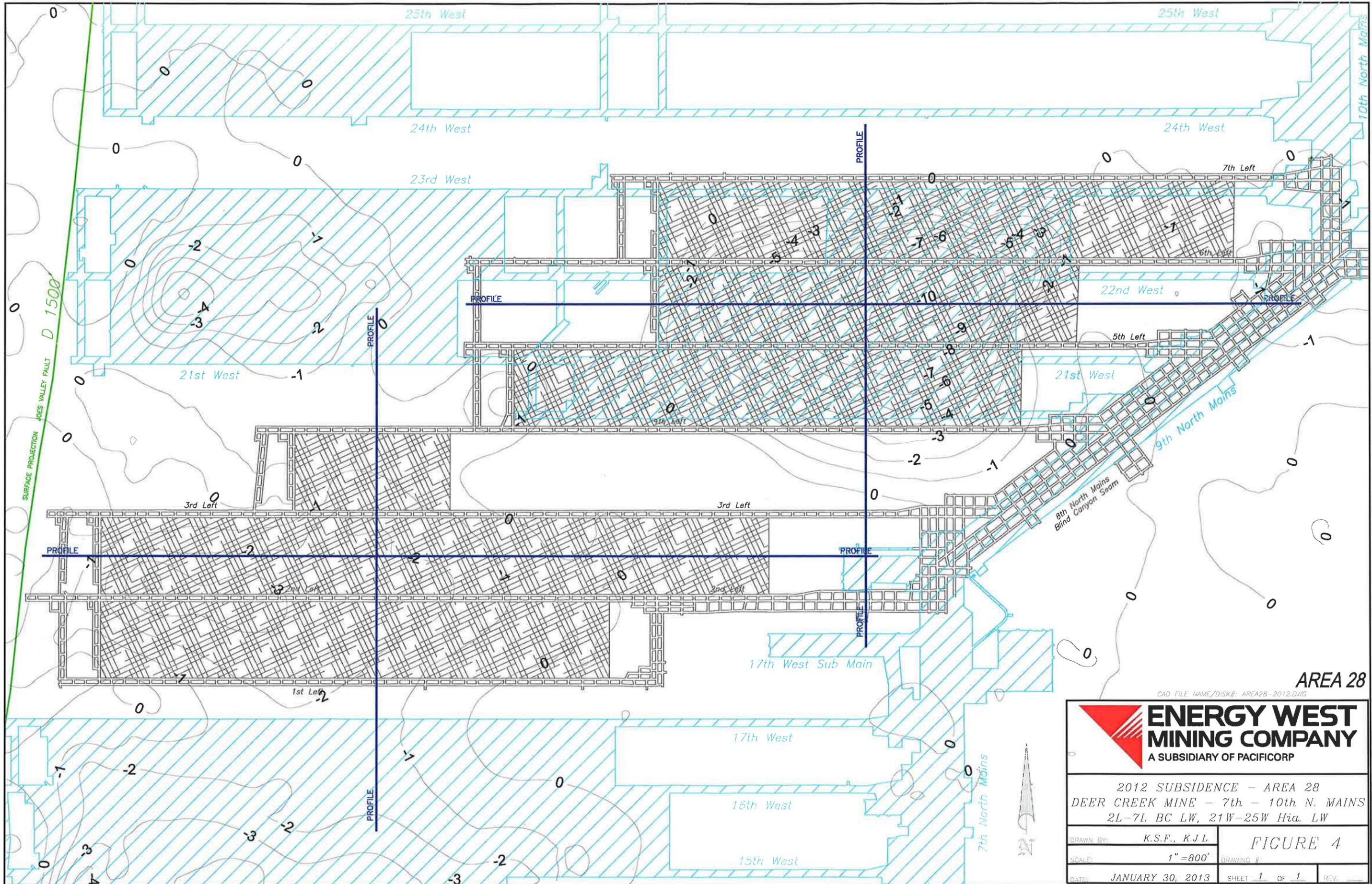
AREA 27

CAD FILE NAME/DISK: AREA27-2012 012413.DWG

**ENERGY WEST MINING COMPANY**  
A SUBSIDIARY OF PACIFICORP

2012 SUBSIDENCE - AREA 27  
DEER CREEK MINE - 7TH NORTH MAINS  
11TH-14TH WEST, 12TH WEST LONGWALL

DRAWN BY: K.S.F., K.J.L.	FIGURE 3
SCALE: 1" = 600'	DRAWING #
DATE: JANUARY 24, 2013	SHEET 1 OF 1



AREA 28

CAD FILE NAME/DISK#: AREA28-2012.DWG

**ENERGY WEST**  
**MINING COMPANY**  
 A SUBSIDIARY OF PACIFICORP

2012 SUBSIDENCE - AREA 28  
 DEER CREEK MINE - 7th - 10th N. MAINS  
 2L-7L BC LW, 21W-25W Hia. LW

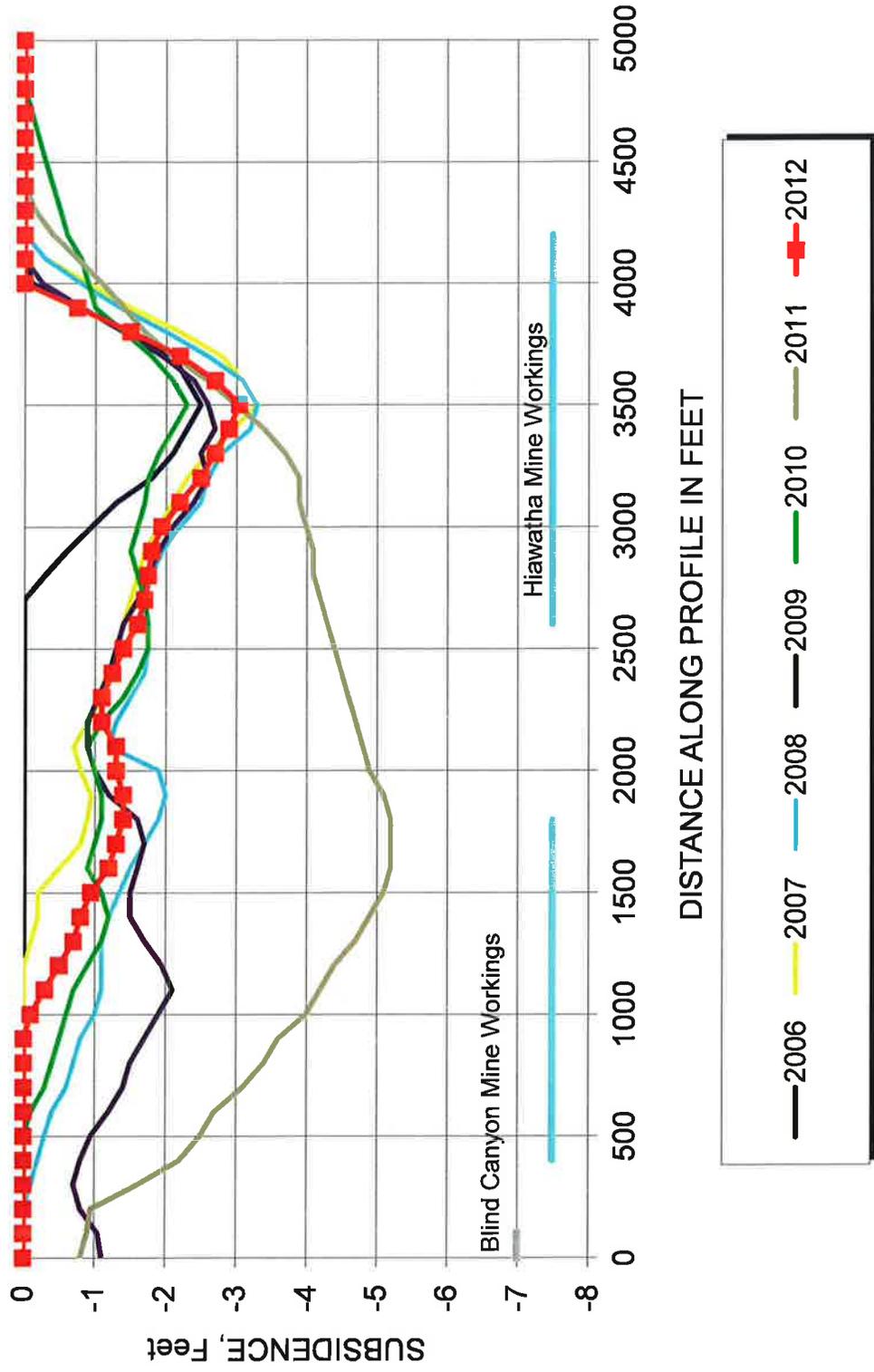
DRAWN BY:	K.S.F., K.J.L.	<b>FIGURE 4</b>
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# Energy West 2012 Subsidence Report

## Area 27 Subsidence Profile (Mill Fork Area)

### North-South

Chart 1



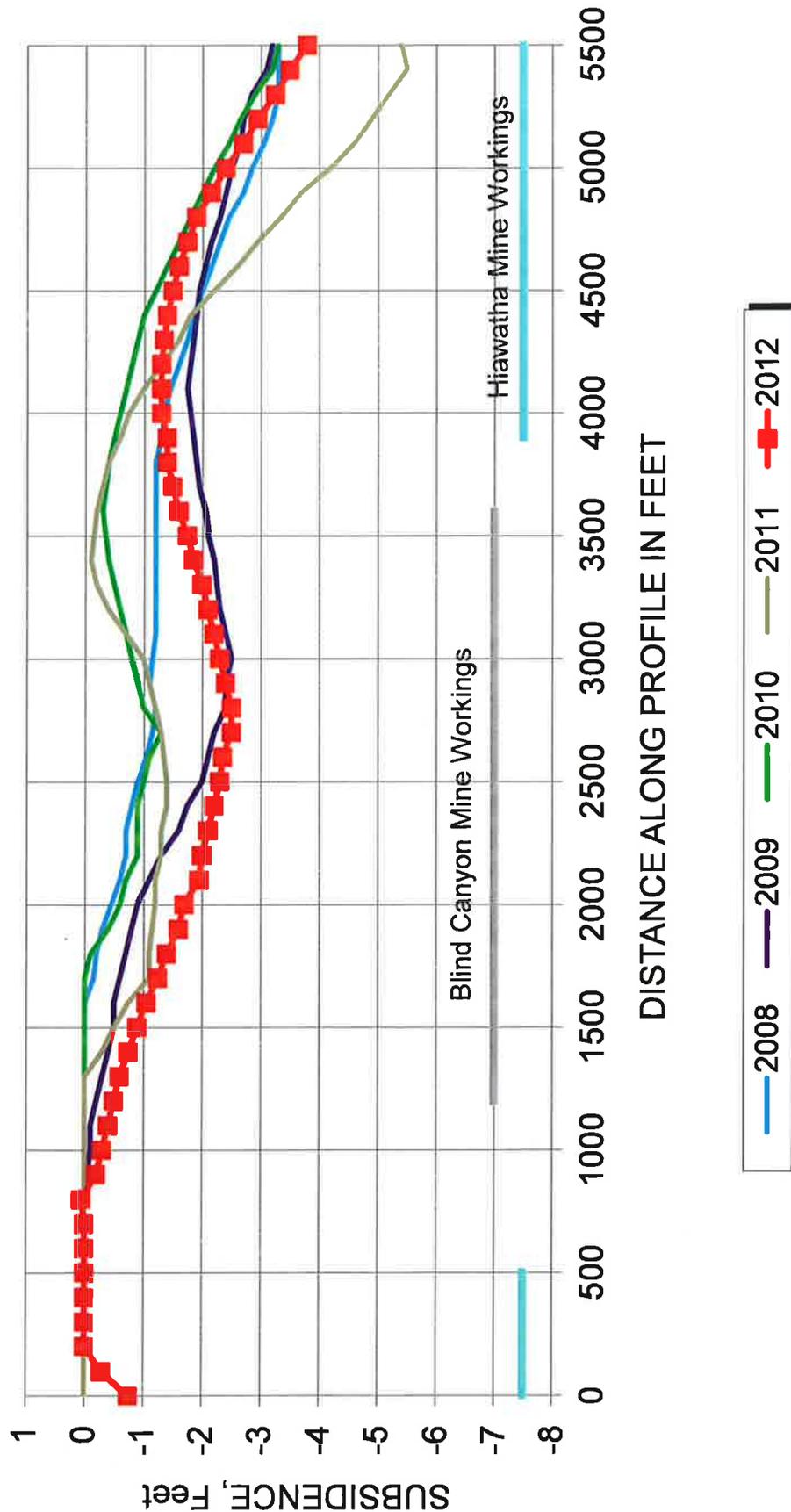


# Energy West 2012 Subsidence Report

## Area 28 Subsidence Profile(Mill Fork Area)

### North-South

Chart 3

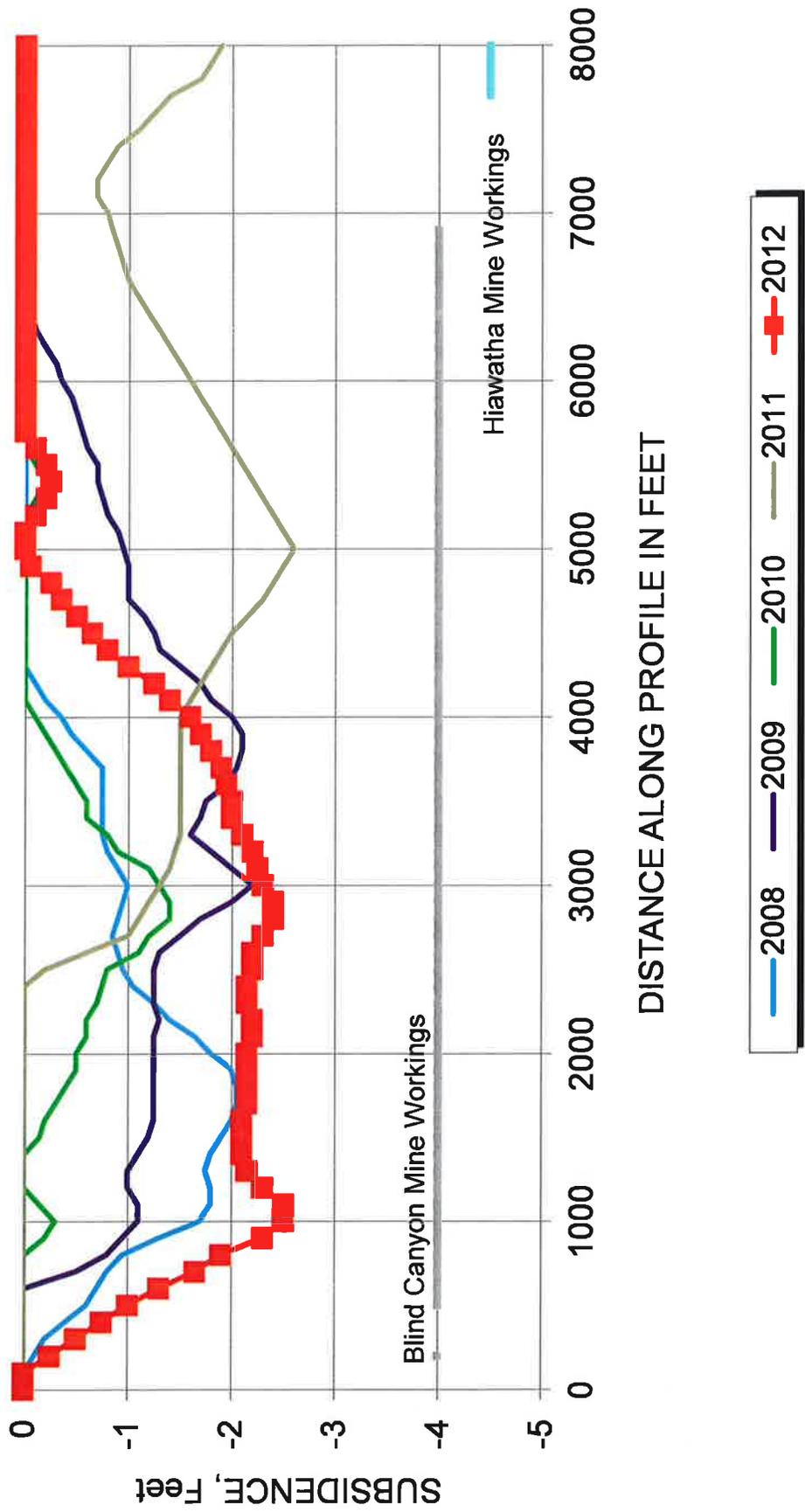


# Energy West 2012 Subsidence Report

## Area 28 Subsidence Profile (Mill Fork Area)

### West-East

Chart 4

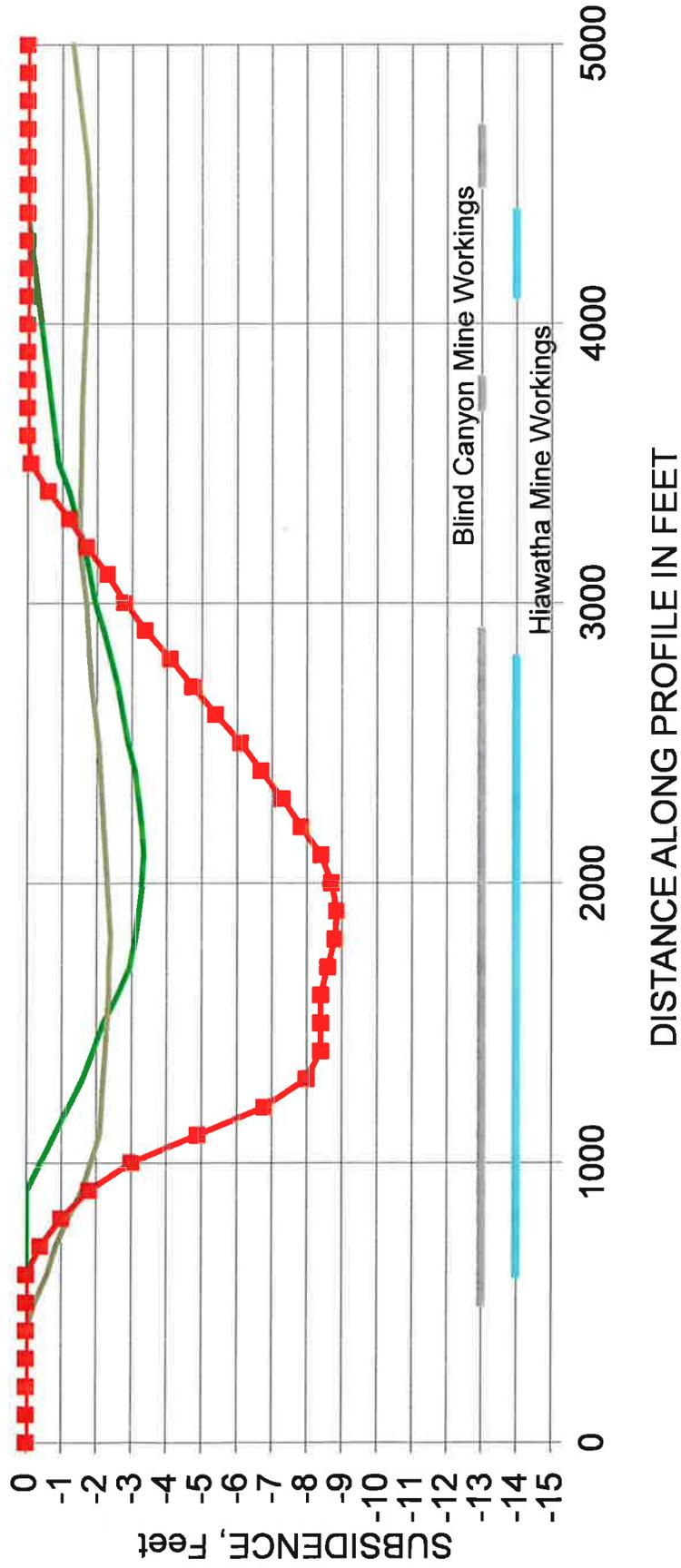


# Energy West 2012 Subsidence Report

## Area 28 Subsidence Profile (Mill Fork Area)

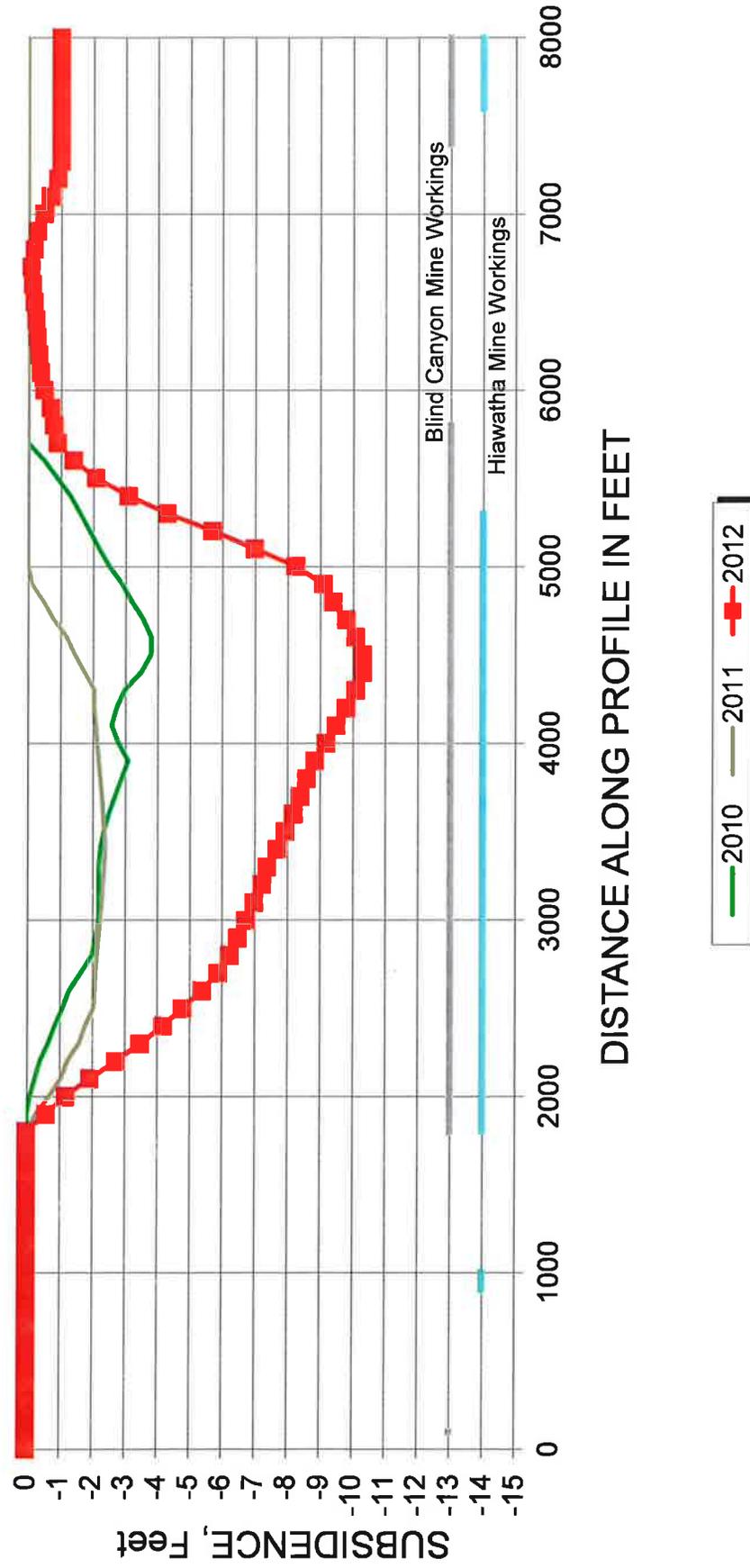
### North-South (New)

Chart 5



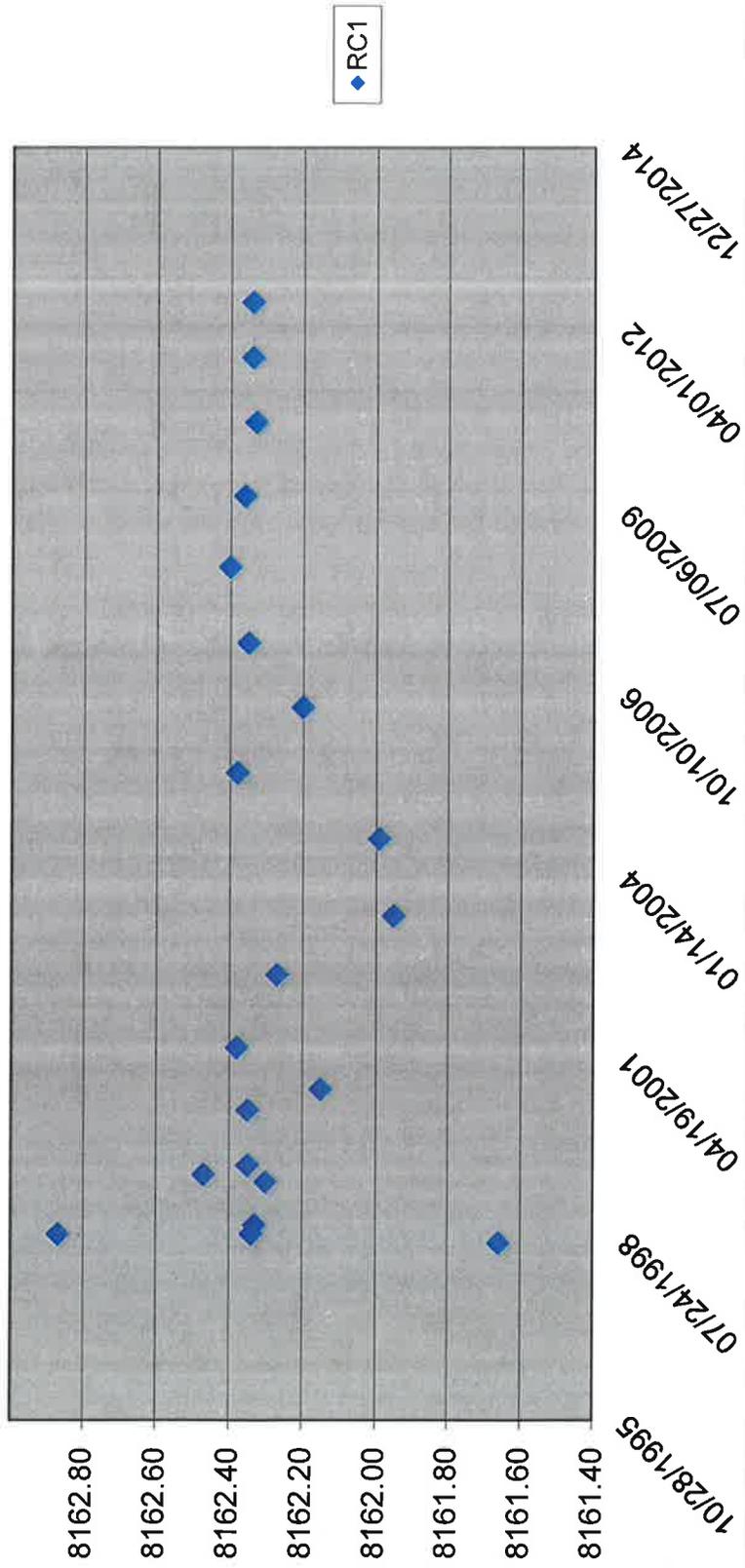
# Energy West 2012 Subsidence Report Area 28 Subsidence Profile (Mill Fork Area) West - East (New)

Chart 6

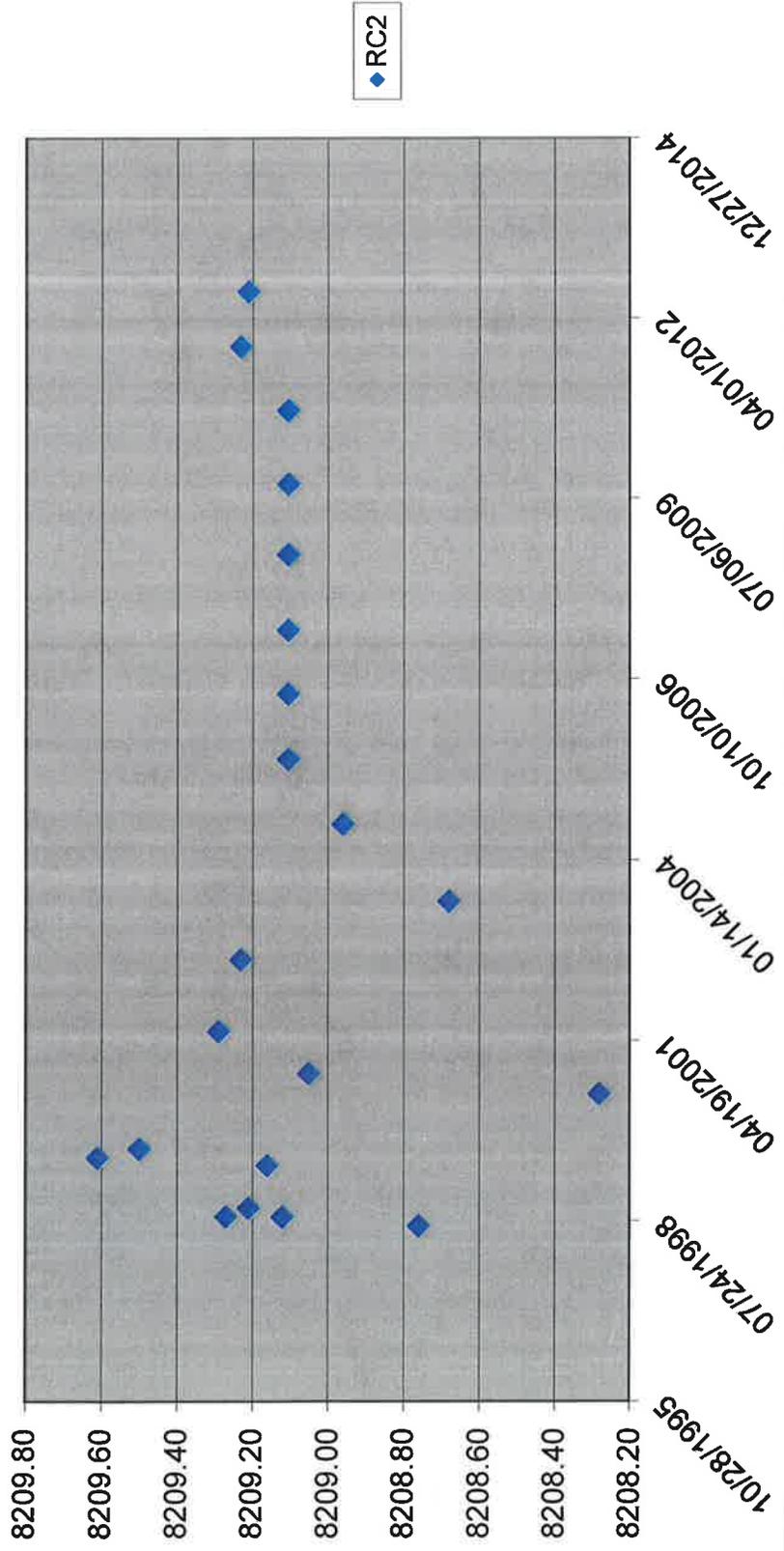


RILDA CANYON MONITORING ABOVE 5TH NORTH DRILL HOLE AREA													
DATE	Bottom End		RC1		RC2		RC3		RC4		Top End		ELEV.
	N	E	ELEV.	N	E	ELEV.	N	E	ELEV.	N	E	ELEV.	
06/25/1998	392182.74	2093512.40	8161.66	392322.12	2092965.04	8208.76	392421.14	2092750.95	8231.12	392536.81	2092275.45	8296.77	
08/12/1998	392184.17	2093512.37	8162.87	392322.95	2092965.38	8209.12	392421.69	2092751.06	8231.47	392536.82	2092275.43	8296.21	
08/14/1998			8162.34			8209.27			8231.57			8296.22	
10/01/1998			8162.33			8209.21			8231.51			8296.19	
05/26/1999			8162.30			8209.16			8231.46			8296.18	
07/06/1999			8162.47			8209.61			8231.97			8296.00	
08/25/1999			8162.35			8209.50			8231.37			8296.18	
06/23/2000			8162.35			8208.28			8231.66			8296.11	
10/17/2000			8162.15			8209.05			8231.38			8296.16	
06/05/2001			8162.38			8209.29			8231.59			8296.18	
07/09/2002			8162.27			8209.23			8231.51			8296.22	
05/28/2003			8161.95			8208.68			8231.08			8295.96	
07/26/2004			8161.99			8208.96			8231.35			8296.14	
07/22/2005			8162.38			8209.10			8231.52			8296.22	
07/17/2006			8162.20			8209.10			8231.44			8296.18	
07/05/2007			8162.35			8209.10			8231.50			8296.22	
08/26/2008			8162.40			8209.10			8231.50			8296.08	
09/21/2009			8162.36			8209.10			8231.54			8296.20	
11/02/2010			8162.33			8209.10			8231.51			8296.21	
10/24/2011			8162.34			8209.23			8231.57			8296.28	
08/24/2012			8162.34			8209.21			8231.54			8296.25	

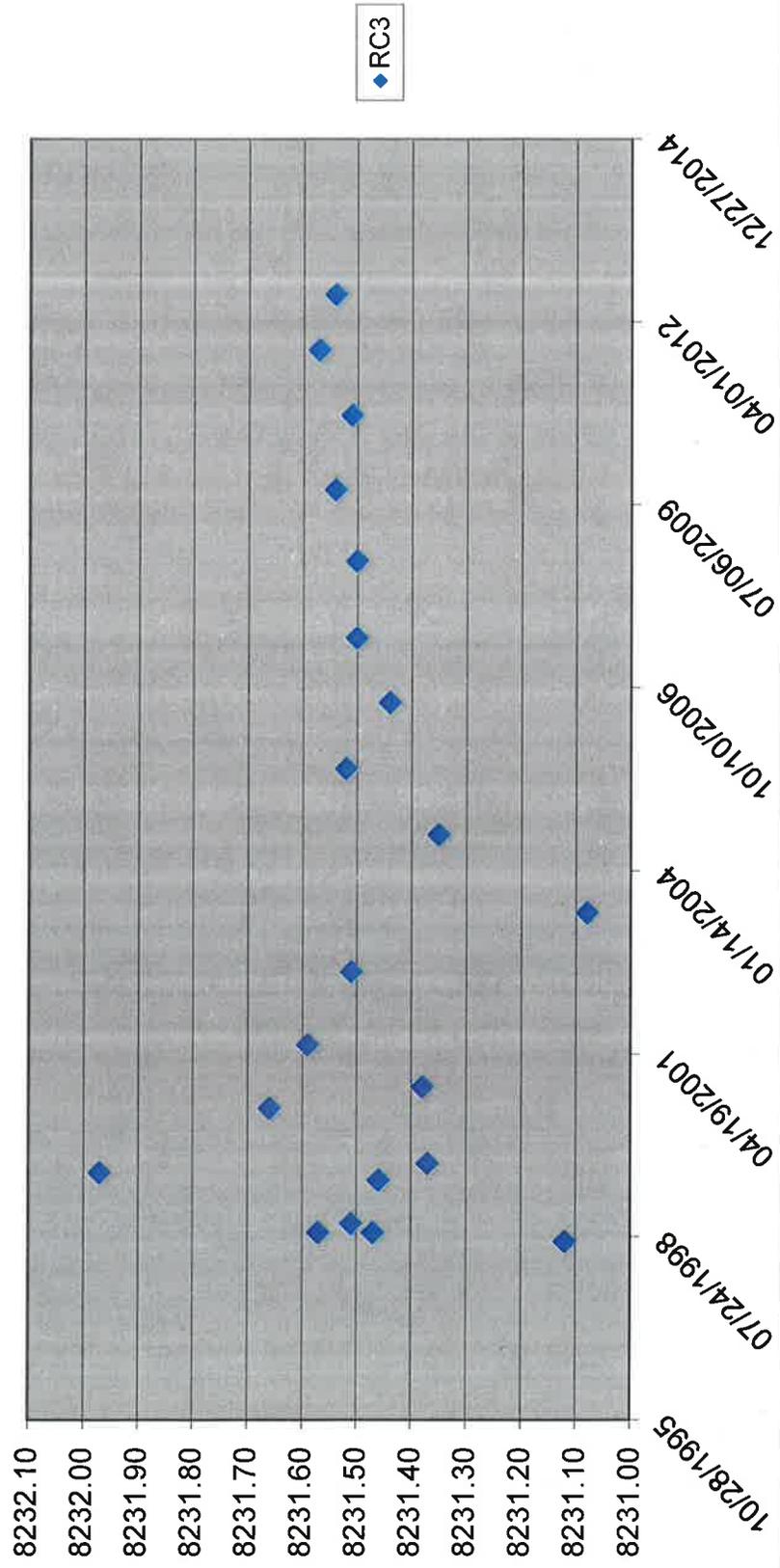
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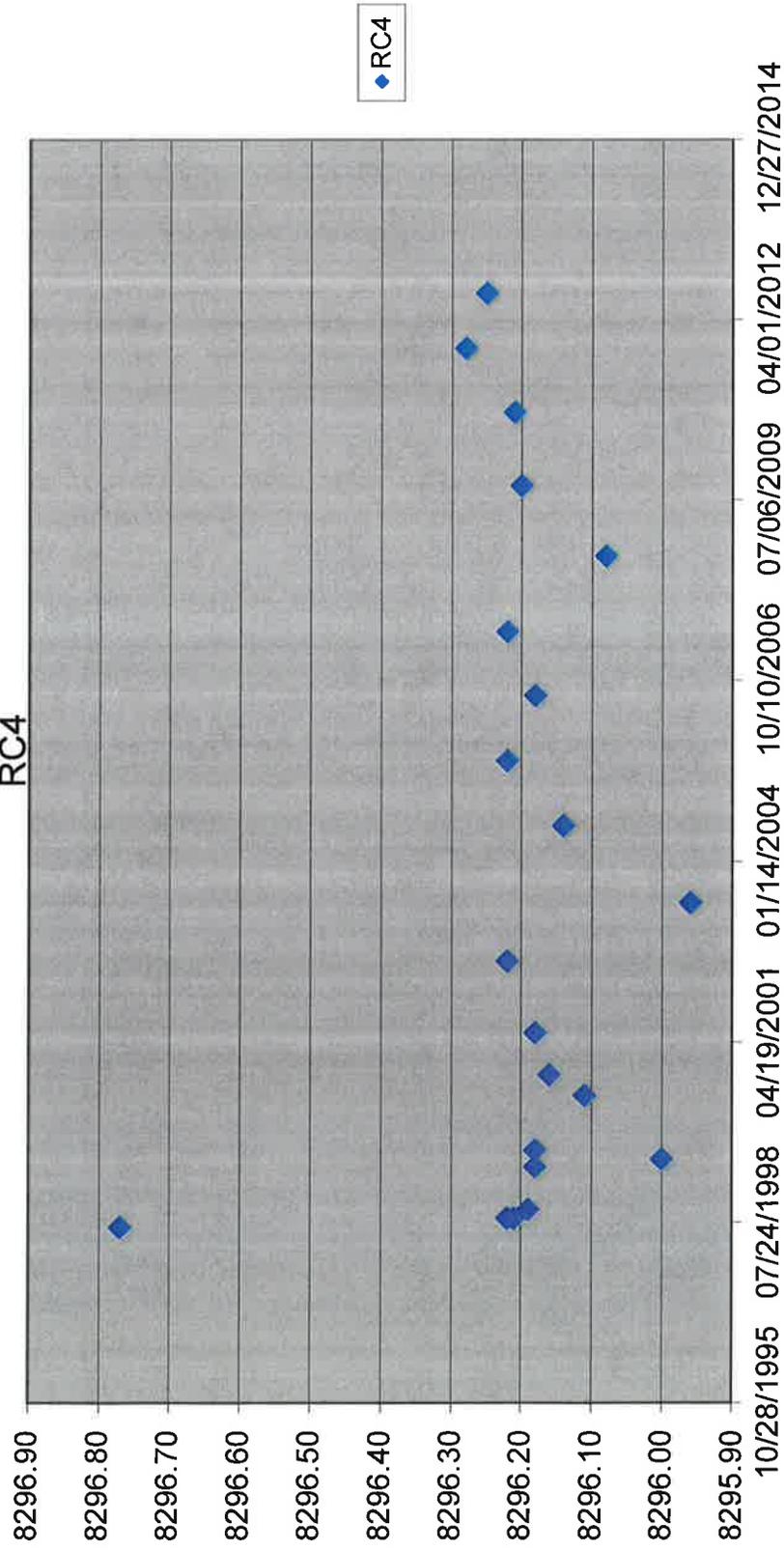
# RC2



# RC3

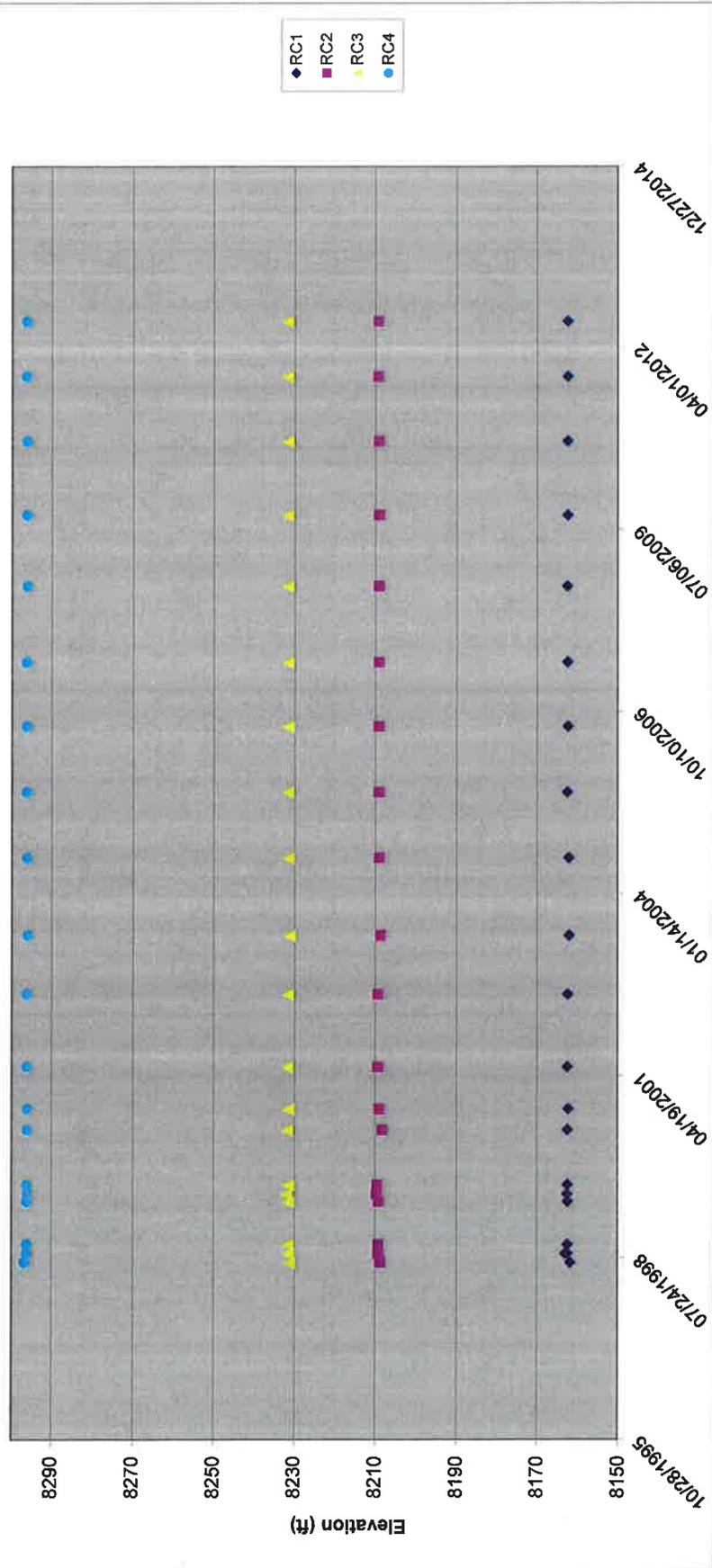


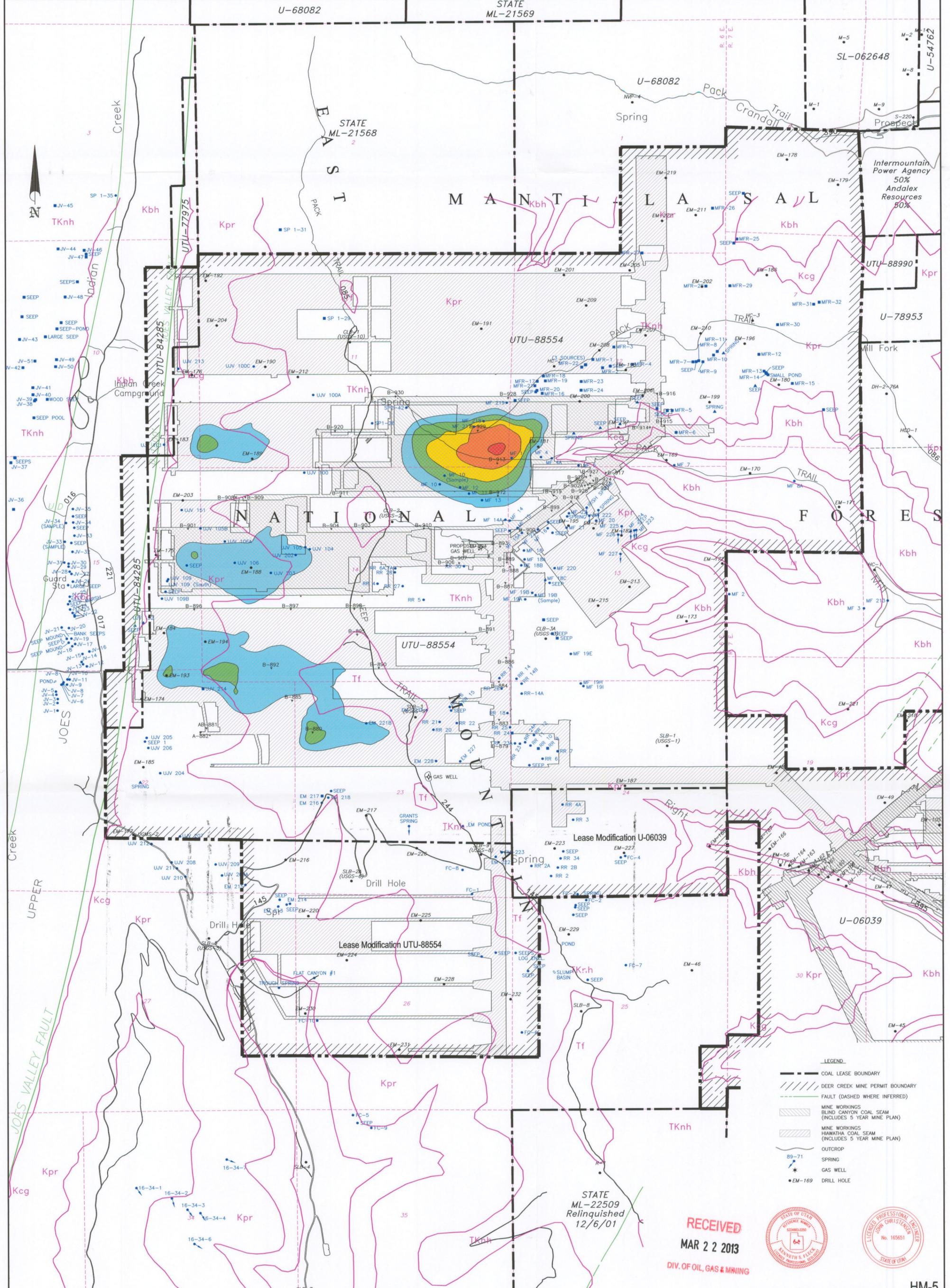
# RC4



◆ RC4

### Rilda Canyon - Right Fork





**Geologic Formation Legend**

Qal	Alluvial Deposits (Stream bed deposits, Alluvial fans, etc.)
Tf	Flagstaff Limestone
TKn	North Horn Formation
Kpr	Upper Price River Formation
Kc	Castlegate Sandstone
Kbh	Blackhawk Formation
Ksp	Star Point Sandstone
Kmm	Mancos Shale (Masuk Member)

**SUBSIDENCE LEGEND**

<span style="display:inline-block; width:15px; height:10px; background-color:lightblue;"></span>	2-4 FEET
<span style="display:inline-block; width:15px; height:10px; background-color:lightgreen;"></span>	4-6 FEET
<span style="display:inline-block; width:15px; height:10px; background-color:yellow;"></span>	6-8 FEET
<span style="display:inline-block; width:15px; height:10px; background-color:orange;"></span>	8-10 FEET
<span style="display:inline-block; width:15px; height:10px; background-color:red;"></span>	10-12 FEET

**LEGEND**

	COAL LEASE BOUNDARY
	DEER CREEK MINE PERMIT BOUNDARY
	FAULT (DASHED WHERE INFERRED)
	MINE WORKINGS BLIND CANYON COAL SEAM (INCLUDES 5 YEAR MINE PLAN)
	MINE WORKINGS HIAWATHA COAL SEAM (INCLUDES 5 YEAR MINE PLAN)
	OUTCROP
	SPRING
	GAS WELL
	DRILL HOLE

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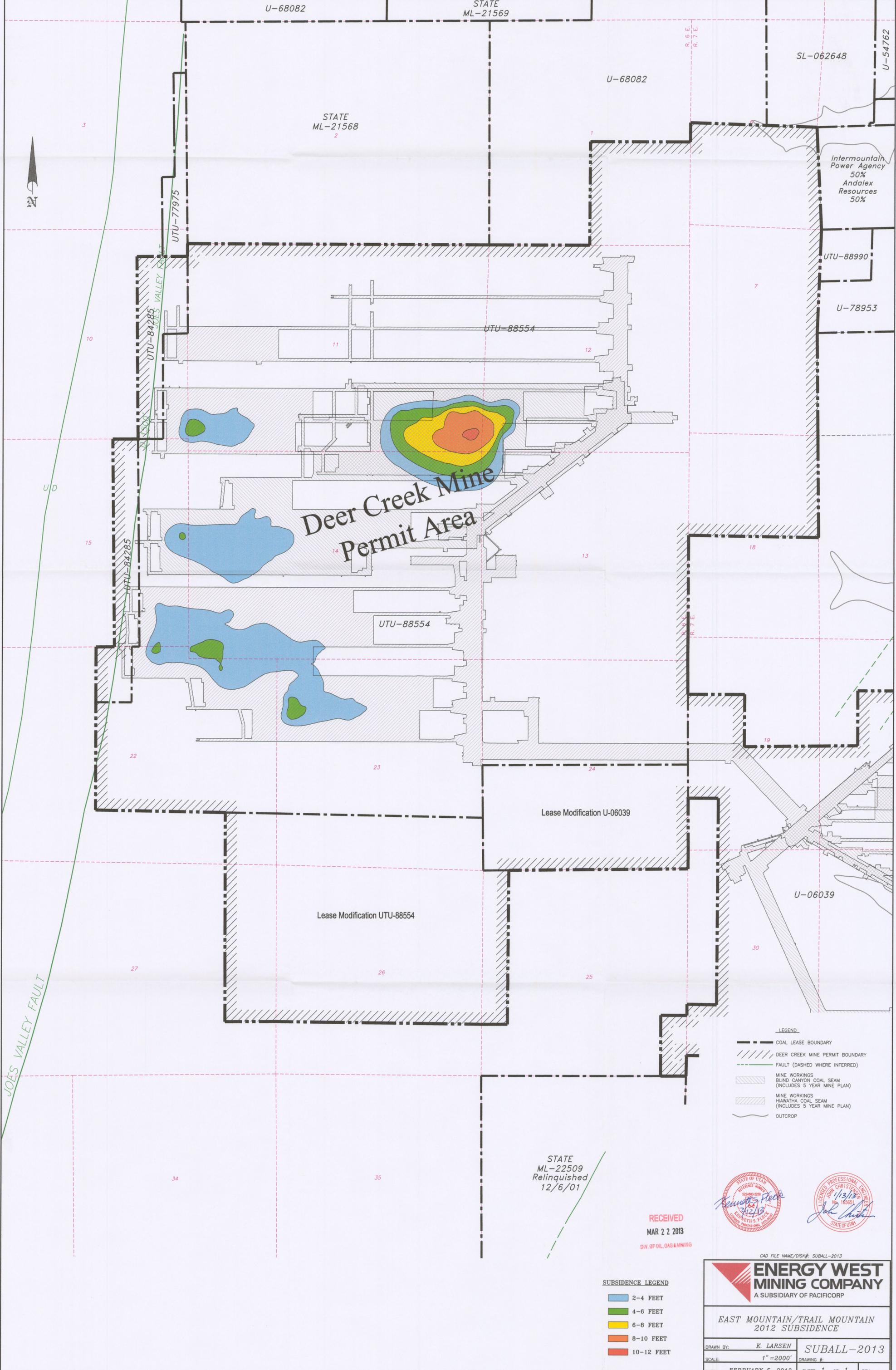
CAD FILE NAME/DISK#: HM-5-2013

**ENERGY WEST MINING COMPANY**  
A SUBSIDIARY OF PACIFICORP

SPRING MAP/EAST & TRAIL MTNS.  
WITH 5 YEAR MINE PLAN 2013-2017  
AND 2012 SUBSIDENCE ZONES

DRAWN BY: K. LARSEN	CE-10904-EM
SCALE: 1" = 1000'	DRAWING #:
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HM-5



JOES VALLEY FAULT

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STATE  
ML-22509  
Relinquished  
12/6/01

- LEGEND
- COAL LEASE BOUNDARY
  - DEER CREEK MINE PERMIT BOUNDARY
  - - - FAULT (DASHED WHERE INFERRED)
  - ▨ MINE WORKINGS  
BLIND CANYON COAL SEAM  
(INCLUDES 5 YEAR MINE PLAN)
  - ▨ MINE WORKINGS  
HIWATHA COAL SEAM  
(INCLUDES 5 YEAR MINE PLAN)
  - ~ OUTCROP

- SUBSIDENCE LEGEND
- 2-4 FEET
  - 4-6 FEET
  - 6-8 FEET
  - 8-10 FEET
  - 10-12 FEET



CAD FILE NAME/DISK#: SUBALL-2013

**ENERGY WEST MINING COMPANY**  
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN/TRAIL MOUNTAIN  
2012 SUBSIDENCE

DRAWN BY: K. LARSEN	SUBALL-2013
SCALE: 1" = 2000'	DRAWING #:
DATE: FEBRUARY 5, 2013	SHEET 1 OF 1 REV.

PACIFICORP - ENERGY WEST MINING COMPANY  
HYDROLOGIC MONITORING PROGRAM  
ANNUAL REPORT FOR 2011

MARCH 2013

Submitted to:  
United States Department of the Interior Bureau of Land Management  
U.S.D.A. - Forest Service: Manti-LaSal National Forest  
Utah Division of Oil, Gas and Mining

Prepared and submitted for PacifiCorp by:

Energy West Mining Company

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MAR 22 2013

DIV. OF OIL, GAS & MINING

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## I. INTRODUCTION

The 2012 Hydrologic Monitoring Report is hereby submitted in accordance with the U.S. Department of Interior, Office of Surface Mining requirements and the Utah State Division of Oil, Gas and Mining guidelines for hydrologic monitoring in areas of and adjacent to coal mining operations.

This is the thirty-fifth annual hydrologic report submitted by PacifiCorp since the report entitled "Monitoring of the Water Resources in the Mining Areas of East/Trail Mountain, Emery County, Utah" was submitted to the U.S. Geological Survey and the Utah Division of Oil, Gas and Mining in December 1977. It addresses flow observations and water quality characteristics of the water resources adjacent to PacifiCorp's mining areas in Emery County. (See Figure 1, A & B)

Information was compiled the past year from in-house as well as from state and federal agencies and private sources as follow:

- U. S. Geological Survey
- U. S. Forest Service
- National Oceanic and Atmospheric Administration
- Utah Division of Oil, Gas and Mining
- Castle Valley Special Services District
- Emery Water Conservancy District
- North Emery Water Users Special Services District

Information from outside agencies will continue to be utilized each year for as long as their data gathering programs continue. As a result, cooperative effort is realized and duplication of effort and expense is substantially reduced.

## II. CLIMATIC OBSERVATIONS

In general, runoff and subsequent water supplies are a direct function of the climatic conditions in any given area. Furthermore, the significance of the weather affecting the flow characteristics of the East/Trail Mountain springs cannot be over-emphasized.

Most of the water supply in the Western United States originates in the high mountain ranges as snowfall during winter periods. Snowmelt augmented by spring precipitation produces runoff which is utilized downstream. Fall precipitation influences the soil moisture conditions prior to snowpack accumulation and has a bearing upon runoff the following year.

## A. Regional Climatology

From 1982 to 1984 the Western United States, especially Utah, experienced an unprecedented wet cycle of precipitation. The pattern changed in 1985 with conditions returning to slightly above normal. During the 1986 water year, the extremely wet trend returned, and the upper Colorado River Basin experienced above average precipitation. The 1987 weather pattern changed dramatically with near normal valley precipitation and mountain snowfall much below normal. The resulting 1987 runoff was substantially below normal. The drought continued from 1988 through 1992 with runoff amounts much below normal for six consecutive years. The 1993 runoff improved substantially with above average flow conditions occurring in most river basins. In 1994, drought conditions returned throughout much of the West. From 1995 through 1999, water supplies were much improved with above average runoff in Emery County. In 2000, weather conditions changed dramatically and the resulting runoff was much lower than normal. Precipitation was variable during 2001 and runoff values continued below normal though the year. The drought continued into 2002 with much lower precipitation and runoff was near-record low levels for most streams in Emery County. The 2003 water year was nearly as severe as 2002 with flows less than 40%. The extreme dry trend continued through 2004 with precipitation and runoff much below average although 2004 was much improved over the previous 4 years. Finally, in 2005 and 2006 wet conditions returned to the West and resulted in improved water supplies in the Huntington Creek drainage. Most local reservoirs filled to capacity. However, extreme drought returned to the region once again in 2007. Below average precipitation and snowfall coupled with dry and hot conditions in March and April resulted in greatly reduced water supplies which, in turn, severely restricted irrigation water supplies during August and September. However, from 2008 through the 2010 water years, drought conditions eased in the region, filling the reservoirs to capacity, resulting in more abundant water supplies for agriculture and culinary uses. The 2011 water year showed the region with near record precipitation. The wet cycle of precipitation mimicked the amounts seen in the early 80's. Spring runoff lasted well into the summer months. Many of the drainages in Emery County swelled beyond their banks.

The water year for 2012 began variable with greatly reduced precipitation. Total precipitation was 50% or less than those amounts recorded for 2011 for all reporting locations. Historical averages were 58%, 86%, 76% of normal for Castle Dale, Huntington, and East Mountain reporting stations respectively. Temperatures were generally above normal for all reporting locations.

## B. Local Climatology

### 1. Precipitation

Precipitation amounts recorded for the 2012 water year will be presented for the Castle Dale, Huntington Plant, and East Mountain weather stations. Weather records were incomplete for Electric Lake during 2012 and therefore, are not included with this report. This station has been eliminated and will no longer be reported. The values for Castle Dale, Huntington and East Mountain are shown in Table 1.

Precipitation in Emery County during 2012 was variable depending on the location. Precipitation at the valley reporting station at Castle Dale was only 61% of normal while precipitation at Huntington Plant was 78%. East Mountain precipitation reported 76% of average.

A comparison of precipitation totals for 2011 and 2012 merits consideration in this study. The intent is to develop a correlation between yearly precipitation and spring discharges on East and Trail Mountains. Table 2 is a comparison of the 2011 and 2012 precipitation levels recorded at the three locations.

Tables 3, 4, 5, and 6 indicate monthly precipitation values at Castle Dale, Huntington, Electric Lake (no longer recorded), and East Mountain from the beginning of operation at each site. The tables indicate monthly trends as well as the great fluctuation in yearly totals. Figure 2 shows monthly precipitation at the East Mountain site for the 2012 water year.

The correlation of precipitation levels with spring discharges will be discussed in the East/Trail Mountain Springs section of this report.

## 2. Temperatures

During the 2012 water year, temperatures were above normal at Castle Dale and Huntington Plant. Temperatures at the East Mountain station were generally above normal. Temperatures at Castle Dale were above normal throughout the year with temperatures between 3.2 to 5.2 degrees above historical averages from March through June. For the year, the average temperature was 3.6 degrees above normal.

At Huntington temperatures were generally above normal throughout the year. For the year the average annual temperature was 1.2 degrees above normal compared to 2011 where the temperature was 1.4 degrees below normal.

At the East Mountain station, temperatures were variable throughout the year. March through June recorded above normal departures of 3.7 to 7.3 degrees. For the year, the temperature at East Mountain averaged 2.4 degrees above normal which mirrored the results from 2011. Temperatures at the Electric Lake station were not recorded. (See Table 7 for temperature data at the 3 stations.)

A comparison of 2011 and 2012 temperatures for the three stations is addressed since temperatures also influence water supplies from year to year. Table 8 depicts the variation and compares 2011 to 2012.

### III. DRAINAGE SYSTEMS

The surface drainage system on East Mountain is divided into two major drainages; the southwest portion forms part of the Cottonwood Creek drainage, and the northeast portion contributes to the Huntington Creek drainage. (See Map HM-1) The drainage boundaries, including minor subdivisions to Cottonwood and Huntington creeks, are designated on the accompanying map.

The surface drainage system on Trail Mountain is totally contained within the Cottonwood Creek drainage system, with minor subdivisions flowing to Indian and Cottonwood Canyon creeks. (See Plate 7-2) Both Huntington and Cottonwood creeks flow out of the Wasatch Plateau in a southeasterly direction. The creeks merge with Ferron Creek to form the San Rafael River, which is a tributary of the Green River.

#### A. Huntington Creek Drainage System

Huntington Creek is comprised of many smaller tributary streams that feed the main stream. Deer Creek, Meetinghouse Canyon, Mill Fork Canyon, Rilda Canyon, and a portion of Crandall Canyon creeks are the only tributaries to Huntington Creek that emanate from within PacifiCorp's coal mining areas.

##### 1. Huntington Creek

Flow data are recorded on a continuous basis by PacifiCorp at three locations; stations are located on 1) Huntington Creek near PacifiCorp's Huntington Plant, 2) Huntington Plant Diversion, and 3) Huntington Creek below Electric Lake about 22 miles upstream from the Huntington Plant. Flow records are maintained by PacifiCorp in order to determine water entitlements and reservoir storage allocation for the various users on the river.

Table 9 shows a summary of actual recorded Huntington Creek flows below Electric Lake and above Huntington Plant. The average daily discharges for the 2012 water year (October 2011 - September 2012) at the two stations are found in Appendix A.

During 2012, the total flow of Huntington Creek at the Huntington Plant was 7,967 acre feet. However, because of plant diversions, lake evaporation and the stored runoff at Electric Lake, adjusted flows of the Huntington Creek at Huntington Plant could increase approximately 25%. A comparison of runoff values for previous years has historically been presented in Table 10. However, because this data is no longer available, Table 10 is discontinued.

During 2012, water quality information on Huntington Creek near the Deer Creek confluence was compiled on a quarterly basis. Locations of water quality sampling stations monitored by PacifiCorp-Energy West Mining Company are listed below (refer to Map HM-1).

- a. HCC01 - Above Power Plant Bridge
- b. HCC02 - Below Deer Creek Confluence

- c. HCC04 - Below Bridge @ Research Farm Bridge +  
+ Not listed on map due to scale.

Specific water quality constituents analyzed are shown in Tables 11, 12, and 13. Values are in milligrams per liter unless otherwise noted. Raw data is on file at the Energy West Main Office. In general, the water shows a gradual increase in concentration of dissolved minerals as the flow proceeds down Huntington Canyon.

## 2. Deer Creek

Deer Creek is an ephemeral tributary of Huntington Creek and flows from the same canyon in which the Deer Creek Mine is located. PacifiCorp monitors the characteristics of Deer Creek according to the following flow and sampling schedule (see Hydrologic Monitoring Schedule Appendix K).

### a. Flow and Sampling Schedule

- (1) Locations:
  - (a) Above the Mine - DCR01
  - (b) @ Permit Boundary - DCR04
  - (c) Below the Mine - DCR06  
(See Map HM-1)
- (2) Flow: Information is collected during the first or second week of each month.
- (3) Water Quality Sampling:

Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix K) The program was initiated in March 1988 and will continue through 2013 (i.e. sampling conducted in March, June, September, and December). Field measurements including pH, specific conductivity, and temperature will be performed in conjunction with quality measurements. Quantity will be monitored monthly.

b. Flow Information

As stated above, flow information is collected monthly throughout the year with the use of two Parshall flumes. (See Map HM-1 for flume locations.) A hydrograph showing all the data collected for 2012 and 1984-2011 has been generated for each location. (See Appendix B) The hydrographs show that consistent flows occurred in the Deer Creek drainage was the result mine water discharge from Deer Creek Mine. However, for 2012, no runoff occurred at DCR01 from May through October. The remaining months of the year found dry or frozen conditions. Flow at the lower two locations occurred throughout the year as the result of Deer Creek Mine discharge with peak flow (result from runoff) occurring in June (DCR04 – 3,504 gpm, DCR06 – 3,424 gpm).

c. Quality Information

In accordance with the Hydrologic Monitoring Plan, baseline quality analysis was performed in 2011. Baseline analysis is repeated once every five (5) years. The results of the historical operational quality analysis are listed in Tables 14 and 15. The minimum, maximum, and mean values are given for a five-year period along with the historical results. Values are in milligrams per liter unless otherwise noted. It is apparent from historical information in the tables that the quality of the Deer Creek runoff degrades slightly from the upper to the lower sampling point. The quality of the lower sampling point is thought to be affected by the Mancos Shale which outcrops above the lower sampling location. Raw data is on file at the Energy West Main Office.

3. Meetinghouse Canyon Creek

Meetinghouse Canyon Creek is an ephemeral tributary of Huntington Creek and is monitored according to the following schedule (see Hydrologic Monitoring Schedule in Appendix K).

a. Flow and Sampling Schedule

- (1) Location: South Fork of Meetinghouse Canyon  
(See Map HM-1)
- (2) Flow: Information is collected during the first or second week of each month.
- (3) Water Quality Sampling:

Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed will be those stated in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix K) The program was initiated in March 1984 and will continue through 2013, (i.e. sampling conducted in March, June, September, and December). Field measurements including pH, specific conductivity, and temperature will be performed monthly in conjunction with quality measurements. Quantity will be monitored monthly.

b. Flow Information

A hydrograph comparing 2012 and 1984-2011 can be found in Appendix C. For location MHC01, no flow occurred in both in the second and third quarters of 2012.

c. Quality Information

In accordance with the Hydrologic Monitoring Plan, baseline quality analysis was performed in 2011. Baseline analysis is repeated once every five (5) years. Quality sampling was initiated in 1986. When there is flow at location MHC01, Table 16 will list the minimum, maximum, and mean values along with historical results. Raw data is on file at the Energy West Main Office.

4. Mill Fork Canyon

Mill Fork Canyon is a tributary of Huntington Creek and was included in PacifiCorp's monitoring program starting in 1997. Monitoring of Mill Fork is conducted according to the following schedule (see Appendix K). Mill Fork Canyon is ephemeral from its headwaters to the western border of Section 21, Township 16 South, Range 7 East, and intermittent from that point to the confluence of Huntington Creek.

a. Flow and Sampling Schedule

(1) Locations:

- (a) Above Mill Fork Fault – MFU03
- (b) Above Old Mines - MFA1
- (c) Mill Fork Canyon Culvert - MFB2  
(See Map HM-1)

(2) Flow: Information is collected during the first or second week of each month.

(3) Water Quality Sampling:

Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix K) The program was initiated in 1997, and will continue through 2013 on a quarterly basis, i.e., March, June, September, and December. Field measurements, including pH, specific conductivity, and temperature will be performed quarterly in conjunction with quality measurements. Quantity will be monitored monthly.

b. Flow Information

Flow information is collected monthly throughout the year (See Map HM-1 for locations.) A hydrograph has been generated for each location. (See Appendix D) Locations MFU3, MFA1 and MFB2 did not flow in May through October 2012.

c. Quality Information

Historical monitoring data collected by Beaver Creek Coal Company - No. 4 Mine and the United States Geological Survey (site No. 76: Open File Report 81-539) has been incorporated in PacifiCorp's hydrologic database. Operational water quality monitoring was conducted during 1997 and 1998 (refer to the Quarterly Hydrologic submittals). Baseline quality analysis was initiated in November 1998 (2002 for MFU03). In accordance with the Hydrologic Monitoring Plan, baseline quality analysis was performed in 2011. Baseline analysis is repeated once every five (5) years.

Historical results of the samples collected are presented in Tables 17, 18 and 19. It is apparent from the data that the quality of the water degrades slightly from the upper reaches of Mill Fork, i.e., MFU3 to the mouth of the canyon, i.e., MFB2. Water quality has remained relatively consistent from year to year. (See Tables 17, 18 and 19). Raw data is on file at the Energy West Main Office.

## 5. Rilda Canyon Creek

Rilda Canyon Creek is a tributary of Huntington Creek and is monitored according to the following schedule (see Appendix K). Rilda Canyon Creek is ephemeral from its headwaters to the western border of Section 28, Township 16 South, Range 7 East, and perennial from that point to the confluence of Huntington Creek.

### a. Flow and Sampling Schedule

#### (1) Locations:

- (a) Right Fork of Rilda - RCF1\*
- (b) Left Fork of Rilda - RCLF1\*\*
- (c) Left Fork of Rilda - RCLF2\*\*
- (d) Rilda Canyon - RCF2\*
- (e) Rilda Canyon - RCF3
- (f) Rilda Canyon - RCW4 (See Map HM-1)

\* During mining of the North Rilda leases, an additional site was added in 1999 upstream of RCF1 (adjacent to EM-163) to monitor surface/groundwater relationships. Flow will be measured yearly during base flow conditions.

\*\* Flow and field parameters only.

(2) Flow: Information is collected during the first or second week of each month.

(3) Water Quality Sampling:

Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix K) The program was initiated in June 1989 except for RCLF1 and RCLF2, which were initiated in 1990 and 1995, respectively, and will continue through 2012 on a quarterly basis, i.e., March, June, September, and December. Field measurements, including pH, specific conductivity, temperature, and dissolved

oxygen, will be performed at the perennial stream locations, i.e., RCF3 and RCW4, monthly in conjunction with quality measurements. Quantity will be monitored monthly.

b. Flow Information

Flow information is collected monthly throughout the year with the use of three Parshall flumes and one V-notch weir. (See Map HM-1 for locations.) A hydrograph has been generated for each flume-weir location. (See Appendix E) Springs utilized by North Emery Water Users Special Services District (NEWUSSD) for culinary purposes are situated between monitoring locations RCF2 and RCF3. Flow above the spring area is ephemeral and below the stream is perennial. For location RCF1 flow occurred only during the months April through October with a peak flow estimated at 1,200 gpm in May. RCLF1 recorded no flow throughout the water year. Location RCLF2 recorded a flow of 4 gpm during the months of April. For location RCF2 flow occurred during the months of May and June with a peak flow estimated at 871 gpm in May. Below the spring area the stream is perennial and increases in flow from RCF3 to RCW4. During 2012 the peak flow for RCF3 was estimated at 735 gpm (May); for RCW4, 569 gpm (April). Baseline flow for 2012 at RCF3 and RCW4 was approximately 40 and 533 gpm, respectively. Data suggest that above the NEWUSSD springs the stream loses water to the alluvium and below the spring area the alluvium recharges the stream causing the flow to increase.

c. Quality Information

In accordance with the Hydrologic Monitoring Plan baseline quality analysis was performed in 2011. Baseline analysis is repeated once every five (5) years. Quality sampling was initiated in 1989; results of the samples collected are presented in Tables 20, 21, and 22. It is apparent from the data that the quality of the water degrades from the upper reaches of Rilda Canyon, i.e., RCF1, to the NEWUSSD spring area, and from that point to the mouth of the canyon, i.e., RCW4. Water quality has remained relatively consistent from year to year. (See Tables 20, 21, and 22) Raw data is on file at the Energy West Main Office.

B. Cottonwood Creek Drainage System

The southern portion of East Mountain and the entire Trail Mountain is intersected by Cottonwood Creek and its associated tributaries, including Cottonwood Canyon Creek and Grimes Wash. The Cottonwood Creek drainage is about equal in size to the Huntington drainage, with a total discharge from each of the drainages of about 70,000 acre feet per year. The major cultural feature on Cottonwood Creek is Joe's Valley Reservoir, located about twelve miles west of the town of Orangeville. The 63,000 acre foot reservoir was constructed by the U. S. Bureau of Reclamation and provides storage water for irrigation, industrial, and municipal needs in the Emery County area.

PacifiCorp monitors three of the tributaries of the Cottonwood Creek drainage system, Cottonwood Canyon Creek, Grimes Wash and Indian Creek. (See Maps HM-1 and MFS1851D)

1. Cottonwood Canyon Creek

Based on data collected by PacifiCorp, Cottonwood Canyon Creek is an ephemeral stream from its headwaters to Section 24, Township 17 South, Range 6 East and intermittent from that point to its confluence with Cottonwood Creek. The majority of water moving through Cottonwood Canyon Creek appears to be through the colluvial valley deposits. An extensive hydrogeologic investigation was conducted in Cottonwood Canyon Creek during 1992. Results can be found in Appendix C of the PAP. Four (4) permanent runoff sampling sites have been established along Cottonwood Canyon Creek and sampled as listed below. (See Hydrologic Monitoring Plan in Appendix K).

a. Flow and Sampling Schedule

- (1) Locations: (See Map HM-1)
  - (a) Above Mine - SW-1
  - (b) Below Mine - SW-2
  - (c) @ USGS Flume - CCC01 (Flow and field parameters only)
  - (d) Above Straight Canyon - SW-3
- (2) Flow: Information is collected during the first or second week of each month.
- (3) Water Quality Sampling:

Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed will be those stated in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix K) The program was initiated in December 1992 and will continue through 2013, i.e. March, June, September, and December. Field measurements including pH, specific conductivity, and temperature will be performed monthly in conjunction with quality measurements. Quantity will be monitored monthly.

b. Flow Information

As stated above, flow information is collected monthly throughout the year. (See Map HM-1 for flume locations.) A hydrograph for 2012 has been generated for each sampling location. (See Appendix F) The hydrographs show the intermittent nature of Cottonwood Canyon Creek. Flow at SW-1, continued from the previous water year and diminished in July. The peak flow occurred in May and recorded a flow of 14.7 gpm. Flow at SW-2 occurred from throughout the entire water year with a peak flow estimated at 32.2 gpm (May). Flow at SW-3 occurred in March, and July through September. Flows recorded at SW-2 and SW-3 are slightly influenced by discharge from the Cottonwood Mine (TMA001).

c. Quality Information

In accordance with the Hydrologic Monitoring Plan, baseline quality analysis was performed in 2011. Baseline analysis is repeated once every five (5) years. The results of the historical operational quality analysis are listed in Tables 23, 24, and 25. The minimum, maximum, and mean values are given for a five-year period along with the historical results. Values are in milligrams per liter unless otherwise noted. Raw data is on file at the Energy West Main Office.

The Cottonwood Canyon Creek drainage quality is influenced by the following factors: 1) A relatively high amount of suspended solids during spring runoff from Indian, Roans, Mill, and Marines canyons; 2) Alluvial/colluvial deposit recharge and discharge areas.

2. Grimes Wash

Grimes Wash is an ephemeral tributary of Cottonwood Creek and flows in the same canyon in which the Wilberg/Cottonwood Mine is located. Three permanent runoff sampling sites were established in 1980 and are sampled as listed below (see Hydrologic Monitoring Plan in Appendix K).

a. Flow and Sampling Schedule

- (1) Locations: (See Map HM-1)
  - (a) Right Fork - GWR01
  - (b) Left Fork - GWR02
  - (c) Below the Mine - GWR03
- (2) Flow: Information is collected during the first or second week of each month.
- (3) Water Quality Sampling:

Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed will be those stated in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix K) The program was initiated in March 1988 and will continue through 2012, i.e. March, June, September, and December. Field measurements including pH, specific conductivity, and temperature will be performed in conjunction with quality measurements. Quantity will be monitored monthly.

b. Flow Information

As stated above, flow information is collected monthly throughout the year with the use of two Parshall flumes. (See Map HM-1 for flume locations.) A hydrograph comparing 2012 to the data collected from 1984 through 2011 has been generated for each flume location. (See Appendix G) The Right and Left forks remained dry all year. Below the mine (GWR03), flow occurred in March and April with a peak of 1.35 gpm in March. Seeps or dampness at the Below the Mine location was noted throughout the remaining part of the year due to the influence of the springs emanating from the Starpoint Sandstone/Mancos Shale formational contact.

c. Quality Information

In accordance with the Hydrologic Monitoring Plan baseline quality analysis was performed in 2011. Baseline analysis is repeated once every five (5) years. The results of the 2011 operational quality analysis are listed in Tables 26, 27, and 28. The minimum, maximum, and mean values are given for a five-year period along with the historical results. Values are in milligrams per liter unless otherwise noted. Raw data is on file at the Energy West Main Office.

The Grimes Wash drainage quality is influenced by two factors: 1) Under normal conditions the Right Fork contributes a relatively high amount of suspended solids during spring runoff due to the fact that it is a south facing canyon dominated by argillaceous sediments; 2) Mancos Shale/Starpoint Sandstone interface seeps and springs elevate the TDS at the Below the Mine location.

3. Indian Creek

Indian Creek is a perennial tributary of the Cottonwood Creek and flows in Upper Joes Valley and merges with Lowry Water near the Joes Valley Reservoir. Four permanent runoff sampling sites were established in 2001 and are sampled as listed below (see Hydrologic Monitoring Plan in Appendix K).

a. Flow and Sampling Schedule

- (1) Locations: (See Map MFS1851D)
  - (a) Above Camp Ground - ICA
  - (b) Indian Creek Flume - ICF
  - (c) Indian Creek Ditch - ICD
  - (d) Below Cross-Over Road - ICB
- (2) Flow: Information is collected during base flow only (October)
- (3) Water Quality Sampling:

Water samples will be collected and analyzed during base flow monitoring. Parameters analyzed will be those stated in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix K) The program was initiated in October 2001 and will continue through 2013. Field measurements including pH, specific conductivity, and temperature will be performed in conjunction with quality measurements.

b. Flow Information

As stated above, flow information is collected during base flow only with the use of portable 90° v-notch weir and one permanent Parshall flume. Flow occurred at all four locations with the highest flow (431 gpm) occurring at ICF. (See Map MFS1851D for monitoring locations.)

c. Quality Information

In accordance with the Hydrologic Monitoring Plan baseline quality analysis was performed in 2011. Baseline analysis is repeated once every five (5) years. The results of the 2012 operational quality analysis are tabulated in Appendix F. Values are in milligrams per liter unless otherwise noted. Raw data is on file at the Energy West Main Office.

#### IV. SPRINGS

A. East Mountain

Between the times where PacifiCorp began monitoring springs on East Mountain and 1986, the number of springs measured increased from less than fifty (50) to nearly eighty (80). PacifiCorp believed that more benefit could be realized by concentrating its monitoring to selective springs in the areas that was undermined within the following five years. (See Map HM-5) A meeting was held on March 25, 1987 with the U. S. Forest Service and the Utah State Division of Oil, Gas and Mining to determine the most effective plan for PacifiCorp's monitoring. A subsequent meeting was held on April 15, 1987 with the State Division of Oil, Gas and Mining to finalize the monitoring plan revisions. In addition to major revisions made in 1987, each year, State and Federal agencies are invited to participate in adjusting the monitoring schedule based on field investigations.

During the meetings it was resolved that the following springs will be monitored. Eight additional springs (denoted with a plus [+] symbol below) were added in 1989 after the annual field verification process jointly conducted by DOGM and PacifiCorp.

* Burnt Tree Springs		79-40
* Elk Spring (dev. in 2009)		80-41
* Sheba Springs		80-43
Ted's Tub	*	80-44
79-2	*	80-46
* 79-10		80-47
79-15	+	80-48
* 79-23		80-50
79-24		82-51
* 79-26	*	82-52
+ 79-28	*	84-56
* 79-29	+	89-60 (Alpine Spring)
79-32	+	89-61 (developed in 2009)
79-34	+	89-65
* 79-35	+	89-66
79-38	+	89-67
	+	89-68

Of these springs, twelve will be monitored on a monthly basis, weather permitting, and have been denoted on the above list with asterisks (\*).

Mill Fork Springs:

EM-216	EMPOND
GRANTS SPRING	LITTLE BEAR
JV-9	JV-34
MF-7	MF-10
MF-19B	MF-213
MF-219	MFR-10
MFR-30	RR-5
RR-15	RR-23A
SP1-26	SP1-29
UJV-101	UJV-206

1. Flow and Sampling Schedule

a. Flow

All springs on the preceding two lists are measured during the months of July and October. In addition, a minimum of twelve springs (southern end of East Mountain) are monitored to establish a discharge recession curve (denoted with an \* above). Generally, measurements are made on a monthly basis during the months of July through October if weather and reasonable access permit; but when historical data indicate that a spring is short-lived, all efforts are made to measure discharge from that spring at least three times, equally spaced, within its flow period.

b. Quality Samples

All springs listed above are sampled for water quality characteristics during the months of July and October. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Operational Quality. (See Appendix K)

2. Spring Flow

Precipitation decreased considerably from 2011 to 2012 on East Mountain. Because of the lack of snowfall and rainfall throughout the water year, spring discharge rates responded with the East Mountain - Southern area, Mill Fork and Trail Mountain with appreciably decreased flows in 2012. Very dry conditions were realized throughout the region during 2012 water year that reported an average of only 74% of normal over the three monitoring sites. Temperature, a critical factor on spring discharge rates, was an overall 2.4 degrees higher (East Mountain Station) in 2012 than the historical averages. However, March through September experienced an average of 3.8 degrees higher than normal temperatures which probably increased evaporation rates which could have reduced recharge even more than reported.

Precipitation received at East Mountain weather station and spring discharge rates set an all time low for the 2002 water year and only improved slightly in 2003 and 2004. Table 29, is a tabulation of the flow data collected during the 2012 monitoring season. To record the season variation, all springs measured in July are measured again in October. The seasonal variation is represented in Table 29, under the column heading "Seasonal Net Change." The percentage figures represent the amount of change, either positive or negative. The average change reveals a thirty-nine percent (39%) [sixty-five percent (65%) by volume] decrease from the July to the October measurements for Southern East Mountain and a seven percent (7%) [eighteen percent (18%) by volume] decrease from the July to the October measurements for the Mill Fork Area. The resulting factor influencing this decrease was the fact that warmer than normal temperatures occurred during March and April in the upper elevation which melted much of the snowpack affecting recharge.

A twenty-nine year comparison of spring discharge is shown in Table 30. The table includes a year by year comparison of springs identified from each mode of occurrence (Table 31). The springs utilized in the comparison are underlined in Table 31. The flow values for the individual springs represent the July measurements. October measurements were not utilized because winter weather conditions caused some springs to become inaccessible.

Table 30 has been compared to East Mountain climatology to see how closely spring discharge rates follow local annual precipitation. Figure 3 reveals good correlation between spring discharge and precipitation. Along with precipitation, temperature plays a critical role in yearly discharge variations, especially during the early stages of the runoff period. Listed in Table 32 is a comparison of January through June temperature data from surrounding weather stations for the period 1982-2012 versus departure from normal. The comparison is vital in determining mining effects on spring discharge versus general changes in annual precipitation.

Table 32 clearly demonstrates near average temperatures between 1982 and 1984, but starting in 1985 and continuing through 2000 (except for 1991 and 2001) positive departure from normal has been significant. However, in 2012 temperatures averaged -4.61 degrees departure from the normal. Comparison between spring discharge rate and general changes in annual precipitation patterns correlated well in the past due to abnormal temperatures experienced during the early runoff period (January through June). Figure 3 not only includes a comparison of spring discharge rate and precipitation as in the past, but also temperature departure due to the critical influence temperature has on peak discharge occurrence.

An additional flow information study was initiated during the summer of 1985. The purpose of the program was to establish flow recession curves for the following springs: (1) Burnt Tree, (2) Elk Springs (developed in 2009), (3) Sheba, (4) 79-10, (5) 79-23, (6) 79-26, (7) 79-29, (8) 79-35, (9) 80-44, (10) 80-46, (11) 82-52, (12) 84-56. The flow information collected during 2012 is shown in Table 33; corresponding spring recession curves comparing 2012 to historical values are located in Appendix H.

### 3. Quality

**TABLE 1: PRECIPITATION IN EMERY COUNTY, UTAH (2012 Water Year)**

	Castle Dale* (Elev. 5800')	Huntington Plant (Elev. 6500')	East Mountain (Elev. 8985')
	Precip. (inches)	Precip. (inches)	Precip. (inches)
	% of Normal	% of Normal	% of Normal
<b>2011</b>			
<i>October</i>	0.39	3.2	0.86
<i>November</i>	0.19	0.59	0.59
<i>December</i>	0.78	0.14	0.53
<b>2012</b>			
<i>January</i>	0.47	0.19	0.75
<i>February</i>	0.56	0.35	0.95
<i>March</i>	0.00	0.59	0.65
<i>April</i>	0.08	0.43	0.44
<i>May</i>	0.00	0	0.00
<i>June</i>	0.00	0.01	0.05
<i>July</i>	1.05	1.72	2.65
<i>August</i>	0.35	0.51	1.29
<i>September</i>	0.82	0.79	0.78
<b>TOTALS</b>	<b>4.69</b>	<b>7.73</b>	<b>9.53</b>
<b>Mean Monthly</b>	0.39	0.71	0.79

NR - No Record

\* Transferred Site from Hunter Plant to Castle Dale

**TABLE 2: COMPARISON OF 2011 AND 2012 PRECIPITATION (Inches)**

<u>Station</u>	<u>2012</u>		<u>2011</u>		<u>2012 As</u>	
	<u>Amount</u>	<u>% of Normal</u>	<u>Amount</u>	<u>% of Normal</u>	<u>% of 2011</u>	
Castle Dale	4.69	61	10.81	78		43
Huntington Plant	7.73	78	14.95	49		52
East Mountain	9.53	76	18.33	73		52

**TABLE 3: CASTLE DALE PRECIPITATION**  
Elevation - 5,800 Feet

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	ANNUAL
70-71	0.41	0.32	0.22	0.31	0.62	0.00	0.21	0.76	0.16	0.19	0.54	0.05	3.79
71-72	1.63	0.21	0.94	0.00	0.00	0.00	0.47	0.00	0.92	0.17	0.67	0.85	5.86
72-73	2.65	1.17	0.27	0.42	0.71	0.97	1.18	0.23	0.54	0.91	0.42	0.07	9.54
73-74	0.17	0.19	0.14	0.94	0.08	0.09	0.00	0.00	0.05	1.41	0.11	0.25	3.43
74-75	1.89	0.63	0.18	0.29	0.23	0.85	0.06	0.21	1.01	1.34	0.11	0.31	7.11
75-76	0.13	0.36	0.02	0.08	0.42	0.01	1.21	0.86	0.04	0.43	0.13	0.66	4.35
76-77	0.10	0.00	0.00	0.37	0.00	0.00	0.06	1.41	0.09	2.16	0.84	0.36	5.39
77-78	0.31	0.16	0.44	1.39	1.69	1.36	0.60	0.53	0.00	0.15	0.11	0.10	6.84
78-79	0.13	2.68	0.47	1.52	0.66	1.64	0.05	0.74	0.04	0.00	1.50	0.00	9.43
79-80	0.01	0.11	0.26	1.96	1.58	1.12	0.67	1.72	0.04	0.41	1.58	2.63	12.09
10-Year	0.74	0.58	0.29	0.73	0.60	0.60	0.45	0.65	0.29	0.72	0.60	0.53	6.78
80-81	1.23	0.25	0.00	0.01	0.08	1.93	0.15	0.53	0.21	0.74	0.57	1.56	7.26
81-82	1.44	0.31	0.20	1.13	0.09	0.91	0.00	0.12	0.15	0.97	2.16	1.17	8.65
82-83	0.16	0.79	1.06	1.07	0.46	0.96	0.25	0.23	0.30	1.25	0.40	0.74	7.67
83-84	0.49	1.24	1.07	0.22	0.22	0.33	0.36	0.08	0.78	0.95	1.38	0.34	7.46
84-85	1.69	0.21	1.18	0.34	0.16	0.96	1.02	0.72	0.19	1.78	0.11	0.88	9.24
85-86	0.98	1.54	0.55	0.07	0.63	0.55	0.44	0.08	0.26	0.72	1.47	0.78	8.07
86-87	1.08	0.10	0.07	0.48	0.45	0.74	0.53	1.03	0.80	2.50	1.65	0.09	9.52
87-88	1.54	1.02	0.66	1.29	0.00	0.63	1.96	0.82	0.30	0.32	0.71	0.66	9.91
88-89	0.70	0.02	0.49	0.45	0.22	0.42	0.02	0.33	0.42	0.70	2.11	0.56	6.44
89-90	0.17	0.03	0.03	0.23	0.72	0.61	0.38	0.09	0.44	0.68	0.81	1.54	5.73
20-Year	0.85	0.57	0.41	0.63	0.45	0.70	0.48	0.52	0.34	0.89	0.87	0.68	7.39
90-91	0.72	0.00	0.27	0.18	0.12	0.85	0.13	0.92	0.90	0.89	1.01	2.13	8.12
91-92	0.20	0.60	0.13	0.43	1.48	1.11	0.31	1.66	0.26	0.04	0.79	0.92	7.93
92-93	0.62	0.37	0.81	2.32	1.77	1.44	0.45	1.85	0.19	0.03	0.54	0.20	10.59
93-94	1.46	0.68	0.18	0.04	0.40	0.07	0.68	0.35	0.03	0.13	0.91	1.30	6.23
94-95	1.70	0.21	-	0.96	0.24	0.80	1.42	1.69	0.61	0.87	1.42	0.47	10.39
95-96	0.00	0.16	0.19	0.71	0.40	1.47	0.02	0.86	0.44	0.51	0.01	2.06	6.83
96-97	0.73	1.30	0.54	1.17	0.18	0.00	0.91	0.59	1.61	1.13	2.77	2.50	13.43
97-98	0.43	0.38	0.05	0.35	2.04	0.04	0.29	0.13	0.55	1.54	0.86	1.16	7.82
98-99	1.71	0.76	0.00	0.17	0.28	0.00	1.64	0.19	0.54	1.15	2.50	1.14	10.08

**TABLE 3: CASTLE DALE PRECIPITATION**  
Elevation - 5,800 Feet

<b>99-00</b>	0.00	0.12	0.41	1.19	0.50	0.03	0.76	0.40	0.28	1.00	0.39	5.08
<b>30-Year</b>	0.82	0.36	0.64	0.57	0.68	0.52	0.65	0.41	0.81	0.97	0.86	7.81
<b>00-01</b>	2.89	0.10	1.14	1.03	0.47	0.23	0.53	0.23	0.81	0.82	0.76	9.10
<b>01-02</b>	0.16	0.17	0.00	0.05	0.02	0.16	0.00	0.26	0.18	0.18	2.55	4.48
<b>02-03</b>	0.78	0.28	0.02	0.37	1.22	0.08	0.56	0.12	0.00	0.87	0.30	5.34
<b>03-04</b>	0.29	0.91	0.30	1.84	0.00	2.02	0.10	0.82	0.41	0.39	1.03	8.67
<b>04-05</b>	2.14	0.51	2.01	1.11	0.17	0.19	0.40	2.11	0.15	0.58	1.00	12.04
<b>05-06</b>	1.37	0.06	0.61	0.16	1.51	0.13	0.03	0.19	0.32	0.83	0.42	5.89
<b>06-07</b>	3.80	0.43	0.40	0.01	0.24	0.52	0.40	0.05	0.43	3.04	1.22	10.55
<b>07-08</b>	0.43	1.33	0.49	0.93	0.00	0.11	0.50	0.35	0.03	0.29	0.68	5.17
<b>08-09</b>	0.36	0.91	0.07	0.37	0	0.59	0.7	0.69	0.07	0.21	0.6	4.79
<b>09-10</b>	0.32	1.53	1.46	0.8	0.65	0.1	0.17	0.46	0.13	0.3	0.1	6.02
<b>40-Year</b>	0.93	0.43	0.65	0.59	0.62	0.49	0.57	0.44	0.67	0.92	0.86	7.66
<b>10-11</b>	2.09	1.79		0.65	0.25	0.36	1.56	0.81	1.73	0.62	0.66	10.81
<b>11-12</b>	0.39	0.78	0.47	0.56	0.00	0.08	0.00	0.00	1.05	0.35	0.82	4.69
<b>Average*</b>	0.95	0.46	0.65	0.60	0.61	0.49	0.60	0.45	0.70	0.91	0.86	7.74

\* Historical Average. Does not include current report year.

**TABLE 4: HUNTINGTON PLANT PRECIPITATION**

Elevation - 6,500 Feet

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	TOTAL
70-71	---	---	1.62	0.04	0.00	0.32	0.29	0.16	0.11	0.57	0.63	0.43	2.27
71-72	2.26	0.59	1.62	0.04	0.00	0.32	0.29	0.16	0.11	0.40	0.66	1.07	8.17
72-73	4.27	1.28	0.34	0.49	0.80	2.42	0.50	0.17	0.97	1.09	1.94	0.12	14.39
73-74	0.08	0.02	0.37	0.20	0.03	0.01	0.00	0.00	0.00	0.09	0.00	0.07	0.87
74-75	0.68	1.19	1.13	1.01	0.30	0.80	0.03	0.75	1.44	2.62	0.31	0.24	9.50
75-76	0.23	0.95	0.03	0.20	0.23	0.00	2.34	0.86	0.02	0.73	0.19	0.85	6.63
76-77	0.56	0.00	0.00	0.35	0.00	0.00	0.00	1.76	0.00	2.08	0.96	0.70	6.41
77-78	0.66	0.12	0.82	1.45	1.00	1.36	0.94	0.72	0.12	0.05	0.72	0.77	8.73
78-79	0.02	2.65	0.25	1.21	0.52	2.50	0.00	0.84	0.05	0.09	3.32	0.20	11.65
79-80	0.17	0.14	0.15	2.88	3.63	0.68	1.13	1.88	0.65	0.18	0.38	2.22	14.09
80-81	1.20	0.06	0.00	0.00	0.00	0.62	0.08	1.75	0.48	0.00	0.58	1.53	6.30
81-82	1.12	0.25	1.30	1.63	0.20	0.73	0.00	0.17	0.00	0.08	0.71	1.91	8.10
82-83	0.20	0.60	0.67	0.16	0.65	1.87	0.08	0.40	0.00	1.61	0.39	1.15	7.78
83-84	0.76	0.76	2.13	0.10	0.15	1.18	0.72	0.17	1.04	0.74	1.39	0.46	9.60
84-85	2.07	0.34	1.74	0.49	0.27	0.53	0.44	1.08	0.42	3.21	0.04	0.81	11.44
85-86	0.77	1.28	0.64	0.01	0.98	0.28	0.43	0.10	0.17	0.42	0.55	1.08	6.71
86-87	0.38	0.15	0.05	0.81	0.66	0.13	1.22	1.48	1.01	2.14	0.65	0.00	8.68
87-88	1.36	1.35	0.51	1.77	0.00	0.10	1.35	0.94	0.83	0.04	0.13	0.92	9.30
88-89	0.31	0.13	0.83	0.68	0.28	0.21	0.20	0.22	1.28	0.78	1.72	0.74	7.38
89-90	0.21	0.28	0.42	0.51	1.18	0.94	1.30	1.35	0.65	1.30	1.27	2.35	11.76
90-91	0.45	0.03	0.43	0.44	0.37	0.68	0.13	3.13	0.60	1.14	1.87	2.38	11.61
91-92	0.21	0.99	0.37	1.20	1.98	1.55	0.47	1.92	1.97	2.99	1.53	0.60	15.78
92-93	1.93	1.02	1.67	2.32	1.71	1.87	0.46	0.65	0.31	0.08	1.68	0.46	14.16
93-94	2.11	0.88	0.23	0.12	0.88	1.17	1.69	0.53	0.05	Tr.	2.14	1.69	11.49
94-95	1.33	0.26	0.33	1.10	0.26	1.05	2.65	2.67	1.17	0.32	2.81	1.48	15.42
95-96	NA	NA	0.90	1.10	0.86	1.52	0.46	1.41	0.72	1.15	0.19	2.18	---
96-97	0.69	1.31	0.63	1.61	0.05	0.00	0.90	1.11	1.20	2.31	3.28	2.49	15.58
97-98	1.92	0.53	0.00	1.27	1.89	0.15	1.13	1.28	0.90	1.27	1.17	1.60	13.11
98-99	2.59	2.29	0.00	0.48	0.37	0.00	2.11	0.29	0.74	1.91	3.41	1.47	15.66
99-00	0.00	0.05	0.10	0.33	1.06	0.88	0.13	0.89	1.83	0.86	2.19	0.80	9.12
00-01	3.04	0.07	0.26	1.69	1.09	0.85	0.46	NR	NR	NR	NR	NR	NR
01-02	NR												
02-03	NR												
03-04	NR												
04-05	NR												
05-06	0.82	0.74	0.80	1.40	0.39	0.00	0.00	0.67	0.22	0.62	2.11	0.72	8.49
06-07	4.47	0.09	0.32	0.35	0.65	0.58	0.40	0.64	1.07	0.71	0.32	0.35	9.55
07-08	0.94	0.01	0.97	0.67	1.42	0.04	0.02	1.10	0.42	0.40	0.58	0.78	7.35
08-09	0.30	0.49	0.18	0.42	0.56	0.00	0.79	0.96	1.95	0.62	1.09	0.58	7.94
09-10	0.49	0.03	0.49	1.22	0.88	0.56	0.03	0.34	0.36	0.27	0.09	0.06	4.82
10-11	3.38	0.18	2.19	0.37	0.45	0.59	0.59	2.20	0.50	2.47	1.22	0.81	14.95
11-12	3.20	0.59	0.14	0.19	0.35	0.59	0.43	0.00	0.01	1.72	0.51	0.79	8.52
Average*	1.20	0.60	0.64	0.84	0.70	0.71	0.64	0.97	0.67	1.01	1.17	1.00	9.85

\* Historical Average. Does not include current report year.

**TABLE 5: ELECTRIC LAKE PRECIPITATION**  
Elevation - 8,350 Feet

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	TOTAL
70-71	2.46	2.35	6.41	1.13	1.66	0.36	1.05	0.66	0.47	0.40	2.15	0.78	19.88
71-72	3.49	1.69	4.07	3.35	0.58	0.70	1.02	0.28	1.49	0.70	0.80	2.91	21.08
72-73	4.18	3.43	3.27	0.97	2.09	2.74	3.67	1.42	0.85	0.82	1.23	1.15	25.82
73-74	0.79	1.90	3.52	2.70	1.12	1.52	2.49	0.20	0.13	2.09	0.06	0.09	16.61
74-75	2.27	0.62	1.73	2.10	2.37	3.42	3.21	1.08	1.93	0.49	0.25	0.25	20.70
75-76	1.31	2.57	0.82	1.44	2.23	1.35	1.47	2.00	1.23	1.07	0.54	1.19	17.22
76-77	1.00	0.25	0.14	0.76	1.14	2.00	0.05	3.00	0.90	2.28	1.31	1.26	14.09
77-78	1.47	2.10	3.20	3.68	2.74	3.16	2.46	1.18	0.30	0.10	0.24	0.77	21.40
78-79	0.40	3.18	2.66	2.90	2.18	2.53	0.72	1.67	0.19	0.96	2.29	0.32	20.00
79-80	1.55	2.23	0.37	4.95	6.01	3.34	1.27	3.09	0.12	0.37	0.38	1.80	25.48
80-81	1.89	2.03	2.62	2.40	2.21	2.11	1.54	1.67	0.68	1.07	0.55	1.05	20.23
81-82	1.45	0.98	0.32	1.30	1.04	3.20	1.45	3.06	0.39	1.61	2.73	1.44	18.97
82-83	4.18	1.44	4.79	5.26	1.66	5.06	1.11	1.40	0.59	1.26	2.29	5.38	34.42
83-84	1.88	3.68	2.76	2.41	4.00	4.30	2.35	2.81	1.35	1.34	1.50	2.88	31.26
84-85	2.15	4.81	7.43	1.27	1.56	2.77	3.23	1.73	3.41	2.55	2.26	1.47	34.64
85-86	4.40	2.63	3.24	1.54	1.09	3.54	1.95	1.19	0.89	3.04	0.03	4.35	26.41
86-87	1.86	1.98	0.55	2.14	8.54	2.48	3.79	1.62	0.26	1.01	1.88	2.73	36.93
87-88	1.39	1.68	3.50	3.06	0.72	3.32	2.14	1.60	0.86	1.04	1.22	0.49	19.65
88-89	1.20	2.68	1.91	1.52	1.99	3.55	0.35	0.06	1.54	1.43	1.37	1.19	18.79
89-90	1.21	1.88	0.70	2.00	4.06	2.30	2.00	0.81	1.87	1.08	0.82	1.87	20.40
90-91	2.08	2.44	2.67	2.31	2.44	2.71	1.74	1.70	0.94	1.36	1.27	1.67	23.32
91-92	1.32	0.90	1.64	1.49	1.64	4.24	3.06	2.60	0.57	1.04	1.39	2.70	22.36
92-93	1.43	2.10	0.87	0.72	2.21	1.95	0.54	1.55	1.01	0.59	1.64	1.02	15.63
93-94	1.51	1.33	3.60	5.01	4.76	2.25	2.49	2.40	1.57	0.48	1.32	0.60	27.32
94-95	2.10	2.19	0.90	1.00	4.00	1.10	2.81	0.99	0.10	0.25	0.75	2.32	18.51
95-96	1.54	4.26	1.60	3.25	1.90	3.84	3.94	5.07	2.04	1.00	2.53	1.95	33.78
96-97	1.43	1.38	3.54	5.84	3.25	3.23	1.75	1.73	0.90	1.09	0.45	2.20	26.90
97-98	2.30	1.88	2.00	3.65	3.60	2.86	1.80	1.82	2.30	2.01	1.86	4.45	25.86
98-99	3.65	2.98	1.15	4.05	1.70	1.44	4.95	2.03	1.28	2.90	3.54	1.20	30.87
99-00	0.15	0.38	1.61	4.19	4.45	1.98	0.66	2.12	2.32	0.00	2.60	1.65	22.11
00-01	1.98	2.28	2.47	2.65	2.59	2.59	1.96	1.88	1.06	1.24	1.45	1.78	23.93
01-02	3.47	1.21	2.19	1.54	2.80	0.79	2.41	1.49	0.37	1.56	3.40	1.01	22.24
02-03	1.35	3.40	1.12	1.08	0.82	2.31	1.68	0.40	0.35	0.58	0.20	3.60	16.89
03-04	2.64	2.08	2.69	0.25	2.07	2.89	2.72	1.47	0.80	0.33	2.24	0.59	20.77
04-05	0.66	2.49	3.71	2.12	2.69	0.66	2.19	0.12	1.30	0.72	0.39	0.45	17.50
05-06	1.53	2.26	3.92	2.92	1.70	5.59	4.72	0.50	0.95	0.65	1.23	1.40	25.32
06-07	3.49	2.52	1.06	0.43	2.48	1.80	1.40	1.44	0.73	1.70	2.18	1.62	20.85
07-08	2.45	1.60	4.07	NA	NA	NA	NA	NA	1.15	1.47	0.30	0.87	11.91
08-09*	-	-	-	-	-	-	-	-	-	-	-	-	-
09-10*	-	-	-	-	-	-	-	-	-	-	-	-	-
10-11*	2.09	2.28	2.50	2.48	2.51	2.54	2.04	1.72	1.02	1.19	1.43	1.70	23.19
11-12*	-	-	-	-	-	-	-	-	-	-	-	-	-
Average**	2.39	2.29	2.51	2.48	2.50	2.53	2.01	1.72	1.01	1.19	1.42	1.69	23.14

NOTE: Climatic Station was moved from a point one mile above the dam site to a point 300 feet below dam site on November 15, 1973. October, November, and December 70-71 were estimated by correlation with Clear Creek Weather Station.

\* No Precipitation data was collected from Electric Lake site.  
\*\* Historical Average. Does not include current report year.

**TABLE 6: EAST MOUNTAIN PRECIPITATION**  
Elevation - 8,985 Feet

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	TOTAL
80-81	1.28	0.39	0.05	0.29	0.52	2.77	0.64	0.87	0.11	0.57	0.85	2.55	10.90
81-82	1.93	0.53	0.97	3.22	0.14	1.67	0.00	0.45	0.09	1.86	1.10	2.61	14.57
82-83	0.38	2.90	1.39	1.30	1.81	1.98	0.92	0.71	0.61	1.27	4.83	1.62	19.71
83-84	0.76	2.43	2.42	0.27	0.65	1.22	0.50	0.22	1.18	1.90	2.33	0.64	14.53
84-85	3.27	0.97	1.67	0.49	0.59	1.77	1.35	1.73	0.28	2.47	0.12	2.31	17.02
85-86	1.15	2.38	0.87	0.30	2.10	1.43	1.05	0.38	0.53	0.87	2.24	1.63	14.92
86-87	1.57	0.39	0.16	1.37	1.37	1.65	1.16	1.77	0.58	2.49	1.16	0.06	13.73
87-88	2.77	1.91	1.29	1.42	0.00	0.99	2.08	1.03	0.81	0.45	0.96	0.91	14.61
88-89	0.61	0.43	1.56	1.00	0.68	1.03	0.26	0.47	0.43	1.19	2.44	0.49	10.59
89-90	0.28	0.39	0.16	0.74	2.08	1.75	1.03	0.26	0.67	0.88	1.03	1.62	10.90
10-Year	1.40	1.27	1.05	1.04	0.99	1.63	0.90	0.79	0.53	1.40	1.71	1.44	14.15
90-91	0.48	0.26	0.66	0.34	0.39	2.34	0.59	1.83	0.21	1.01	1.48	3.11	12.69
91-92	0.49	1.07	0.07	0.61	1.73	2.39	0.56	2.19	0.95	0.85	0.48	0.35	11.74
92-93	1.57	0.57	1.53	4.10	2.34	2.01	0.33	0.72	0.19	0.04	0.82	0.14	14.37
93-94	2.23	1.12	0.14	0.32	1.35	0.34	2.65	0.36	0.39	0.10	0.83	1.49	11.33
94-95	1.86	1.42	0.65	1.37	0.66	0.79	3.75	2.29	1.19	0.34	1.52	0.62	16.46
95-96	0.18	0.46	0.64	1.39	1.18	2.23	0.21	1.14	0.30	0.58	0.35	3.46	12.12
96-97	1.50	1.63	1.66	2.49	1.56	0.00	0.40	0.91	0.15	0.15	1.30	2.43	11.75
97-98	0.24	0.84	0.23	0.97	3.34	0.71	0.81	0.37	0.04	0.78	0.57	2.16	11.06
98-99	3.01	1.08	0.00	0.75	0.34	0.07	2.82	0.36	1.21	2.08	2.24	0.78	14.73
99-00	0.04	0.05	0.28	0.48	3.27	1.56	0.15	0.72	0.59	0.03	2.03	0.96	10.16
20-Year	1.28	1.06	0.82	1.16	1.30	1.43	1.06	0.94	0.53	1.00	1.43	1.50	13.39
00-01	3.48	0.62	0.39	1.96	1.21	1.03	1.12	1.39	0.19	0.58	1.09	0.12	13.17
01-02	0.11	0.40	0.18	0.03	0.19	0.10	0.16	0.00	0.06	0.26	0.69	4.15	6.34
02-03	0.73	0.82	0.75	0.01	0.96	1.20	0.37	0.57	0.37	0.06	1.59	0.94	8.36
03-04	0.27	0.86	1.95	0.21	2.73	0.00	1.94	0.12	1.27	0.49	0.67	0.38	10.89
04-05	2.56	2.06	1.16	3.47	1.41	0.63	1.19	1.04	1.36	0.44	0.83	1.07	17.22
05-06	1.44	0.64	0.98	0.87	0.41	3.67	0.44	0.03	0.55	0.58	0.50	0.48	10.59
06-07	3.66	0.21	0.48	0.25	0.18	0.96	0.98	0.19	0.05	0.70	0.89	0.99	9.54
07-08	0.87	1.74	1.44	0.95	1.36	0.27	0.47	1.06	0.17	0.16	1.53	0.12	10.14
08-09	0.47	0.54	1.51	0.42	1.48	0.18	0.93	2.10	1.26	0.49	0.75	0.45	10.58
09-10	0.34	0.14	1.52	2.09	1.04	1.16	0.43	0.59	0.79	0.50	0.60	0.00	9.20
30-Year	1.32	0.98	0.89	1.12	1.24	1.26	0.98	0.86	0.55	0.81	1.26	1.29	12.46
10-11	3.06	0.54	3.86	0.16	1.34	0.90	0.77	2.65	0.57	2.47	1.15	0.86	18.33
11-12	0.86	0.59	0.53	0.75	0.95	0.65	0.44	0.00	0.05	2.65	1.29	0.78	9.53
Average*	1.36	0.95	0.97	1.07	1.23	1.23	0.95	0.89	0.54	0.91	1.26	1.26	12.56

\* Historical average values. Does not include current report year.

**TABLE 7: TEMPERATURES IN EMERY COUNTY, UTAH (2012 Water Year)**

	Castle Dale**		Huntington Plant		East Mountain	
	Average Temperature*	Departure From Normal	Average Temperature*	Departure From Normal	Average Temperature*	Departure From Normal
<b>2011</b>						
<i>October</i>	50.6	2.2	49.2	0.0	45.1	3.7
<i>November</i>	39.2	3.7	34.3	-0.7	29.9	0.4
<i>December</i>	24.3	0.0	28.0	-0.2	21.9	-0.4
<b>2012</b>						
<i>January</i>	27.8	7.0	30.5	2.0	26.4	2.5
<i>February</i>	32.3	4.4	29.5	0.1	20.8	-4.0
<i>March</i>	43.6	5.2	42.8	2.6	37.1	5.7
<i>April</i>	50.6	4.1	48.8	2.9	45.3	7.3
<i>May</i>	58.7	3.2	58.9	3.1	50.9	3.7
<i>June</i>	69.4	4.9	71.3	4.0	63.9	6.2
<i>July</i>	72.8	1.9	71.1	0.1	63.9	-1.2
<i>August</i>	71.8	3.2	71.4	0.7	62.6	-0.6
<i>September</i>	63.1	3.2	63.0	0.4	59.4	5.3
<b>AVERAGE</b>	<b>38.0</b>	<b>3.6</b>	<b>49.9</b>	<b>1.2</b>	<b>43.9</b>	<b>2.4</b>

\* Temperatures reported in degrees Fahrenheit.

\*\* Transferred Site from Hunter Plant to Castle Dale in 2008

**TABLE 8: COMPARISON OF 2011 AND 2012 TEMPERATURES\***

<u>Station</u>	<u>2011</u>		<u>2012</u>		<u>2012 Departure From 2011</u>
	<u>Average Temperature</u>	<u>Departure From Normal</u>	<u>Average Temperature</u>	<u>Departure From Normal</u>	
Castle Dale	48.1	-0.08	38.0	3.58	-10.1
Huntington Plant	46.7	-1.4	49.9	1.2	3.2
East Mountain	43.9	2.5	43.9	2.4	0.0
<u>Average Departure From Normal</u>		<b>0.3</b>		<b>2.4</b>	

\* Temperatures reported in degrees Fahrenheit.

**TABLE 9: HUNTINGTON CREEK WATER FLOWS (2012 Water Year)**

	<u>Huntington Creek Below Electric Lake*</u>	<u>Huntington Creek At Plant*</u>
<i>Total Yearly Flow (Acre Feet)</i>	12,150	7,967
<i>Mean Discharge in Cubic Feet Per Second (CFS)</i>	16.7	48
<i>Maximum Discharge (CFS)</i>	60.6	132
<i>Date of Maximum Discharge</i>	24-Jun-12	18-May-12
<i>Minimum Discharge (CFS)</i>	3.9	10.8
<i>Date of Minimum Discharge</i>	24/05/2012	30-Dec-12

\*Influenced by upstream storage in Electric Lake.

**TABLE 10: DISCONTINUED**

TABLE 11: HUNTINGTON CREEK WATER QUALITY \*  
HCC01 - ABOVE POWER PLANT

2012** SAMPLE DATES	ALKALINITY				CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (nat)	POTASSIUM	SODIUM	SULFATE	TDS	
	ACIDITY	BICARBONATE	Calcium	Carbonate																	
20120313	0	191	61.34	21	13	509	252	0.26	0	24.08	0	0	0	0	8.47	1.76	12.33	43	24	279	
20120612	0	163	50.92	6	6	371	189	0.27	0	15.04	0	0	0.005	0	8.58	0.93	5.12	21	24	210	
20120910	0	178	55.4	0	8	417	211	1.03	0	17.75	0	0	0	0	8.57	1.54	7.01	26	111	241	
20121204	0	197	60.7	25	15	577	281	0.12	0	31.33	0	0	0.031	0	8.42	2.18	15.47	72	5	326	
No. of Analytes	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
2011**	0	143	48.03	0	5	327	167	0.08	0	11.35	0	0	0	0	8.48	0.76	4.92	12	8	183	
MAX	0	251	73.08	10	16	602	320	1.19	0	33.5	0	0	0.013	0	8.61	2.04	13.39	61	85	329	
MEAN	0	183	58.18	2.5	9.75	434.5	229.75	0.39	0	20.51	0	0	0.005	0	8.54	1.31	8.50	32.5	28.5	243	
2010**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MAX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MEAN	0	182	57	12	11	469	233	0	0	22	0	0	0	0	9	2	10	41	41	264	
2009**	0	163	51	0	6	371	189	0.12	0	15.04	0	0	0.00	0	8.42	0.93	5	21	6	210	
MIN	0	197	61	25	15	577	281	1.03	0	31.33	0	0	0.03	0	8.58	2.18	15	72	111	326	
MAX	0	182	57	12	11	469	233	0.42	0	22.05	0	0	0.01	0	8.51	1.60	10	41	41	264	
MEAN	0	154	47	0	5	358	189	0	8	14	0	0	0	0	8	1	4	19	5	219	
MIN	0	218	65	7	16	563	289	0	9	31	0	0	0	0	9	2	13	59	13	311	
MAX	0	184	56	3	10	454	235	0	9	23	0	0	0	0	9	1	9	40	10	278	
MEAN	0	144	52.7	0.0	4.0	361	185	0.12	7.80	12.94	0	0.01	0.01	0	8.34	0.78	3.89	15.0	0.0	229	
2008**	0	216	65.8	15.0	20.0	630	306	1.05	15.10	34.36	0	0.07	0.07	0	8.60	2.08	15.49	83.0	11.0	399	
MIN	0	181	58.5	7.7	11.0	498	243	0.39	10.73	23.53	0	0.03	0.03	0	8.51	1.52	9.11	45.8	5.7	236	
MAX	0	152	49	8	5	401	188	0.13	10.89	16	0	0.01	0.01	0	8.23	0.70	4	18	13	193	
MEAN	0	207	61	8	12	599	260	0.30	13.12	27	0	0.03	0.03	0	8.51	1.68	11	54	19	301	
2007**	0	181	56	8	9	486	226	0.23	11.80	21	0	0.02	0.02	0	8.40	1.39	7	36	15	250	
MIN	0	157	47	5	5	387	177	0.12	11.61	14	0	0.00	0.00	0	7.99	0.75	4	19	8	209	
MAX	0	233	73	20	20	701	324	0.77	14.32	35	0	0.02	0.02	0	8.43	1.93	18	85	969	467	
MEAN	0	198	61	11	11	531	252	2.34	13.17	24	0	0.01	0.01	0	8.19	1.32	10	47	251	306	
2006**	0	161	49	3	3	362	178	0.08	9.42	14	0	0.01	0.01	0	8.28	0.69	3	15	14	204	
MIN	0	221	65	21	21	641	291	0.49	12.43	31	0	0.05	0.05	0	8.45	2.36	18	66	38	366	
MAX	0	193	58	10	10	484	232	0.27	10.87	21	0	0.02	0.02	0	8.34	1.46	10	38	28	280	
MEAN	0	154	44	6	5	332	173	0.12	5.27	15	0	0.01	0.01	0	8.41	0.84	5	17	13	153	
2005**	0	245	59	6	15	485	245	0.28	14.66	24	0	0.05	0.05	0	8.63	1.74	13	45	37	287	
MIN	0	196	53	6	9	425	215	0.22	10.27	20	0	0.05	0.05	0	8.48	1.25	8	33	23	237	
MAX	0	193	46	5	6	222	206	0.11	4.73	19	0	0.01	0.01	0	8.25	1.16	7	27	6	200	
MEAN	0	193	58	5	14	525	250	0.70	7.01	26	0	0.03	0.03	0	8.56	1.96	13	51	17	321	
2004**	0	216	53	5	9	395	221	0.29	6.20	22	0	0.02	0.02	0	8.42	1.54	10	37	11	250	
MIN	0	195	45	8	5	358	178	0.20	10.65	16	0	0	0	0	8.40	1	7	20	17	153	
MAX	0	232	52	8	11	461	216	2.10	13.62	21	0	0.01	0.01	0	8.58	1	10	38	143	276	
MEAN	0	217	49	8	8	413	199	0.83	11.86	19	0	0.01	0.01	0	8.46	1	9	30	63	230	
2003**	126	170	43	5	5	348	153	0.10	8.20	11	0	0	0	0	8.43	1	5	14	7	196	
MIN	400	265	58	5	15	574	248	0.50	8.20	25	0	0	0	0	8.61	2	15	45	37	290	
MAX	218	220	50	5	10	459	201	0.30	8.20	19	0	0	0	0	8.52	2	9	30	21	243	
MEAN	176	254	41	6	3	304	148	0.20	5.40	11	0	0	0	0	8.28	1	2	10	10	168	
MIN	0	126	32.7	0.0	1.0	210	118	0.01	3.8	9	0	0.00	0.00	0	7.10	0.01	1.00	2.0	0.00	134	
MAX	400	400	102.6	38.0	45.0	701	392	13.30	15.1	44.70	0.25	7.0	0.30	7.0	8.90	5.00	55.00	130.0	969.00	467	
MEAN	4.4	213.7	56.5	4.5	11.9	412.12	221.49	0.48	8.7	19.54	0.07	0.05	0.05	2.0	8.40	1.34	8.09	32.0	31.35	240	
No. of Analytes	119	119	119	80	118	129	119	108	120	119	69	83	119	83	65	129	101	119	119	121	129

HISTORICAL 1999-2011

\* Quality parameters are reported as mg/l unless otherwise noted.  
\*\* Data: Database input restricted to values greater than the boundary minimum detection limit.

TABLE 12: HUNTINGTON CREEK WATER QUALITY \*  
 HCC02 - @ POWER PLANT (BELOW DEER CREEK CONFLUENCE)

2012** SAMPLE DATES	ALKALINITY		CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umho/cm)	DISSOLVED OXYGEN	HARDNESS	IRON		MANGANESE	MAGNESIUM	POTASSIUM	SODIUM	SULFATE	TSS	TDS
	ACTIVITY	BICARBONATE							TOTAL	DISSOLVED							
20120313	0	205	62	11	23	571	0	268	0	0	0	27	2	20	51	47	323
20120614	0	171	54	0	7	388	0	203	0	0	0	17	1	8	24	19	226
20120910	0	183	55	0	9	427	0	214	1	0	0	19	2	9	30	119	257
20121204	0	209	58	31	29	711	0	303	0	0	0	39	4	37	96	0	399
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
2011**																	
MIN	0.0	148.0	49.3	0.0	6.0	332.0	0.0	172.0	0.2	0.0	0.0	11.9	0.8	5.3	13.0	0.0	###
MAX	0.0	251.0	70.6	19.0	18.0	660.0	0.0	331.0	1.3	0.0	0.0	37.6	2.9	21.7	82.0	98.0	###
MEAN	0.0	184.5	58.1	4.8	11.8	464.5	0.0	237.0	0.4	0.0	0.0	22.3	1.7	11.9	41.0	33.0	###
2010**																	
MIN	0	150	47	0	4	326	8.70	170	0.09	0.00	0.00	12	0.80	4	14	6	194
MAX	0	221	59	21	36	687	10.90	291	1.62	0.00	0.00	35	3.54	36	85	134	414
MEAN	0	185	53	5	17	496.5	9.65	226	0.52	0.00	0.00	23	2.11	18	48	45	293
2009**																	
MIN	0	155	47	0	7	370	8	194	0	0	0	15	1	6	22	10	229
MAX	0	227	64	9	33	686	9	306	0	0	0	35	3	28	78	17	422
MEAN	0	189	56	2	17	516	8	246	0	0	0	26	2	16	53	14	319
2008**																	
MIN		227	64	9	33	686	9.20	306	4.00	0.12	0.00	35	0.92	28	78	17	422
MAX		144	43	4	15	393.875	7.42	187.4375	1.14	0.00	1.00	20	4.00	13	39	11	243
2007**																	
MIN		158	48	10	5	412	10.15	185	0.14	0.01	0.01	16	1	4	19	8	192
MAX		215	61	10	22	681	14.04	270	0.24	0.03	0.03	29	2	19	66	15	330
MEAN		187	55	10	12	514.75	11.83	228.5	0.19	0.02	0.02	22	2	10	40	11	261
2006**																	
MIN		157	47	6	6	400	11.50	179	0.10	0.00	0.00	15	1	5	20	8	215
MAX		235	73	76	27	899	14.31	332	11.93	0.01	0.01	36	2	51	86	1420	498
MEAN		200	61	27	27	596.5	13.31	258.25	3.10	0.01	0.01	25	1	20	48	363	318
2005**																	
MIN		164	43	5	4	372	9.49	182	0.08	0.01	0.01	15	1	5	17	8	223
MAX		220	63	5	32	674	14.78	284	0.38	0.05	0.05	31	2	29	73	37	389
MEAN		194	56	5	14	498	11.79	229.75	0.23	0.02	0.02	22	2	14	41	26	289
2004**																	
MIN		153	45	6	6	336	5.61	177	0.15	0.01	0.01	16	1	5	18	12	166
MAX		226	58	6	51	609	14.61	248	0.57	0.02	0.02	25	2	32	47	41	368
MEAN		192	53	6	20	463.5	10.25	217.25	0.34	0.01	0.01	20	1	15	35	26	265
2003**																	
MIN		221	47	5	7	422	4.70	212	0.11	0.01	0.01	19	1	8	28	7	213
MAX		251	56	7	19	634	6.96	250	0.78	0.02	0.02	26	2	16	53	50	318
MEAN		234	53	6	13	511.25	6.22	226.5	0.31	0.02	0.02	23	2	12	39	21	258
2002**																	
MIN		198	44	5	6	369	10.08	180	0.20	0.01	0.01	17	1	8	22	16	172
MAX		248	53	6	16	569	13.84	227	1.60	0.02	0.02	23	2	14	43	128	300
MEAN		226	49	6	11	457.25	11.88	204.75	0.75	0.01	0.01	20	1	11	33	79	251
2001**																	
MIN		172	44	8	6	364	8.20	159	0.10	0.05	0.05	12	2	6	16	9	200
MAX		284	59	8	32	642	8.20	259	0.60	0.05	0.05	27	2	23	52	33	338
MEAN		226	50	8	19	507	8.20	207.75	0.37	0.05	0.05	20	2	14	35	21	268
2000**																	
MIN		175	41	5	5	316	5.90	148	0.10	0.01	0.01	11	1	3	14	15	169
MAX		279	60	5	34	587	11.90	261	0.20	0.02	0.02	27	2	22	65	27	339
MEAN		226	50	5	17	456	10.03	206.5	0.17	0.01	0.01	20	2	12	36	21	257
HISTORICAL 1990-2011																	
MIN		148	32	0	1	210	3.8	129	0.01	0	0	8	0.01	1	4	0	161
MAX		310	91.7	37	76	899	15	448	11.93	0.21	0.1	39.9	5	51.2	150	1420	498
MEAN		217.2	57.9	4.5	15.3	452.1	8.6	233.6	0.5	0.1	0.1	21.2	1.7	11.2	40.4	36.6	###
No. of Analysis	66	114	114	81	113	124	119	114	106	65	77	114	95	114	114	118	124

\* Quality parameters are reported as mg/l unless otherwise noted.  
 \*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 13: HUNTINGTON CREEK WATER QUALITY \*  
HCC04 - @ RESEARCH FARM

2012** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umho/cm)	DISSOLVED OXYGEN	HARDNESS	IRON		MAGNESIUM	MANGANESE		OIL & GREASE		PH (nd/ho)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
								TOTAL	DISSOLVED		GREASE	PH								
20120313	0	208	63	8	22	573	269	0	0	27	0.01	0	0	8.53	2.04	20	55	28	315	
20120614	0	172	53	0	8	392	200	0	0	17	0.00	0	0	8.57	1.21	8	26	16	229	
20120910	0	181	56	0	11	446	220	1	0	19	0.05	0	0	8.62	1.75	9	32	136	251	
20121204	0	212	61	26	36	745	321	0	0	41	0.02	0	0	8.45	4.01	39	108	0	409	
No. of Analytes																				
2011**																				
MIN	150.0	49.6	0.0	6.0	335.0	0.0	174.0	0.1	0.0	12.1	0.0	0.0	0.0	8.4	0.8	5.6	14.0	7.0	198.0	
MAX	257.0	74.1	0.0	27.0	685.0	0.0	339.0	1.2	0.0	37.5	0.0	0.0	0.0	8.6	2.6	24.1	83.0	98.0	415.0	
MEAN	0.0	192.3	0.0	15.8	482.5	0.0	241.0	0.5	0.0	22.8	0.0	0.0	0.0	8.5	1.6	13.4	43.8	42.5	284.5	
MIN	172	48	0	4	327	8.70	167	0.08	0.00	12	0.00	0.00	0.00	8.45	0.82	5	15	7	188	
MAX	212	59	26	37	690	10.80	291	1.78	0.00	35	0.00	0.00	0.00	8.61	3.36	36	88	142	411	
MEAN	193	52	7	18	501.25	9.63	223.75	0.55	0.00	23	0.00	0.00	0.00	8.54	2.00	18	51	48	297	
2009**																				
MIN	149	47	0	7	376	8	197	0	0	16	0	0	0	8	1	6	23	5	234	
MAX	226	67	13	45	737	9	325	0	0	38	0	0	0	9	3	34	95	21	450	
MEAN	187	57	7	24	536	9	258	0	0	28	0	0	0	9	2	21	61	13	341	
2008**																				
MIN	226	67	0	45	737	9.20	325	0.00	0.00	38	0.00	0.00	0.00	8.60	0.92	34	95	21	450	
MAX	142	44	20	20	418.1875	7.47	195.875	1.10	0.00	21	1.00	1.00	1.00	7.38	2.48	16	46	11	237	
MEAN	161	49	7	7	428	10.18	189	0.15	0.00	16	0.01	0.01	0.01	8.31	1	6	23	8	208	
MIN	212	62	25	25	700	13.79	279	0.26	0.20	31	0.03	0.03	0.03	8.59	3	22	73	38	370	
MAX	187	56.5	15.0	15.0	536.25	11.99	235.75	0.20	0.20	22.99	0.02	0.02	0.02	8.44	1.60	12.36	45.8	19.0	283.3	
MEAN	159	48	8	8	420	11.58	184	0.12	0.12	16	0.01	0.01	0.01	8.02	1	7	25	6	215	
MIN	235	78	104	104	1036	14.59	366	16.43	0.46	42	0.01	0.01	0.01	8.50	3	70	109	1370	589	
MAX	199	63	38	38	663	13.52	274	4.46	0.25	28	0.01	0.01	0.01	8.33	2	27	61	358	351	
MEAN	163	48	4	4	378	9.07	186	0.10	0.10	15	0.00	0.00	0.00	8.06	1	5	19	38	225	
MIN	215	68	48	48	784	12.69	312	0.42	0.42	35	0.05	0.05	0.05	8.47	2	34	97	57	459	
MAX	191	59	21	21	545	10.34	244	0.26	0.26	24	0.02	0.02	0.02	8.32	1	16	53	45	323	
MEAN	153	45	7	7	360	5.46	179	0.11	0.11	16	0.02	0.02	0.02	8.41	1	7	22	15	205	
MIN	248	60	7	7	640	14.64	262	0.46	0.46	27	0.03	0.03	0.03	8.61	2	33	65	40	384	
MAX	198	55	7	7	493	10.25	226	0.25	0.25	22	0.02	0.02	0.02	8.49	1	16	44	24	287	
MEAN	211	49	5	5	444	4.65	218	0.11	0.01	20	0.01	0.01	0.01	8.34	1	10	34	7	282	
MIN	251	61	6	6	638	7.07	282	0.84	0.01	32	0.03	0.03	0.03	8.57	2	26	79	56	377	
MAX	233	56	6	6	530	6.28	244	0.34	0.01	26	0.02	0.02	0.02	8.49	2	18	56	25	307	
MEAN	196	44	6	6	397	10.24	184	0.20	0.20	18	0.01	0.01	0.01	8.41	1	10	25	17	197	
MIN	240	57	8	8	722	13.60	254	1.60	0.63	27	0.03	0.03	0.03	8.59	2	21	70	103	343	
MAX	224	51	7	7	524	11.89	220	0.63	0.63	23	0.01	0.01	0.01	8.50	1	15	47	55	289	
MEAN	181	46	5	5	382	8.30	168	0.10	0.10	13	0.00	0.00	0.00	8.36	2	8	20	8	197	
MIN	294	67	5	5	727	8.30	303	0.30	0.20	33	0.03	0.03	0.03	8.59	2	35	87	29	432	
MAX	232	54	5	5	556	8.30	227	0.20	0.20	23	0.02	0.02	0.02	8.46	2	20	50	18	298	
MEAN	175	42	8	8	328	6.50	4	0.20	0.20	12	0.00	0.00	0.00	8.35	2	3	17	10	187	
MIN	268	61	8	8	640	11.80	268	0.20	0.20	29	0.03	0.03	0.03	8.45	2	23	74	31	371	
MAX	225	52	8	8	484	9.80	173	0.20	0.20	21	0.02	0.02	0.02	8.38	2	13	45	21	276	
MEAN	96	35.3	0.0	2.0	220	4.2	145	0.00	0.00	9.90	0.000	0.000	0.000	7.35	0.01	2.00	9.0	0.00	170	
MIN	326	108.1	44.0	104.0	1036	14.7	347	16.43	0.37	42.00	0.30	0.30	0.30	8.94	10.70	69.0	170.0	1370.00	589	
MAX	219	59.4	5.0	19.6	486.3	8.5	299.0	0.57	0.08	23.09	0.05	0.05	0.05	8.42	1.76	14.47	53.9	38.08	293.9	
MEAN	125	125	89	125	142	138	124	113	75	125	85	66	66	143	107	125	125	125	136	
No. of Analytes																				

HISTORICAL 1998-2011

\* Quality parameters are reported as mg/l unless otherwise noted.  
\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 14: DEER CREEK SURFACE WATER QUALITY \*  
DCR01 - ABOVE THE MINE

2012** SAMPLE DATES	ACIDITY		ALKALINITY		CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY		HARDNESS	IRON		IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE		PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
	2	2	2	2				(umhos/cm)	2		2	2				2	2						
<b>2011**</b>																							
No. of Analysis	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
MIN	0	249	42.93	0	5	574	243	0	0	25.43	0	0	8.33	0.85	27.21	29	0	320					
MAX	0	252	63	24	5	589	262	0.18	0	32.92	0	0	8.55	0.99	38.62	50	26	325					
MEAN	0	250.5	52.965	12	5	581.5	252.5	0.09	0	29.175	0	0	8.44	0.92	32.915	39.5	13	322.5					
NO SAMPLES DURING 2010																							
NO SAMPLES DURING 2009																							
<b>2008**</b>																							
MIN	0	205	39.54	18	4	529	207	0	0	26.31	0	na	8.71	0.96	32.66	34	0	268					
MAX	0	205	39.54	18	4	529	207	0	0	26.31	0	na	8.71	0.96	32.66	34	0	268					
MEAN	0	205	39.54	18	4	529	207	0	0	26.31	0	na	8.71	0.96	32.66	34	0	268					
NO SAMPLES DURING 2007																							
<b>2006**</b>																							
MIN	238	43	538	223	6	538	223	0.06	0	28	0	0	8.39	1	30	35	15	279					
MAX	283	49	720	259	8	720	259	0.06	0	33	0	0	8.59	1	47	68	15	406					
MEAN	261	46	629	241	7	629	241	0.06	0	31	0	0	8.49	1	39	52	15	343					
<b>2005**</b>																							
MIN	258	49	567	268	5	567	268	0.23	0	31	0	0	8.18	1	30	37	27	328					
MAX	278	56	702	268	7	702	268	0.23	0	35	0	0	8.46	1	61	63	27	403					
MEAN	268	53	635	268	6	635	268	0.23	0	33	0	0	8.32	1	45	50	27	366					
<b>2004**</b>																							
MIN	244	43	505	213	4	505	213	0.20	0	26	0	0	8.32	1	33	34	11	314					
MAX	244	43	505	213	4	505	213	0.20	0	26	0	0	8.32	1	33	34	11	314					
MEAN	244	43	505	213	4	505	213	0.20	0	26	0	0	8.32	1	33	34	11	314					
NO FLOW DURING 2003																							
NO FLOW DURING 2002																							
<b>2001**</b>																							
MIN	317	41	620	222	5	620	222	0.20	0	26	0	0	8.30	1	31	41	35	307					
MAX	321	46	662	226	7	662	226	0.20	0	30	0	0	8.72	1	45	63	35	366					
MEAN	319	44	641	224	6	641	224	0.20	0	28	0	0	8.51	1	38	52	35	337					
<b>2000**</b>																							
MIN	307	39	547	218	4	547	218	0.20	0	28	0	0	8.45	1	42	46	6	329					
MAX	325	41	615	233	6	615	233	0.20	0	33	0	0	8.48	1	48	74	6	378					
MEAN	316	40	581	226	5	581	226	0.20	0	31	0	0	8.47	1	45	60	6	354					
<b>HISTORICAL 1978-2011</b>																							
MIN	137.0	107.2	1580	599.00	176.0	1580	599.00	40.10	0.4	83.90	0.24	5.00	8.8	4.33	111.6	255	3592	897					
MAX	0.0	2.2	360	193.00	3.5	360	193.00	0.00	0.0	19.30	0.00	0.00	7.0	0.01	13.4	10	0	291					
MEAN	10.1	53.3	594.2	274.74	16.2	594.2	274.74	0.78	0.1	33.79	0.04	1.09	8.1	1.20	33.8	59.4	89.85	345.56					
No. of Analysis	29	47	87	47	48	87	47	77	23	47	69	27	88	37	47	49	80	88					

\* Quality parameters are reported as mg/l unless otherwise noted.  
\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 15: DEER CREEK SURFACE WATER QUALITY \*  
DCR06 - BELOW THE MINE

2012** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MANGANESE	OIL & GREASE	PH (unit)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20120313	0	264	58	5	117	1075	353	0	0	50	0	8	6	90	108	0	606
20120612	0	252	48	0	40	852	323	0	0	49	0	9	7	60	139	0	499
20120910	0	230	49	14	33	802	318	0	0	48	0	9	6	67	130	0	481
20121204	0	240	52	47	46	888	327	0	0	48	0	9	8	67	126	0	494
No. of Analytes	4	4	4	4	4	4	0	4	4	4	4	4	4	4	4	4	4
2011**																	
MIN	0	244	51	0	30	805	323	0	0	42	0	8	5	48	105	0	459
MAX	0	263	63	24	104	1127	386	0	0	56	0	9	8	101	199	25	712
MEAN	0	255	59	6	57	913	354	0	0	50	0	9	6	64	145	15.5	548.25
2010**																	
MIN	0	251	49.1	0.0	40	894	315	0	0	44	0	9	8	62	151	0	555
MAX	0	277	58.6	33.0	103	1169	367	0	0	54	0	9	10	110	175	11	686
MEAN	0	266	54.9	10.8	62	1000	338	0	0	49	0	9	9	81	164	4	610
2009**																	
MIN	0	245	51	0	38	860	326	0	0	48	0	8	5	57	115	0	510
MAX	0	368	70	12	107	1142	413	0	0	62	0	9	9	91	211	22	707
MEAN	0	285	60	3	63	982	379	0	0	56	0	8	7	68	157	12	598
2008**																	
MIN	0	229	50	0	45	827	325	0	0	4	0	4	4	4	4	4	4
MAX	0	267	63	26	149	1279	387	0	0	49	0	8	5	50	93	0	466
MEAN	0	247	56	12	90	1027	350	0	0	51	0	9	7	74	151	7	744
2007**																	
MIN	0	243	54	0	30	871	332	0	0	46	0	8	5	39	74	71	431
MAX	0	276	66	6	79	988	371	1	1	50	0	9	7	64	126	71	540
MEAN	0	265	62	6	51	951	353	1	1	48	0	8	6	47	96	71	486
2006**																	
MIN	0	235	49	0	65	937	281	0	0	39	0	2	2	62	71	5	510
MAX	0	289	75	0	409	2255	406	0	0	57	0	6	6	275	113	25	1172
MEAN	0	257	60	0	179	1344	350	0	0	48	0	4	4	127	96	12	703
2005**																	
MIN	0	246	43	0	45	720	278	0	0	37	0	2	2	46	59	32	429
MAX	0	267	65	0	209	1472	375	0	0	51	0	6	6	136	109	56	791
MEAN	0	257	53	0	89	969	315	0	0	45	0	4	4	70	85	44	543
2004**																	
MIN	0	247	48	6	62	799	307	0	0	0	0	4	4	49	85	102	445
MAX	0	343	63	7	431	1876	351	4	4	0	0	6	6	254	101	216	1042
MEAN	0	278	54	7	196	1196	326	1	1	0	0	5	5	122	92	159	662
2003**																	
MIN	10	256	52.8	6	94	435	340	0.03	0.03	48	0	8.46	5.01	69	102	12	511
MAX	10	371	57.8	17	136	969	358	0.12	0.12	52	0	8.63	5.63	91	110	12	602
MEAN	10	316	55.8	10	109	780	348	0.07	0.07	51	0	8.57	5.35	77	106	12	563
2002**																	
MIN	0	266	41.0	0	49	735	279	0.20	0.20	43	0	8.50	5.00	48	87	6	400
MAX	0	338	53.0	322	93	932	322	0.20	0.20	46	0	8.66	5.00	68	112	6	559
MEAN	0	303	49.0	73	73	860	306	0.20	0.20	45	0	8.56	5.00	59	98	6	501
2001**																	
MIN	0	298	47.0	0	39	777	261	0.10	0.10	35	0	8.40	2.00	36	77	6	452
MAX	0	327	68.0	177	177	1364	396	0.10	0.10	55	0	8.65	5.00	137	136	9	779
MEAN	0	309	55.0	101	101	1015	320	0.10	0.10	44	0	8.50	4.00	80	108	8	565
2000**																	
MIN	0	286	51.0	0	59	858	309	0.10	0.10	44	0	8.19	5.00	50	99	5	494
MAX	0	332	65.0	0	77	945	389	0.70	0.70	55	0	8.41	6.00	57	161	63	551
MEAN	0	313	56.3	6	68	889	341	0.40	0.40	49	0	8.31	5.33	53	128	25	520
HISTORICAL 1978-2011																	
MIN	0.0	162	2.4	0.0	5.0	420	243.00	0.00	0.00	27.14	0.00	6.92	1.00	28.13	59.00	0.00	273.00
MAX	90.0	456	191.9	38.0	1112.0	4590	990.00	170.00	1.22	124.00	9.00	8.94	10.30	758.00	610.00	20540.00	2460.00
MEAN	5.1	301.2	71.7	5.6	99.3	1026.9	398.98	1.52	0.10	52.48	1.22	8.29	5.08	82.06	162.13	183.15	623.74
No. of Analytes	70	116	116	88	118	163	116	137	63	116	70	163	116	116	118	144	163

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database Input restricted to values greater than laboratory minimum detection limit.

TABLE 16: MEETINGHOUSE CANYON WATER QUALITY \*

MHC01 - LEFT FORK

2012** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umho/cm)	HARDNESS	IRON		MAGNESIUM	MANGANESE	OIL & GREASE	PH (min)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
								TOTAL	DISSOLVED									
No. of Analysis																		
2011**																		
MIN	0	207	43	0	4	487	250	0	0	24	0	0	9	1	8	33	17	266
MAX	0	225	60	0	4	502	253	1	0	35	0	0	9	1	11	42	72	281
MEAN	0	216	52	0	4	495	252	0	0	29	0	0	9	1	10	38	45	274
NO FLOW DURING 2010																		
NO FLOW DURING 2009																		
2008**																		
MIN		183	36.18		3.0	451	208	0.72		28.53			8.62	1.13	9.8	22	25	249
MAX		183	36.18		3.0	451	208	0.72		28.53			8.62	1.13	9.8	22	25	249
MEAN		183	36.18		3.0	451	208	0.72		28.53			8.62	1.13	9.8	22	25	249
2007**																		
MIN		191	37		4.0	485	221	0.33		31.60			8.39	0.90	10.0	28	31	223
MAX		191	37		4.0	485	221	0.33		31.60			8.39	0.90	10.0	28	31	223
MEAN		191	36.5		4.0	485	221	0.33		31.60			8.39	0.90	10.0	28.0	31.0	223
2006**																		
MIN		199	42		5.0	437	219	0.07		27.40			8.37	0.93	8.2	26	22	222
MAX		207	43		5.0	498	229	0.14		29.41			8.59	1.05	10.5	30	22	262
MEAN		203	43		5.0	468	224	0.11		28.41			8.48	0.99	9.4	28	22	242
2005**																		
MIN		204	41		4.0	446	237	0.40		30.80	0.006		8.41	0.94	8.9	33		261
MAX		215	51		5.0	532	255	0.56		32.80	0.012		8.56	1.21	11.6	42		301
MEAN		210	46		4.5	489	246	0.48		31.80	0.009		8.49	1.08	10.2	38		281
2004**																		
MIN		210	49		3.0	420	221	0.10		23.90	0.007		8.40	0.71	6.5	18		264
MAX		210	49		3.0	420	221	0.10		23.90	0.007		8.40	0.71	6.5	18		264
MEAN		210	49		3.0	420	221	0.10		23.90	0.007		8.40	0.71	6.5	18		264
2003**																		
NO FLOW DURING 2003																		
NO FLOW DURING 2002																		
2001**																		
MIN		236	34	5	3.2	438	200	0.30		27.00			8.56		9.0	28	7	257
MAX		240	40	8	3.6	517	211	0.30		28.00			8.71		11.0	31	29	265
MEAN		238	37	7	3.4	478	206	0.30		27.50			8.64		10.0	30	18	261
2000**																		
MIN		241	34	5	3.0	395	199	0.40		26.00			8.29	1.00	7.0	20	50	212
MAX		262	37	5	3.0	398	204	1.20		29.00			8.47	1.00	11.0	24	66	239
MEAN		252	36	5	3.0	397	202	0.80		27.50			8.38	1.00	9.0	22	58	226
HISTORICAL 1986-2011																		
MIN	0.0	183	2.2	0.0	1.0	300	175.00	0.02	0.00	17.200	0.0	0.00	7.03	0.01	3.8	8.00	0.1	183
MAX	49.0	307	80.4	34.0	47.5	557	350.00	1.20	0.30	36.50	0.1	10.90	8.81	1.62	14.0	100.00	175	304
MEAN	6.6	235	44.7	6.0	6.8	425	229.33	0.28	0.08	27.30	0.0	1.58	8.26	0.94	8.6	31.12	31	245.83
No. of Analysis																		
		24	44	36	44	44	44	41	25	44	26	24	44	35	44	44	41	44

\* Quality parameters are reported as mg/l unless otherwise noted.  
 \*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 17: MILL FORK CANYON WATER QUALITY \*  
MFU3 - ABOVE MILL FORK FAULT

2012** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE FH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
No. of Analytes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011**																	
MIN	0	207	63	0	5	427	235	4	0	19	0	0	1	6	16	1804	258
MAX	0	219	63	0	5	482	259	4	0	27	0	0	1	8	32	1804	259
MEAN	0	213	61	0	4	455	247	2	0	23	0	0	1	7	24	902	259
2010**																	
MIN	0	191	54.75	0	2	393	206.00	4	0.00	16.90	0	0.00	0.86	6	15	409	221
MAX	0	191	54.75	0	2	393	206.00	4	0.00	16.90	0	0.00	0.86	6	15	409	221
MEAN	0	191	54.75	0	2	393	206.00	4	0.00	16.90	0	0.00	0.86	6	15	409	221
2009**																	
MIN	0	209	62.60	9	2	453	251.00	0	0.00	23.11	0	0.00	0.98	6	23	0	261
MAX	0	209	62.60	9	2	453	251.00	0	0.00	23.11	0	0.00	0.98	6	23	0	261
MEAN	0	209	62.60	9	2	453	251.00	0	0.00	23.11	0	0.00	0.98	6	23	0	261
2008**																	
MIN	0.0	162	60.72	37	2	428	233	0.37	0	19.69	0.01	0	0.78	4.11	15	53	234
MAX	0.0	162	60.72	37	2	428	233	0.37	0	19.69	0.01	0	0.78	4.11	15	53	234
MEAN	0.0	162	60.72	37	2	428	233	0.37	0	19.69	0.01	0	0.78	4.11	15	53	234
2007**																	
No Flow During 2007																	
2006**																	
MIN		221	61.80		3	468	246	0.08		22.30		8.33	1	4.72	20	9	275
MAX		221	61.80		3	468	246	0.08		22.30		8.33	1	4.72	20	9	275
MEAN		221	61.80		3	468	246	0.08		22.30		8.33	1	4.72	20	9	275
2005**																	
MIN		187	64.20	20	2	431	240	0.22		19.40	0	8.46	1	4.35	17	50	247
MAX		187	64.20	20	2	431	240	0.22		19.40	0	8.46	1	4.35	17	50	247
MEAN		187	64.20	20	2	431	240	0.22		19.40	0	8.46	1	4.35	17	50	247
2004**																	
MIN		222	54.20		2	436	224	0.11		21.60		8.35	1	4.67	22	227	227
MAX		222	54.20		2	436	224	0.11		21.60		8.35	1	4.67	22	227	227
MEAN		222	54.20		2	436	224	0.11		21.60		8.35	1	4.67	22	227	227
2003**																	
MIN		251	61.40	7	3	455	241	0.10		21.40		8.38	1	4.79	23	272	272
MAX		251	61.40	7	3	455	241	0.10		21.40		8.38	1	4.79	23	272	272
MEAN		251	61.40	7	3	455	241	0.10		21.40		8.38	1	4.79	23	272	272
2002**																	
NO FLOW DURING 2002																	
2001**																	
NO FLOW DURING 2001																	
2000**																	
NO FLOW DURING 2000																	
HISTORICAL 1986-2011																	
MIN	0.0	162	54.2	7.0	2.0	428	224.00	0.08	0.000	19.4	0.00	0.00	1	4	15	9	227
MAX	0.0	251	64.2	37.0	3.0	468	246.00	0.37	0.000	22.3	0.00	0.00	1	5	23	53	275
MEAN	0.0	209	60.5	21.3	2.4	443.6	236.80	0.18	0.000	20.9	0.00	0.00	0.8	4.53	19.4	37.333	251
No. of Analytes	3	7	7	5	7	7	7	7	3	7	4	3	7	7	7	5	7

\* Quality parameters are reported as mg/l unless otherwise noted.  
\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

**TABLE 18: MILL FORK CANYON WATER QUALITY \***  
**MFAL - ABOVE MINE**

2012** SAMPLE DATES	ALKALINITY		CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON		MAGNESIUM	MANGANESE	OIL & GREASE		PH (umbs)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
	ACIDITY	BICARBONATE						TOTAL	DISSOLVED			GREASE	PH						
No Flow During 2012																			
No. of Analysis																			
<b>2011**</b>																			
MIN	0	206	54.73	0	2	427	231	0	0	18.49	0	0	0	8.42	0.73	6.17	16	0	253
MAX	0	210	61.86	0	2	468	247	13.41	0	26.71	0	0	0	8.5	0.99	7.4	32	1426	256
MEAN	0	208	58.295	0	2	447.5	239	6.705	0	22.6	0	0	0	8.46	0.86	6.785	24	713	254.5
<b>2010**</b>																			
MIN	0	191	54.76	0	2	387	206	3.29	0	16.82	0	0	0	8.56	0.85	5.89	15	379	226
MAX	0	191	54.76	0	2	387	206	3.29	0	16.82	0	0	0	8.56	0.85	5.89	15	379	226
MEAN	0	191	54.76	0	2	387	206	3.29	0	16.82	0	0	0	8.56	0.85	5.89	15	379	226
<b>2009**</b>																			
MIN	0.0	206	61.23	10	2	443	246.00	0	0.00	23	0	0.00	0	8.61	0.96	6	23	8	264
MAX	0.0	206	61.23	10	2	443	246.00	0	0.00	23	0	0.00	0	8.61	0.96	6	23	8	264
MEAN	0.0	206	61.23	10	2	443	246.00	0	0.00	23	0	0.00	0	8.61	0.96	6	23	8	264
<b>2008**</b>																			
MIN		162	60.59	36	2	433	233	0.40		19.78				8.52	0.78	4.20	15	26	227
MAX		162	60.59	36	2	433	233	0.40		19.78				8.52	0.78	4.20	15	26	227
MEAN		162	60.59	36	2	433	233	0.40		19.78				8.52	0.78	4.20	15	26	227
<b>2007**</b>																			
MIN	No Flow During 2007																		
MAX	No Flow During 2007																		
MEAN	No Flow During 2007																		
<b>2006**</b>																			
MIN	220		63		3	463	251	0.08		23				8.47		4.84	20	12	265
MAX	220		63		3	463	251	0.08		23				8.47		4.84	20	12	265
MEAN	220		63		3	463	251	0.08		23				8.47		4.84	20	12	265
<b>2005**</b>																			
MIN	190		62	17	2	429	239	0.54		21	0			8.51		4.51	17	43	245
MAX	190		62	17	2	429	239	0.54		21	0			8.51		4.51	17	43	245
MEAN	190		62	17	2	429	239	0.54		21	0			8.51		4.51	17	43	245
<b>2004**</b>																			
MIN	215		54		2	436	223			22				8.54		4.77	23	5	219
MAX	215		54		2	436	223			22				8.54		4.77	23	5	219
MEAN	215		54		2	436	223			22				8.54		4.77	23	5	219
<b>2003**</b>																			
MIN	275		61	6	3	451	243	0.07		22				8.45		4.60	23	4	262
MAX	275		61	6	3	451	243	0.07		22				8.45		4.60	23	4	262
MEAN	275		61	6	3	451	243	0.07		22				8.45		4.60	23	4	262
<b>2002**</b>																			
MIN	NO FLOW DURING 2002																		
MAX	NO FLOW DURING 2002																		
MEAN	NO FLOW DURING 2002																		
<b>2001**</b>																			
MIN	NO FLOW DURING 2001																		
MAX	NO FLOW DURING 2001																		
MEAN	NO FLOW DURING 2001																		
<b>2000**</b>																			
MIN	NO FLOW DURING 2000																		
MAX	NO FLOW DURING 2000																		
MEAN	NO FLOW DURING 2000																		
<b>HISTORICAL 1996-2011</b>																			
MIN	0.0	153	32.0	5.0	2.0	180	208	0.06	0.0	13.0	0.00	0.00	0.00	8	1	1	12	1	176
MAX	0.0	400	82.0	36.0	24.0	813	462	3.03	0.5	73.0	0.00	0.00	0.00	9	3	24	223	342	710
MEAN	0.0	273	57.7	13.7	9.4	514.3	298.1	0.59	0.2	37.5	0.00	0.00	0.00	8.2	1.66	9.7	61.6	44.3	334.9
No. of Analysis	3	26	27	7	26	27	27	21	5	27	3	3	3	28	24	27	27	25	27

\* Quality parameters are reported as mg/l unless otherwise noted.  
\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 19: MILL FORK CANYON WATER QUALITY \*  
MF82 - BELOW MINE

2012** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
NO FLOW DURING 2012																		
No. of Analysis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011**																		
MIN	0	217	63	0	2	441	239	18	0	20	0	0	8	1	6	19	1872	266
MAX	0	217	63	0	2	441	239	18	0	20	0	0	8	1	6	19	1872	266
MEAN	0	217	63	0	2	441	239	18	0	20	0	0	8	1	6	19	1872	266
2010**																		
MIN	0	203	55	0	2	414	219	0	0	20	0	0	9	1	7	22	0	258
MAX	0	272	64	22	9	732	399	4	0	58	0	0	9	3	15	104	416	432
MEAN	0	238	60	11	6	573	309	2	0	39	0	0	9	2	11	63	208	345
2009**																		
MIN	0	267	59	0	6	628	347	0	0	43	0	0	9	2	12	70	0	357
MAX	0	269	67	0	10	759	408	0	0	63	0	0	9	3	15	117	18	473
MEAN	0	268	63	0	8	694	378	0	0	53	0	0	9	2	13	94	9	415
2008**																		
MIN	0	283	67	0	10	810	441	0	0	66	0	0	8	3	16	132	0	504
MAX	0	293	75	18	11	918	474	0	0	70	0	0	9	3	17	148	0	546
MEAN	0	288	71	9	11	864	458	0	0	68	0	0	8	3	17	140	0	525
2007**																		
MIN	0	315	70	0	11	956	438	0	0	64	0.003	0.003	8.13	2.32	17.40	124	7	561
MAX	0	351	82	14	14	1040	519	0	0	77	0.003	0.003	8.33	3.60	20.40	177	7	579
MEAN	0	336	77	9	12	984	487	0	0	71	0.003	0.003	8.23	2.94	19.23	154	7	571
2006**																		
MIN	0	251	66	0	5	564	296	0	0	32	0.002	0.002	8.41	1.29	7.06	39	17	324
MAX	0	332	77	0	12	924	447	0	0	62	0.002	0.002	8.43	2.58	16.98	132	17	497
MEAN	0	292	71	0	9	744	372	0	0	47	0.002	0.002	8.42	1.94	12.02	86	17	411
2005**																		
MIN	0	200	56	16	3	461	258	1	1	23	0.018	0.018	8.46	0.97	5.12	22	54	280
MAX	0	274	66	22	9	730	350	1	1	51	0.018	0.018	8.48	2.33	12.90	77	54	415
MEAN	0	237	61	19	6	596	304	1	1	37	0.018	0.018	8.47	1.65	9.01	50	54	348
2004**																		
MIN	0	279	58	10	10	654	327	0	0	44	0.027	0.027	8.49	1.88	10.60	67	338	
MAX	0	297	59	10	12	684	357	0	0	51	0.027	0.027	8.52	2.52	13.90	93	415	
MEAN	0	288	59	10	11	669	342	0	0	47	0.027	0.027	8.51	2.20	12.25	80	377	
2003**																		
MIN	0	354	71	9	14	715	375	0	0	48	0.027	0.027	8.41	2.20	12.20	86	415	
MAX	0	354	71	9	14	715	375	0	0	48	0.027	0.027	8.41	2.20	12.20	86	415	
MEAN	0	354	71	9	14	715	375	0	0	48	0.027	0.027	8.41	2.20	12.20	86	415	
2002**																		
NO FLOW DURING 2002																		
2001**																		
NO FLOW DURING 2001																		
2000**																		
NO FLOW DURING 2000																		
HISTORICAL 1986-2001																		
MIN	0.0	183	1.0	0.0	2.0	240	227.0	0.00	0	14.0	0.0	0.00	7.27	0.70	5	16	0	204
MAX	0.0	412	81.6	37.0	17.0	1040	519.0	0.97	10	81.1	0.0	0.00	8.90	5.20	20	177	64	579
MEAN	0.0	309	58.7	13.4	9.1	591.9	334.3	0.30	2.08	46.4	0.0	0.00	8.24	2.05	11.0	70.91	17.4	376.3
No. of Analysis	5	42	42	17	43	44	43	23	10	43	8	4	44	42	43	43	28	42

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Detritus input restricted to values greater than laboratory minimum detection limit.

**TABLE 20: RILDA CANYON SURFACE WATER QUALITY \***  
**RCF1 - RILDA CANYON FLUME - RIGHT FORK**

2012** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (unibs)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20120612	0	209	56	0	1	438	0	0	21	0	0	8	1	7	18	26	229
20120910	0	213	56	0	2	447	0	0	25	0	0	9	1	9	25	12	256
No. of Analysis	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2011** MIN	196	53	0	0	1	408	0	0	18	0	0	9	1	4	10	17	226
MAX	209	60	0	0	1	431	4	0	22	0	0	9	1	8	22	347	231
MEAN	203	56	0	0	1	420	2	0	20	0	0	9	1	6	16	182	228.5
2010** MIN	201	58	0	0	1	399	1	0	18	0	0	9	1	5	10	133	226
MAX	201	58	0	0	1	399	1	0	18	0	0	9	1	5	10	133	226
MEAN	201	58	0	0	1	399	1	0	18	0	0	9	1	5	10	133	226
2009** MIN	202	53	9	9	3	446	0	0	25	0	0	9	1	9	25	0	264
MAX	202	53	9	9	3	446	0	0	25	0	0	9	1	9	25	0	264
MEAN	202	53	9	9	3	446	0	0	25	0	0	9	1	9	25	0	264
2008** MIN	198	52	0	0	2	446	0	0	0	0	0	0	1	1	9	0	0
MAX	202	53	9	9	3	453	237	0	24	25	0	9	9	9	24	24	252
MEAN	200	53	5	3	3	450	119	0	12	13	0	4	5	5	16	126	126
2007** MIN	186	51	0	0	2	484	0.05	0.05	21.6	0.000	0.000	8.05	0.74	7.36	19	242	242
MAX	199	53	0	0	3	513	0.05	0.05	26.0	0.000	0.000	8.32	1.24	8.93	27	263	263
MEAN	193	52.4	0	0	2.5	498.5	0.05	0.05	23.8	0.000	0.000	8.19	0.99	8.15	23.0	252.5	252.5
2006** MIN	207	56	0	0	3	434	0.25	0.25	19.7	0	0	8.46	0.86	5.00	15	16	240
MAX	213	59	0	0	3	488	0.25	0.25	22.1	0	0	8.49	1.01	8.06	23	16	259
MEAN	210	58	0	0	3	461	0.25	0.25	20.9	0	0	8.48	0.94	6.53	19	16	250
2005** MIN	199	56	0	0	2	420	0.31	0.31	19.1	0	0	8.30	0.80	4.86	13	73	268
MAX	208	65	0	0	3	485	0.31	0.31	23.5	0	0	8.61	1.14	8.74	22	73	280
MEAN	204	60	0	0	3	453	0.31	0.31	21.3	0	0	8.46	0.97	6.80	18	73	274
2004** MIN	195	46	0	0	2	394	0.06	0.06	18.7	0	0	8.44	0.77	5.36	16	6	145
MAX	204	51	0	0	3	433	0.06	0.06	22.9	0	0	8.60	1.02	8.02	25	6	233
MEAN	200	48	0	0	3	414	0.06	0.06	20.8	0	0	8.52	0.90	6.69	21	6	189
2003** MIN	224	49	5	5	2	416	0.04	0.04	20.4	0	0	8.56	0.74	5.92	16	5	215
MAX	245	56	8	8	2	421	0.36	0.36	23.3	0	0	8.58	1.21	8.40	24	5	248
MEAN	235	52	7	7	2	419	0.30	0.30	21.9	0	0	8.57	0.98	7.16	20	5	232
2002** MIN	269	50	0	0	2	430	0.15	0.15	22.0	0	0	8.62	0.90	9.00	22	229	229
MAX	269	50	0	0	2	430	0.15	0.15	22.0	0	0	8.62	0.90	9.00	22	229	229
MEAN	269	50	0	0	2	430	0.15	0.15	22.0	0	0	8.62	0.90	9.00	22	229	229
2001** MIN	244	46	6	6	2	468	0.10	0.10	19.0	0	0	8.55	0.74	5.00	15	17	242
MAX	261	58	6	6	2	508	0.10	0.10	22.3	0	0	8.62	0.90	9.00	26	17	273
MEAN	253	52	6	6	2	488	0.10	0.10	20.5	0	0	8.59	0.74	7.00	21	17	258
2000** MIN	252	53	0	0	2	420	0.23	0.23	22.0	0	0	8	6.00	6.00	20	13	266
MAX	252	53	0	0	2	420	0.23	0.23	22.0	0	0	8	6.00	6.00	20	13	266
MEAN	252	53	0	0	2	420	0.23	0.23	22.0	0	0	8	6.00	6.00	20	13	266
HISTORICAL 1989-2011 MIN	177	46.0	0.0	1.0	300	195.00	0.0	0.0	17.54	0.00	0.00	7.8	0.0	3.78	1	0	145
MAX	329	108.6	27.0	15.0	513	384.00	3.9	1.2	30.00	0.14	5.00	8.9	10.0	24	80	347	292
MEAN	234	58.2	8.1	4.1	428.1	235.95	0.6	0.1	22.05	0.04	1.80	8.5	1.4	7.7	21.14324324	59.6	248.18
No. of Analysis	13	36	28	36	36	36	25	14	36	14	12	36	29	36	35	23	36

\* Quality parameters are reported as mg/l unless otherwise noted.  
 \*\* Data: Data base input restricted to values greater than laboratory minimum detection limit.

TABLE 21: RILDA CANYON SURFACE WATER QUALITY \*  
 RCF3 - RILDA CANYON FLUME - ABOVE NEWUA SPRINGS

2012** SAMPLE DATES	ACIDITY	ALKALINITY		CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umho/cm)	DISSOLVED OXYGEN	HARDNESS	IRON		MANGANESE	OIL & GREASE PH (units)		POTASSIUM	SODIUM	SULFATE	TSS	TDS
		BICARBONATE	CARBONATE							TOTAL	DISSOLVED		GREASE	PH					
20120313	0.0	350.0	101.0	0.0	10.0	7.5	521.0	495.0	0.1	0.0	59.1	0.0	8.0	2.9	26.0	159.0	0.0	556.0	
20120612	0.0	250.0	66.8	0.0	4.0	297.0	576.0	297.0	0.2	0.0	31.5	0.0	8.2	1.4	11.8	56.0	8.0	334.0	
20120910	0.0	332.0	94.5	0.0	9.0	465.0	882.0	465.0	0.2	0.0	55.7	0.0	8.1	2.8	23.2	143.0	0.0	550.0	
20121204	30.0	315.0	79.7	0.0	7.0	393.0	747.0	393.0	0.2	0.0	47.2	0.0	8.1	2.1	17.4	93.0	7.0	433.0	
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
<b>2011**</b>																			
MIN	0	212	59.9	0	2.0	8.70	423	228	0.16	0.00	19.14	0.00	7.95	0.80	4.79	13.0	0.0	258	
MAX	5	351	97.0	0	11.0	8.70	899	481	14.79	0.00	58.07	0.03	8.54	2.82	24.63	152.0	1786.0	573	
MEAN	1	287	79.9	0	7.0	8.70	702	373	3.86	0.00	42.22	0.02	8.19	1.97	16.74	95.0	448.0	436	
<b>2010**</b>																			
MIN	0	179	61	2	2.0	6.10	411	221	0.29	0.00	18.45	0.00	7.87	0.81	5.10	13.0	0.0	233	
MAX	20	378	115	10	11.0	10.20	922	510	1.37	0.00	62.65	0.04	8.56	3.10	26.36	157.0	100.0	592	
MEAN	10	322	97	8	7.3	8.80	765	419.75	0.65	0.02	48.58	0.02	8.14	2.42	19.78	111.3	34.0	488	
<b>2009**</b>																			
MIN	0	217	62	2	2	8	462	251	0	0	23	0	8	1	7	26	6	288	
MAX	15	374	108	10	10	9	1005	545	1	0	67	0	8	3	30	183	90	678	
MEAN	9	330	91	8	8	8	840	448	1	0	53	0	8	3	22	130	31	550	
<b>2008**</b>																			
MIN	0	179	61	2	2	9	470	242	1	0	22	0	8	1	5	18	8	247	
MAX	20	378	115	10	10	16	1072	577	1	0	70	0	9	4	29	213	12	742	
MEAN	10	322	97	8	8	12	911	471	1	0	55	0	8	3	23	147	10	571	
<b>2007**</b>																			
MIN	285	378	77.6	6.0	6.0	10.09	834	378	0.20	0.00	44.70	0.02	7.54	1.86	15.60	90.0	5.0	438	
MAX	400	400	132.0	12.0	12.0	12.48	1304	614	1.17	0.00	69.10	0.09	8.04	3.51	30.06	255.0	6.0	746	
MEAN	370	370	111.2	10.2	10.2	11.26	1128.2	536.2	0.50	0.00	62.75	0.05	7.79	3.14	26.11	196.0	5.5	653	
<b>2006**</b>																			
MIN	220	376	112	3.0	3.0	10.3	487	252	0.16	0.00	23.8	0	7.78	0.98	6.4	25	6	278	
MAX	376	376	112	12.0	12.0	12.5	1073	563	0.30	0.00	69.0	0	8.18	3.32	26.8	185	18	626	
MEAN	328	328	94	8.8	8.8	11.7	906	454	0.25	0.00	53.3	0	7.97	2.57	20.9	135	10	517	
<b>2005**</b>																			
MIN	206	310	61	2.0	2.0	9.1	437	239	0.15	0.00	21.2	0	7.94	0.94	5.8	19	109	273	
MAX	353	353	95	13.0	13.0	14.2	974	467	2.16	0.00	56.0	0	8.53	3.16	27.4	155	109	586	
MEAN	310	310	83	7.8	7.8	11.6	805	392	0.68	0.00	44.8	0	8.13	2.32	19.9	111	109	486	
<b>2004**</b>																			
MIN	8	217	53	3.0	3.0	6.0	450	225	0.17	0.00	22.6	0	7.92	0.94	7.1	29	19	217	
MAX	15	448	102	12.0	12.0	13.3	948	505	0.27	0.00	60.7	0	8.31	2.82	27.3	176	19	613	
MEAN	12	341	85	8.0	8.0	10.1	791	408	0.21	0.00	47.5	0	8.08	2.29	20.8	128	19	478	
<b>2003**</b>																			
MIN	7	280	62	3.0	3.0	5.1	505	263	0.12	0.00	21.8	0	7.73	1.02	8.9	36	11	319	
MAX	16	458	100	12.0	12.0	6.5	948	497	0.27	0.00	58.2	0	8.26	2.90	27.4	176	11	605	
MEAN	12	406	89	8.5	8.5	6.0	823	430	0.20	0.00	40.9	0	8.05	2.40	22.3	133	11	512	
<b>2002**</b>																			
MIN	423	423	90	8.0	8.0	9.2	885	447	0.10	0.00	54.0	0	8.02	2.00	25	151	8	563	
MAX	433	433	94	9.0	9.0	12.8	936	474	0.30	0.00	58.0	0	8.12	3.00	27	172	8	624	
MEAN	429	429	92	8.8	8.8	10.7	912	460	0.18	0.00	56.0	0	8.07	2.75	26	163	8	584	
<b>2001**</b>																			
MIN	287	287	55	3.4	3.4	5.64	564	244	0.10	0.00	26.0	0	7.97	1.00	10	43	5	302	
MAX	431	431	92	8.5	8.5	10.8	908	456	1.30	0.00	55.0	0	8.19	3.00	23	159	16	569	
MEAN	380	380	78	6.7	6.7	7.92	792	377	0.53	0.00	44.0	0	8.10	2.33	18	116	11	474	
<b>2000**</b>																			
MIN	38.0	281	56	3.0	3.0	9.9	500	251	0.10	0.00	27.0	0	7.88	2.00	8	44	5	199	
MAX	38.0	418	87	8.0	8.0	10.8	882	431	0.10	0.00	52.0	0	8.17	3.00	24	140	14	570	
MEAN	38.0	367	76	6.0	6.0	10.4	740	370	0.10	0.00	43.7	0	8.07	2.50	18	106	8	436	
<b>HISTORICAL 1995-2011</b>																			
MIN	0.0	179	52.7	2.0	2.0	4.4	380	221	0.02	0.00	18.5	0.000	7.50	0.01	4.8	7.0	0.0	199	
MAX	38.0	500	132.0	50.0	50.0	15.5	1304	748	14.79	0.41	70.2	0.20	8.83	5.00	30.1	255.0	1786.0	746	
MEAN	8.3	356	85.5	4.2	4.2	8.6	750.7	407.3	0.65	0.07	45.6	0.04	8.08	2.26	17.3	106.4	62.2	463	
No. of Analysis	43	79	79	38	38	73	80	79	79	33	79	51	80	76	79	79	79	55	79

\* Quality parameters are reported as mg/l unless otherwise noted.  
 \*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

**TABLE 22: RILDA CANYON SURFACE WATER QUALITY \***  
**RCW4 - RILDA CANYON FLUME - NEAR HIGHWAY 31**

2012** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20120313	356	141	29	1512	865	0	0	0	125	0	0	5	34	485	0	1112
20120612	301	102	22	1143	615	0	0	0	88	0	0	4	26	338	6	763
20120910	341	124	0	1376	767	0	0	0	111	0	0	5	31	423	0	994
20121204	314	114	26	1285	766	0	0	0	102	0	0	5	32	327	0	927
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
2011**																
MIN	215	60.8	0	457	9.20	239	0.00	0.00	21.31	0.00	0.00	0.92	5.81	26.0	0.0	266
MAX	362	142.2	0	1498	9.20	882	18.51	0.00	128.02	0.00	0.00	5.16	34.54	517.0	2084.0	1145
MEAN	295	105.5	0	1078	9.20	605	4.64	0.00	83.12	0.00	0.00	3.48	23.75	304.3	523.5	776
2010**																
MIN	224	65.3	3.0	528	6.70	277	0.00	0.00	27.78	0.00	0.00	1.24	7.57	58.0	0.0	315
MAX	367	140.5	19.0	1551	10.50	925	1.29	0.00	139.37	0.00	0.00	8.50	33.43	552.0	102.0	1233
MEAN	322	115.7	14.5	1220	9.15	707	0.39	0.00	101.48	0.00	0.00	3.98	25.67	383.8	28.0	915
2009**																
MIN	243	77.1	5.0	679	8.40	367	0.00	0.00	42.44	0.00	0.00	1.69	11.59	118.0	0.0	450
MAX	361	161.5	17.0	1683	9.20	1015	0.36	0.00	148.57	0.00	0.00	5.51	35.14	643.0	21.0	1393
MEAN	320	125.3	13.5	1331	8.80	778	0.09	0.00	112.93	0.00	0.00	4.23	27.27	444.0	5.3	1048
2008**																
MIN	222	72	3	601	9	313	0	0	32	0	0	1	8	72	0	336
MAX	356	175	20	1890	14	1137	1	0	170	0	0	6	38	764	92	1532
MEAN	307	139	13	1447	11	852	0	0	122	0	0	5	28	503	23	1095
2007**																
MIN	296	115.0	12.0	1392	10.12	678	0.07	0.00	94.80	0.00	0.00	2.99	24.10	349.0	5.0	868
MAX	373	172.0	25.0	2050	13.47	1060	0.07	0.00	155.00	0.00	0.00	5.25	37.10	698.0	5.0	1429
MEAN	339	153.4	18.8	1810.2	11.35	947.2	0.07	0.00	136.95	0.00	0.00	4.51	33.70	606.4	5.0	1292.6
2006**																
MIN	242	70.2	5.0	592	10.41	313	0.35	0.00	33.40	0.00	0.00	1.45	9.65	61.0	26.0	351
MAX	337	114.0	16.0	1272	13.50	659	0.35	0.00	90.80	0.00	0.00	3.78	28.40	309.0	26.0	825
MEAN	305	96.1	12.0	1038	11.96	529	0.35	0.00	70.00	0.00	0.00	2.95	21.57	222.3	26.0	663.33
2005**																
MIN	222	65.5	3.0	421	9.38	270	2.96	0.00	25.90	0.06	0.06	1.02	7.44	35.0	188.0	302
MAX	359	99.7	15.0	1129	15.87	550	2.96	0.00	73.00	0.06	0.06	3.13	27.50	239.0	188.0	729
MEAN	298	83.2	11.0	846	12.25	442	2.96	0.00	56.80	0.06	0.06	2.40	20.48	164.7	188.0	564.67
2004**																
MIN	252	60.9	5.0	585	4.46	297	0.65	0.00	35.10	0.02	3.0	1.53	11.80	75.0	35.0	348
MAX	421	90.0	16.0	979	10.57	529	0.65	0.00	73.90	0.02	3.0	3.19	27.20	210.0	35.0	666
MEAN	325	74.3	10.3	796	8.19	415	0.65	0.00	55.77	0.02	3.0	2.45	20.47	147.3	35.0	511
2003**																
MIN	326	73.9	8.0	662	5.38	361	0.07	0.00	42.80	0.01	0.01	1.84	15.60	102.0	5.0	451
MAX	448	94.3	10	1058	6.66	538	0.54	0.00	73.50	0.01	0.01	3.34	27.50	255.0	24.0	701
MEAN	394	84.4	10	906	6.22	476	0.24	0.00	64.28	0.01	0.01	2.85	24.23	194.5	14.5	584.25
2002**																
MIN	389	81.0	17.0	970	9.17	495	0.20	0.00	67.00	0.00	0.00	3.00	26.00	179.0	0.0	616
MAX	421	87.0	19.0	1058	12.92	505	0.20	0.00	71.00	0.00	0.00	3.00	30.00	230.0	0.0	717
MEAN	398	84.8	18.5	995	10.70	501	0.20	0.00	69.75	0.00	0.00	3.00	28.25	207.8	0.0	652.5
2001**																
MIN	311	62.0	8.4	724	8.20	307	0.20	0.00	37.00	0.00	0.00	2.00	15.00	97.0	17.0	386
MAX	426	85.0	19.0	1046	8.20	476	0.20	0.00	64.00	0.00	0.00	3.00	27.00	190.0	17.0	603
MEAN	385	76.3	14.8	907	8.20	419	0.20	0.00	55.50	0.00	0.00	2.75	23.00	156.8	17.0	536.5
2000**																
MIN	325	63.0	6.0	630	6.20	318	0.10	0.00	39.00	0.00	0.00	2.00	14.00	83.0	5.0	376
MAX	420	76.0	16.0	907	14.00	415	0.10	0.00	59.00	0.00	0.00	3.00	26.00	157.0	7.0	572
MEAN	382	69.3	12.0	802	10.50	387	0.10	0.00	52.00	0.00	0.00	2.50	22.25	130.0	6.0	492
1999**																
MIN	209	59.0	2.0	400	3.9	239	0.00	0.00	21.31	0.00	0.00	0.01	5.81	15.0	0.0	260
MAX	40.0	461	51.0	2050	15.9	1137	18.51	0.28	170.07	0.20	5.0	8.86	52.00	764.0	2084.0	1532
MEAN	5.5	91.6	23.3	926.2	8.7	509.6	0.87	0.05	68.16	0.03	1.5	8.30	22.17	211.0	84.0	628.6
No. of Analysis	74	74	38	75	69	74	42	27	74	30	32	75	74	74	46	74

**HISTORICAL 1989-2011**  
 \* Quality parameters are reported as mg/l unless otherwise noted.  
 \*\* Data Database input restricted to values greater than laboratory minimum detection limit.

TABLE 23: COTTONWOOD CANYON CREEK WATER QUALITY •  
SW-1

2012** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umho/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20120316	6	383	90	0	17	911	0	486	0	17	63	0	0	8	2	31	143	0
20120612	0	389	93	0	18	1016	0	515	0	0	69	0	0	8	2	32	160	11
No. of Analytes	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2011**																		
MIN	0	245	68	0	5	534	0	296	0	0	31	0	0	8	1	9	31	0
MAX	5	355	86	13	13	841	0	459	1	0	59	0	0	9	2	25	110	62
MEAN	2	294	74	4	9	677	0	370	0	0	45	0	0	8	1	17	70	23
2010**																		
MIN	1	1	1	0	1	1	1	0	0	1	0	0	1	1	1	1	1	1
MAX	17	384	98	1	20	1036	519	1	1	67	1	1	8	2	34	187	14	664
MEAN	9	193	49	1	11	519	260	1	1	34	1	1	4	1	18	94	8	333
2009**																		
MIN	12	358	95	0	20	992	527	0	0	70	0	0	8	2	35	169	6	663
MAX	14	400	100	0	22	1109	580	0	0	80	0	0	8	2	37	216	29	706
MEAN	13	379	97	0	21	1051	554	0	0	75	0	0	8	2	36	193	18	685
2008**																		
MIN	0	400	100	0	20	1109	0	580	0	0	80	0	0	8	2	37	216	29
MAX	0	400	100	0	20	1109	0	580	0	0	80	0	0	8	2	37	216	29
MEAN	0	400	100	0	20	1109	0	580	0	0	80	0	0	8	2	37	216	29
2007**																		
MIN	355	85	85	16	16	924	457	0	60	60	0	0	8	2	27	131	35	560
MAX	389	88	88	20	20	1026	513	0	71	88	0	0	8	2	34	149	35	630
MEAN	372	86	86	18	18	975	485	0	66	66	0	0	8	2	30	140	35	595
2006**																		
MIN	245	60	60	6	6	583	284	0	32	32	0	0	8	1	10	35	7	318
MAX	335	81	81	13	13	858	425	0	54	54	0	0	8	1	22	96	28	452
MEAN	302	72	72	10	10	755	369	0	46	46	0	0	8	1	17	71	14	405
2005**																		
MIN	237	60	60	5	5	535	281	0	31	31	0	0	8	1	11	37	9	336
MAX	372	83	83	14	14	968	456	0	60	60	0	0	8	2	25	125	17	565
MEAN	305	72	72	10	10	752	369	0	46	46	0	0	8	1	18	81	13	451
2004**																		
MIN	331	86	86	14	14	858	443	0	56	56	0	0	8	2	23	165	5	575
MAX	331	86	86	14	14	858	443	0	56	56	0	0	8	2	23	165	5	575
MEAN	331	86	86	14	14	858	443	0	56	56	0	0	8	2	23	165	5	575
2003**																		
MIN	442	95	95	20	20	1015	541	0	74	74	0	0	8	2	34	206	7	657
MAX	442	95	95	20	20	1015	541	0	74	74	0	0	8	2	34	206	7	657
MEAN	442	95	95	20	20	1015	541	0	74	74	0	0	8	2	34	206	7	657
2002**																		
NO FLOW DURING 2002																		
2001**																		
MIN	289	43	43	8	8	521	239	0	32	32	0	0	8.10	3.0	12.0	38	25	304
MAX	299	49	49	9	9	531	262	0	34	34	0	0	8.24	3.0	13.0	43	29	319
MEAN	294	46	46	9	9	526	251	0	33	33	0	0	8.17	3.0	12.5	41	27	312
2000**																		
MIN	289	43	43	8	8	521	239	0	32	32	0	0	8.10	3.0	12.0	38	25	304
MAX	299	49	49	9	9	531	262	0	34	34	0	0	8.24	3.0	13.0	43	29	319
MEAN	294	46	46	9	9	526	251	0	33	33	0	0	8.17	3.0	12.5	41	27	312
HISTORICAL 1977-2011																		
MIN	0.0	231	6.0	0.0	0.7	380.0	3.80	210.00	0.0	0	2.4	0.00	0.0	7.1	1.0	6.0	20	0
MAX	27.0	442	152.3	20.0	27.0	1109.0	10.9	580.00	15.9	0	80.4	1.31	358.0	8.7	21.0	60.0	239	1298
MEAN	6.0	337	68.3	4.8	12.7	708.4	7.5	353.66	0.8	0	41.1	0.07	9.7	8.0	2.7	20.6	79	61.6
No. of Analytes	49	94	93	24	94	55	61	64	23	94	67	44	89	90	93	94	84	94

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 24: COTTONWOOD CANYON CREEK WATER QUALITY - SW-2

2012** SAMPLE DATES	ALKALINITY ACIDITY	BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umho/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (unb)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20120516	0	346	88	19	19	934		484	1	0	64	0	0	9	4	34	159	63
20120612	0	323	81	0	16	984		478	0	0	67	0	0	8	5	36	194	0
20120905	0	301	85	0	13	1010		494	0	0	68	0	0	8	7	38	215	11
20121205	0	321	89	0	15	988		505	0	0	68	0	0	8	7	37	228	0
No. of Analytes	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
2011** MIN	0	323	80	0	16	934	0	478	0	0	64	0	0	8	4	34	157	0
MAX	0	346	88	29	30	984	0	484	1	0	69	0	0	9	5	36	194	63
MEAN	0	334	83	16	22	965	0	481	0	0	67	0	0	8	4	35	170	23
2010** MIN	0	302	84	0	14	985	480	0	0	64	0	0	8	6	35	230	0	674
MAX	0	335	94	28	25	1062	559	0	0	79	0	0	8	7	42	258	29	736
MEAN	0	321	89	11	19	1029	510	0	0	70	0	0	8	6	40	239	7	700
2009** MIN	0	293	79	0	15	1001	490	0	0	69	0	0	8	5	36	220	0	630
MAX	9	340	101	5	22	1059	577	0	0	79	0	0	8	7	44	242	12	782
MEAN	2	318	88	1	18	1032	519	0	0	75	0	0	8	6	39	231	7	690
2008** MIN	0	288	70	0	15	915	462	0	0	70	0	0	8	4	33	178	0	526
MAX	0	360	96	0	26	1162	549	0	0	75	0	0	8	7	43	244	10	718
MEAN	0	315	85	0	19	1034	507	0	0	71	0	0	8	6	37	218	3	652
2007** MIN	8	287	78	5	14	995	464	0	0	65	0	0	8	4	34	170	16	597
MAX	8	326	92	26	22	1156	515	0	0	71	0	0	8	7	41	257	16	716
MEAN	8	305	87	16	17	1068	500	0	0	68	0	0	8	6	37	231	16	680
2006** MIN		244	57		8	597	289	0	0	35	0	0	8	1	12	45	5	331
MAX		327	86		23	1057	503	0	0	70	0	0	8	4	34	183	35	628
MEAN		298	75		17	905	432	0	0	59	0	0	8	3	28	138	20	520
2005** MIN		233	58		7	558	282	0	0	34	0	0	8	1	12	46	5	333
MAX		331	92		42	1283	546	0	0	77	0	0	8	6	46	250	38	768
MEAN		303	75		22	971	445	0	0	63	0	0	8	4	32	174	18	593
2004** MIN		287	73		16	908	448	1	0	60	0	0	8	4	33	214	10	602
MAX		345	87		45	1097	510	1	0	71	0	0	8	7	49	289	49	692
MEAN		310	81		28	1001	472	1	0	66	0	0	8	6	41	243	30	659
2003** MIN		356	78.0		16	993	479			69			8.26	5	39	238	6	630
MAX		391	91.2		25	1079	535			77			8.49	7	46	274	6	738
MEAN		372	85.1		22	1035	510			72			8.41	6	42	258	6	696
2002** MIN		361	76.0		19	1021	474			68			8.25	6	43	249	15	702
MAX		398	87.0		28	1096	505			70			8.42	8	46	273	15	758
MEAN		375	80.0		24	1064	484			69			8.36	7	45	259	15	730
2001** MIN		288	19.0		13	563	113	0.10		16			8.36	1	25	57	6	335
MAX		627	46.0		92	1251	271	0.50		38			8.62	5	268	103	29	786
MEAN		489	31.5		39	1037	192	0.30		28			8.50	4	172	87	14	642
2000** MIN		288	19.0		13	563	113	0.10		16			8.36	1	25	57	6	335
MAX		627	46.0		92	1251	271	0.50		38			8.62	5	268	103	29	786
MEAN		489	31.5		39	1037	192	0.30		28			8.50	4	172	87	14	642
HISTORICAL 1977-2011 MIN	0.00	233	11.1	0.0	4.0	410	113.00	0.00	0.000	16.0	0.00	0.00	7.14	1.0	8.0	19.5	0	290
MAX	25.00	642	136.9	85.0	179.0	1709	631.00	10.60	1.25	109.0	0.22	39.00	8.93	24.0	268.0	289	788	1170
MEAN	3.29	353	67.55	11.45	25.25	943.5119048	398.47	0.51	0.10	54.52	0.03	3.13	8.3	4.2	51.7	149	56	562.08
No. of Analytes	54	119	119	48	119	80	86	99	34	119	75	61	114	118	118	119	99	119

\* Quality parameters are reported as ug/l unless otherwise noted.  
 \*\* Data base input restricted to values greater than laboratory minimum detection limit.

TABLE 25: COTTONWOOD CANYON CREEK WATER QUALITY \*  
SW-3

2012** SAMPLE DATES	ALKALINITY		CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umho/cm)	HARDNESS	IRON		MANGANESE	OIL & GREASE		PH (meh)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
	ACIDITY	BICARBONATE						TOTAL	DISSOLVED		GREASE	PH						
20120316	7	432	112	0	220	1945	667	0	0	0	0	0	8	4	196	337	11	1226
20120905	0	385	101	0	225	2047	669	0	0	101	0	0	8	5	206	363	0	1246
No. of Analysis	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2
2011**																		
MIN	0	253	61	0	6	543	285	0	0	32	0	0	8	1	10	38	9	291
MAX	0	394	109	48	241	2022	681	1	0	99	0	0	9	4	200	365	144	1314
MEAN	0	308	80	16	110	1219	478	1	0	67	0	0	8	3	94	197	68	758.33
2010**																		
NO FLOW DURING 2010																		
2009**																		
NO FLOW DURING 2009																		
2008**																		
MIN	1	1	1	0	1	1	1	0.08	0	1	0.016	0	1.00	1.00	1	1	0	1
MAX	10	466	124	0	303	2300	784	1.00	0	115	1.000	0	8.21	4.46	220	395	1	1498
MEAN	7	311	83	0	202	1534	523	0.39	0	77	0.344	0	5.81	3.31	147	264	0	999
2007**																		
MIN	6	352	110	0	330	2380	748	0	0	115	0	0	8	5	220	382	9	1515
MAX	6	375	117	0	336	2390	778	0	0	118	0	0	8	6	228	401	9	1544
MEAN	6	364	113	0	333	2385	763	0	0	117	0	0	8	5	224	392	9	1530
2006**																		
MIN		246	58		33	738	312	0	0	41	0	0	8	2	27	69	37	409
MAX		346	105		215	1914	668	0	0	99	0	0	8	4	140	279	37	1120
MEAN		296	81		124	1326	490	0	0	70	0	0	8	3	83	174	37	765
2005**																		
MIN		228	57		10	566	301	0	0	39	0	0	9	1	15	51	14	332
MAX		433	153		10	3070	913	0	0	129	0	0	9	5	221	444	23	1835
MEAN		331	105		229	1818	607	0	0	84	0	0	9	3	118	248	19	1084
2004**																		
NO FLOW DURING 2004																		
2003**																		
NO FLOW DURING 2003																		
2002**																		
NO FLOW DURING 2002																		
2001**																		
MIN		485	15		31	1230	99	0.30	0.30	15.0	0.00	0.00	8.52	4.00	233	112	12	774
MAX		602	32		607	2800	216	0.30	0.30	33.0	0.43	114.00	9.00	5.00	531	147	18	1563
MEAN		552	23		181	1652	159	0.30	0.30	24.8	0.12	4.58	8.75	4.50	325	130	15	988
2000**																		
MIN		485	15		31	1230	99	0.30	0.30	15.0	0.00	0.00	8.52	4.00	233	112	12	774
MAX		602	32		607	2800	216	0.30	0.30	33.0	0.43	114.00	9.00	5.00	531	147	18	1563
MEAN		552	23		181	1652	159	0.30	0.30	24.8	0.12	4.58	8.75	4.50	325	130	15	988
HISTORICAL 1977-2011																		
MIN	0.0	228	14.3	0.0	1.7	506	99.00	0.04	0.00	2.4	0.00	0.00	7	1	3.0	22	0	40
MAX	27.0	633	159.0	70.0	607.0	3070	913.00	19.00	0.43	129.0	2.48	114.00	9	30	531.0	444	5024	1835
MEAN	5.1	370	71.1	12.8	59.5	1294	427.28	1.06	0.12	52.6	0.12	4.58	8.17	4.3	85.5	173	133	644.98958
No. of Analysis	52	100	99	43	99	61	67	89	29	101	65	66	95	98	99	100	85	100

\* Quantify parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 26: GRIMES WASH WATER QUALITY \*  
GWR01 - RIGHT FORK

2012 **SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM SULFATE	TSS	TDS	
2011**	NO SAMPLES COLLECTED DURING 2012 -NO FLOW																	
2010**	NO SAMPLES COLLECTED DURING 2011 -NO FLOW																	
2009**	NO SAMPLES COLLECTED DURING 2010 -NO FLOW																	
2008**	NO SAMPLES COLLECTED DURING 2009 -NO FLOW																	
2007**	NO SAMPLES COLLECTED DURING 2008 -NO FLOW																	
2006**	NO SAMPLES COLLECTED DURING 2007 -NO FLOW																	
2005**	NO SAMPLES COLLECTED DURING 2006 -NO FLOW																	
2004**	NO SAMPLES COLLECTED DURING 2005 -NO FLOW																	
2003**	NO SAMPLES COLLECTED DURING 2004 -NO FLOW																	
2002**	NO SAMPLES COLLECTED DURING 2003 -NO FLOW																	
2001**	NO SAMPLES COLLECTED DURING 2002 -NO FLOW																	
2000**	NO SAMPLES COLLECTED DURING 2001 -NO FLOW																	
2000**	NO SAMPLES COLLECTED DURING 2000 -NO FLOW																	
<u>HISTORICAL 1979-2011</u>																		
MIN	0.1	104	30.0	1.0	3.0	190	112	0.01	0.05	6.30	0.01	0.5	7.20	1.60	1.85	20.0	0.5	115
MAX	39.0	320	57.0	1.0	26.4	750	320	20.60	3.31	46.20	0.30	9.0	8.70	7.64	20.44	161.7	7116.0	700
MEAN	5.5	238	42.6	1.0	10.8	557	238	1.38	0.47	31.96	0.06	1.8	8.09	3.21	13.20	63.7	370.2	338
No. of Analytes	11	10	10	9	12	43	10	47	9	9	42	12	47	10	10	14	47	47

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 27: GRIMES WASH WATER QUALITY \*

GWR02 - LEFT FORK

2012** SAMPLE DATES	ALKALINITY		CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY		HARDNESS	IRON		MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
	ACIDITY	BICARBONATE				(umhoat/cm)	DISSOLVED		TOTAL	MAGNESIUM								
No. of Analysis	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0
2011**																		
MIN	0	267	50	0	9	709	327	0	0	49	0	0	8	1	42	111	0	416
MAX	0	323	84	0	12	882	443	1	0	57	0	0	9	2	42	160	67	564
MEAN	0	295	67	0	11	796	385	1	0	53	0	0	8	1	42	136	34	490
2010**	NO SAMPLES COLLECTED DURING 2010 -NO FLOW																	
2009**	NO SAMPLES COLLECTED DURING 2009 -NO FLOW																	
2008**	NO SAMPLES COLLECTED DURING 2008 -NO FLOW																	
2007**																		
MIN	297	56.2	56.2	11	11	810	359	305	1	43	0	0	8.3	1.1	40	129	9	391
MAX	297	56.2	56.2	11	11	810	359	369	1	47	0	0	8.3	1.1	40	129	25	497
MEAN	297	56.2	56.2	11	11	810	359	337	1	45	0	0	8.4	1.3	37	97	17	444
2006**																		
MIN	263	51	16	9	9	732	305	330	0	47	0	0	8.5	1.4	38	101	5	450
MAX	303	71	16	9	9	838	369	380	0	50	0	0	8.6	1.8	40	117	53	491
MEAN	283	61	16	9	9	785	337	355	0	49	0	0	8.5	1.6	39	109	29	471
2005**																		
MIN	286	55	9	9	9	803	330	302	0	49	0	0	8.48	2.00	42.00	136.0	17.0	423
MAX	304	69	25	9	9	818	380	302	0	49.00	0	0	8.48	2.00	42.00	136.0	17.0	423
MEAN	295	62	17	9	9	811	355	302	0	49.00	0	0	8.48	2.00	42.00	136.0	17.0	423
2004**	No flow during 2004																	
2003**	No flow during 2003																	
2002**	No flow during 2002																	
2001**																		
MIN	329	44.0	7.0	8.0	8.0	806	303	0.10	0.10	44.00	0	0	8.40	1.00	35.00	109.2	10.0	451
MAX	370	72.0	7.0	9.8	9.8	917	361	0.10	0.10	47.00	0	0	8.56	1.00	42.00	122.0	10.0	460
MEAN	350	58.0	7.0	8.9	8.9	861.5	332	0.10	0.10	45.50	0	0	8.53	1.00	38.50	115.6	10.0	455.5
2000**																		
MIN	296	40.0	40.0	10.0	10.0	691	302	0.02	0.02	49.00	0	0	8.48	2.00	42.00	136.0	17.0	423
MAX	296	40.0	40.0	10.0	10.0	691	302	0.02	0.02	49.00	0	0	8.48	2.00	42.00	136.0	17.0	423
MEAN	296	40.0	40.0	10.0	10.0	691	302	0.02	0.02	49.00	0	0	8.48	2.00	42.00	136.0	17.0	423
HISTORICAL 1979-2011																		
MIN	188	2.3	1.0	6.0	6.0	410	196	0.02	0.02	23.80	0.01	0.1	7.30	1.00	11.10	30.4	0.5	212
MAX	34.0	88.9	26.0	156.0	156.0	917	460	2.52	2.52	68.50	0.15	3.5	8.85	3.00	42.00	212.0	1428.0	570
MEAN	4.2	51.5	6.4	14.6	14.6	652	308	0.22	0.08	42.54	0.03	1.0	8.08	1.50	31.30	91.4	51.8	380
No. of Analysis	19	31	24	31	31	66	31	62	10	31	54	18	68	31	31	32	65	68

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

**TABLE 28: GRIMES WASH WATER QUALITY \***  
**GWR03 - RIGHT FORK**

2012** SAMPLE DATES	ALKALINITY		CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umho/cm)	HARDNESS	IRON		MANGANESE	MAGNESIUM	GREASE	OIL &	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
	ACIDITY	BICARBONATE						TOTAL	DISSOLVED										
20120315	5	190	76	0	104	973	364	0	0	0	42	0	0	8	8	63	187	110	599
No. of Analytes																			
2001**																			
MIN	0	265	57	0	58	941	384	0	0	0	59	0	0	8	2	65	146	9	566
MAX	0	292	86	0	70	1126	499	0	0	0	69	0	0	8	2	69	214	22	726
MEAN	0	279	72	0	64	1034	442	0	0	0	64	0	0	8	2	67	180	16	646
2010** NO SAMPLES COLLECTED DURING 2010 -NO FLOW																			
2009**																			
MIN	7	293	144	0	475	2810	931	0	0	0	139	0	0	8	8	262	578	0	1863
MAX	7	293	144	0	475	2810	931	0	0	0	139	0	0	8	8	262	578	0	1863
MEAN	7	293	144	0	475	2810	931	0	0	0	139	0	0	8	8	262	578	0	1863
2008**																			
MIN	335	158	158	0	397	2740	1004	0.17	0.007	0.007	148.2	8.18	8.06	8.18	8.06	236	561	22	1873
MAX	335	158	158	0	397	2740	1004	0.17	0.007	0.007	148.2	8.18	8.06	8.18	8.06	236	561	22	1873
MEAN	335	158	158	0	397	2740	1004	0.17	0.007	0.007	148.2	8.18	8.06	8.18	8.06	236	561	22	1873
2007**																			
MIN	275	80	76	0	204	1689	564	0.08	0.00	0.00	88	8.11	4.08	8.11	4.08	143	300	6	1082
MAX	340	157	131	0	517	3210	1049	0.09	0.01	0.01	130	8.50	8.66	8.50	8.66	294	622	6	2071
MEAN	311	131	131	0	397	2653	863	0.09	0.01	0.01	130	8.28	6.78	8.28	6.78	231	486	6	1685
2006**																			
MIN	277	64	64	15	29	900	363	0.07	0.00	0.00	48	8.40	1.66	8.40	1.66	45	122	10	512
MAX	282	66	66	15	73	1081	388	0.50	0.00	0.00	56	8.47	2.14	8.47	2.14	70	142	16	619
MEAN	280	65	65	15	51	991	376	0.29	0.00	0.00	52	8.44	1.90	8.44	1.90	57	132	13	565.5
2005**																			
MIN	257	70	70	7	35	856	373	0.07	0.00	0.00	48	8.34	2.09	8.34	2.09	48	134	11	581
MAX	308	145	145	16	360	2760	799	0.74	0.02	0.02	106	8.50	5.77	8.50	5.77	215	427	56	1620
MEAN	282	97	97	12	165	1622	537	0.50	0.01	0.01	71	8.44	3.57	8.44	3.57	116	244	34	974.3
2004**																			
MIN	311	122	122	7	183	1657	674	0.09	1.18	0.00	90	7.68	5.74	7.68	5.74	118	434	7	1159
MAX	394	192	192	7	539	3020	1048	2.62	1.18	0.04	144	8.21	7.73	8.21	7.73	252	653	134	2006
MEAN	349	167	167	7	433	2629	945	0.94	1.18	0.02	129	8.04	7.19	8.04	7.19	213	582	49	1758
2003**																			
MIN	10	356	133	7	182	1781	756	0.03	0.02	0.01	101	8.01	6.41	8.01	6.41	113	460	1242	1242
MAX	12	447	163	7	294	2290	909	0.62	0.02	0.02	124	8.43	7.08	8.43	7.08	165	549	1579	1579
MEAN	11	395	145	7	221	2006	842	0.19	0.02	0.01	116	8.26	6.75	8.26	6.75	136	517	1421	1421
2002**																			
MIN	318	146	146	0	296	2250	859	0.00	0.00	0.00	118	7.84	7.00	7.84	7.00	171	538	1584	1584
MAX	438	166	166	0	708	3650	1065	0.00	0.00	0.00	158	8.49	9.00	8.49	9.00	397	783	2449	2449
MEAN	390	155	155	0	433	2737	930	0.00	0.00	0.00	132	8.07	7.67	8.07	7.67	248	631	1894	1894
2001**																			
MIN	346	80	80	0	60	1169	418	0.80	0.00	0.00	53	7.87	2.00	7.87	2.00	59	172	6	601
MAX	423	143	143	0	651	3640	843	0.80	0.00	0.00	86	8.43	6.00	8.43	6.00	429	551	37	1985
MEAN	372	108	108	0	239	2151	623	0.80	0.00	0.00	86	8.24	4.50	8.24	4.50	194	361	22	1272
2000**																			
MIN	298	105	105	0	223	1895	563	0.50	0.00	0.00	73	8.15	5.00	8.15	5.00	150	392	10	1347
MAX	323	132	132	0	3226	9960	696	1.00	0.00	0.00	101	8.22	6.00	8.22	6.00	1870	464	70	5862
MEAN	311	116	116	0	1030	4136	650	0.75	0.00	0.00	88	8.20	5.25	8.20	5.25	630	432	43	2568
HISTORICAL 1979-2011																			
MIN	0.0	117	5.1	0.0	10.0	220	146.00	0.00	0.000	0.00	10.7	0.00	0.00	7.10	0.0	9.0	46	0	152
MAX	127.0	486	274.0	16.0	4531.0	12000	1165.00	22.60	2.26	0.90	160.8	27.00	27.00	8.81	12.8	3181.0	783	9702	7160
MEAN	11.5	340	125.2	2.5	294.1	1716.6	658.62	0.77	0.18	0.06	83.5	2.70	2.70	8.08	5.8	202.5	356.3	156.3	1088.7
No. of Analytes	61	96	96	55	98	136	96	123	57	102	96	57	57	140	95	96	99	118	138

\* Quality parameters are reported as mg/l unless otherwise noted.  
 \*\* Data: Data base input restricted to values greater than laboratory minimum detection limit.

**Table 29**  
**EAST MOUNTAIN SPRINGS DISCHARGE**  
**2012**

Spring	Date Sampled	Flow (GPM)	Temp. C	Date Sampled	Flow (GPM)	Temp. C	Seasonal Net Change %
<b>Sheba</b>	07/05/2012	0.7	9.5	10/03/2012	0.0		-100.00
<b>Elk Spring</b>	07/05/2012	20.0	5.5	10/01/2012	1.0	6.0	-95.20
<b>Burnt Tree</b>	07/16/2012	3.5	8.3	10/02/2012	3.1	8.8	-12.29
<b>Jerk Water</b>							
<b>Pine Springs</b>							
<b>Pine Sp. Trough</b>							
<b>Ted's Tub</b>	07/17/2012	3.5	10.9	10/02/2012	1.4	10.4	-61.36
<b>79-1</b>							
<b>79-2</b>	07/16/2012	0.9	7.9	10/02/2012	0.4	8.6	-58.62
<b>79-3</b>							
<b>79-4</b>							
<b>79-5</b>							
<b>79-6</b>							
<b>79-7</b>							
<b>79-8</b>							
<b>79-9</b>							
<b>79-10</b>	07/05/2012	3.2	8.3	10/03/2012	1.7	8.1	-46.60
<b>79-11</b>							
<b>79-12</b>	07/17/2012	Dry		10/02/2012	Dry		
<b>79-13</b>							
<b>79-14</b>							
<b>79-15</b>	07/17/2012	SEEP		10/02/2012	Dry		
<b>79-16</b>							
<b>79-17</b>							
<b>79-18</b>							
<b>79-19</b>							
<b>79-20</b>							
<b>79-21</b>							
<b>79-22</b>							
<b>79-23</b>	07/17/2012	Dry		10/02/2012	Dry		
<b>79-24</b>	07/17/2012	Dry		10/02/2012	Dry		
<b>79-25</b>							
<b>79-26</b>	07/16/2012	Dry		10/03/2012	Dry		
<b>79-27</b>							
<b>79-28</b>	07/16/2012	0.9	9.4	10/03/2012	0.9	8.1	3.30
<b>79-29</b>	07/16/2012	0.5	8.1	10/03/2012	0.3	6.7	-53.70
<b>79-30</b>							
<b>79-31</b>							
<b>79-32</b>	07/16/2012	0.6	11.3	10/03/2012	0.3	13.4	-45.45
<b>79-33</b>							
<b>79-34</b>	07/17/2012	2.5	6.6	10/02/2012	1.1	6.6	-55.60
<b>79-35</b>	07/05/2012	0.8	7.3	10/01/2012	0.7	10.4	-6.41
<b>79-36</b>							
<b>79-37</b>							
<b>79-38</b>	07/17/2012	0.0		10/02/2012	Dry		
<b>79-39</b>							



**Table 29**  
**EAST MOUNTAIN SPRINGS DISCHARGE**  
**2012**

Spring	Date Sampled	Flow (GPM)	Temp. C	Date Sampled	Flow (GPM)	Temp. C	Seasonal Net Change %
<b>MILL FORK</b>							
<b>2012</b>							
Spring	Date Sampled	Flow (GPM)	Temp. C	Date Sampled	Flow (GPM)	Temp. C	Seasonal Net Change %
EM-216	07/16/2012	seep	0.0	10/03/2012	Dry	0.0	
EMPOND	07/16/2012	1.6	5.7	10/03/2012	0.4	10.6	-76.88
GRANTS SPRING	07/16/2012	0.8	6.7	10/03/2012	0.6	8.1	-30.95
LITTLE BEAR	07/31/2012	345.6	Mud Slide	10/24/2012	318.0	9.3	*
JV-9	07/18/2012	0.1	0.0	10/04/2012	0.4	10.6	700.00
JV-34	07/19/2012	seep	0.0	10/04/2012	seep	0.0	
MF-7	07/23/2012	24.0	4.8	10/04/2012	18.2	5.6	-24.17
MF-10	07/26/2012	9.8	2.4	10/03/2012	0.0	0.0	-100.00
MF-19B	07/16/2012	seep	0.0	10/03/2012	0.0	0.0	
MF-213	07/23/2012	27.3	8.1	10/04/2012	21.1	9.2	-22.71
MF-219	07/18/2012	0.2	2.9	10/03/2012	0.0	0.0	-100.00
MFR-10	07/18/2012	10.3	5.7	10/03/2012	2.6	6.8	-74.56
MFR-30	07/18/2012	0.0	0.0	10/03/2012	0.0	0.0	
RR-5	07/16/2012	seep	0.0	10/03/2012	0.0	0.0	
RR-15	07/17/2012	16.7	3.7	10/17/2012	9.0	4.5	-46.35
RR-23A	07/17/2012	19.4	4.2	10/04/2012	5.7	5.3	-70.62
SPI-26	07/18/2012	6.2	5.4	10/03/2012	3.8	5.4	-39.35
SPI-29	07/18/2012	seep	0.0	10/03/2012	0.0	0.0	
UJV-101	07/19/2012	0.8	9.7	10/04/2012	0.6	7.0	-28.21
UJV-206	07/19/2012	0.8	7.4	10/04/2012	0.9	6.3	10.13
UJV-213	07/19/2012	0.3	9.5	10/04/2012	0.2	10.3	-48.39
<b>TOTAL FLOW FOR JULY</b>		<b>463.9</b>			<b>381.3</b>		
				<b>Net Change - Average</b>			<b>7.41</b>
				<b>Net Change - By Volume</b>			<b>-17.80</b>

**TOTAL FOR JULY 2011 =553.3 GPM**  
**JULY 2012 78.62 % LOWER THAN JULY 2011**

\*(substitute nine yr average for C14)

Table 30: East Mountain Yearly Spring Discharge Variations (GPM)

SOUTHERN AREA

July Flow Data

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Buratt Tree	30.5	26.6	26.1	17.5	10.2	12.0	6.4	4.1	2.0	4.0	8.6	7.5	7.5	5.5	8.5	6.8	5.0	3.3	5.6	3.4	2.2	2.0	6.0	7.0	3.6	3.6	2.8	1.5	6.15	3.5	
Elk Spring*	642.3	427.9	390.5	309.7	217.0	217.4	78.5	130.8	176.0	116.8	369.9	46.2	595.3	309.0	235.0	413.0	309.0	107.0	131.0	46.0	73.0	110.0	280.0	309.0	91.0	91.0	2.6	2.6	3.9	0.67	
Sheba	22.9	19.7	14.4	8.6	11.4	10.4	1.1	8.1	10.1	6.3	11.0	0.9	10.6	14.9	4.8	7.2	6.1	2.6	2.9	0.4	3.0	3.1	6.5	5.0	1.3	1.3	2.6	11.8	18.0	73.17	3.52
Ted's Tub	89.0	48.0	39.1	31.6	69.0	60.0	5.0	13.0	21.0	13.6	51.0	6.0	76.2	36.7	42.9	83.2	30.0	24.0	24.0	3.0	10.7	15.0	32.0	38.0	11.9	32.0	11.8	18.0	73.17	3.52	
79-2	9.1	9.7	5.5	2.9	4.0	2.1	2.7	3.9	2.4	2.3	7.5	1.7	2.6	2.0	2.1	2.1	2.2	1.9	1.9	1.2	2.0	2.0	2.6	2.1	1.2	2.1	1.5	1.2	5.14	0.87	3.24
79-10	37.1	20.0	33.3	26.1	26.1	25.0	7.0	10.2	12.5	10.5	30.0	4.0	30.0	17.6	14.0	24.0	20.0	5.2	10.3	1.3	5.5	5.7	16.0	21.0	3.2	11.4	5.9	5.2	3.1	3.24	
79-15	42.9	26.1	18.2	18.2	14.6	12.7	2.9	3.0	5.0	4.1	20.7	2.0	33.3	11.0	13.6	18.3	15.0	6.3	10.5	0.1	4.8	7.6	12.0	15.0	3.9	15.8	0.7	1.4	24.49	SEEP	
79-23	20.0	3.6	6.8	0.6	damp	damp	dry	dry	damp	dry	damp	dry	no flow	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	damp	dry	dry	dry	dry	dry	dry	SEEP
79-24	9.3	6.1	5.0	4.3	damp	0.8	dry	dry	dry	dry	damp	dry	0.1	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
79-26	20.7	20.0	10.9	8.7	1.5	3.3	0.3	0.3	damp	damp	10.0	dry	10.0	0.8	5.0	7.9	2.7	1.4	4.3	0.1	0.1	0.6	5.6	6.0	0.0	0.0	1.00	dry	dry	dry	dry
79-29	10.0	6.2	6.0	4.7	2.5	2.6	1.1	1.3	1.7	0.8	2.9	0.7	3.1	1.2	1.0	3.0	1.7	1.3	1.5	0.1	0.1	0.6	0.6	0.6	0.2	1.0	0.6	0.3	1.55	0.54	
79-32	3.3	3.1	2.7	1.3	1.0	0.6	0.5	damp	no flow	no flow	1.3	damp	1.0	0.6	1.0	2.2	1.0	0.4	0.6	0.1	0.1	seep	0.3	0.2	Seep	Seep	0.2	dry	dry	dry	dry
79-34	56.7	42.9	18.5	16.7	10.5	13.3	dry	dry	0.3	damp	13.0	dry	30.0	7.5	5.5	13.2	8.6	0.4	8.4	dry	1.8	2.0	13.5	17.4	2.5	13.9	3.7	4.5	37.5	2.5	0.78
79-35	15.0	10.5	10.5	7.8	6.3	2.7	1.9	4.3	4.4	4.4	8.9	0.5	3.0	4.5	8.6	4.6	5.0	2.7	4.5	0.8	1.3	2.3	3.5	3.9	1.0	2.0	1.7	1.5	2.3	0.78	
79-38	10.9	9.2	4.7	3.6	8.3	10.0	1.1	7.8	6.5	2.3	6.4	0.5	10.0	7.5	4.0	7.5	5.0	4.0	3.3	0.1	2.3	2.4	4.0	5.0	0.5	4.9	1.2	2.6	10.0	0	
80-41	10.9	15.0	5.8	4.1	2.5	3.9	dry	dry	dry	dry	4.0	dry	2.0	0.5	1.4	2.0	1.7	dry	dry	dry	dry	dry	1.0	1.2	dry	dry	dry	dry	dry	2	0
80-44	24.0	20.0	6.6	3.1	0.4	1.8	dry	dry	dry	dry	2.7	dry	1.5	damp	0.5	0.1	dry	dry	dry	dry	dry	1.4	5.4	6.0	Seep	Seep	Damp	Seep	5.39	0	
80-46	24.0	13.1	5.5	2.2	dry	0.5	dry	dry	dry	dry	1.4	dry	3.0	damp	0.2	0.5	0.1	0.5	0.5	dry	dry	dry	Seep	Seep	dry	dry	dry	dry	0.6	0	
80-47	60.0	28.3	18.2	12.0	4.0	6.7	dry	dry	dry	dry	7.5	dry	5.0	damp	4.0	4.6	2.5	damp	2.1	dry	dry	dry	Damp	Damp	Damp	Damp	Damp	Damp	0.92	seep	
82-51	10.0	5.9	3.8	2.6	damp	9.9	4.6	2.0	1.3	3.3	13.3	2.2	12.6	5.0	9.2	10.5	8.6	5.0	9.4	2.0	1.5	4.4	7.8	6.0	2.4	3.0	1.4	0.7	9.1	1.04	
82-52	80.0	48.0	32.1	23.3	20.1	21.5	2.6	1.3	1.0	1.0	16.7	2.0	15.0	7.0	12.0	12.0	3.4	8.0	1.8	1.0	1.0	1.0	16.0	17.8	2.9	1.6	Seep	dry	dry	1.95	0
84-56	9.6	6.3	4.7	3.7	2.5	2.9	1.6	1.0	0.5	0.6	1.0	0.3	1.0	0.3	0.7	1.7	0.9	0.2	0.8	0.1	dry	seep	Seep	0.5	0.0	Damp	Seep	Seep	0.84	0.41	
Totals	1273.2	839.5	587.0	530.2	421.3	425.5	115.4	188.4	244.7	170.0	595.0	74.5	862.2	432.6	379.9	633.5	441.6	167.0	237.0	59.4	109.1	158.9	416.5	467.2	123.6	185.9	34.1	40.8	245.95	37.62	

\*Note: Elk Spring and 89-61 was developed for culinary use by NEWUSSD in early 2009.

xx No measurement - utilized yearly comparison.

MILL FORK AREA

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Spring																														
EM-216																														
EM-216																														
GRANTS SPRING																														
LITTLE BEAR*																														
JV-9	430	409	357	383	388	340	332	270	296	243	419	218	418	443	447	477	428	395	373	240	284	385.0	350.0	396.0	349.0	378.0	366.0	297.0	380.4	345.6
JV-34																														
MF-7																														
MF-10																														
MF-19B																														
MF-219																														
MF-10																														
MF-30																														
RR-5																														
RR-15																														
RR-23A																														
SPL-26																														
SPL-29																														
UJV-101																														
UJV-206																														
Totals																														

\*Note: Little Bear flow values for 2006-2008 has been corrected.

**Table 31b**  
**Mode of Occurrence – East Mountain Springs – Mill Fork Area**  
**Occurrences**

<b>Stratigraphic Location</b>	<b>Flow along permeable strata (fluvial channels) underlain by impermeable mudstone which intersects the land surface</b>
<p align="center"><b>Alluvium</b>  <b>Joes Valley Alluvium</b>  <b>JV-1 through JV-35</b></p>	<p><u>JV-9, JV-34</u></p>
<p align="center"><b>Flagstaff Limestone</b></p>	<p>EM-221A</p>
<p align="center"><b>North Horn Formation</b></p>	<p><u>EM-216, EM-217, EM-218, EM-221B, EM-222, EM-223, EM-227, EM-228, EMPOND, GRANTS SPRING, JV-36, JV-37, JV-38, JV-39, JV-40, JV-41, JV-42, JV-43, JV-44, JV-45, JV-46, JV-47, JV-48, JV-49, JV-50, JV-51, JV-52, MF-10, MF-11, MF-12, MF-13, MF-14, MF-14A, MF-15, MF-16, MF-18, MF-18A, MF-18B, MF-18C, MF-19A, MF-19B, MF-19E, MF-19H, MF-19I, MF-21, MF-217, MF-218, MF-219, MF-220, MF-221, MFR-1, MFR-2, MFR-3, MFR-7, MFR-8, MFR-9, MFR-10, MFR-11, MFR-16, MFR-17, MFR-18, MFR-19, MFR-20, MFR-21, MFR-22, MFR-23, MFR-24, RR-2, RR-2A, RR-2B, RR-3, RR-4, RR-4A, RR-5, RR-6, RR-6A, RR-7A, RR-10, RR-11, RR-12, RR-14, RR-14A, RR-14B, RR-15, RR-16, RR-17, RR-18, RR-20, RR-21, RR-22, RR-23, RR-23A, RR-24, RR-24A, RR-25, RR-26, RR-27, RR-28, RR-30, RR-34, SP1-26, SP1-29, SP1-31, SP2-42, UJV-100, UJV-100A, UJV-104, UJV-105, UJV-202, UJV-203</u></p>
<p align="center"><b>Upper Price River Formation</b></p>	<p>EM-214, EM-215, MF-1, MF-4, MF-4A, MF-5, MF-20, MFR-4, MFR-5, MFR-12, MFR-13, MFR-14, MFR-15, MFR-26, MFR-27, MFR-28, MFR-29, MFR-30, MFR-31, MFR-32, RR-7, UJV-100C, UJV-105B, UJV-106, UJV-106A, UJV-109, UJV-109B, UJV-109 South, UJV-151, UJV-204, UJV-205, UJV-206, UJV-207, UJV-209, UJV-209A</p>
<p align="center"><b>Castle Gate Sandstone</b></p>	<p>MFR-6, UJV-101, UJV-208, UJV-210, UJV-211, UJV-212, UJV-213</p>
<p align="center"><b>Blackhawk Formation</b></p>	<p>MF-2, MF-3, MF-7, MF-8A, MF-213, MFR-2</p>
<p align="center"><b>Star Point Sandstone</b></p>	<p>Little Bear Spring</p>

**Table 31a**  
**Mode of Occurrence -- East Mountain Springs -- Southern Area**  
**Occurrences**

Stratigraphic Location	Permeable fluvial channels that intersect the land surface	Flow along permeable strata underlain by impermeable mudstone which intersects the land surface	Contact of permeable beds and the Roans Canyon Fault zone	Mode of Occurrence not identified
Base of Flagstaff		79-6, 79-7, 79-35, 86-58, 89-69	<u>Sheba Springs, 79-1</u>	
North Horn Formation	Ted's Tub, Burnt Tree, 79-2, 79-3, 79-8, 79-9, 79-11, 79-12, 79-13, 79-14, 79-15, 79-16, 79-17, 79-21, 79-22, 79-26, 79-27, 79-28, 79-29, 79-34, 79-39, 80-42, 80-43, 80-46, 80-47, 80-48, 80-53, 84-56, 86-59, 89-62, 89-63, 89-64, 89-65, 89-66, 89-67, 89-68, 89-71		<u>Elk Springs, 79-10, 79-18, 79-19, 79-20, 84-54, 89-61, 89-70</u>	
Base of North Horn Formation		79-23, 79-25, 79-32, 79-36, 79-37, 79-38, 84-55	79-30, 79-31	
Other Stratigraphic Horizons	<u>Blackhawk Formation</u> 80-50, 84-57, 91-73 <u>Price River Formation</u> Bear Canyon Fault Zone 82-51		<u>Price River</u> 80-49, <u>Blackhawk</u> 91-72	<u>Flagstaff Limestone</u> 79-4, 79-5, Pine Springs Trough <u>Price River Formation</u> 79-24, 79-33, 79-40, 80-41, 80-44, 80-45, 82-52, Jerk Water, 89-60 ( <u>Alpine</u> )

TABLE 32: TEMPERATURE COMPARISON

	EAST MOUNTAIN DEPARTURE FROM NORMAL	ELECTRIC LAKE DEPARTURE FROM NORMAL	CASTLE DALE DEPARTURE FROM NORMAL	HUNTINGTON PLANT DEPARTURE FROM NORMAL
1993				
JAN	-3.8	2.7	0.9	-0.8
FEB	-3.5	-2.9	0.5	-1.3
MAR	4.2	-1.6	7.2	-0.5
APR	-2.2	0.1	4.4	-2.0
MAY	4.1	2.8	8.9	1.6
JUN	-3.0	-2.2	5.8	-4.1
1994				
JAN	0.8	2.3	-1.2	6.3
FEB	-3.5	3.2	1.6	-3.5
MAR	6.1	6.6	10.1	5.0
APR	0.0	6.0	4.7	0.2
MAY	4.6	7.2	8.9	2.7
JUN	9.1	4.8	13.4	2.4
1995				
JAN	1.4	1.6	3.9	1.5
FEB	10.3	5.2	11.8	7.4
MAR	3.1	2.4	7.6	0.1
APR	3.4	-0.1	3.4	-2.0
MAY	2.2	-3.9	3.4	-5.5
JUN	1.1	-2.2	2.5	-6.6
1996				
JAN	5.1	2.1	3.5	2.4
FEB	-7.7	-0.9	8.4	1.6
MAR	7.5	0.6	7.8	1.5
APR	3.0	2.6	5.4	1.1
MAY	8.5	3.6	8.0	2.2
JUN	8.5	5.2	9.6	1.2
1997				
JAN	-0.9	1.6	0.1	0.3
FEB	0.8	-5.7	-2.3	-4.2
MAR	8.8	6.2	8.1	2.2
APR	1.4	-0.7	3.2	-3.1
MAY	0.0	4.2	10.5	3.5
JUN	4.6	4.9	8.9	-0.6
1998				
JAN	4.2	2.0	6.9	5.4
FEB	-1.5	-3.1	4.6	-2.8
MAR	6.4	2.1	5.7	1.0
APR	0.6	-2.0	0.8	-2.9
MAY	5.0	0.3	5.3	-0.5
JUN	-2.3	-1.1	3.0	-6.1
1999				
JAN	7.8	5.4	8.9	8.0
FEB	4.7	-0.5	7.6	2.1
MAR	7.4	4.1	8.6	6.7
APR	-0.9	-3.7	-1.8	-1.9
MAY	-0.4	-1.0	4.9	-0.1
JUN	1.8	0.2	6.3	-3.1
2000				
JAN	2.5	3.6	10.0	4.0
FEB	4.4	-0.9	9.8	5.0
MAR	1.8	1.0	6.8	2.0
APR	8.6	7.2	7.0	6.0
MAY	9.2	7.4	11.0	5.9
JUN	5.8	3.3	8.8	2.8
2001				
JAN	-9.2	-2.6	1.3	1.0
FEB	-11.5	-2.0	1.0	-4.0
MAR	-7.8	4.4	9.0	1.9
APR	-8.5	3.0	2.2	-1.1
MAY	-3.9	6.5	9.5	
JUN	-6.0	3.7	9.0	
2002				
JAN	-4.7	-4.0	1.9	
FEB	-6.4	-8.1	2.0	
MAR	-1.0	-1.8	2.2	
APR	3.5	5.6	7.4	
MAY		3.0	7.8	
JUN	6.0	1.4	10.5	
2003				
JAN	12.6	1.9	10.1	
FEB	-1.8	-4.3	4.0	
MAR	3.4	1.7	6.2	
APR	3.1	0.3	3.9	
MAY	10.0	3.0	10.2	
JUN	2.7	1.9	8.0	
2004				
JAN	1.0	-3.8	-5.3	
FEB	-2.5	-6.4	0.1	
MAR	9.1	9.0	10.5	
APR	0.5	6.6	6.7	
MAY	5.7	3.0	8.1	
JUN	1.7	2.0	7.5	
2005				
JAN	14.1	8.9	6.1	
FEB	6.3	-6.1	4.4	
MAR	7.2	-0.3	10.8	
APR	7.1	-2.0	2.6	
MAY	8.8	-0.1	8.7	

**TABLE 32: TEMPERATURE COMPARISON**

	<i>EAST MOUNTAIN DEPARTURE FROM NORMAL</i>	<i>ELECTRIC LAKE DEPARTURE FROM NORMAL</i>	<i>CASTLE DALE DEPARTURE FROM NORMAL</i>	<i>HUNTINGTON PLANT DEPARTURE FROM NORMAL</i>	
<i>JUN</i>	3.7	-3.5	0.2		
<b>2006</b>					
<i>JAN</i>	5.6	-7.2	2.3	3.9	
<i>FEB</i>	2.3	-10.1	2.2	0.0	
<i>MAR</i>	2.3	-5.4	0.3	-4.1	
<i>APR</i>	7.3	3.0	6.5	2.6	
<i>MAY</i>	11.2	6.0	12.1	3.7	
<i>JUN</i>	4.3	5.2	9.8	2.2	
<b>2007</b>					
<i>JAN</i>	8.0	9.4	1.1	1.3	
<i>FEB</i>	6.9	-0.1	7.1	5.9	
<i>MAR</i>	12.4	6.6	4.8	11.2	
<i>APR</i>	5.6	5.3	2.4	2.8	
<i>MAY</i>	7.1	3.3	1.7	2.0	
<i>JUN</i>	9.9	4.2	2.6	4.4	
<b>2008</b>					
<i>JAN</i>	5.1	NA	-2.9	-3.1	
<i>FEB</i>	-6.6	NA	-2.6	-2.0	
<i>MAR</i>	5.8	NA	-0.9	-2.5	
<i>APR</i>	-3.4	NA	-1.7	-3.0	
<i>MAY</i>	-5.1	NA	-1.4	-2.6	
<i>JUN</i>	-4.2	-1.1	0.3	-0.5	
<b>2009</b>					
<i>JAN</i>	9.6	NA	3.5	-3.1	
<i>FEB</i>	3.4	NA	6.2	-0.6	
<i>MAR</i>	-6.5	NA	2.3	0.9	
<i>APR</i>	-3.4	NA	1.5	-1.2	
<i>MAY</i>	6.8	NA	3.2	3.4	
<i>JUN</i>	-2.7	NA	-0.4	-5.1	
<b>2010</b>					
<i>JAN</i>	2.6	NA	-1.2	-6.3	
<i>FEB</i>	2.0	NA	-6.2	-1.4	
<i>MAR</i>	5.1	NA	-1.0	0.5	
<i>APR</i>	6.5	NA	2.1	-0.4	
<i>MAY</i>	2.6	NA	-1.9	2.1	
<i>JUN</i>	8.9	NA	3.5	-2.2	
<b>2011</b>					
<i>JAN</i>	0.1	NA	3.1	-0.7	
<i>FEB</i>	-4.3	NA	1.8	-3.5	
<i>MAR</i>	1.5	NA	1.0	-0.8	
<i>APR</i>	4.3	NA	-1.8	-2.7	
<i>MAY</i>	-0.2	NA	-4.4	-7.0	
<i>JUN</i>	-2.7	NA	-1.6	1.0	
<b>2012</b>					
<i>JAN</i>	2.5	NA	7.0	2.0	
<i>FEB</i>	-4.0	NA	4.4	0.1	
<i>MAR</i>	5.7	NA	5.2	2.6	
<i>APR</i>	7.3	NA	4.1	2.9	
<i>MAY</i>	3.7	NA	3.2	3.1	
<i>JUN</i>	6.2	NA	4.9	6.0	
<b>YEAR</b>	<b>EAST MOUNTAIN</b>	<b>ELECTRIC LAKE</b>	<b>HUNTER PLANT</b>	<b>HUNTINGTON PLANT</b>	<b>TOTAL</b>
1982		-2.8	0.0	1.2	-0.5
1983		-2.7	2.5	1.0	0.3
1984		-2.2	0.5	0.1	-0.5
1985	3.1	0.3	3.0	0.9	1.8
1986	2.9	3.4	6.3	3.2	4.0
1987	1.7	-0.5	3.2	1.1	1.4
1988	-0.2	-0.1	3.5	0.5	0.9
1989	0.0	-0.1	4.1	0.3	1.1
1990	2.3	1.8	7.3	1.2	3.2
1991	-1.9	-1.4	3.8	-2.5	-0.5
1992	1.9	6.5	6.6	1.8	4.2
1993	-0.9	-0.5	4.6	-1.7	0.4
1994	2.9	3.0	6.3	2.7	4.2
1995	3.6	0.5	5.4	-0.9	2.2
1996	6.7	2.2	7.1	1.7	4.4
1997	2.5	1.8	4.8	-0.3	2.2
1998	2.1	-0.3	4.4	-1.0	1.3
1999	3.4	0.8	5.8	2.0	3.0
2000	5.4	3.6	8.9	4.3	5.6
2001	-7.8	2.2	5.3		-0.1
2002	-0.5	-0.2	5.3		1.5
2003	5.0	0.8	7.1		4.3
2004	2.6	1.7	4.7		3.0
2005	7.9	-0.5	5.5		4.3
2006	5.5	-1.8	5.5	1.4	2.7
2007	8.6	4.8		4.6	6.0
2008	-1.4		CASTLE DALE -1.5	-2.5	-1.8
2009	1.2	NA	2.2	-0.9	0.99
2010	4.6	NA	-1.1	-1.3	0.73
2011	0.9	NA	-0.3	-2.3	-0.55
2012	3.6	NA	4.8	2.4	3.60

**Table 33**  
**EAST MOUNTAIN**  
**SPRING DISCHARGE RECESSON STUDY**  
**YEAR 2012**

SPRING		JUL	AUG	SEP	OCT
<b>79-10</b>	Flow (GPM)	3.2	2.4	2.0	1.7
	Temp. (C)	8.3	10.1	9.3	8.1
<b>SHEBA SPRINGS</b>	Flow (GPM)	0.7	Seep	Dry	Dry
	Temp. (C)	9.5			
<b>ELK SPRING*</b>	Flow (GPM)	Developed and no longer applicable to recession study			
	Temp. (C)				
<b>79-35</b>	Flow (GPM)	.78.	0.7	0.8	0.7
	Temp. (C)	7.3	8.2	8.3	10.4
<b>79-26</b>	Flow (GPM)	Dry	Dry	Dry	Dry
	Temp. (C)				
<b>79-29</b>	Flow (GPM)	0.5	0.5	0.8	0.8
	Temp. (C)	8.1	9.1	6.2	6.2
<b>84-56</b>	Flow (GPM)	0.4	0.2	Dry	Dry
	Temp. (C)	8.0	10.0		
<b>80-44</b>	Flow (GPM)	seep	Seep	Dry	Dry
	Temp. (C)				
<b>80-46</b>	Flow (GPM)	Dry	Dry	Dry	Dry
	Temp. (C)				
<b>BURNT TREE</b>	Flow (GPM)	3.5	3.2	4.1	3.1
	Temp. (C)	8.3	8.6	8.6	8.8
<b>79-23</b>	Flow (GPM)	Dry	Dry	Dry	Dry
	Temp. (C)				
<b>82-52</b>	Flow (GPM)	Seep	Seep	Dry	Seep
	Temp. (C)				

\*Note: Elk Spring and 89-61 was developed for culinary use by NEWUSSD in early 2009.

**Table 34a: East Mountain Springs Water Quality (Historical vs. 2012) \***  
Southern Area

PARAMETER	Burnt Tree		Elk Spring		Sheba Springs		79-10		79-23		79-26	
	Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical	2012
Elevation	9260		9350		9740		9350		9035		9310	
Geologic Formation	TKn		TKn		Tf		Kpr		TKn		TKn	
Bicarbonate	321.69	263.5	280.94	239.50	285.09	258.00	306.73	254.00	413.13		320.46	no flow during 2012
Calcium	58.72	52.66	62.32	59.52	83.76	87.93	72.01	68.59	79.64		54.45	
Carbonate	1.34	0	1.37	0.00	1.14	0.00	1.73	0.00	1.00		4.65	
Chloride	5.41	3.5	4.43	2.50	4.48	1.00	4.84	3.00	11.27		6.44	
Cond.(umhos/cm)	512.70	525	449.25	476.50	449.85	495.00	487.37	493.50	691.29		523.00	
Hardness	258.79	242	247.10	246.50	248.77	265.00	273.12	267.50			265.74	
Iron	0.10	0	0.08	0.00	0.14	0.00	0.29	0.46			0.46	
Magnesium	27.76	26.915	22.89	23.87	10.68	11.07	22.39	23.27	38.29		31.16	
Manganese	0.04	0	0.04	0.00	0.04	0.00	0.04	0.00	0.01		0.04	
pH(units)	7.55	7.6	7.83	7.71	7.52	7.62	7.69	8.30	7.73		8.10	
Potassium	1.21	0.695	1.68	0.71	1.86	0.00	1.67	0.59	1.54		1.51	
Sodium	16.18	21.2	7.40	6.91	4.01	2.63	4.83	4.58	14.87		15.52	
Sulfate	18.40	12	16.08	7.5	14.74	5	11.13	7	27.19		19.59	
TDS	286.41	273.5	253.28	262.5	261.17	298	275.74	281.5	364.25		292.94	
PARAMETER	79-29		79-35		80-44		80-46		82-52		84-56	
Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical
Elevation	9410		9585		8980		9350		8995		9335	
Geologic Formation	TKn		Tf		Kpr		TKn		Kpr		TKn	
Bicarbonate	315.04	247.50	292.02	239.00	436.27	no flow during 2012	345.12	no flow during 2012	409.85		342.41	no flow during 2012
Calcium	44.43	38.26	80.22	71.01	97.58	97.58	61.43	61.35	74.40		61.35	55.98
Carbonate	1.38	0.00	1.20	0.00	0.67	0.67	1.64	1.59	1.61		1.59	0.00
Chloride	18.36	19.50	3.86	1.50	10.87	10.87	4.55	4.55	10.07		9.61	6.50
Cond.(umhos/cm)	560.05	597.50	457.45	462.00	867.18	867.18	549.61	553.51	682.67		553.51	574.00
Hardness	254.21	240.50	265.08	253.00	385.75	385.75	280.68	291.22	330.90		291.22	268.00
Iron	0.32	0.03	0.34	0.06	0.00	0.00	0.08	0.53	0.18		0.53	0.00
Magnesium	35.44	35.20	16.21	18.36	41.55	41.55	29.05	35.93	35.93		32.89	31.095
Manganese	0.94	0	0.04	0	0.01	0.01	0.03	0.04	0.04		0.05	0
pH(units)	7.73	7.935	7.82	8.015	7.86	7.86	7.41	7.66	7.66		7.48	7.55
Potassium	2.09	1.285	0.90	0.265	3.59	3.59	0.79	1.48	1.48		1.41	0.905
Sodium	32.91	35.32	4.31	3.035	36.18	36.18	9.91	29.16	29.16		16.96	20.46
Sulfate	37.69	33.5	15.33	4.5	136.05	136.05	16.31	44.29	44.29		28.05	30.5
TDS	325.80	321	267.40	269	533.91	533.91	309.58	400.42	400.42		322.79	307

\* Quality parameters reported as mg/l unless otherwise noted

Table 34b: East Mountain Springs Water Quality (Historical vs. 2012) \*

PARAMETER	EM POND		EMS JV34		EMS JV9		EMS MF7		EMS MF10		EMS MF19B	
	Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical	2012
Elevation	10,280		8,692		8,618		8,580		10,250		10,111	
Geologic Formation	TKn		Alluvium		Alluvium		Kbh		TKn		TKn	
Bicarbonate	243.77	221.5	314.57	no	333.78	316	276.26	268	209.61	198	231.63	no
Calcium	59.23	57.325	82.95	flow	87.65	89.23	73.02	74.575	54.91	47.94	65.99	flow
Carbonate	0.00	0	0.00	during	0.00	0	0.00	0	0.56	0	2.67	during
Chloride	1.42	1.5	3.16	2012	0.00	5	2.67	2.5	1.47	1	2.00	2012
Cond.(umhos/cm)	460.27	438.5	591.24		683.09	645	580.09	590.5	411.52	409	453.32	
Hardness	240.00	231	309.14		357.13	366	302.65	309	215.48	199	243.47	
Iron - Total	0.31	0.045	0.42		0.09	0.08	0.14	0.225	0.00	0	0.45	
Magnesium	22.38	21.415	24.80		34.62	34.82	29.22	29.81	19.02	19.31	19.10	
Manganese - Total	0.00	0	0.01		0.01	0.004	0.00	0	0.00	0	0.03	
pH (units)	7.98	7.845	8.12		7.39	7.47	7.82	7.925	8.11	7.76	8.28	
Potassium	0.63	0.71	1.32		1.18	1.32	1.18	1.195	0.86	0.93	1.00	
Sodium	2.21	2.195	7.61		7.28	7.73	6.40	9.48	2.19	2.59	1.86	
Sulfate	4.81	3.5	16.24		51.99	47	45.86	52	7.20	7	6.58	
TDS	249.77	221	326.10		386.61	378	326.26	345.5	226.83	211	246.63	

PARAMETER	EMS MF213		EMS MF219		EMS MFR-10		EMS MFR-30		EMS RR-15		EMS RR-23A	
	Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical	2012
Elevation	8,030		10,220		9,900		9,680		10,350		10,023	
Geologic Formation	Kbh		TKn		TKn		Kpr		TKn		TKn	
Bicarbonate	275.91	256.5	236.73	228	266.39	242	305.17	no	232.55	222	256.13	230
Calcium	65.35	63.09	65.47	63.26	73.36	67.01	84.28	flow	58.47	58.095	69.48	69.82
Carbonate	0.00	0	0.00	0	0.00	0	0.00	during	0.00	0	0.00	0
Chloride	2.59	2.5	1.94	2	2.44	2	2.25	2012	1.10	0.5	1.72	1.5
Cond.(umhos/cm)	544.13	522.5	491.14	488	526.74	501	624.83		436.45	440	494.35	489
Hardness	282.39	272.5	259.41	253	279.91	265	311.00		228.50	231	257.39	260
Iron - Total	0.16	0	0.22	0	0.42	0	0.42		0.12	0	0.33	0.07
Magnesium	28.97	27.895	23.28	23.16	23.50	23.71	24.43		20.04	20.84	20.37	20.83
Manganese - Total	0.00	0	0.01	0	0.00	0	0.01		0.00	0	0.00	0
pH (units)	7.98	8.175	7.87	8.35	8.04	8.38	7.95		7.90	7.78	7.63	7.47
Potassium	1.04	0.97	1.22	1.34	0.82	0.86	0.81		0.72	0.81	0.67	0.715
Sodium	5.37	6.085	2.39	2.65	3.95	5.66	12.96		2.93	3.19	2.81	2.99
Sulfate	25.42	26.5	26.62	28	22.87	29	32.25		6.48	7	11.83	13.5
TDS	294.96	291	270.64	297	294.65	292	351.08		242.73	227.5	274.74	268

PARAMETER	EMS RR-5		EMS SP1-26		EMS SP1-29		EMS UV101		EMS UV206		GRANTS LITTLE BEAR		LITTLE BEAR	
	Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical	2012
Elevation	10,160		10,340		10,360		8,960		9,200		10,280		7,540	
Geologic Formation	TKn		TKn		TKn		Kcp		Kpr		TKn		Ksp	
Bicarbonate	210.88	no	210.09	201	272.24	no	239.39	219	253.73	233	234.74	224	286.16	273
Calcium	62.87	flow	60.17	60.065	68.40	flow	70.52	68.33	67.69	68.36	54.61	51.82	66.34	67.84
Carbonate	0.00	during	0.00	0	0.00	during	0.00	0	0.00	0	0.00	0	0.00	0
Chloride	1.41	2012	2.52	2.5	2.19	2012	4.47	4	4.70	4.5	3.68	3.5	3.95	4
Cond.(umhos/cm)	428.88		424.35	405.5	497.76		532.28	502	577.64	509	468.79	450	592.16	589
Hardness	224.82		213.30	212.5	263.18		271.44	267.5	266.00	267	244.79	231.5	315.32	315
Iron - Total	0.36		0.33	0.115	0.04		0.24	0	0.02	0	0.00	0	0.03	0
Magnesium	16.49		15.32	15.18	22.41		23.14	23.545	23.54	23.44	26.30	24.83	36.32	35.29
Manganese - Total	0.00		0.00	0	0.00		0.00	0	0.00	0	0.00	0	0.00	0
pH (units)	7.86		7.85	7.995	7.65		7.96	8.41	7.95	7.965	7.75	7.815	7.41	7.45
Potassium	0.56		0.72	0.7	1.25		1.25	1.25	1.57	1.65	1.52	1.405	1.67	1.47
Sodium	1.81		2.22	2.155	3.29		5.78	5.75	6.41	6.275	3.59	3.675	7.26	7.56
Sulfate	6.59		6.93	6	7.73		39.64	39.5	31.04	36.5	11.68	10.5	36.58	39
TDS	240.47		232.74	226.5	263.88		304.06	289.5	290.5	305.5	251.11	229.5	324.21	334

\* Quality parameters reported as mg/l unless otherwise noted

TABLE 35: NEWUA - RILDA CANYON SPRING FLOW (GPM)  
MONTHLY MEASUREMENTS

DATE	METER 2	METER 3	METER 4	TOTAL
09/06/1990	10	75	120	315
02/18/1990	15.1	78.9	91	186
11/07/1990	13.3	37.5*	30	71
11/14/1990	14.5	67.4	9.3	91
11/19/1990	13.6	57.7	6.3	77
1991	10.9	56.5	4.7	72
09/1	10.9	107	136	253.9
09/1	12.3	95	160	267.3
09/1	9.3	95	160	264.3
09/10/1991	9.3	165	140	314.3
10/21/1991	7.3	85	55	147.3
11/20/1991	8	80	16.2	164.2
09/07/1992	8	46	7.7	61.7
05/15/1992	7.5	110	140	227.5
06/12/1992	7	100	180	287
07/20/1992	7	80	150	237
08/14/1992	7.1	90	110	207.1
09/03/1992	6	55	75	131
10/30/1992	5.5	45	2.6	53.1
05/15/1993	6	25	13	44
08/11/1993	6.6	90	150	246.6
07/29/1993	6	110	70	246
08/27/1993	4	96	170	270
09/21/1993	2	60	110	172
10/23/1993	3	30	55	88
05/26/1994	4.8	45	75	124.8
06/16/1994	5	100	160	265
07/18/1994	5.5	100	130	235.5
08/24/1994	2	70	80	152
09/12/1994	2.7	50	20	54.7
10/23/1994	2	30	1.5	33.5
12/14/1994	2	31	**	40
06/22/1995	8	ov. capacity	**	**
07/21/1995	2	ov. capacity	**	**
08/24/1995	4	ov. capacity	**	**
08/15/1995	2.3	150	**	152.3
10/11/1995	3.3	73	**	76.3
11/09/1995	8	100	**	108
04/03/1996	5	175	**	180
05/11/1996	5.5	175.0*	**	180
07/23/1996	5.5	200.0*	**	205
01/21/1996	4.8	150.0*	**	154.8
05/11/1996	4.3	150.0*	**	154.3
10/27/1996	3.8	80	**	83.8
11/14/1996	4	80	**	84
12/12/1996	4	100	**	104
1996 problems: +ive spring affected flow measurements				
DATE	METER 2	METER 3	TOTAL	NEWUA METER
08/28/1997	5.3	150	+150.0***	91.0****
09/29/1997	6	150	+150.0***	200
06/23/1997	6	150	+150.0***	300
07/17/1997	6	150	+150.0***	270
05/26/1997	5.5	150	+150.0***	270
09/13/1997	5.5	150	+150.0***	270
10/12/1997	5.9	150	+150.0***	180
11/14/1997	5.9	100	+100.0****	160
12/14/1997	4	100	+100.0****	130
DATE	METER 2	METER 3	TOTAL	NEWUA METER
04/14/1998	6.7	100	**	167
05/07/1998	7.5	158	**	145
06/05/1998	10.3	+100.0***	**	280
07/06/1998	7.5	+100.0***	**	200
05/10/1998	7.1	+100.0***	**	200
09/14/1998	6.0	+100.0***	**	240
10/05/1998	6.0	+100.0***	**	200
11/05/1998	6.7	172	**	180
09/8	5.0	93	**	130
DATE	METER 2	METER 3	TOTAL	NEWUA METER
01/13/1999	5.0	120	125+	150
01/02/1999	6.3	90	96+	120
03/02/1999	6.6	80	87+	110
04/15/1999	5.0	65	70+	120
05/11/1999	5.8	100	106+	150
06/12/1999	6.6	150	157+	200
07/26/1999	6.9	170	177+	250
08/13/1999	6.7	200	207+	270
09/16/1999	6.0	200	206+	225
10/30/1999	4.0	200	204	200
11/17/1999	3.2	100	103	130
12/09/1999	2.5	80	83	110
DATE	METER 2	METER 3	TOTAL	NEWUA METER
01/12/2000	2.3	60	62.2+	110
02/03/2000	3.4	50	56.4+	110
03/09/2000	**	**	**	120
04/03/2000	**	**	**	150
05/03/2000	3	86	89+	270
06/20/2000	3	160	163+	270
07/02/2000	1.1	170	172.1+	240
08/09/2000	1.8	200	201.6+	280
09/10/2000	1.3	120	121.3+	160
10/10/2000	1.7	50	51.7+	150
11/25/2000	1.4	65	66.4+	100
12/03/2000	1.07	61	62.1+	100
DATE	METER 2	METER 3	TOTAL	NEWUA METER
01/02/2001	1.02	82.5	63.52*	100
02/02/2001	1.02	82.5	63.52*	90
03/11/2001	1.5	52	53.5	60
04/23/2001	1.9	140	141.9	150
05/21/2001	1.6	214	215.6	210
07/03/2001	1.2	200	201.2	210
01/14/2001	1.1	180	181.1	220
02/11/2001	1	161	163	180
03/17/2001	1.3	150	151.5	120
11/27/2001	1.6	100	101.6	100
12/11/2001	1.2	40	40*	70
DATE	METER 2	METER 3	TOTAL	NEWUA METER
01/17/2002	1.5	45	47	60
02/11/2002	1.4	31	35	60
03/26/2002	0.5	35	34	60
04/11/2002	0.6	46	47	50
03/08/2002	0.5	40	41	55
04/25/2002	1.0	166	167	120
05/22/2002	0.7	170	171	210
06/10/2002	0.7	150	151	150
07/18/2002	0.5	60	61	90
10/16/2002	0.4	35	35	60
11/12/2002	0.4	51	51	60
12/15/2002	1.8	46	48	60
DATE	METER 2	METER 3	TOTAL	NEWUA METER
01/17/2003	1.6	46	48	60
03/16/2003	1.6	31	35	60
05/12/2003	1.5	40	42	50
04/21/2003	1.5	50	51	60
03/22/2003	3.7	150	154	70
04/26/2003	3	222	225	205
07/22/2003	2.8	190	193	225
07/16/2003	2.2	190	192	220
08/03	0.4	130	130	130.4
09/03	1	75	76	76
10/03	0.8	70	71	70.8
11/09/2003	0.5	38	39	38.8
DATE	METER 2	METER 3	TOTAL	NEWUA METER
01/27/2004	0.4	35.3	25	****
02/12/2004	0.5	100	101	45
03/23/2004	0.4	136	136	120
06/25/2004	****	120	120	****

TABLE 36: NEWUA - RILDA CANYON SPRING FLOW (GPM)  
MONTHLY MEASUREMENTS

DATE	METER 2	METER 3	METER 4	TOTAL
07/26/2004	*****	130	130	*****
08/06/2004	*****	125	125	100
07/09/2004	*****	142	142	100
16/15/2004	*****	30	30	50
11/04/2004	*****	*****	*****	83
10/4	*****	*****	*****	73
33	*****	*****	68	88
2003	*****	*****	65	85
05/11/2003	*****	*****	82	82
04/30/2003	*****	*****	82	83
03/19/2003	*****	*****	100	100
05/09/2003	*****	*****	230	230
07/06/2003	*****	*****	240	240
08/23/2003	*****	*****	233	233
07/22/2003	*****	*****	*****	*****
10/24/2003	*****	115	150	150
11/24/2003	*****	112	178	178
01/05/2006	*****	73	72	72
01/20/2006	*****	Inaccessible	72	72
02/23/2006	*****	Inaccessible	72	72
03/14/2006	*****	Inaccessible	83	83
07/23/2006	*****	100	102	102
03/23/2006	*****	200	160	160
05/28/2006	*****	200	230	230
07/26/2006	*****	330	240	240
08/29/2006	*****	210	233	233
09/27/2006	*****	150	*****	*****
10/26/2006	*****	183	150	150
11/17/2006	*****	180	158	158
12/07/2006	*****	107	125	125
01/10/2007	*****	200	140	140
03/26/2007	*****	94	130	130
03/26/2007	*****	69	123	123
04/19/2007	*****	70	113	113
05/10/2007	*****	92	250	250
06/28/2007	*****	190	270	270
07/17/2007	*****	170	*****	*****
06/30/2007	*****	162	*****	*****
08/10/2007	*****	127	*****	*****
10/28/2007	*****	60	150	150
11/14/2007	*****	68	115	115
12/03/2007	*****	25.8	95	95
01/15/2008	*****	Inaccessible	65	65
02/10/2008	*****	Inaccessible	65	65
07/24/2008	*****	Inaccessible	65	65
04/23/2008	*****	100	75	75
05/03/2008	*****	10	218	218
04/17/2008	*****	11	240	240
07/07/2008	*****	10	260	260
08/19/2008	*****	10	250	250
08/23/2008	*****	107	230	230
10/23/2008	*****	54	160	160
11/19/2008	*****	44	130	130
12/04/2008	*****	42	80	80
01/13/2009	*****	Inaccessible	75	75
02/17/2009	*****	Inaccessible	61	61
02/24/2009	*****	37	81	81
04/16/2009	*****	27	65	65
05/07/2009	*****	44	65	65
06/15/2009	*****	183	235	235
07/18/2009	*****	150	240	240
08/23/2009	*****	167	240	240
06/02/2009	*****	120	125	125
11/11/2009	*****	50	110	110
10	*****	33	100	100
9	*****	*****	130	120
01/22/2010	*****	*****	90	90
02/17/2010	*****	*****	80	80
03/17/2010	*****	*****	80	80
04/26/2010	*****	*****	55	83
05/20/2010	*****	*****	150	150
06/03/2010	*****	*****	210	210
07/09/2010	*****	180	210	210
08/12/2010	*****	190	420	420
09/02/2010	*****	150	200	200
10/27/2010	*****	26	210	210
11/12/2010	*****	43	165	165
12/07/2010	*****	40	160	160
01/12/2011	*****	Inaccessible	148	148
02/07/2011	*****	Inaccessible	150	150
03/23/2011	*****	Inaccessible	150	150
04/11/2011	*****	50	160	160
05/26/2011	*****	188	355	355
06/13/2011	*****	200	200	200
07/22/2011	*****	167	235	235
08/23/2011	*****	214	250	250
09/06/2011	*****	200	235	235
10/18/2011	*****	160	225	225
11/02/2011	*****	81	150	150
12/02/2011	*****	68	210	210
01/10/2012	*****	48	97	97
02/07/2012	*****	40	59	59
03/15/2012	*****	28	97	97
04/10/2012	*****	73	0	0
05/10/2012	*****	200	0	0
06/18/2012	*****	120	170	170
07/03/2012	*****	30	210.6	210.6
08/13/2012	*****	97	180.6	180.6
09/10/2012	*****	Line Closed	161	161
10/23/2012	*****	Line Closed	0	0
11/06/2012	*****	Line Closed	0	0
12/04/2012	*****	Line Closed	0	0

\* Flow not available  
 \*\* Data collected during pump test  
 \*\*\* Diverted through Meter 3  
 \*\*\*\* O = capacity  
 \*\*\*\*\* Meter Value problem  
 \* Meter 3 - valve would not open  
 \*\* - Any valve  
 \* - Not Working - Used Total of Meter 2 & 3 placement

TABLE 36

NEWUA - RILDA CANYON SPRINGS  
AVERAGE WATER QUALITY\*

PARAMETER **	METER 2		METER 3		METER 4	
	Historical	2012	Historical	2012	Historical	2012
Bicarbonate	433.17	No Samples	369.01	303	356.38	
Calcium	88.41	During	77.84	74.17	70.3	
Carbonate	1.96	2012	1.24	0	0.7	
Chloride	10.48	Problem	9.16	9	13.1	
Cond.(umhos/cm)	792.43	With	723.25	713	535.5	
Hardness	432.87	Valve	385.65	363	347.94	
Iron - Total	0.46		0.32	0.77	0.13	
Iron - Dissolved	0.12		0.06	0	0.06	
Magnesium	51.47		46.44	43.22	41.86	
Mangenesse - Total	0.05		0.01	0	-	
Mangenesse -Dissolved	0.10		0.04	0	0.08	
pH(units)	7.28		7.41	7.47	7.41	
Potassium	2.68		1.98	1.7	2.13	
Sodium	16.69		15.72	14.67	12.96	
Sulfate	104.51		85.58	74	55.4	
TDS	497.64		436.61	397	365.13	

Combined with Meter 3  
in 1995

\* Quality parameters reported as mg/l unless otherwise noted  
 \*\* Data: Database input restricted to values greater than laboratory minimum detection limit.  
 Flow through Meter 4 was combined with Meter 3 in 1995

**Table 37**  
**TRAIL MOUNTAIN**  
**SPRING DISCHARGE RECESSION STUDY**  
**YEAR 2012**

SPRING		JUL	AUG	SEP	OCT	Seasonal Net Change %
<b>T-6</b>	Flow (GPM)	0.0	0.0	0.0	0.0	
<b>18-2-1</b>	Temp. (C)					
<b>T-8</b>	Flow (GPM)	0.0	0.0	0.0	0.0	
<b>17-21-1</b>	Temp. (C)					
<b>T-9</b>	Flow (GPM)	3.3	3.6	2.7	3.1	-6.06
<b>17-22-1</b>	Temp. (C)	11.0	9.0	8.0	8.0	
<b>T-10</b>	Flow (GPM)	0.0	0.0	0.0	0.0	
<b>17-26-4</b>	Temp. (C)					
<b>T-14</b>	Flow (GPM)	0.0	0.0	0.0	0.0	
<b>17-25-1</b>	Temp. (C)					
<b>T-14A</b>	Flow (GPM)	0.0	0.0	0.0	0.0	
<b>17-26-5</b>	Temp. (C)					
<b>T-15</b>	Flow (GPM)	0.0	0.0	0.0	0.0	
<b>17-35-1</b>	Temp. (C)					
<b>T-16</b>	Flow (GPM)	0.0	0.0	0.0	0.0	
<b>17-35-2</b>	Temp. (C)					
<b>TM-23*</b>	Flow (GPM)	0.0	0.0	0.0	0.0	
	Temp. (C)					

<b>JULY TOTAL</b>	<b>3.3</b>	<b>OCTOBER TOTAL</b>	<b>3.10</b>
		<b>Net Change - Average</b>	<b>-6.06</b>
<b>TOTAL FOR JULY 2011 =</b>	<b>21.08</b>	<b>Net Change - By Volume</b>	<b>-6.06</b>

**FLOW FOR JULY 2011 WAS 84.35% GREATER THAN JULY 2012**

**TABLE 38: TRAIL MOUNTAIN YEARLY SPRING DISCHARGE VARIATIONS (GPM)**

Spring	JULY FLOW DATA												
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	
T-6 (18-2-1)	11	0.5	0.5	1.2	0.03	6	1.6	4.1	3.3	7.5	9.8	3.5	
T-8 (17-21-1)	4.7	0.2	0.25	Dry	0.14	1.7	0.2	1.7	0.6	0.9	2.1	1.4	
T-9 (17-22-1)	8	0.2	0.1	Dry	2.5	40	4	20	8.6	4.8	24	10.9	
T-10 (17-26-4)	4.7	Dry	0.15	Dry	Dry	0.4	Damp	0.4	0.2	0.4	0.5	0.7	
T-14 (17-25-1)	5	Dry	Dry	Dry	Dry	1.6	Damp	2	0.9	1	2.1	2.1	
T-14A (17-26-5)	10	Dry	Dry	Damp									
T-15 (17-35-1)	2.1	0.2	0.5	0.75	0.33	1.6	0.5	1.2	0.8	1	3.3	2.3	
T-16 (17-35-2)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Damp	Damp	
T-23 (17-14-4)	22**	4.0*	Dry	57.8****	84.4****								
<b>TOTAL</b>	67.5	5.1	1.5	1.95	2.67	51.3	6.3	29.4	14.4	15.6	99.6	105.3	
	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>			
T-6 (18-2-1)	3	4.8	1.0	0.0	0.0	1.8	3.6	0.3	1.2	Dry			
T-8 (17-21-1)	0.4	0.4	-0.1	-0.1	0	0.26	0.52	Dry	Dry	Dry			
T-9 (17-22-1)	2.7	6	2.6	5.2	6.8	17	6	3.9	11.8	5.8			
T-10 (17-26-4)	0.3	0.2	Seep	Seep	Seep	Seep	0.25	Seep	Seep	Seep			
T-14 (17-25-1)	0.3	0.5	Seep	Dry	Dry	0	Damp	Dry	Dry	Dry			
T-14A (17-26-5)	Dry	0	0.0	0.0	0.0	0.0	0.0	Dry	Dry	Dry			
T-15 (17-35-1)	0.9	0	0.0	0.0	0.0	0.0	0.0	Dry	Dry	Dry			
T-16 (17-35-2)	Dry	0	0.0	0.0	0.0	0.0	0.0	Dry	Dry	Dry			
T-23 (17-14-4)	39.7****	0	0.0	0.0	0.0	17.7****	24.4****	Dry	Dry	Dry			
<b>TOTAL</b>	47.2	11.9	3.6	5.2	6.8	36.76	46.6	Dry	13.0	5.8			
	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>			
T-6 (18-2-1)	Dry	1.79	0										
T-8 (17-21-1)	Dry	0.89	0										
T-9 (17-22-1)	2.8	19	3.3										
T-10 (17-26-4)	Seep	Seep	0										
T-14 (17-25-1)	Dry	Seep	0										
T-14A (17-26-5)	Dry	Dry	0										
T-15 (17-35-1)	Dry	Dry	0										
T-16 (17-35-2)	Dry	Dry	0										
T-23 (17-14-4)	Dry	*****	*****										
<b>TOTAL</b>	2.8	21.68	3.3										

\* August measurement

\*\* September measurement

\*\*\* First year monitored by PacificCorp

\*\*\*\* Cottonwood Canyon Creek Gain/Loss Surveys

\*\*\*\*\*Site SW-1 is used to monitor flow contributions in Cottonwood Canyon Creek

Table 39: Trail Mountain Springs Water Quality (Historical vs. 2012) \*

PARAMETER	18-2-1		17-21-1		17-22-1		17-26-4		17-25-1		17-26-5**	
	Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical	2012	Historical	2012
Elevation	8395		9320		9210		8880		8155		9080	
Geologic Formation	TKn		TKn		TKn		TKn		Kcg		TKn	
Bicarbonate	393.49	No Flow During 2012	387.53	No Flow During 2012	308.33	238.0	398.07	No Flow During 2012	545.79	No Flow During 2012	404	No Flow During 2012
Calcium	61.84		52.94		46.28	46.0	60.54		89.63		78.6	
Carbonate	1.16		1.18		2.39	0.0	8.33		3.50		<.5	
Chloride	45.37		30.70		9.75	8.0	26.93		31.55		20.8	
Cond.(umhos/cm)	974.37		717.90		538.11	515.0	743.61		1169.33		860	
Hardness	391.02		244.33		255.22	250.0	350.22		486.08		442	
Iron	0.16		0.09		0.29	0.0	0.94		6.79		0.30	
Magnesium	57.37		27.88		34.02	32.7	80.40		59.30		59.75	
Manganese	0.05		0.05		0.04	0.0	0.08		0.04		0.02	
pH(units)	7.70		7.59		7.80	7.9	7.97		7.85		7.75	
Potassium	1.56		2.05		1.46	0.9	1.84		2.29		1.93	
Sodium	66.49		61.33		20.01	17.6	32.75		66.71		31.07	
Sulfate	141.22		17.89		17.68	12.0	59.10		216.89		142.9	
TDS	585.78		393.96		292.54	268.0	426.34		723.00		515	

PARAMETER	17-35-1		17-35-2		17-14-4	
	Historical	2012	Historical	2012	Historical	2012
Elevation	8880		9000		7880	
Geologic Formation	TKn		TKn		Alluvium	
Bicarbonate	388	No Flow During 2012	No Flow During 2012	No Flow During 2012	363	No Flow During 2012
Calcium	41.6		Historical Flow		65.9	
Carbonate	5.71				13.91	
Chloride	42.47				642	
Cond.(umhos/cm)	770				346	
Hardness	251				0.19	
Iron	0.67				43.95	
Magnesium	36.40				0.02	
Manganese	0.08				7.77	
pH(units)	8.00				1.95	
Potassium	1.55				15.83	
Sodium	78.00				61.9	
Sulfate	45.2				385	
IDS	441					

TRAIL MOUNTAIN SPRINGS CROSS REFERENCE

ENERGY WEST  
 18-2-1  
 17-21-1  
 17-22-1  
 17-26-4  
 17-25-1  
 17-26-5  
 17-35-1  
 17-35-2  
 17-14-4

ARCO'S  
 T-6  
 T-8  
 T-9  
 T-10  
 T-14  
 T-14A  
 T-15  
 T-16  
 TM-23

\* Quality parameters reported as mg/l unless otherwise noted  
 \*\* High TSS, Elevated Total Iron

**TABLE 40: DEER CREEK IN-MINE WATER QUALITY \***

2012*** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON DISSOLVED	MAGNESIUM	MANGANESE	PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
<b>TW-10</b>														
20120313	322.0	74.3	0.0	4.0	659.0	337.0	0.0	36.7	0.0	7.4	1.4	16.5	46.0	346.0
20120927	316.0	72.3	0.0	4.0	655.0	331.0	0.0	36.6	0.0	7.5	1.2	15.5	45.0	353.0
<b>2012***</b>														
MIN	316.0	72.3	0.0	4.0	655.0	331.0	0.0	36.6	0.0	7.4	1.2	15.5	45.0	346.0
MAX	322.0	74.3	0.0	4.0	659.0	337.0	0.0	36.7	0.0	7.5	1.4	16.5	46.0	353.0
MEAN	319.0	73.3	0.0	4.0	657.0	334.0	0.0	36.7	0.0	7.5	1.3	16.0	45.5	349.5
No. of Analysis	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>2011***</b>														
MIN	305	72	0	4	618	326	0	36	0	7	1	15	44	333
MAX	317	75	0	4	640	343	0	38	0	7	1	17	47	378
MEAN	309.25	73.16	0.00	4.00	633.50	334.00	0.00	36.75	0.00	7.45	1.32	16.01	45.25	364.75
<b>HISTORICAL 1988-2011</b>														
MIN	279	61.3	0.0	0.4	450	279	0.00	18.70	0.000	6.60	0.01	9.81	27	313
MAX	714	211.0	5.0	30.0	950	732	1.17	77.10	1.210	8.40	5.00	55.03	350	505
MEAN	359.06	76.65	1.01	6.54	635.14	346.29	0.11	36.66	0.06	7.39	1.37	15.52	49.66	374.94
<b>MN-ME**</b>														
20120313	338	94	0	7	866	472	0	57	0	8	3	20	150	529
20120927	303	84	0	7	838	432	0	54	0	8	3	20	137	496
<b>2012***</b>														
MIN	303	84	0	7	838	432	0	54	0	8	3	20	137	496
MAX	338	94	0	7	866	472	0	57	0	8	3	20	150	529
MEAN	321	88.93	0.0	7	852	452	0	55.86	0.0	8.08	3.00	19.78	144	513
No. of Analysis	2	2	2	2	2	2	2	2	2	2	2	2.00	2	2
<b>2011***</b>														
MIN	319	85	0	6	821	434	0	54	0	8	3	19.76	150	522
MAX	347	97	0	7	865	488	0	60	0	8	3	19.96	161	575
MEAN	332	93	0	7	850	467	0	57	0	8	3	19.86	156	557
<b>HISTORICAL 1991-2011</b>														
MIN	69	0.0	4.0	500.0	329	0	37.60	0.00	6.900	0.74	14.90	40.00	240.00	0
MAX	475	120.3	23.0	25.0	1139	590	2.81	70.43	0.200	8.23	14.00	37.16	218.00	678
MEAN	392.36	91.12	1.73	7.69	824.65	432.95	0.14	49.75	0.03	7.79	3.06	18.85	117.15	507.73

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Sample site initiated during 1991.

\*\*\* 1997 Data: Database input restricted to values greater than laboratory minimum detection limit.

**TABLE 41: DEER CREEK MINE - DISCHARGE WATER QUALITY\***

Parameters	2012**				Historical - (1976-2011)			
	Minimum	Maximum	Mean	No. of Analysis	Minimum	Maximum	Mean	No. of Analysis
Acidity	0	0	0.00	0	0.1	97	13.28	266
Chloride	0	59.00	14.40	12	0.7	285	19.11	430
Conductivity (umhos/cm)	774	1039.00	850.00	12	480	1900	900.12	444
Iron - Total	0.17	0.79	0.41	12	0.01	7.53	0.62	442
Oil & Grease	<i>No oil and grease seen noted during sampling</i>							
pH (units)	7.34	7.60	7.44	12	0.1	48.8	3.21	238
Sulfate	73	182.00	113.30	12	6.52	8.51	7.49	432
TDS	415	643.00	505.80	12	13	518	172.57	438
TSS	0	16.00	2.70	12	289	1111	572.71	450
					0	2784	47.66	379

\* Quality parameters reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

TABLE 42: WILBERG/COTTONWOOD IN-MINE WATER QUALITY \*

2012** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON DISSOLVED	MAGNESIUM	MANGANESE	PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
2S XC-11 Mine Sealed May 2001 - In-Mine Monitoring Discontinued													
2011** MIN													
MAX													
MEAN													
TMA XC-32 Mine Sealed May 2001 - In-Mine Monitoring Discontinued													
2011** MIN													
MAX													
MEAN													
No. of Analysis													
HISTORICAL 1983-2001													
MIN	403	116.0	0.1	6.0	1000	725	0.01	5.40	6.50	0.30	5.80	250.0	664
MAX	676	330.0	5.0	160.0	2600	1022	0.30	134.40	8.07	7.40	36.90	690.0	1328
MEAN	565	171.0	1.6	20.3	1495.0	868.0	0.13	105.50	7.23	4.22	22.56	412.0	1050
No. of Analysis													
HISTORICAL 1983-2001													
MIN	379	114	1	7	1171	581	0.10	72	7.03	6	33	256	816
MAX	467	133	5	17	1352	688	0.70	90	8.20	10	44	491	993
MEAN	441.0	119.0	3.5	12.3	1259.0	609.0	0.2	75.7	7.27	7.5	39.2	338.5	868.4

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* 1997 Data: Database input restricted to values greater than laboratory minimum detection limit.

**TABLE 43: WILBERG/COTTONWOOD - DISCHARGE WATER QUALITY**

**\* GRIMES WASH**

	2012			Historical - (1976-2001)			
	Min	Max	Mean	Min	Max	Mean	
	No Discharge During 2012						No. of Analysis
pH				6.9	8.47	7.7	273
Acidity				0.1	62	10.61	193
Bicarb. Alkalinity				190	539	364	173
Chloride				0.6	80	17.5	247
Conductivity				490	1611	1041	205
Iron				0.01	3	0.33	233
Oil & Grease				0.1	23.8	2.3	193
Sulfate				29.2	600	264	249
TDS				407	1287	672	273
TSS				0.1	222	7.8	262

**MILLER CANYON (Final Reclamation Completed 6/1999)**

	2012			Historical - (1984-1999)			
	Min	Max	Mean	Min	Max	Mean	
	Not part of monitoring program						No. of Analysis
pH				6.4	8.83	7.3	81
Acidity				0.1	100	22.45	72
Bicarb. Alkalinity				267	543	408.7	79
Chloride				10	155	22.14	77
Conductivity				480	1900	1216	81
Iron - Total				0.01	1.38	0.24	79
Oil & Grease				0.1	7.2	2.1	71
Sulfate				200	680	419.3	79
TDS				413	1182	926	81
TSS				0.1	32	4.8	109

**TMA001\***

	2012			Historical - (2001-2011)			
	Min	Max	Mean	Min	Max	Mean	
	No Visual Oil & Grease Noted in 2012						No. of Analysis
Acidity	0	0		6	6	6	1
Chloride	0	15	12.42	6	41	16.69	128
Conductivity (umhos)	1094	1118	1103.92	1062	1436	1158.40	128
Iron - Total	0	0.31	0.08	0	0.4	0.01	54
Oil & Grease	No Visual Oil & Grease Noted in 2012						0
pH (units)	7.31	7.41	7.35	6.2	8.08	7.38	127
Sulfate	172	230	216.58	215	322	257.98	128
TDS	685	734	716.50	696	803	754.50	128
TSS	0	13	1.50	0	14	1.51	50

\* Discharge Re-located From Grimes Wash to TMA July 2001

ND - Not Detected

**TABLE 44: TRAIL MOUNTAIN IN-MINE WATER QUALITY \***

2012** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON DISSOLVED	MANGANESE	PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
UG-3 Mine Sealed April 2001 - In-Mine Monitoring Discontinued												
2012** MIN		26.0	0.1	380	151	0.03	19.6	7.41	2.1	33.0	15.0	252
MAX		49.3	25.0	696	222	0.20	29.0	8.48	5.0	61.0	130.0	424
MEAN		34.2	7.3	542	189	0.15	25.3	8.09	3.6	46.1	33.7	308
* Quality parameters are reported as mg/l unless otherwise noted.												
** Data: Database input restricted to values greater than laboratory minimum detection limit.												
HISTORICAL 1985 - 2001												

**TABLE 45 : TRAIL MOUNTAIN - DISCHARGE WATER QUALITY**

**@ COTTONWOOD CANYON PORTALS  
2012**

	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>No. of Analysis</b>		<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>No. of Analysis</b>
<b>pH</b>	Mine Sealed April 2001 - No Discharge					7.8	8.53	8.26	67
<b>Acidity</b>						12	58	35	2
<b>Bicarb. Alkalinity</b>						341	922	753	48
<b>Chloride</b>						10	410	36.5	49
<b>Conductivity</b>						1116	1655	1464	55
<b>Iron</b>						0.3	2.3	0.55	71
<b>Oil &amp; Grease</b>						2	2	2	2
<b>Sulfate</b>						50	292	152	48
<b>TDS</b>						671	1072	936	70
<b>TSS</b>						5	42	109	36

**OLIPHANT PORTALS**

**2012**

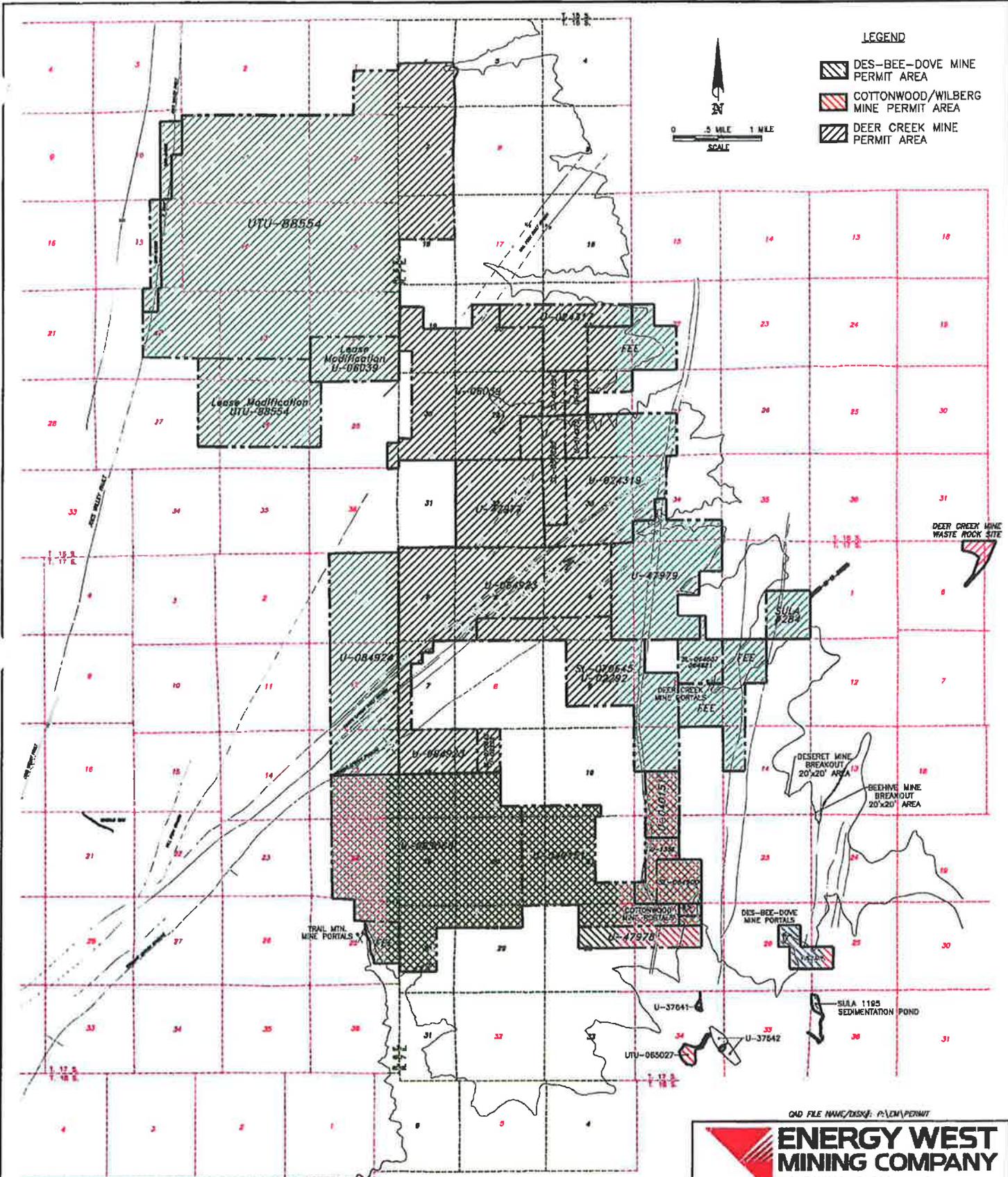
**Historical**

	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>No. of Analysis</b>		<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>No. of Analysis</b>
	No Flow for 2012 - Damp					7.54	8.91	8.1	45
<b>Acidity</b>						1	19	7.73	15
<b>Bicarb. Alkalinity</b>						214	327	282	45
<b>Chloride</b>						4	21	8.3	45
<b>Conductivity</b>						482	925	663	42
<b>Iron</b>						0.01	0.7	0.16	23
<b>Oil &amp; Grease</b>						0.4	5	4.4	8
<b>Sulfate</b>						90	330	123	45
<b>TDS</b>						354	584	410	45
<b>TSS</b>						1	90	22.6	23

TABLE 46: WELLS - WATER QUALITY \*

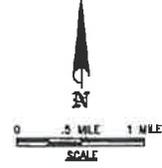
2012* SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhscfcm)	HARDNESS	IRON			PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
							DISSOLVED	MAGNESIUM	MANGANESE					
<b>DEER CREEK - DCWR-1</b>														
20120313	700	107.29	0	753	18130	919	0	158.22	0.01	7.63	13.32	4933.1	8616	15819
20120614	681	106.74	0	747	17730	927	0	160.45	0.01	7.65	13.31	4695.9	8546	15490
20120910	684	104.09	0	758	18130	885	0	151.87	0	7.62	15.11	5010.9	9030	15633
20121204	653	98.42	38	829	18001	870	0	151.56	0.01	7.71	25.11	4780.8	9159	15415
MIN	653	98	0	747	17730	870	0	152	0	8	13	4696	8546	15415
MAX	700	107	38	829	18130	927	0	160	0	8	25	5011	9159	15819
MEAN	680	104	10	772	17998	900	0	156	0	8	17	4855	8838	15589
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
<b>HISTORICAL 1989-2011:</b>														
MIN	531	95.0	0	17	17300	318	0.00	4.54	0.00	7.34	6.12	4500	6000	11466
MAX	935	880.10	83	1140	45000	3351	1.74	351.00	0.20	8.47	43.80	9978	18000	24189
MEAN	737.36	156.69	3.77	762.69	21867.07	1171.23	0.19	189.21	0.04	7.74	17.53	5922.14	11728.61	18903.21
<b>WILBERG/COFFINWOOD - CWRW-1</b>														
20120319	543	388.83	0	2354	16360	3787	0	683.8	0	7.42	36.35	3223.37	6741	14240
20120613	510	406.14	0	2290	16930	4076	0	743.43	0	7.39	32.35	3188.9	6776	15069
20120905	509	402.36	0	2239	17010	3935	0.05	711.65	0	7.45	34.79	3259.7	6839	15060
20121205	502	395.37	0	2381	17090	3942	0	717.54	0	7.3	44.96	3163.2	7044	15094
2012**														
MIN	502	389	0	2239	16360	3787	0	684	0	7	32	3163	6741	14240
MAX	543	406	0	2381	17090	4076	0	743	0	7	45	3260	7044	15094
MEAN	521	398	0	2316	16848	3935	0	714	0	7	37	3209	6850	14866
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
<b>HISTORICAL 1989-2011:</b>														
MIN	233	132	0.00	280	10,666	1629	0.00	137.7	0.000	6.90	8.0	851	750	5,231
MAX	864	1,135	26	4,020	120,000	8,327	37.77	1,717	2.480	8.33	122.0	8,812	24,000	30,440
MEAN	408	380	1.7	2,324	21,172	3,851	1.36	699	0.209	7.56	35.8	3,834	8,298	15,759
<b>TRAIL MOUNTAIN IM-1B</b>														
20120316	440	9	22	56	1053	57	0	8	0	9	2	241	17	634
20120613	453	9	9	57	1032	58	0	8	0	9	3	221	7	599
20120905	435	9	13	57	1043	58	0	9	0	9	2	225	8	606
20121205	454	9	5	57	1054	56	0	8	0	9	3	215	17	641
2012**														
MIN	435	8.73	0	56	1032	56	0	8.28	0	8.51	2.33	215.25	7	599
MAX	454	9.27	22	57	1054	58	0	8.54	0.009	8.61	2.72	240.73	17	641
MEAN	445.50	9.06	10.00	56.75	1045.50	57.25	0.00	8.40	0.01	8.55	2.54	225.55	12.25	620.00
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
<b>HISTORICAL 1987-2011:</b>														
MIN	304.0	2.4	0	16	783	7.0	0.00	1.0	0.000	7.43	1	5	0	402
MAX	1015.0	14	164	717	4580	72.0	0.20	10.7	0.2	9.55	15.7	1316	664	3,290
MEAN	490.32	8.83	25.4	65.56	1086.03	56.3	0.03	8.3	0.018	8.45	2.59	236.44	24.33	641

\* Quality parameters are reported as mg/l unless otherwise noted.  
 \*\* Data: Database input restricted to values greater than laboratory minimum detection limit.



**LEGEND**

-  DES-BEE-DOVE MINE PERMIT AREA
-  COTTONWOOD/WILBERG MINE PERMIT AREA
-  DEER CREEK MINE PERMIT AREA



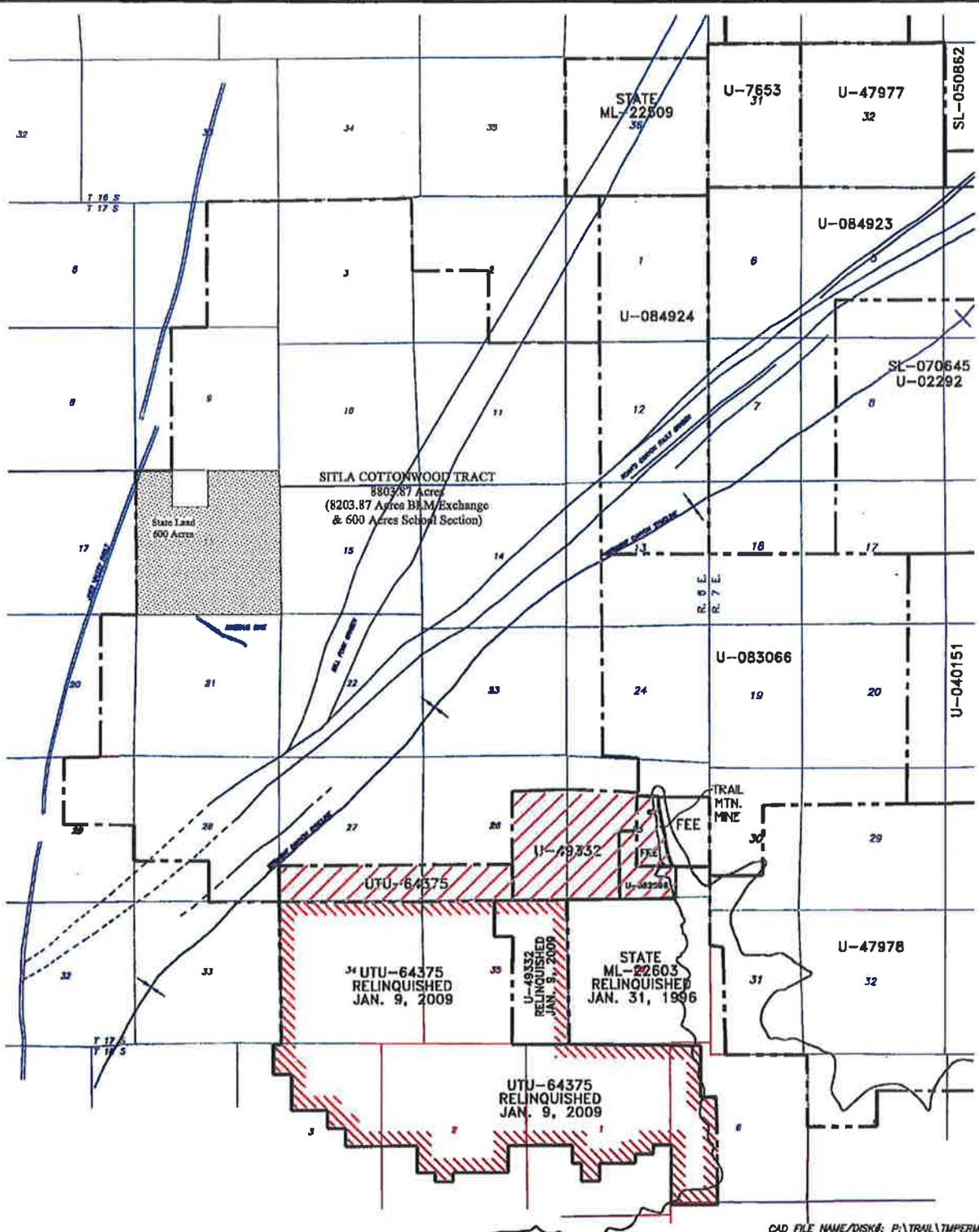
GMD FILE NAME/DISK #: P:\DM\PERMIT



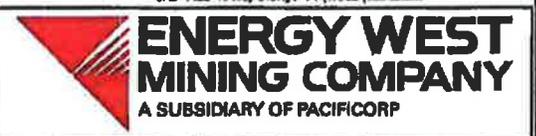
**ENERGY WEST MINING COMPANY**  
A SUBSIDIARY OF PACIFICORP

**MINE PERMIT BOUNDARIES**

DRAWN BY: <b>K. LARSEN</b>	<b>FIGURE 1</b>
SCALE: <b>AS NOTED</b>	DRAWING #:
DATE: <b>FEBRUARY 7, 2013</b>	SHEET <b>1</b> OF <b>1</b> REV. <b>---</b>



CAD FILE NAME/DISK#: P:\TRAIL\TMPERMIT



**TRAIL MOUNTAIN MINE  
MINE PERMIT BOUNDARY**

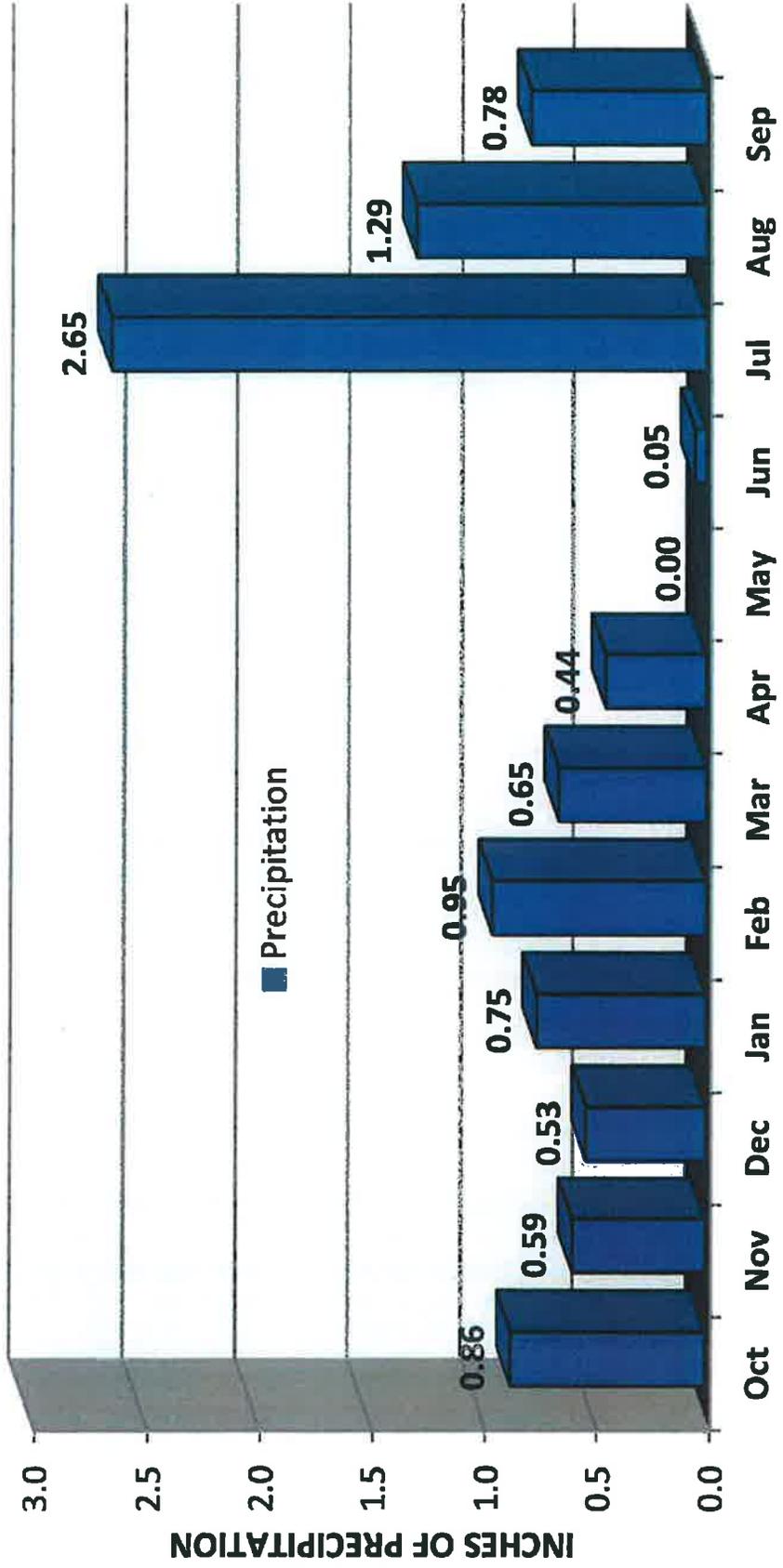
DRAWN BY: **K. LARSEN**  
 SCALE: **1" = 1 MILE**  
 DATE: **FEBRUARY 7, 2013**

**FIGURE 1B**  
 DRAWING #:  
 SHEET **1** OF **1** REV. \_\_\_\_\_

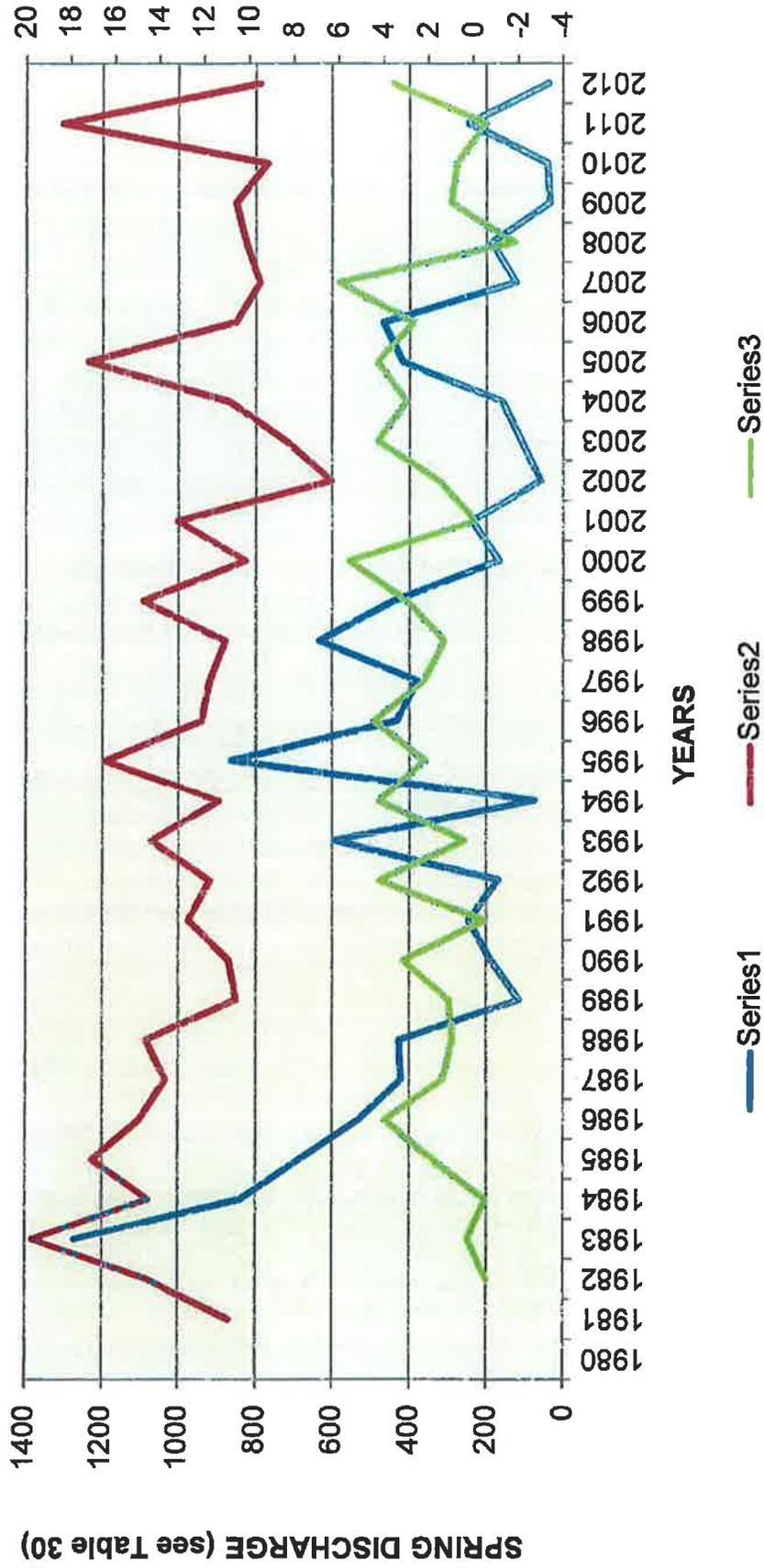
SCALE: 1"=1 MILE

 TRAIL MOUNTAIN MINE PERMIT AREA  
 LEASE RELINQUISHMENT AREA

**FIGURE 2**  
**EAST MOUNTAIN PRECIPITATION**  
**2012 WATER YEAR**  
**Total Precipitation = 9.53 inches**



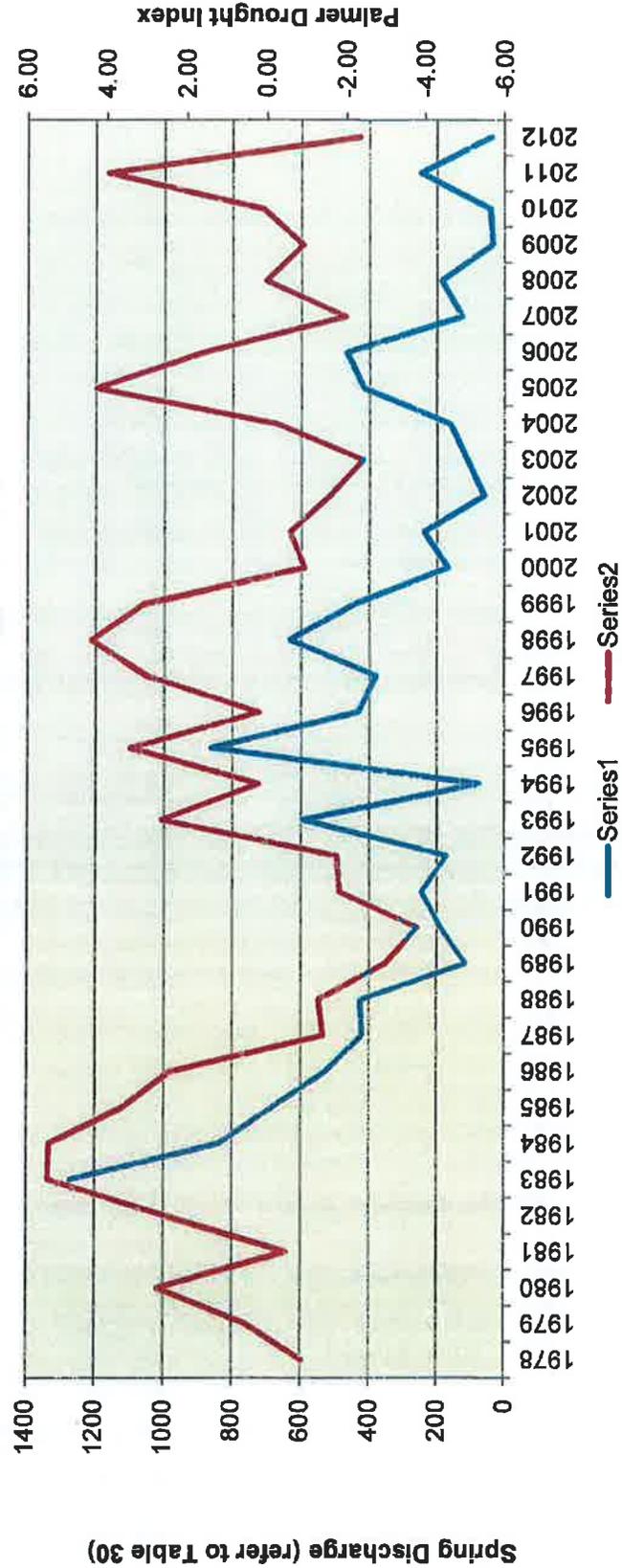
**FIGURE 3a**  
**EAST MOUNTAIN**  
**SPRING DISCHARGE vs. PRECIPITATION vs. TEMPERARURE**



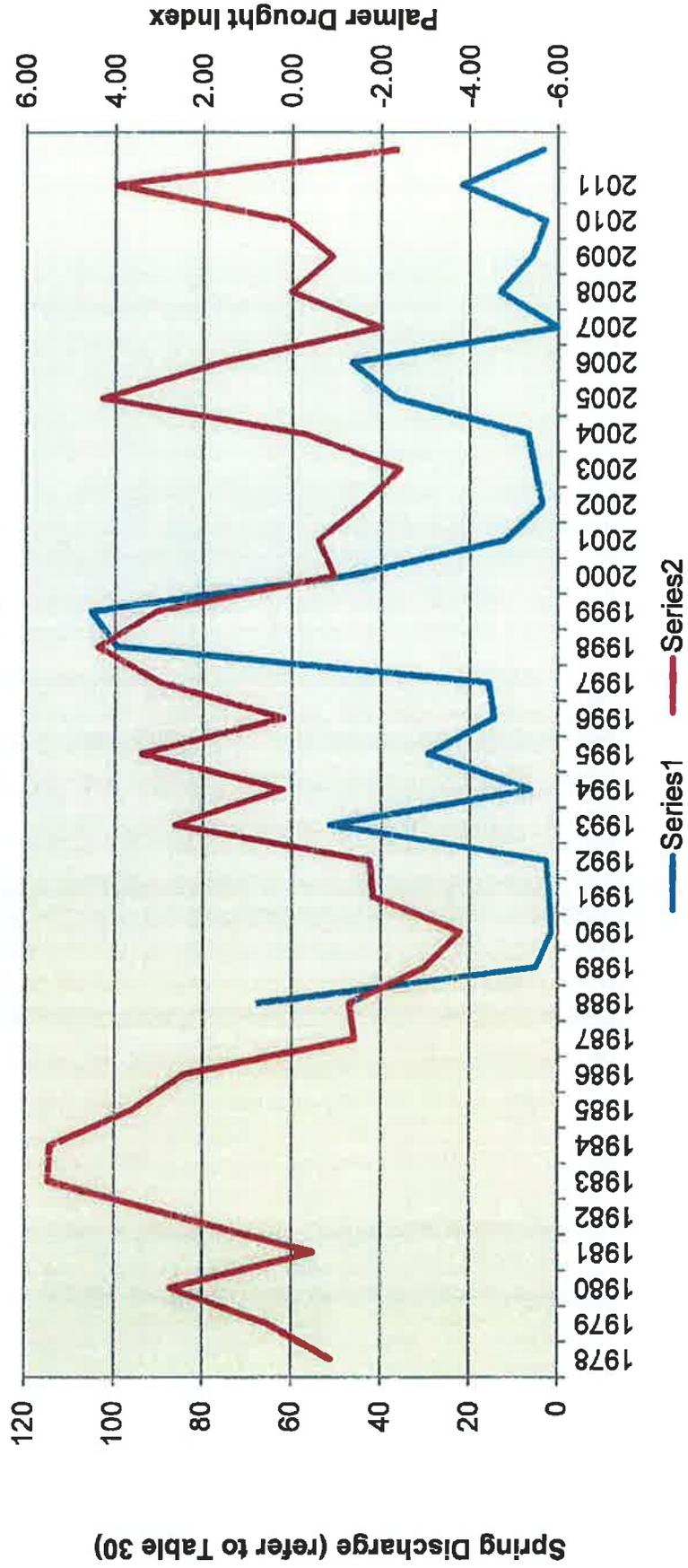
PRECIPITATION (in.) & Temp (depart. from normal)  
 Refer to tables 6 and 32

SPRING DISCHARGE (see Table 30)

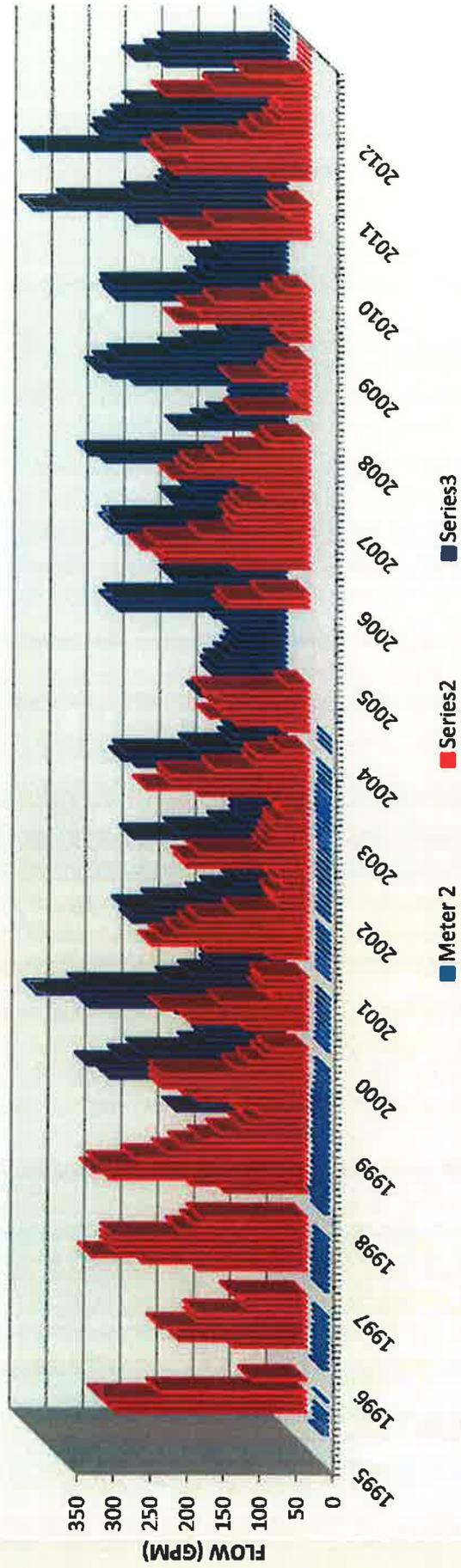
**FIGURE 3b**  
**EAST MOUNTAIN**  
**SPRING DISCHARGE vs. PALMER DROUGHT INDEX**  
(Palmer Data - Average of Region 4 & 5)



**FIGURE 3C**  
**TRAIL MOUNTAIN**  
**SPRING DISCHARGE VS. PALMER DROUGHT INDEX**  
(Palmer Data - Average of Region 4 & 5)

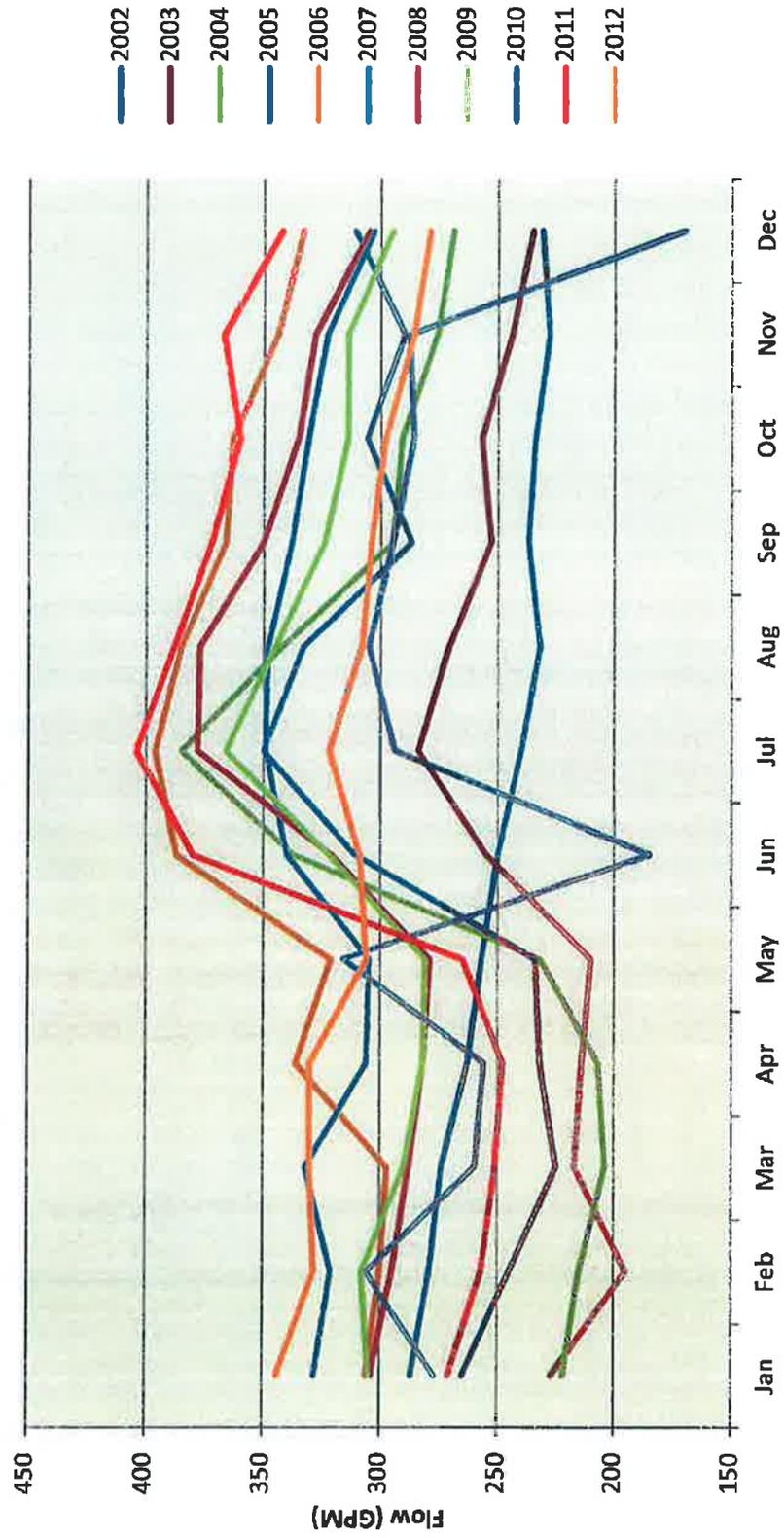


**FIGURE 4a**  
**NORTH EMERY WATER USERS SPECIAL SERVICES DISTRICT**  
**RILDA CANYON SPRINGS**



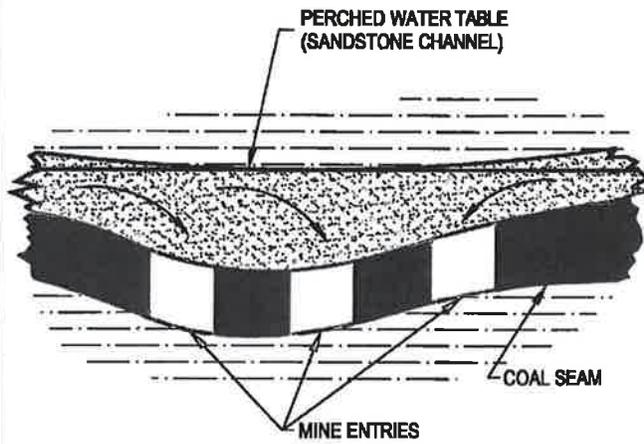


**FIGURE 4c**  
**CASTLE VALLEY SPECIAL SERVICES DISTRICT**  
**MONTHLY LITTLE BEAR SPRING USAGE (10 YR)**

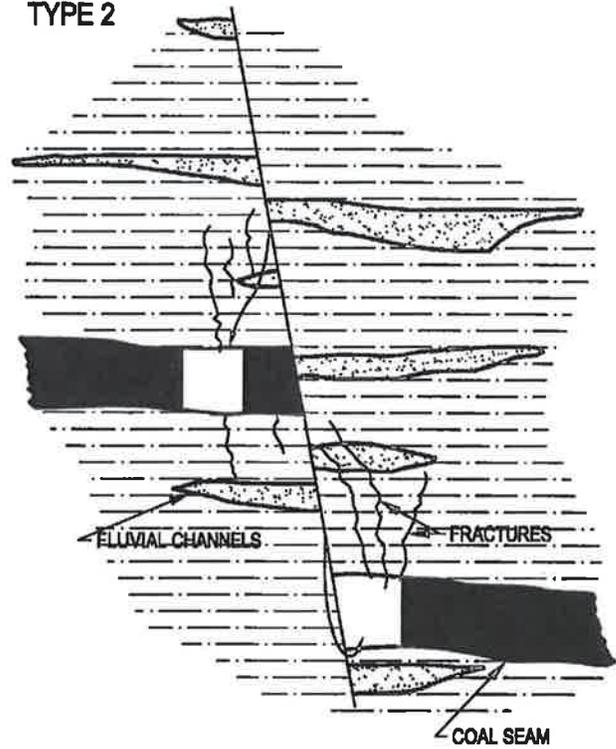


**FIGURE 5  
LONG TERM WATER SOURCES**

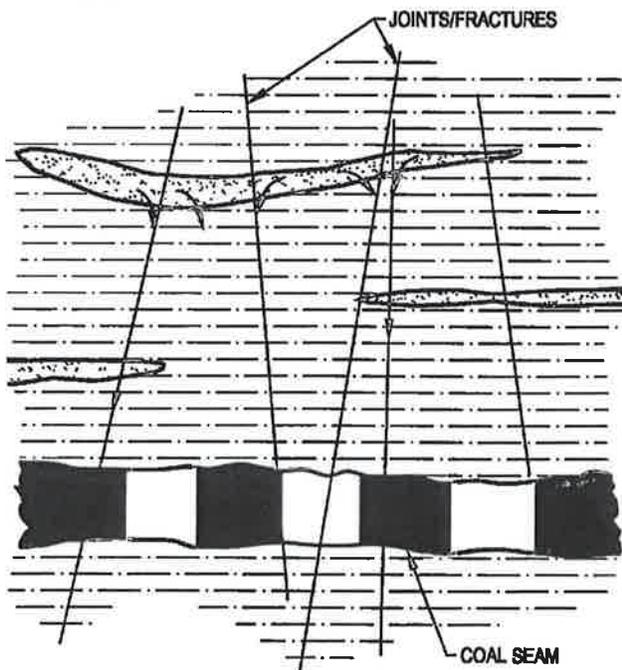
**TYPE 1**



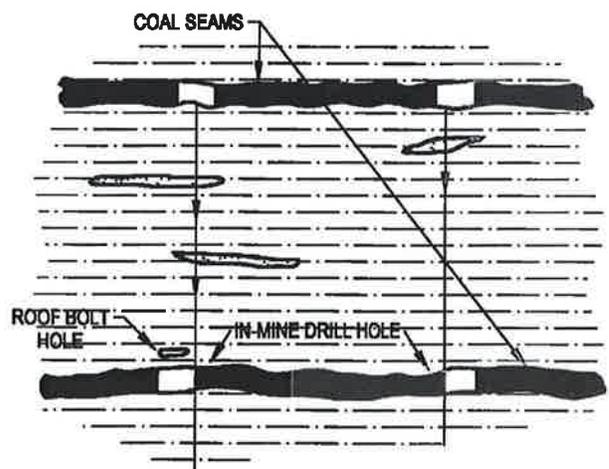
**TYPE 2**



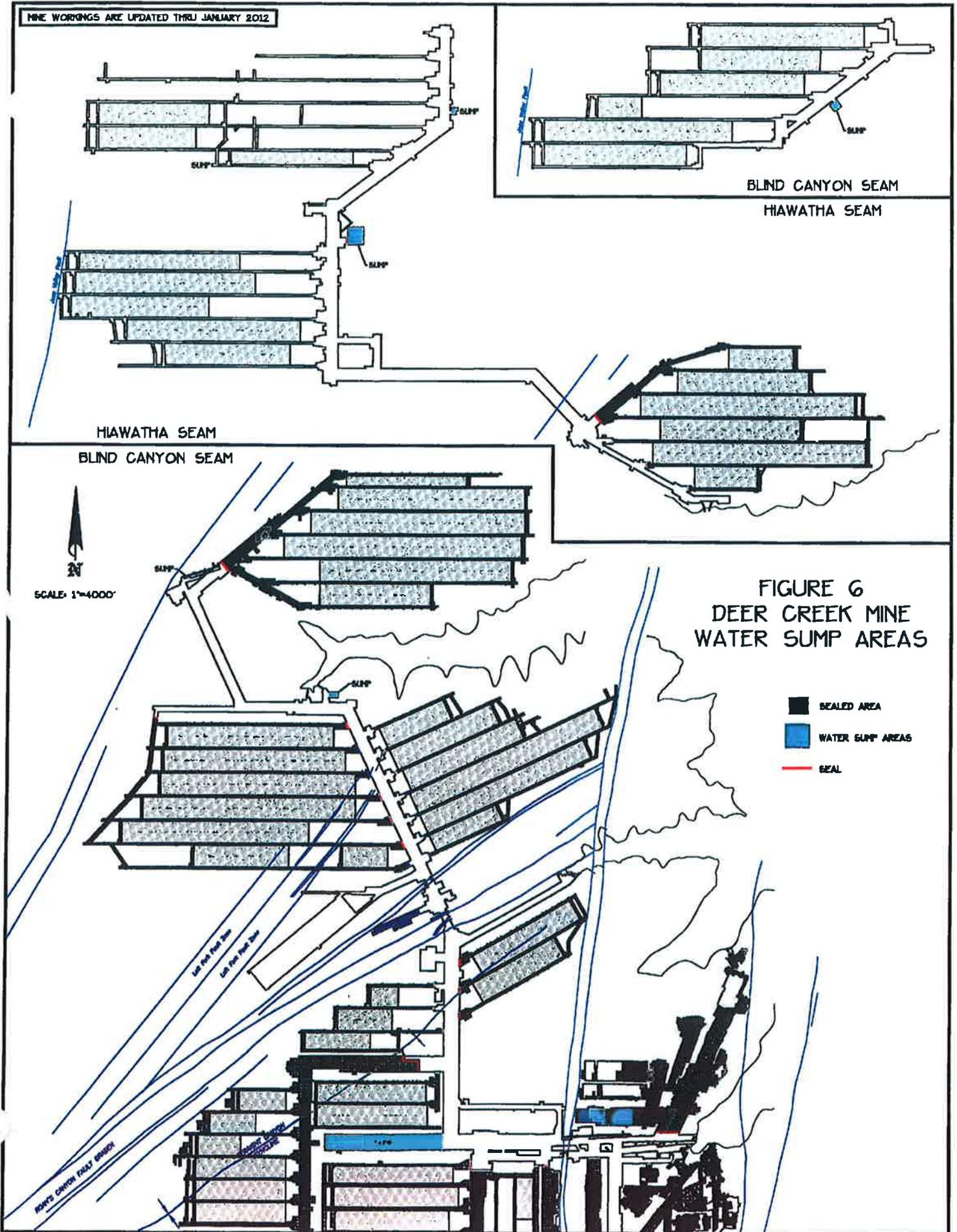
**TYPE 3**



**TYPE 4**



MINE WORKINGS ARE UPDATED THRU JANUARY 2012



BLIND CANYON SEAM  
HIAWATHA SEAM

HIAWATHA SEAM  
BLIND CANYON SEAM

FIGURE 6  
DEER CREEK MINE  
WATER SUMP AREAS

- SEALED AREA
- WATER SUMP AREAS
- SEAL

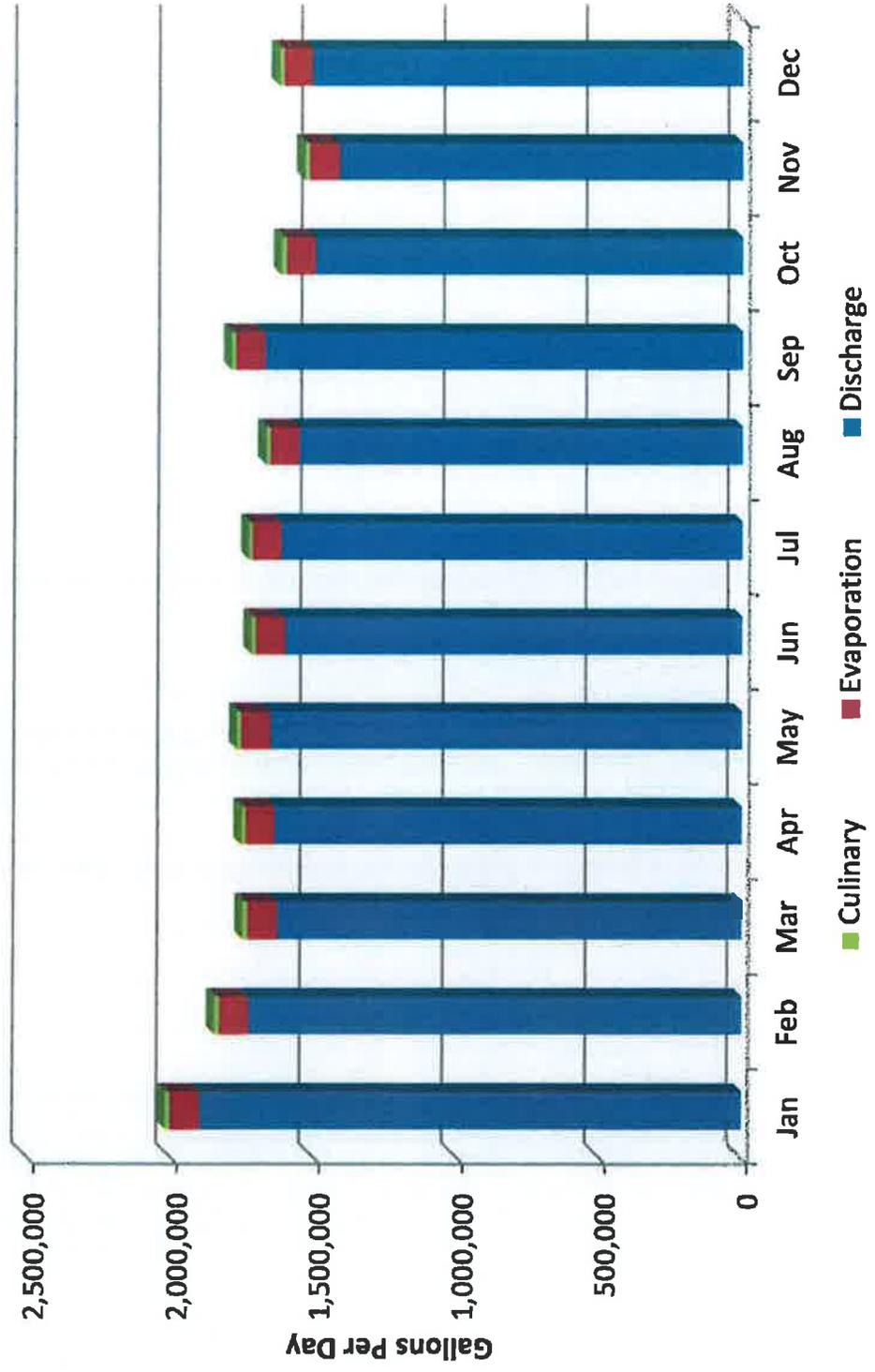
SCALE: 1"=4000'



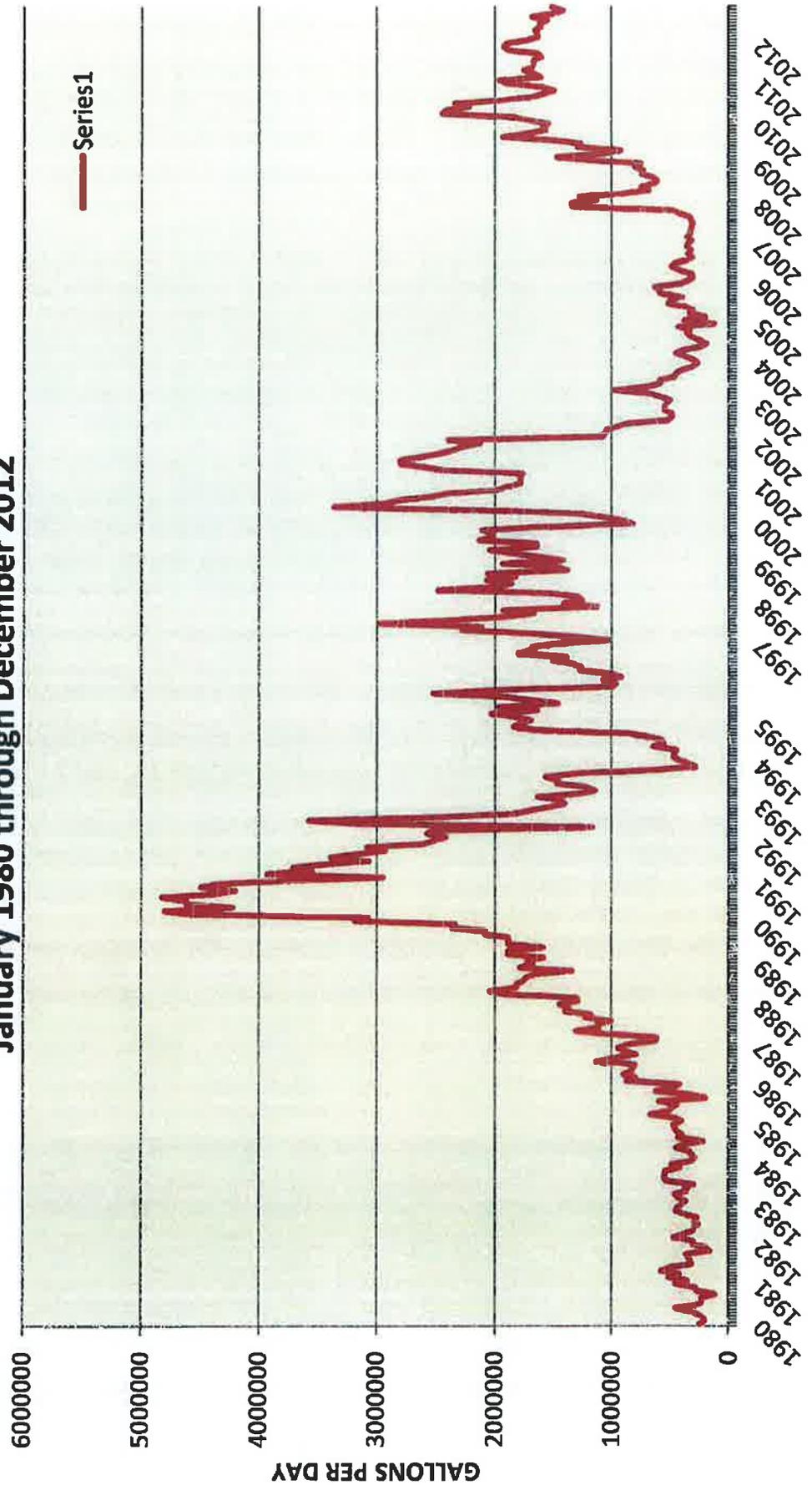
PORTS CANYON FINAL BRIDGE

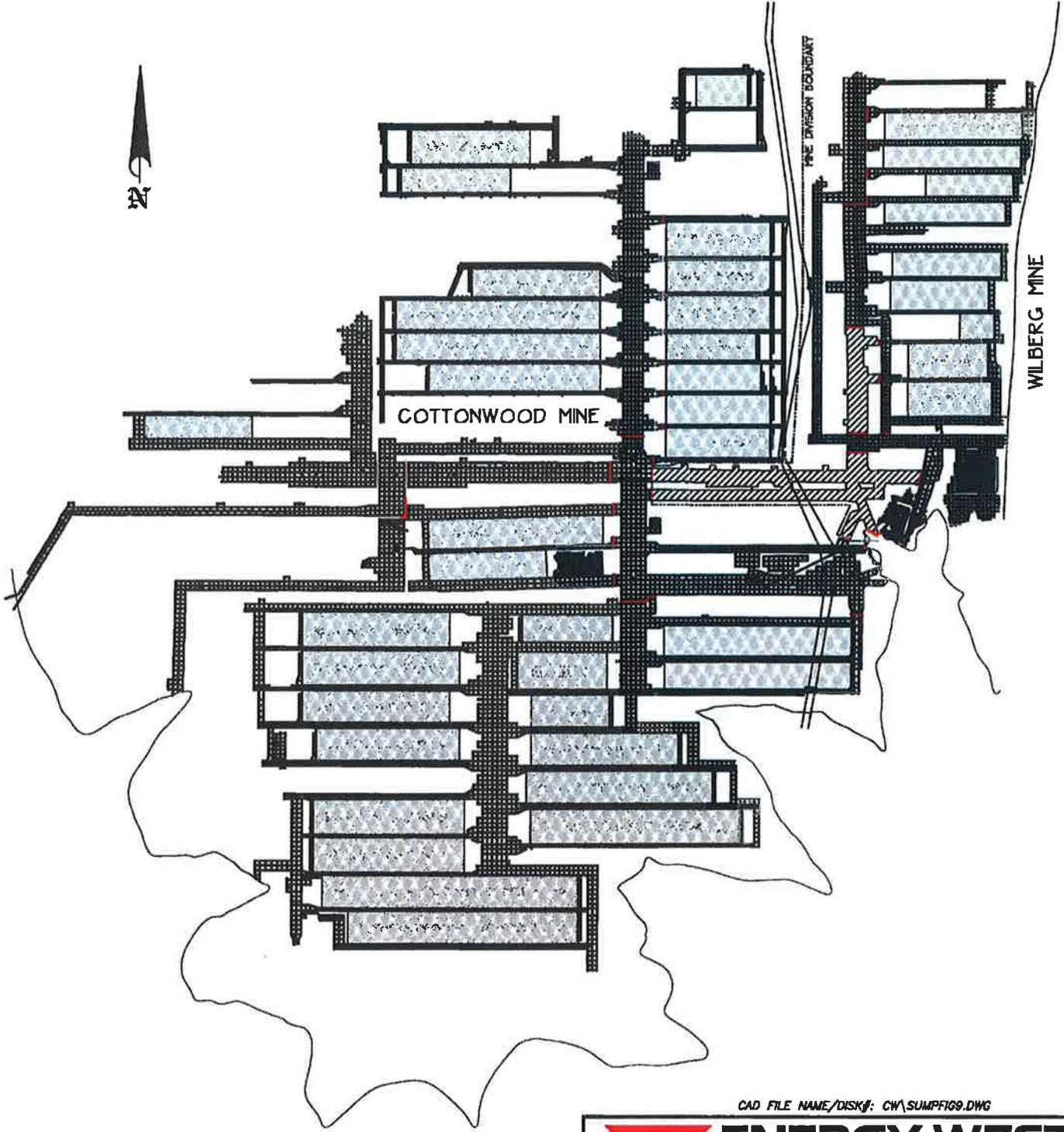
Lift Pit Shaft Two  
Lift Pit Shaft One

**FIGURE 7**  
**DEER CREEK MINE**  
**2012 MINE WATER DISCHARGE**



**FIGURE 8**  
**DEER CREEK MINE DISCHARGE**  
**@ Deer Creek (UPDES UT-0023604)**  
**January 1980 through December 2012**





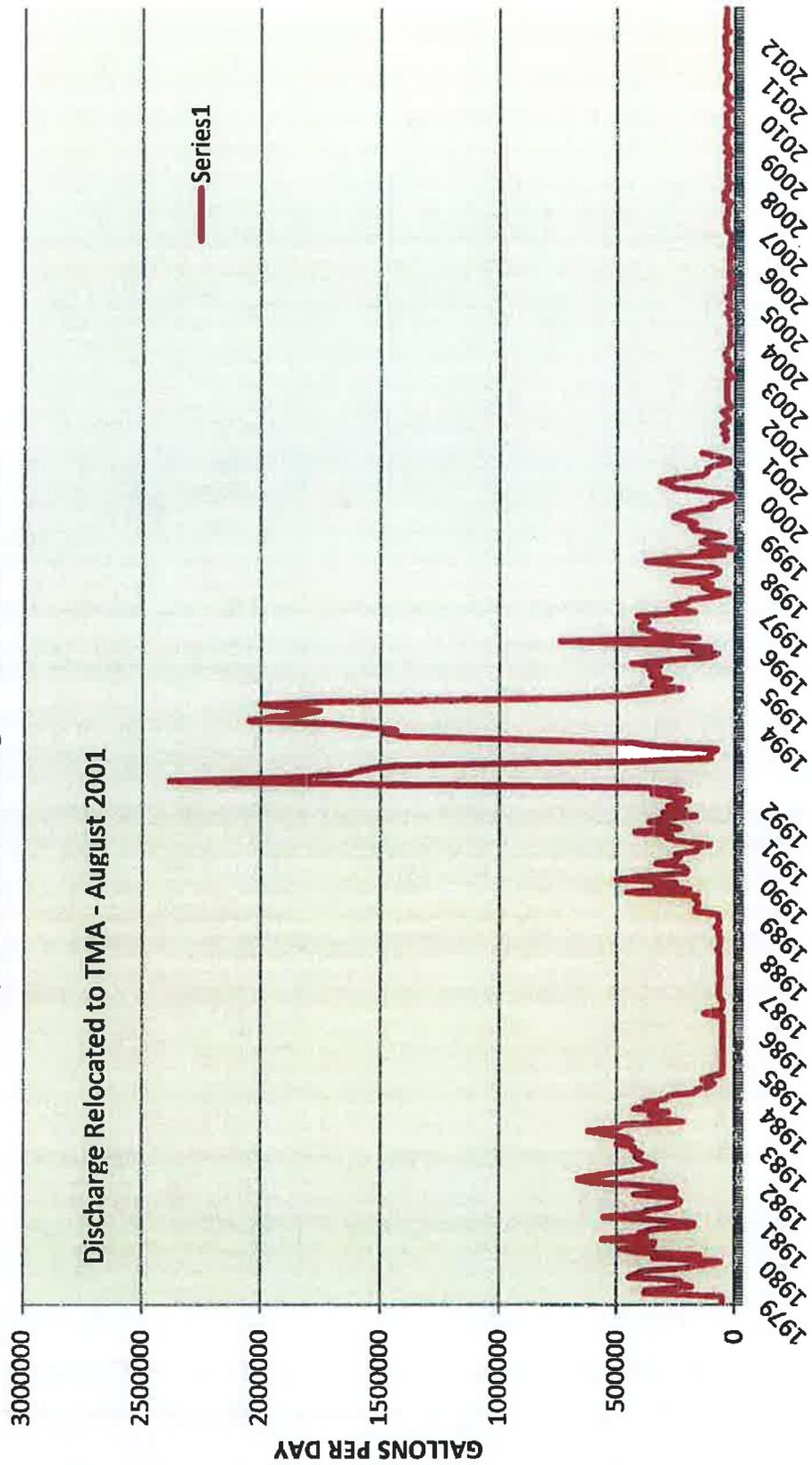
-  SEALED AREA
-  SEAL
-  SEALED AREA DUE TO THE FIRE

MINE SEALED MAY 2001  
WORKINGS ARE UPDATED TO MARCH 1, 1997

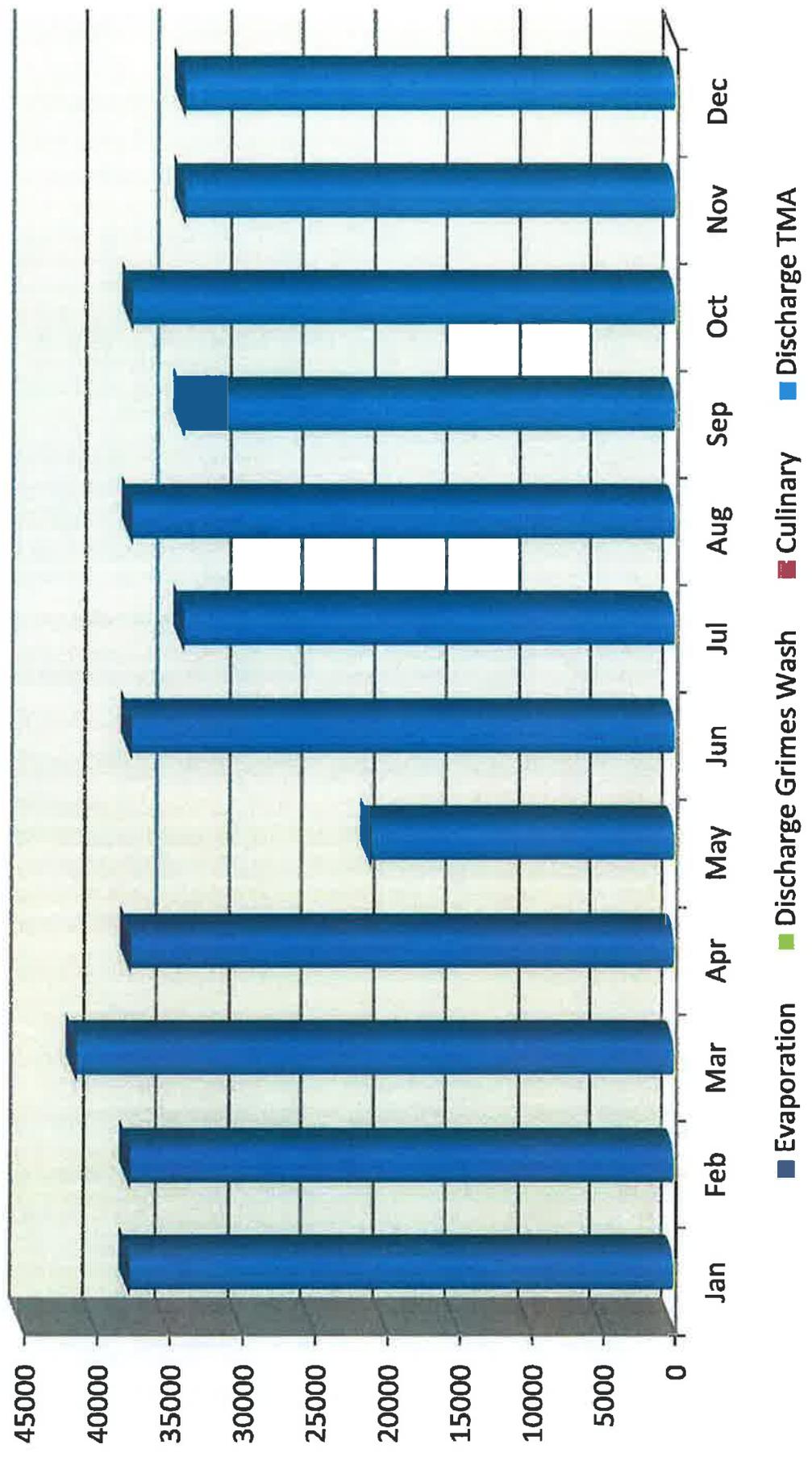
CAD FILE NAME/DISK#: CW\SUMPFIG9.DWG

 <b>ENERGY WEST MINING COMPANY</b> A SUBSIDIARY OF PACIFICORP		
		<b>COTTONWOOD/WILBERG MINE WATER SUMP AREAS</b>
DRAWN BY: <b>K. LARSEN</b>	<b>FIGURE 9</b>	
SCALE: <b>1" = 3000'</b>	DRAWING #:	
DATE: <b>FEBRUARY 16, 2012</b>	SHEET <b>1</b> OF <b>1</b>	REV.

**FIGURE 10**  
**WILBERG/COTTONWOOD MINE DISCHARGE**  
**@ Grimes Wash/TMA (UPDES UT-0022896)**  
**April 1979 through December 2011**

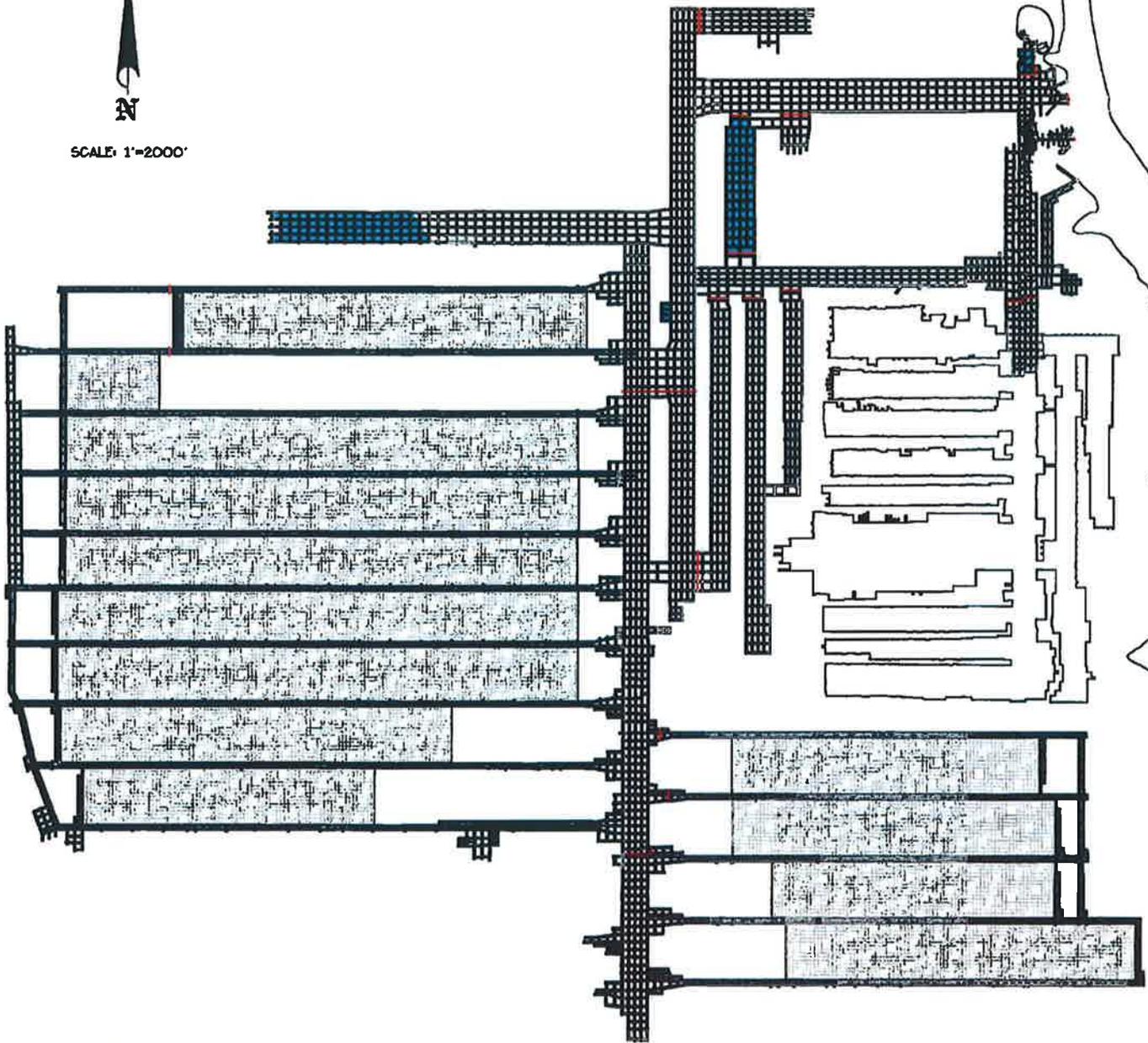


**FIGURE 11**  
**WILBERG/COTTONWOOD**  
**2012 MINE WATER DISCHARGE**





SCALE: 1"=2000'



SEALED AREA



WATER SUMP AREAS



SEAL

MINE SEALED APRIL 2001  
WORKINGS ARE UPDATED TO APRIL 2001

CAD FILE NAME/DISK#: SLMP12.DWG



**ENERGY WEST  
MINING COMPANY**  
A SUBSIDIARY OF PACIFICORP

**TRAIL MOUNTAIN MINE  
WATER SUMP AREAS**

DRAWN BY: **K. LARSEN**

**FIGURE 12**

SCALE: **1"=2000'**

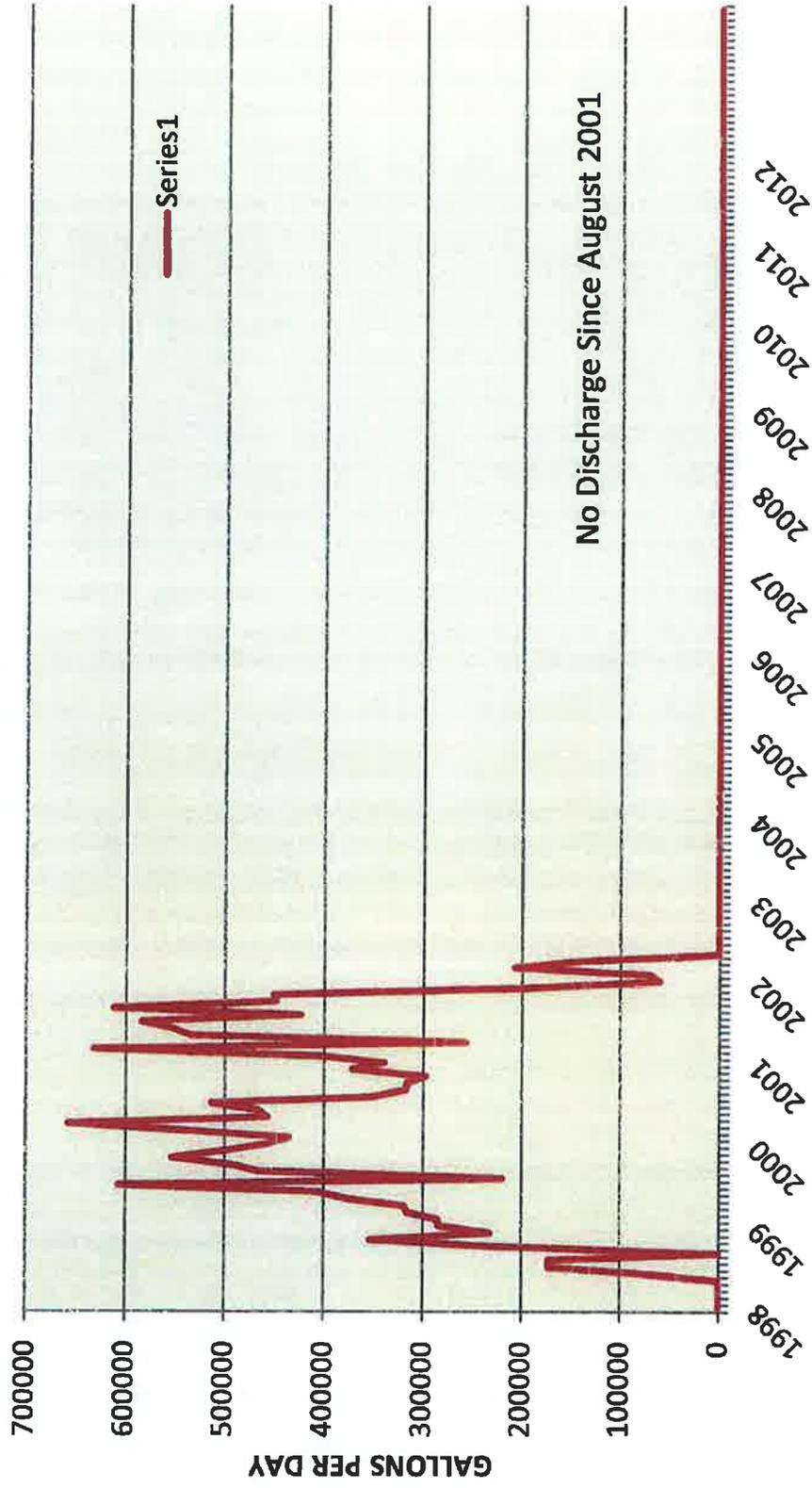
DRAWING #:

DATE: **FEBRUARY 16, 2012**

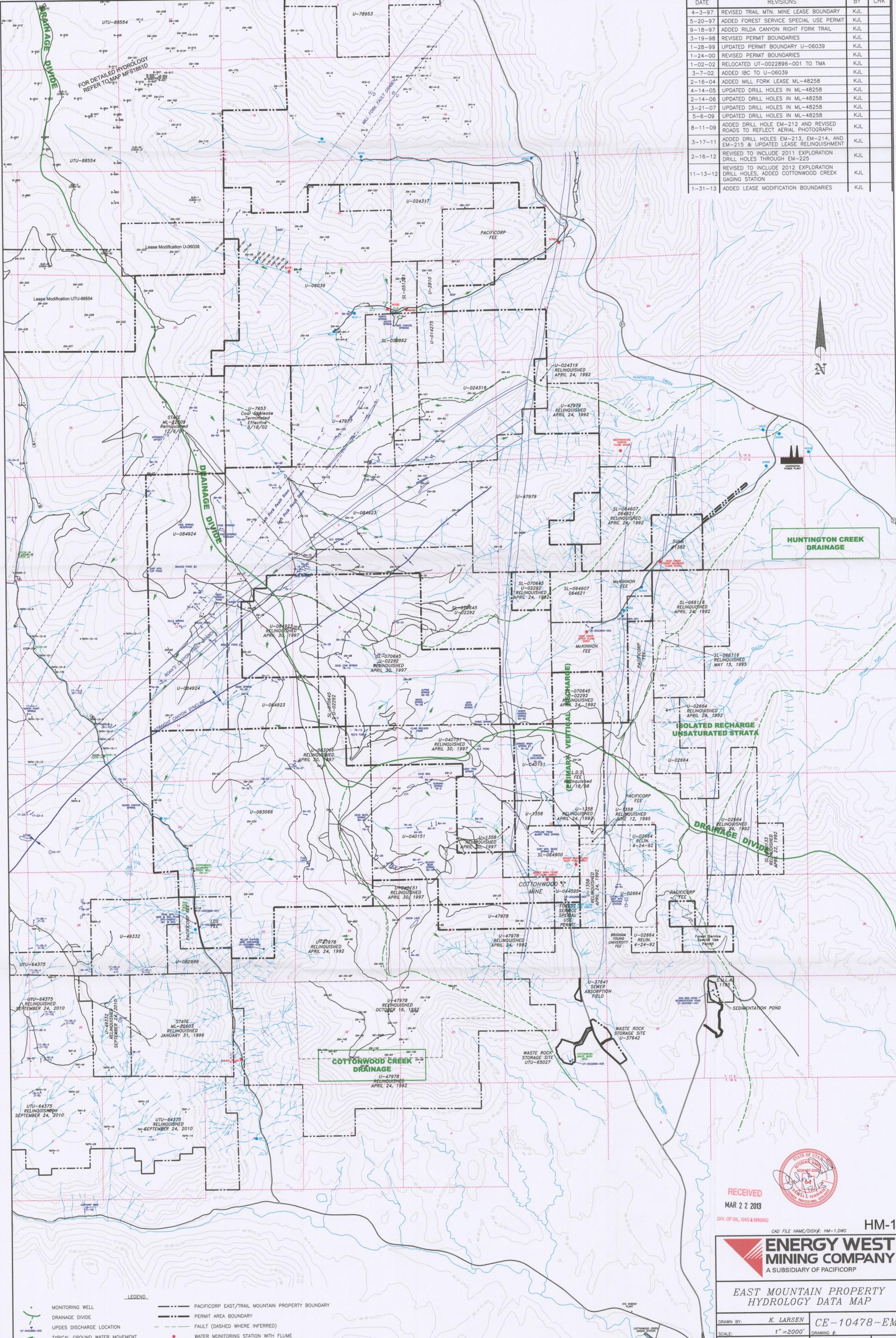
SHEET **1** OF **1**

REV. **\_\_\_**

**FIGURE 13**  
**TRAIL MOUNTAIN MINE DISCHARGE**  
**@Cottonwood Canyon Creek (UPDES UT-0023728)**



DATE	REVISIONS	BY	CHK
4-3-97	REVISED TRAIL MTN. MINE LEASE BOUNDARY	KJL	
5-20-97	ADDED FOREST SERVICE SPECIAL USE PERMIT	KJL	
9-18-97	ADDED RILDA CANYON RIGHT FORK TRAIL	KJL	
3-19-98	REVISED PERMIT BOUNDARIES	KJL	
1-28-99	UPDATED PERMIT BOUNDARY U-06039	KJL	
1-24-00	REVISED PERMIT BOUNDARIES	KJL	
1-02-02	RELOCATED UT-0022896-001 TO TMA	KJL	
3-7-02	ADDED IBC TO U-06039	KJL	
2-16-04	ADDED MILL FORK LEASE ML-48258	KJL	
4-14-05	UPDATED DRILL HOLES IN ML-48258	KJL	
2-14-06	UPDATED DRILL HOLES IN ML-48258	KJL	
3-21-07	UPDATED DRILL HOLES IN ML-48258	KJL	
5-6-09	UPDATED DRILL HOLES IN ML-48258	KJL	
8-11-09	ADDED DRILL HOLE EM-212 AND REVISED ROADS TO REFLECT AERIAL PHOTOGRAPH	KJL	
3-17-11	ADDED DRILL HOLES EM-213, EM-214, AND EM-215 & UPDATED LEASE RELINQUISHMENT	KJL	
2-16-12	REVISED TO INCLUDE 2011 EXPLORATION DRILL HOLES THROUGH EM-225	KJL	
11-13-12	REVISED TO INCLUDE 2012 EXPLORATION DRILL HOLES, ADDED COTTONWOOD CREEK GAGING STATION	KJL	
1-31-13	ADDED LEASE MODIFICATION BOUNDARIES	KJL	



HUNTINGTON CREEK DRAINAGE

ISOLATED RECHARGE UNSATURATED STRATA

DRAINAGE DIVIDE

COTTONWOOD CREEK DRAINAGE

LEGEND

- MONITORING WELL
- DRAINAGE DIVIDE
- UPDES DISCHARGE LOCATION
- TYPICAL GROUND WATER MOVEMENT
- GAS WELL
- PACIFICORP EAST/TRAIL MOUNTAIN PROPERTY BOUNDARY
- PERMIT AREA BOUNDARY
- FAULT (DASHED WHERE INFERRED)
- WATER MONITORING STATION WITH FLUME
- WATER MONITORING STATION



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HM-1

CAD FILE NAME/DISK#: HM-1.DWG

**ENERGY WEST MINING COMPANY**  
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY HYDROLOGY DATA MAP

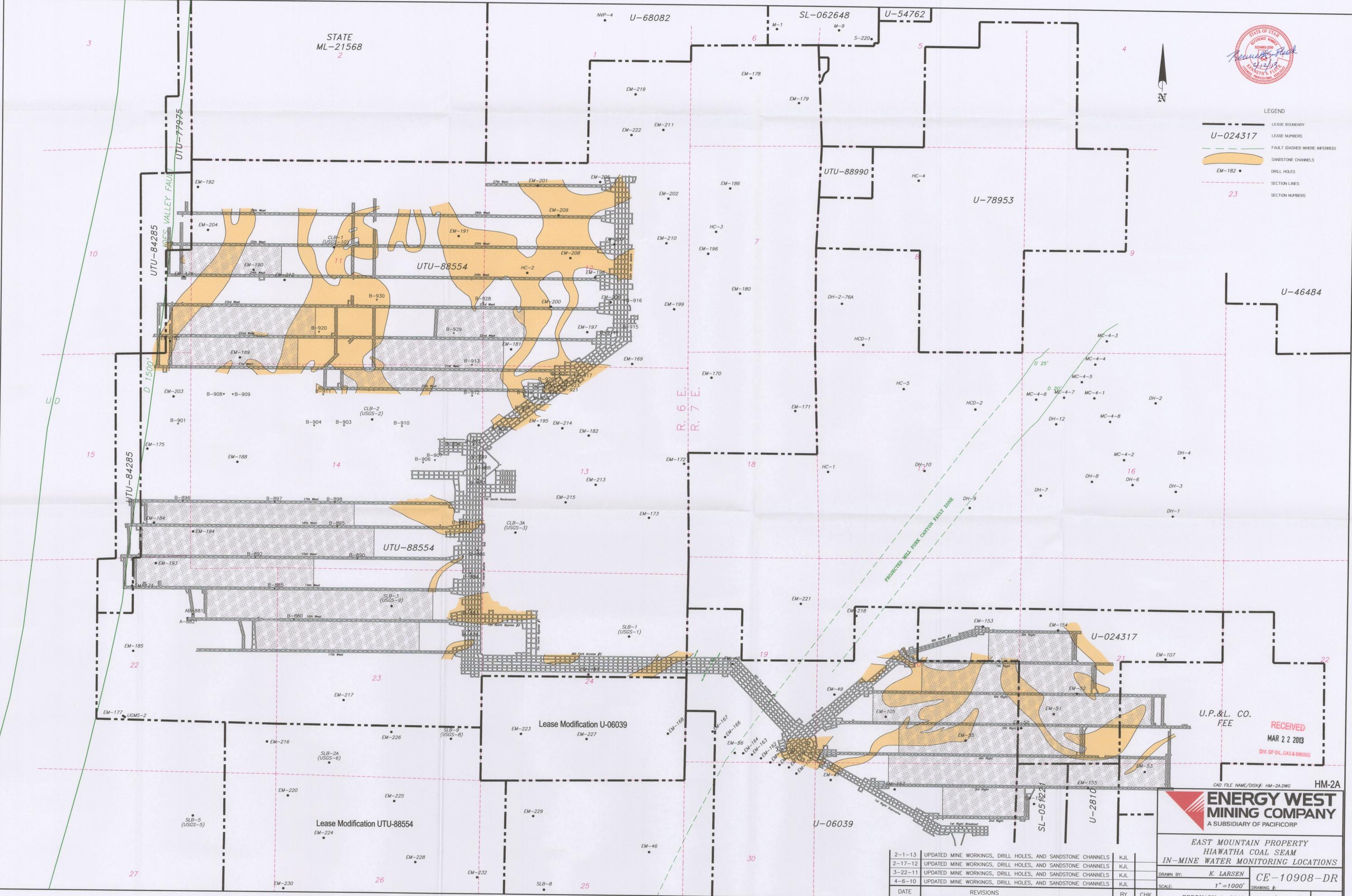
DRAWN BY: K. LARSEN  
SCALE: 1"=2000'  
DATE: JANUARY 31, 2013

CE-10478-EM  
DRAWING #:  
SHEET 1 OF 1 REV.



LEGEND

	LEASE BOUNDARY
	LEASE NUMBERS
	FAULT (DASHED WHERE INFERRED)
	SANDSTONE CHANNELS
	DRILL HOLES
	SECTION LINES
	SECTION NUMBERS



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CAD FILE NAME/DISK#: HM-2A.DWG HM-2A



EAST MOUNTAIN PROPERTY  
HIAWATHA COAL SEAM  
IN-MINE WATER MONITORING LOCATIONS

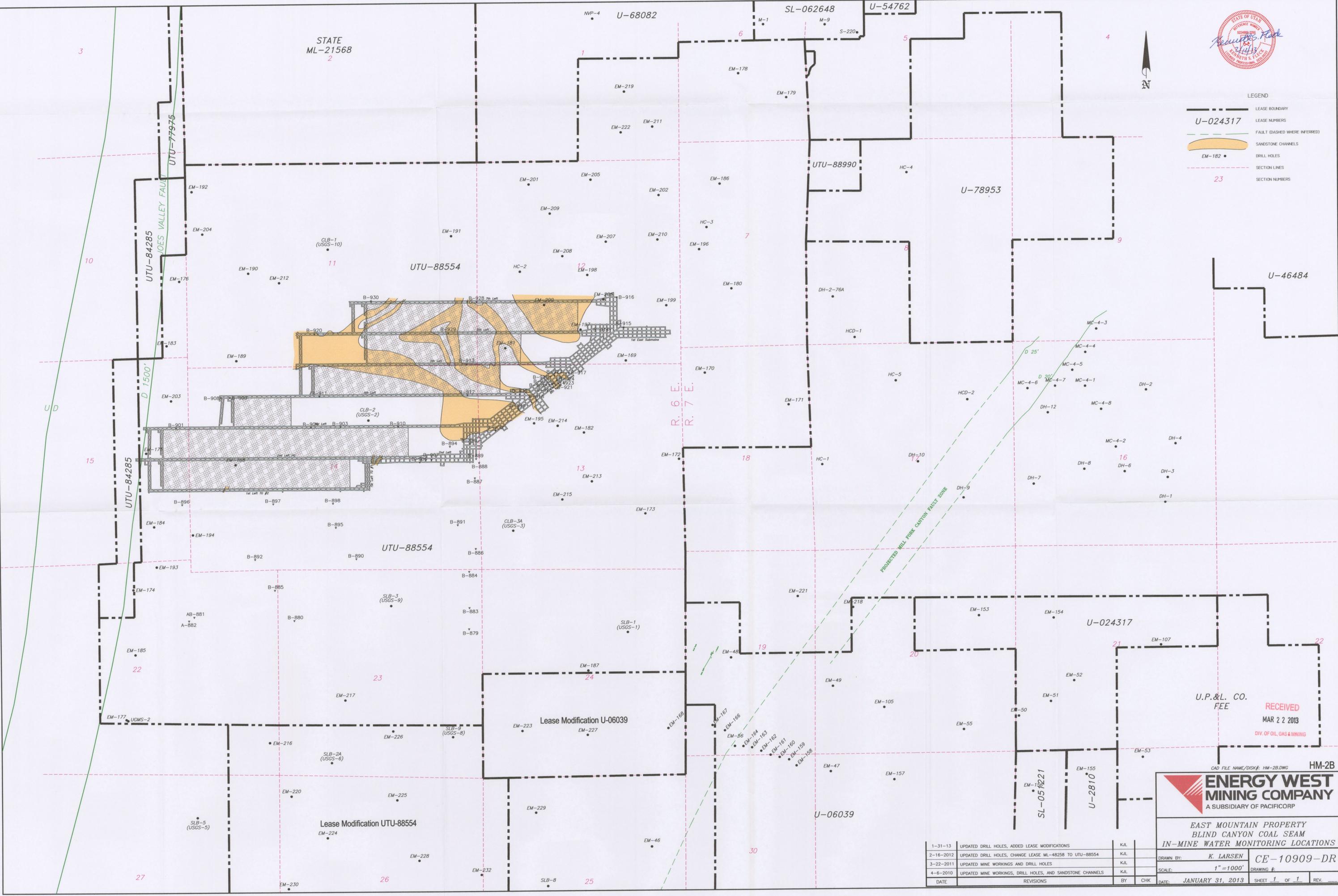
2-1-13	UPDATED MINE WORKINGS, DRILL HOLES, AND SANDSTONE CHANNELS	KJL
2-17-12	UPDATED MINE WORKINGS, DRILL HOLES, AND SANDSTONE CHANNELS	KJL
3-22-11	UPDATED MINE WORKINGS, DRILL HOLES, AND SANDSTONE CHANNELS	KJL
4-6-10	UPDATED MINE WORKINGS, DRILL HOLES, AND SANDSTONE CHANNELS	KJL
DATE	REVISIONS	BY

DRAWN BY: K. LARSEN  
SCALE: 1" = 1000'  
DATE: FEBRUARY 1, 2013  
DRAWING #: CE-10908-DR  
SHEET 1 OF 1

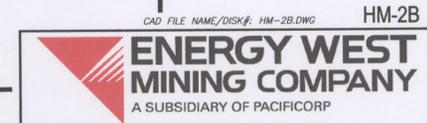


LEGEND

- LEASE BOUNDARY
- LEASE NUMBERS
- - - FAULT (DASHED WHERE INFERRED)
- SANDSTONE CHANNELS
- EM-182 DRILL HOLES
- - - SECTION LINES
- 23 SECTION NUMBERS



U.P.&L. CO.  
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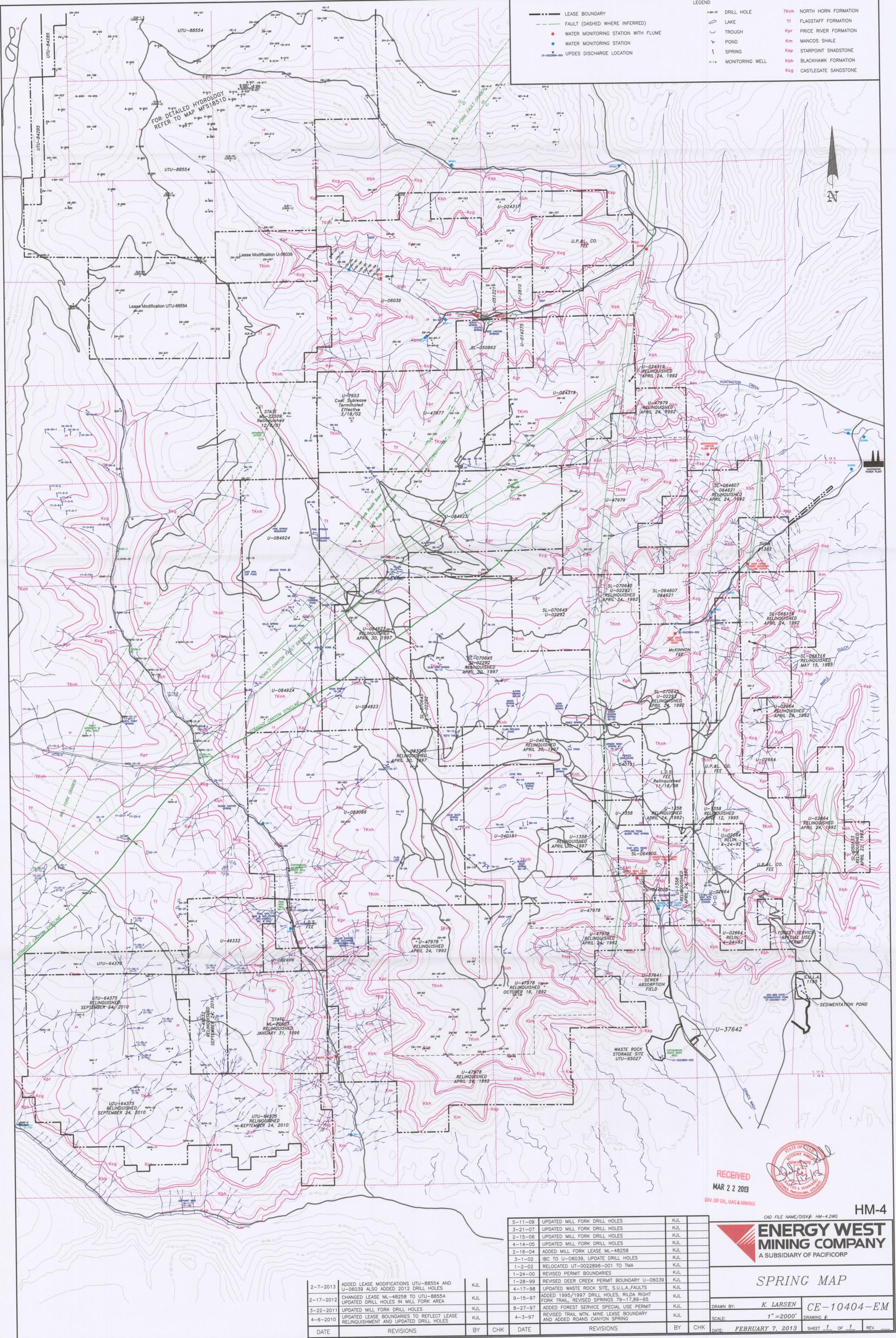
EAST MOUNTAIN PROPERTY  
BLIND CANYON COAL SEAM  
IN-MINE WATER MONITORING LOCATIONS

DRAWN BY: K. LARSEN  
SCALE: 1" = 1000'  
DATE: JANUARY 31, 2013

DATE	REVISIONS	BY	CHK
1-31-13	UPDATED DRILL HOLES, ADDED LEASE MODIFICATIONS	KJL	
2-16-2012	UPDATED DRILL HOLES, CHANGE LEASE ML-48258 TO UTU-88554	KJL	
3-22-2011	UPDATED MINE WORKINGS AND DRILL HOLES	KJL	
4-6-2010	UPDATED MINE WORKINGS, DRILL HOLES, AND SANDSTONE CHANNELS	KJL	

CE-10909-DR  
SHEET 1 OF 1 REV. —

CAD FILE NAME/DISK# HM-2B.DWG HM-2B



- LEGEND**
- LEASE BOUNDARY
  - - - FAULT (DASHED WHERE INFERRED)
  - WATER MONITORING STATION WITH FLUME
  - WATER MONITORING STATION
  - UPDES DISCHARGE LOCATION
  - DRILL HOLE
  - LAKE
  - TROUGH
  - POND
  - SPRING
  - MONITORING WELL
  - TKnh NORTH HORN FORMATION
  - Tf FLAGSTAFF FORMATION
  - Kpr PRICE RIVER FORMATION
  - Km MANCOS SHALE
  - Ksp STARPOINT SNADSTONE
  - Kbh BLACKHAWK FORMATION
  - Kcg CASTLEGATE SANDSTONE



FOR DETAILED HYDROLOGY  
REFER TO MAP MF51851D

UTU-8854

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HM-4

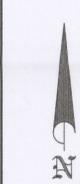
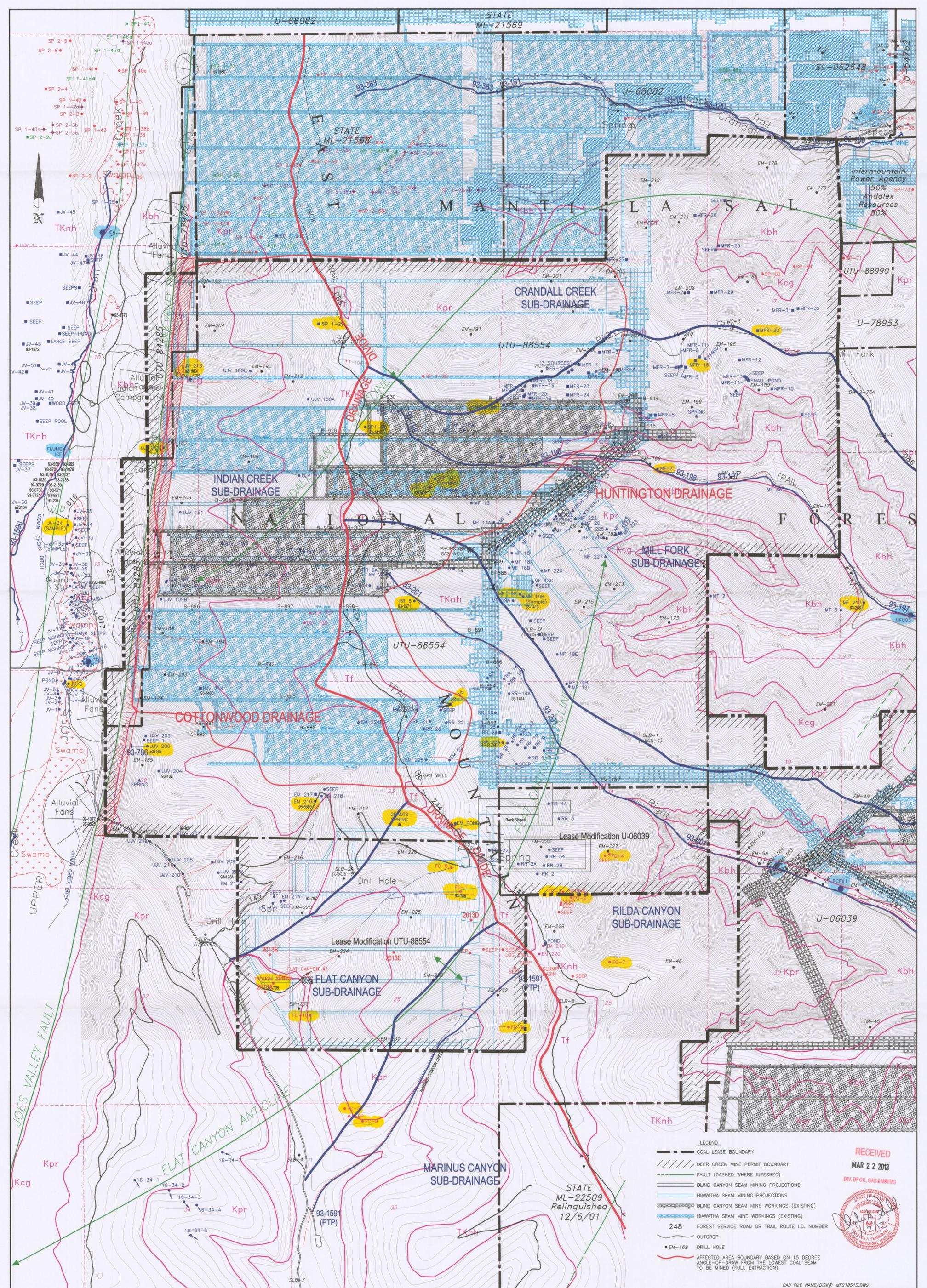
CAD FILE NAME/DISK#: HM-4.DWG  
**ENERGY WEST MINING COMPANY**  
A SUBSIDIARY OF PACIFICORP

SPRING MAP

DRAWN BY: K. LARSEN  
SCALE: 1" = 2000'  
DATE: FEBRUARY 7, 2013 SHEET 1 OF 1 REV. \_\_\_\_\_

DATE	REVISIONS	BY	CHK	DATE	REVISIONS	BY	CHK
5-11-09	UPDATED MILL FORK DRILL HOLES					KJL	
3-21-07	UPDATED MILL FORK DRILL HOLES					KJL	
2-15-06	UPDATED MILL FORK DRILL HOLES					KJL	
4-14-05	UPDATED MILL FORK DRILL HOLES					KJL	
2-16-04	ADDED MILL FORK LEASE ML-48258					KJL	
3-1-02	IBC TO U-06039, UPDATE DRILL HOLES					KJL	
1-2-02	RELOCATED UT-0022896-001 TO TMA					KJL	
1-24-00	REVISED PERMIT BOUNDARIES					KJL	
1-28-99	REVISED DEER CREEK PERMIT BOUNDARY U-06039					KJL	
4-17-98	UPDATED WASTE ROCK SITE, S.U.L.A. FAULTS					KJL	
9-15-97	ADDED 1995/1997 DRILL HOLES, RILDA RIGHT FORK TRAIL, REVISED SPRINGS 79-17,89-65					KJL	
8-27-97	ADDED FOREST SERVICE SPECIAL USE PERMIT					KJL	
4-3-97	REVISED TRAIL MTN. MINE LEASE BOUNDARY AND ADDED ROANS CANYON SPRING					KJL	
2-7-2013	ADDED LEASE MODIFICATIONS UTU-8854 AND U-06039 ALSO ADDED 2012 DRILL HOLES					KJL	
2-17-2012	CHANGED LEASE ML-48258 TO UTU-8854 UPDATED DRILL HOLES IN MILL FORK AREA					KJL	
3-22-2011	UPDATED MILL FORK DRILL HOLES					KJL	
4-6-2010	UPDATED LEASE BOUNDARIES TO REFLECT RELINQUISHMENT AND UPDATED DRILL HOLES					KJL	

CE-10404-EM



**SPRING LEGEND**

MFB02	SURFACE WATER MONITORING LOCATION	17-3-2	TRAIL MOUNTAIN SPRINGS	+	SPRING LOCATION (1991 SURVEY)
●	SPRING LOCATION (1994-1995 SURVEY)	★	SPRING LOCATION (1992 SURVEY)	●	SPRING LOCATION (1989-1990 SURVEY)
●	GPS LOCATED 2000	●	SPRING MONITORING LOCATION (ENERGY WEST)	●	SPRING LOCATION (1987 SURVEY)
●	GPS LOCATED 2001	●	GROUND WATER RIGHTS	●	SPRING LOCATION (1985 SURVEY)
●	GPS LOCATED 2002	●	93-198	☆	MONITORING LOCATIONS (GENVAL RESOURCES)
●	GPS LOCATED 2010-2011				

**Geologic Formation Legend**

Qal	Alluvial Deposits (Stream bed deposits, Alluvial fans, etc.)
Tf	Flagstaff Limestone
TKn	North Horn Formation
Kpr	Upper Price River Formation
Kc	Castlegate Sandstone
Kbh	Blackhawk Formation
Ksp	Star Point Sandstone
Kmm	Mancos Shale (Masuk Member)

**LEGEND**

- COAL LEASE BOUNDARY
- DEER CREEK MINE PERMIT BOUNDARY
- FAULT (DASHED WHERE INFERRED)
- BLIND CANYON SEAM MINING PROJECTIONS
- HIAWATHA SEAM MINING PROJECTIONS
- BLIND CANYON SEAM MINE WORKINGS (EXISTING)
- HIAWATHA SEAM MINE WORKINGS (EXISTING)
- 248 FOREST SERVICE ROAD OR TRAIL ROUTE I.D. NUMBER
- OUTCROP
- EM-169 DRILL HOLE
- AFFECTED AREA BOUNDARY BASED ON 15 DEGREE ANGLE-OF-DRAW FROM THE LOWEST COAL SEAM TO BE MINED (FULL EXTRACTION)

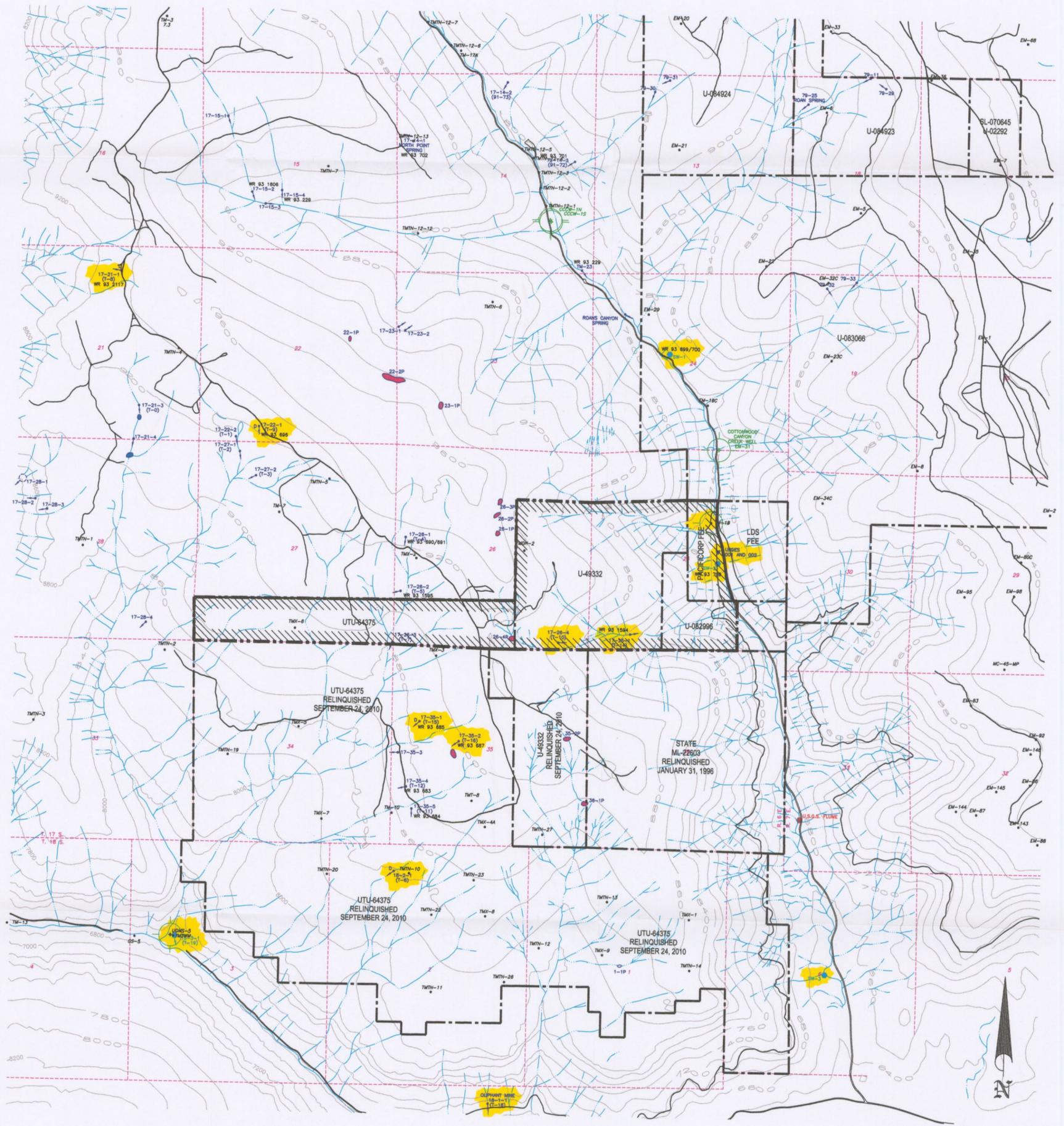
RECEIVED MAR 22 2013  
DIV. OF OIL, GAS & MINING

CAD FILE NAME/DISK: MFS1851D.DWG

**ENERGY WEST MINING COMPANY**  
A SUBSIDIARY OF PACIFICORP

DEER CREEK MINE - MILL FORK AREA  
LEASES UTU-88554/UTU-84285  
HYDROLOGIC MONITORING MAP

DRAWN BY: K. LARSEN	MFS1851D
SCALE: 1" = 1000'	DRAWING #:
DATE: OCTOBER 18, 2012	SHEET 1 OF 1 REV. 15



- LEGEND**
- TRAIL MOUNTAIN MINE PERMIT BOUNDARY
  - PACIFICORP LEASE BOUNDARY
  - DEVELOPED SPRING (WITH STOCK WATERING TROUGH)
  - POND RUNOFF FED
  - POND SPRING FED - CONSIDERED DEVELOPED BY THE USFS
  - SPRING: TOWNSHIP-SECTION-SPRING NO. (MTN. COAL I.D.)  
WATER RIGHTS NO.
  - WATER MONITORING STATION WITH FLUME
  - WATER MONITORING STATION
  - UPDES DISCHARGE LOCATION
  - MONITORING WELL
  - WATER WELL
  - U-49332 FEDERAL COAL LEASE NUMBER
  - DRILL HOLE
  - EAST MOUNTAIN DRILL HOLE NO. 12 (C=CORED)
  - TRAIL MOUNTAIN DRILL HOLE NO. 10
  - SPRING OR WATER MONITORING LOCATION (ENERGY WEST)

RECEIVED  
 MAR 22 2013  
 DIV. OF OIL, GAS & MINING



CAD FILE NAME/DISK#: TMS1450C PLATE 7-2

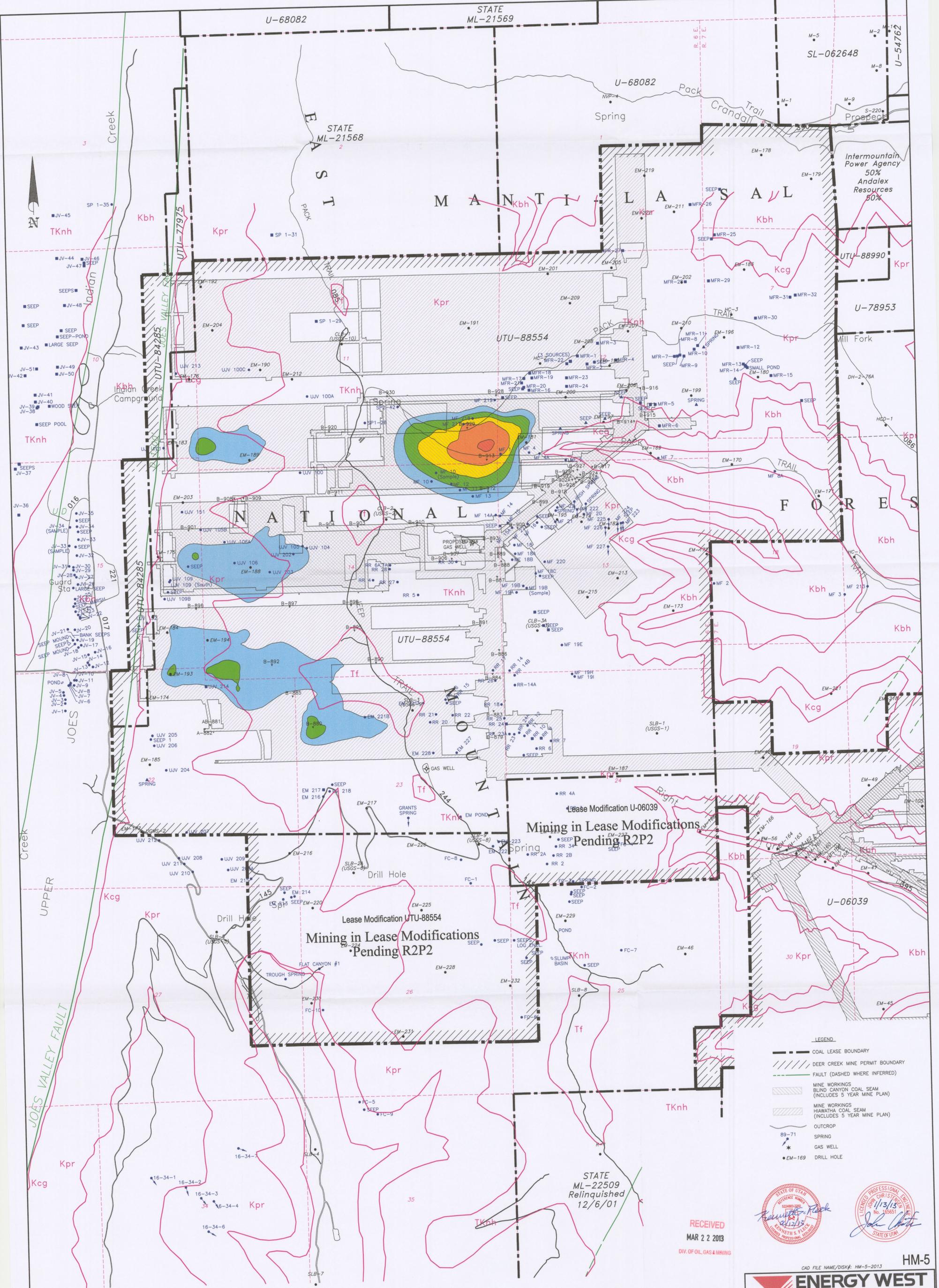
**ENERGY WEST MINING COMPANY**  
 A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE  
 WATER MONITORING LOCATIONS  
 DISCHARGE LOCATIONS

DATE	REVISIONS	BY	CHK
2-7-13	ADDED 2012 DRILL HOLES	KJL	
2-28-12	ADDED SPRING OR WATER MONITORING LOCATIONS	KJL	
3-24-2011	ADDED TRAIL MOUNTAIN LEASE RELINQUISHMENT	KJL	
12-15-2010	REVISED LEASES TO REFLECT PHASE III LEASE RELINQUISHMENT	KJL	
4-6-2010	REVISED LEASES TO REFLECT LEASE RELINQUISHMENT	KJL	

DRAWN BY: K. LARSEN  
 SCALE: 1" = 2000'  
 DATE: FEBRUARY 7, 2013

TMS1450C  
 DRAWING #:  
 SHEET 1 OF 1



**Geologic Formation Legend**

- Qal Alluvial Deposits (Stream bed deposits, Alluvial fans, etc.)
- Tf Flagstaff Limestone
- TKn North Horn Formation
- Kpr Upper Price River Formation
- Kc Castlegate Sandstone
- Kbh Blackhawk Formation
- Ksp Star Point Sandstone
- Kmm Mancos Shale (Masuk Member)

**SUBSIDENCE LEGEND**

- 2-4 FEET
- 4-6 FEET
- 6-8 FEET
- 8-10 FEET
- 10-12 FEET

- LEGEND**
- COAL LEASE BOUNDARY
  - DEER CREEK MINE PERMIT BOUNDARY
  - FAULT (DASHED WHERE INFERRED)
  - MINE WORKINGS BLIND CANYON COAL SEAM (INCLUDES 5 YEAR MINE PLAN)
  - MINE WORKINGS HAWATHA COAL SEAM (INCLUDES 5 YEAR MINE PLAN)
  - OUTCROP
  - 89-71 SPRING
  - \* GAS WELL
  - EM-169 DRILL HOLE

RECEIVED  
MAR 2 2 2013  
DIV. OF OIL, GAS & MINING



CAD FILE NAME/DISK#: HM-5-2013

**ENERGY WEST MINING COMPANY**  
A SUBSIDIARY OF PACIFICORP

SPRING MAP/EAST & TRAIL MTNS.  
WITH 5 YEAR MINE PLAN 2013-2017  
AND 2012 SUBSIDENCE ZONES

DRAWN BY: K. LARSEN  
SCALE: 1" = 1000'  
DATE: FEBRUARY 5, 2013

CE-10904-EM  
DRAWING #:   
SHEET 1 OF 1  
REV.   
HM-5

**PacifiCorp Energy - Electric Lake**

**Daily Discharge (cubic feet per second)**

**2012**

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Day
1	7.0	6.6	8.2	5.9	35.5	27.0	32.6	7.6	25.5	23.0	16.1	9.0	1
2	7.1	6.6	8.2	7.7	41.4	28.9	32.6	11.5	25.8	23.0	11.8	9.0	2
3	7.0	6.6	8.2	7.0	37.8	28.9	26.0	11.5	26.3	23.0	9.8	6.7	3
4	6.7	6.6	8.2	7.0	35.7	28.9	21.7	11.5	26.3	23.0	9.8	6.2	4
5	6.6	6.6	8.2	7.0	35.7	28.9	21.8	11.5	26.3	23.0	9.8	6.5	5
6	6.6	6.6	7.3	7.0	35.7	28.9	22.3	10.3	26.3	23.0	7.0	7.0	6
7	6.6	6.6	7.3	7.0	42.0	28.9	22.4	16.1	26.3	23.0	9.7	7.5	7
8	6.6	6.6	7.3	7.0	45.2	28.9	22.4	20.3	26.3	23.0	22.0	7.6	8
9	6.6	6.6	7.3	7.0	46.5	29.0	23.0	20.3	26.3	23.0	9.8	7.6	9
10	6.6	6.6	6.3	7.0	45.6	29.0	24.6	20.3	26.6	23.0	9.8	7.6	10
11	6.6	6.6	6.3	7.0	47.5	29.3	25.5	20.3	23.6	23.0	9.8	7.7	11
12	6.6	6.6	6.3	7.0	46.5	29.6	25.5	20.3	22.0	23.0	6.6	7.8	12
13	6.6	6.6	6.3	7.0	46.5	29.6	25.5	20.3	22.2	23.0	5.1	7.8	13
14	6.6	6.6	6.4	7.0	46.5	29.7	25.5	18.3	22.0	23.0	4.5	7.8	14
15	6.6	6.7	6.4	7.1	33.1	29.8	25.5	17.2	22.4	23.0	6.2	7.8	15
16	6.6	6.9	6.4	7.2	13.4	29.8	25.5	17.2	22.7	23.0	7.6	7.8	16
17	6.6	7.0	6.3	7.4	15.3	29.8	25.5	17.2	23.0	23.0	9.0	7.8	17
18	6.6	7.0	6.6	7.5	17.2	29.8	25.5	17.2	19.8	22.4	9.0	7.8	18
19	6.6	7.0	6.6	9.4	17.2	27.3	25.5	17.2	21.5	18.9	6.7	7.8	19
20	6.6	7.0	6.6	6.4	17.2	26.9	30.0	17.2	21.7	15.5	6.8	16.0	20
21	6.6	6.7	6.6	7.4	17.2	28.0	33.7	38.1	21.7	15.5	7.3	25.9	21
22	6.6	6.9	6.6	7.4	17.3	28.0	33.7	54.8	22.1	15.5	9.4	25.5	22
23	6.6	4.6	6.8	7.4	16.3	28.0	29.8	58.9	21.8	15.5	9.4	24.8	23
24	6.6	3.9	6.8	7.4	17.8	28.0	27.1	60.6	23.2	15.5	9.4	17.3	24
25	6.6	5.1	6.8	7.4	17.8	13.5	27.7	59.7	23.0	15.5	9.4	11.1	25
26	6.6	5.1	6.6	7.4	17.8	6.9	28.0	38.0	23.0	16.0	8.9	11.1	26
27	6.6	6.8	6.6	16.9	17.8	13.4	28.0	38.9	23.0	16.5	7.6	7.8	27
28	6.6	8.2	6.8	25.5	17.9	17.8	28.0	39.1	23.0	17.7	9.0	7.8	28
29	6.6	8.2	6.8	25.5	20.7	27.2	28.0	30.5	23.0	17.1	9.0	7.8	29
30	6.6		5.6	25.5	23.2	32.6	28.0	25.5	23.0	16.1	9.0	7.8	30
31	6.6		6.0		23.2		16.9	25.5		16.1		7.8	31
<b>Avg. cfs</b>	<b>6.7</b>	<b>6.5</b>	<b>6.9</b>	<b>9.3</b>	<b>29.3</b>	<b>26.7</b>	<b>26.4</b>	<b>25.6</b>	<b>23.7</b>	<b>20.2</b>	<b>9.2</b>	<b>10.2</b>	
<b>Total Acre-Ft</b>	<b>409</b>	<b>376</b>	<b>421</b>	<b>555</b>	<b>1799</b>	<b>1588</b>	<b>1619</b>	<b>1571</b>	<b>1405</b>	<b>1237</b>	<b>545</b>	<b>624</b>	

Note: The blue font on Electric Lake outflow numbers from 25 Sept through 17 Oct indicate estimated flow. Beavers had backed up the stream and gave a false reading during that period.

**Total Annual Discharge (acre-feet) 12150**

**Total Water Year Discharge (acre-feet) 11380**

Maximum Flow 60.6

Minimum Flow 3.9

**2012 -Water Flows above Huntington Power Plant (in cfs) - 2012**

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Day
1	10.1	14.9	16.5	36.6	92.8	94.0	118.8			53.4	24.7	15.6	1
2	16.6	15.1	15.6	29.1	113.0	98.4	124.1			53.4	23.9	15.4	2
3	18.5	14.4	16.8	24.4	121.6	98.0	106.7			54.3	18.4	16.8	3
4	18.2	11.8	17.6	33.3	121.9	96.7	110.6			55.1	17.8	13.7	4
5	20.2	9.7	18.1	47.4	121.0	96.5	122.9			56.0	17.2	15.7	5
6	18.8	14.9	19.6	41.8	102.9	96.2	126.4		83.8	58.1	14.8	16.5	6
7	19.4	11.6	16.6	33.4	101.2	94.0	102.0		93.1	58.9	12.4	15.0	7
8	15.4	16.7	15.2	33.7	105.6	92.1	84.6		97.8	58.9	24.4	15.0	8
9	21.6	15.3	15.5	39.0	115.6	91.9	86.9		104.3	55.5	13.9	14.0	9
10	17.9	14.0	16.9	48.7	119.7	93.5	80.9		83.9	51.9	12.2	14.0	10
11	18.7	13.6	18.1	53.8	124.2	90.2	80.1		58.4	50.1	10.0	13.0	11
12	7.6	14.3	14.9	54.4	116.1	85.9	75.9		58.8	55.7	8.3	13.0	12
13	15.0	14.1	20.7	45.7	115.7	85.3	78.4		58.1	51.0	9.5	12.0	13
14	19.2	14.1	20.2	43.4	115.5	84.6	83.9		61.8	49.4	10.7	12.0	14
15	17.5	13.8	22.8	41.9	126.9	79.9	88.4		63.2	49.7	9.7	11.0	15
16	21.2	13.8	24.5	38.2	131.9	78.2	87.2		63.5	66.5	9.9	11.0	16
17	9.1	13.7	25.1	40.6	129.4	78.4	80.9		63.8	55.4	9.3	10.0	17
18	17.8	12.9	22.9	40.6	128.5	79.7	56.9		61.3	47.7	9.5	10.0	18
19	25.4	17.6	20.1	51.8	123.7	80.3	54.1		54.8	44.8	9.4	9.0	19
20	21.6	14.6	19.1	51.3	117.7	81.1	55.4		48.6	38.5	9.0	15.0	20
21	20.0	14.7	19.0	62.0	117.8	87.3	63.0		47.9	36.6	10.0	15.0	21
22	18.5	14.9	19.4	73.5	113.2	85.4	62.8		47.9	36.1	13.3	15.0	22
23	15.3	15.1	22.6	77.2	100.3	86.8	82.6		47.9	38.2	17.4	15.0	23
24	20.5	12.9	26.1	86.9	95.7	87.5	79.4		48.4	38.4	19.0	10.0	24
25	16.6	13.6	27.2	94.9	94.2	93.6	64.6		50.2	38.4	19.3	9.0	25
26	15.8	13.4	27.1	84.0	89.8	102.5	63.5		56.5	37.1	18.5	9.0	26
27	15.7	14.3	21.0	97.7	88.2	88.8	67.3		59.9	38.4	13.9	9.0	27
28	9.2	15.9	21.2	88.4	87.3	101.4	77.5		55.9	37.1	13.5	8.7	28
29	16.4	15.6	22.8	80.4	86.6	110.2	72.3		54.0	26.2	16.8	4.2	29
30	18.5		25.8	79.8	89.3	106.0	100.0		52.9	15.1	16.3	3.9	30
31	16.3		32.2		90.8		112.0			24.9		4.0	31

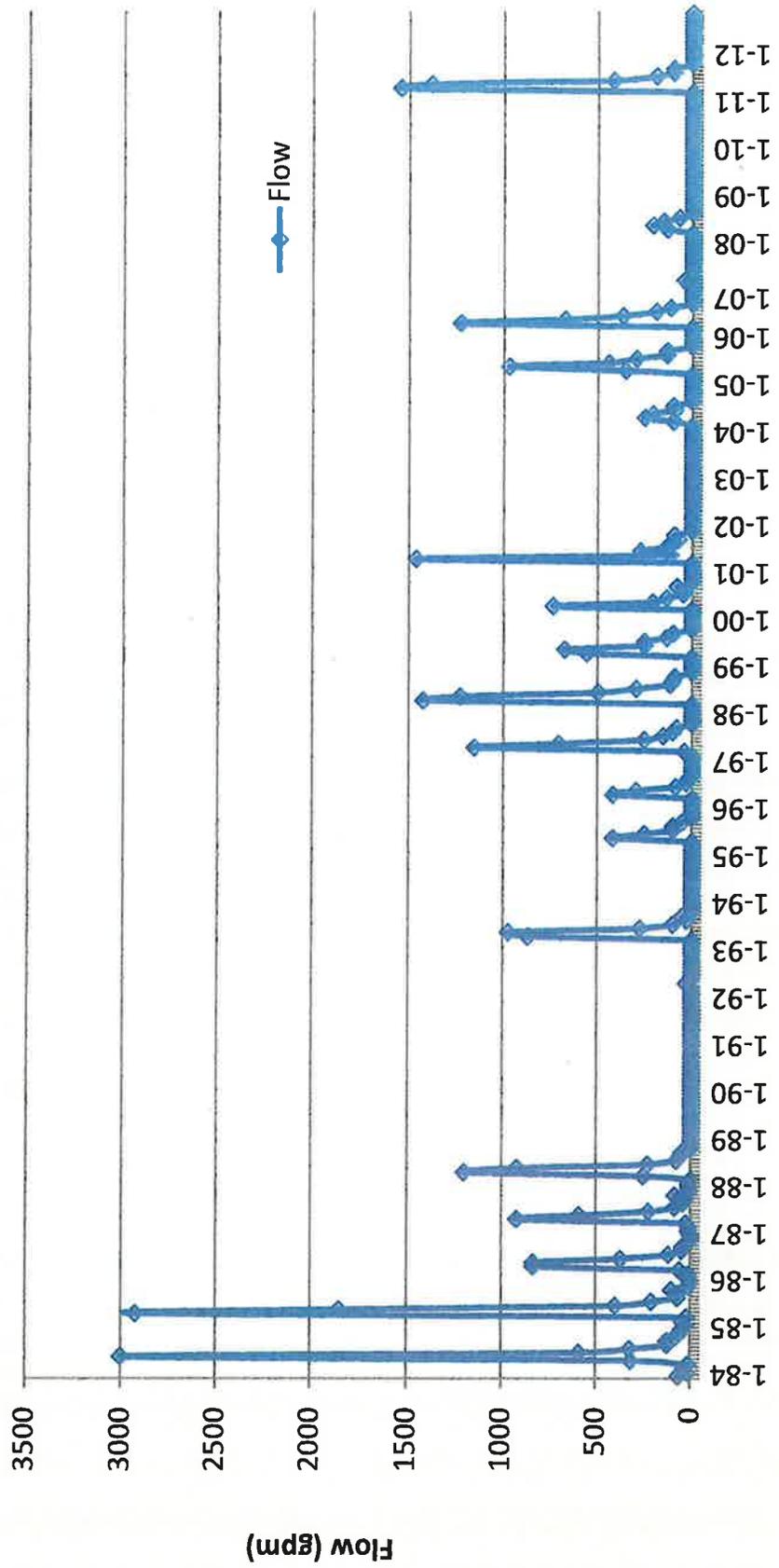
Totals in  
 acre feet: **269.0**    **207.7**    **323.8**    **835.3**    **1716.2**    **1376.0**    **1338.4**    **0.0**    **772.1**    **722.6**    **218.7**    **187.1**

Annual Total (af): **7967.0**

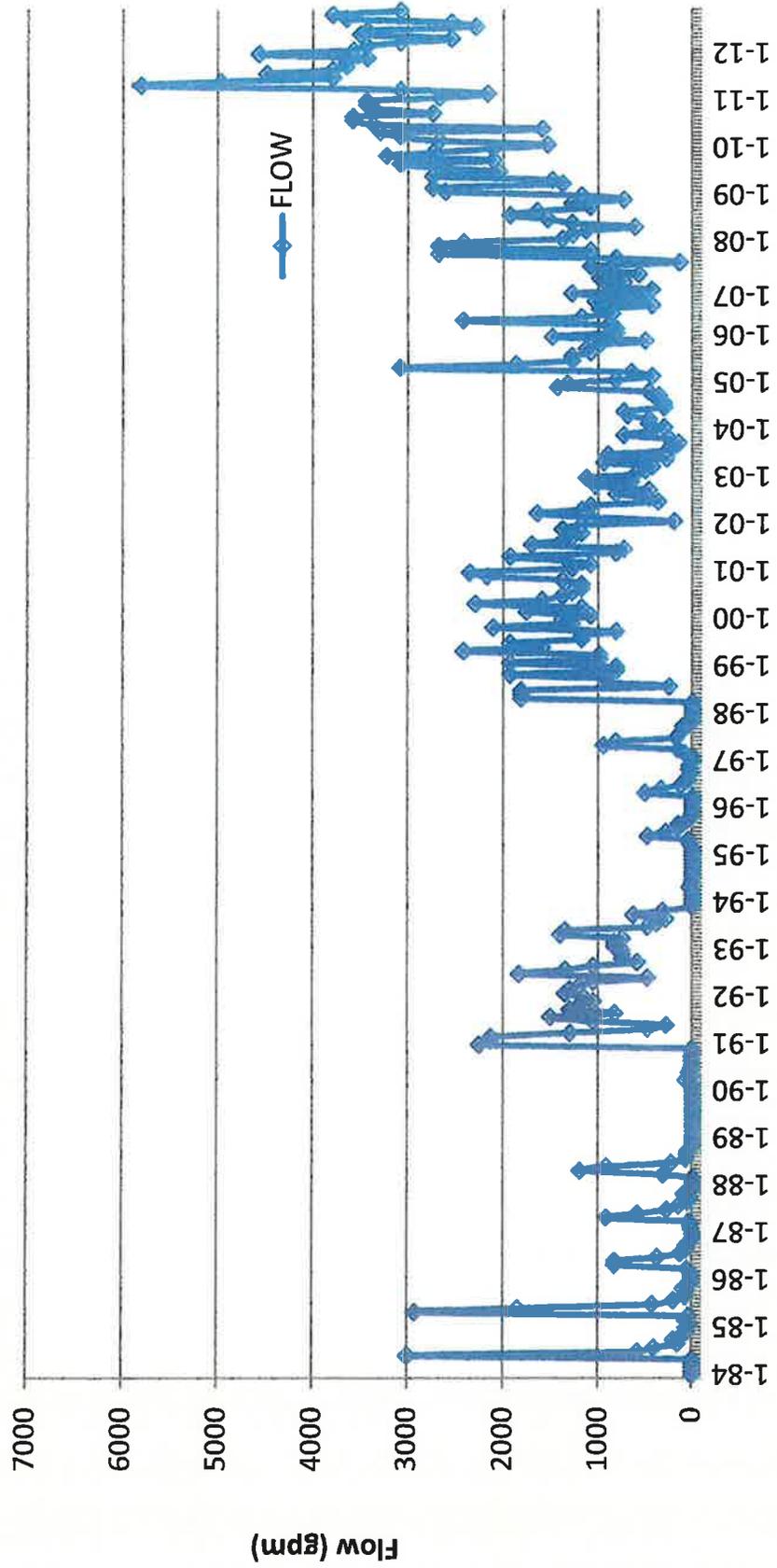
Missing data in August and September is from fire related mud slides causing damage to monitoring site.

Max	25.4	17.6	32.2	97.7	131.9	110.2	126.4	0.0	104.3	66.5	24.7	16.8
Min	7.6	9.7	14.9	24.4	86.6	78.2	54.1	0.0	47.9	15.1	8.3	3.9
Mean	17.2	14.2	20.7	55.1	109.6	90.8	85.5	#DIV/0!	63.7	46.2	14.4	12.0

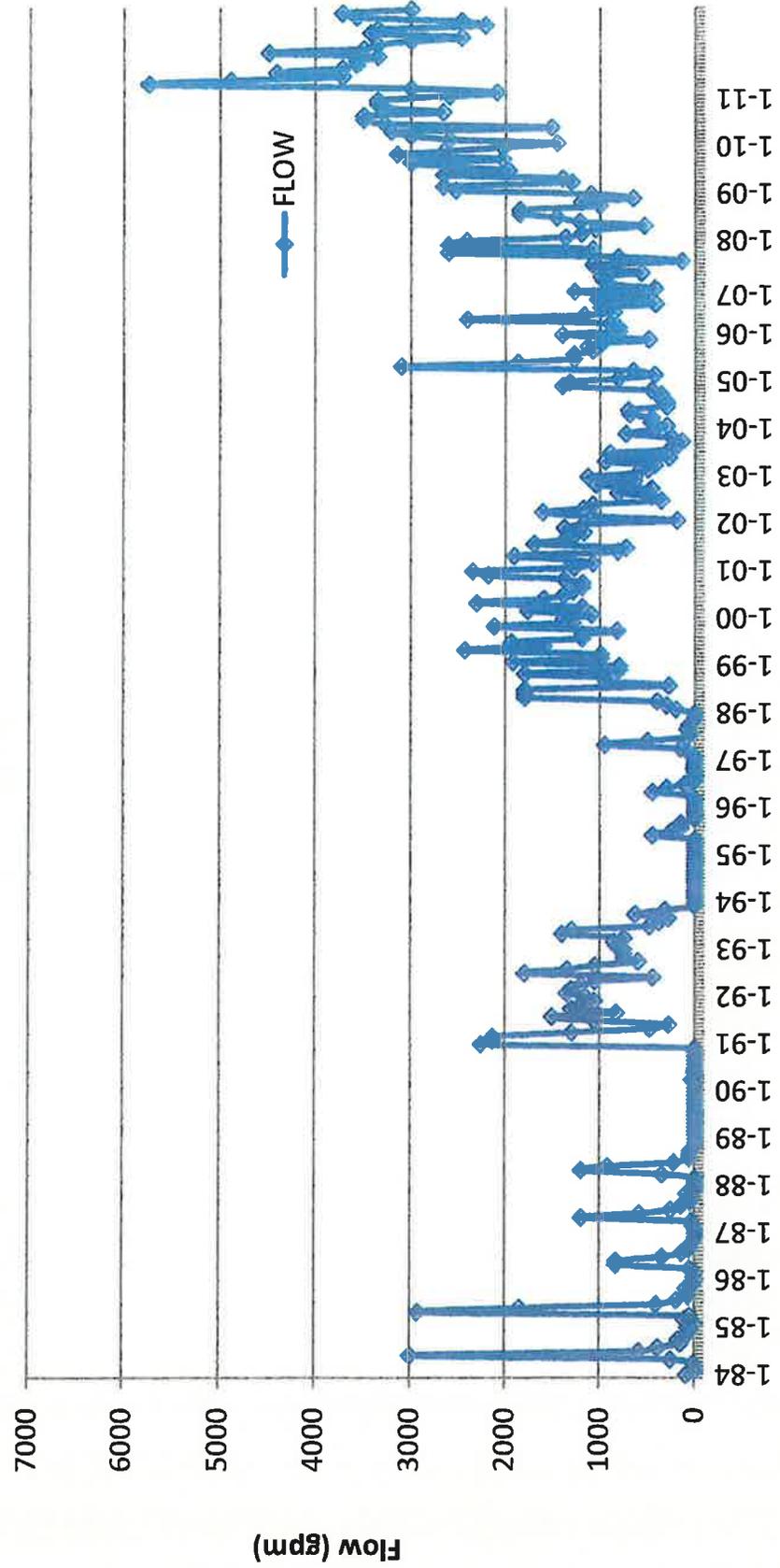
**DEER CREEK  
(DCR01) ABOVE MINE  
DISCHARGE RESSION CURVE**



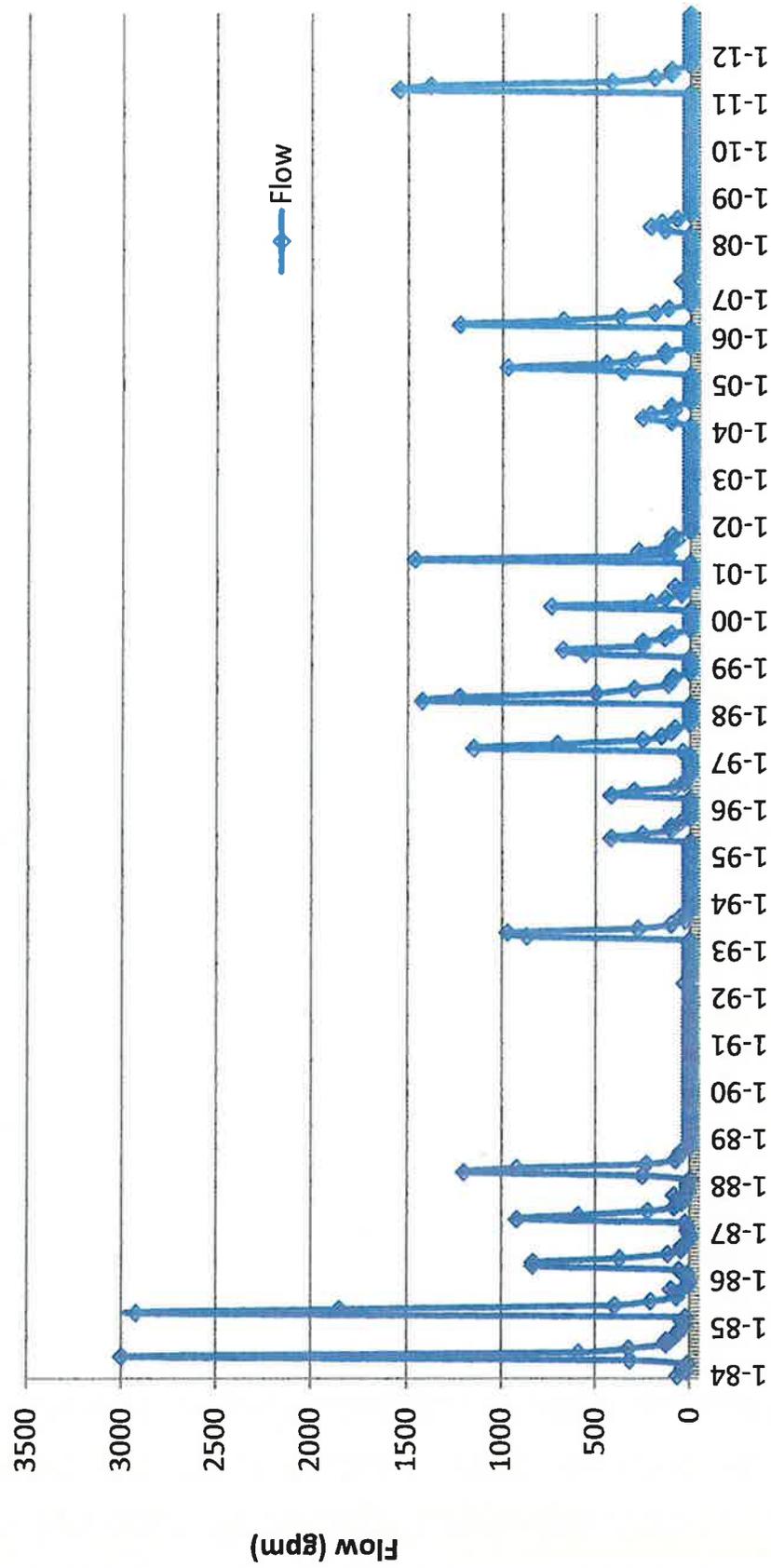
**DEER CREEK  
(DCR04) AT PERMIT BOUNDARY  
DISCHARGE RESSION CURVE**



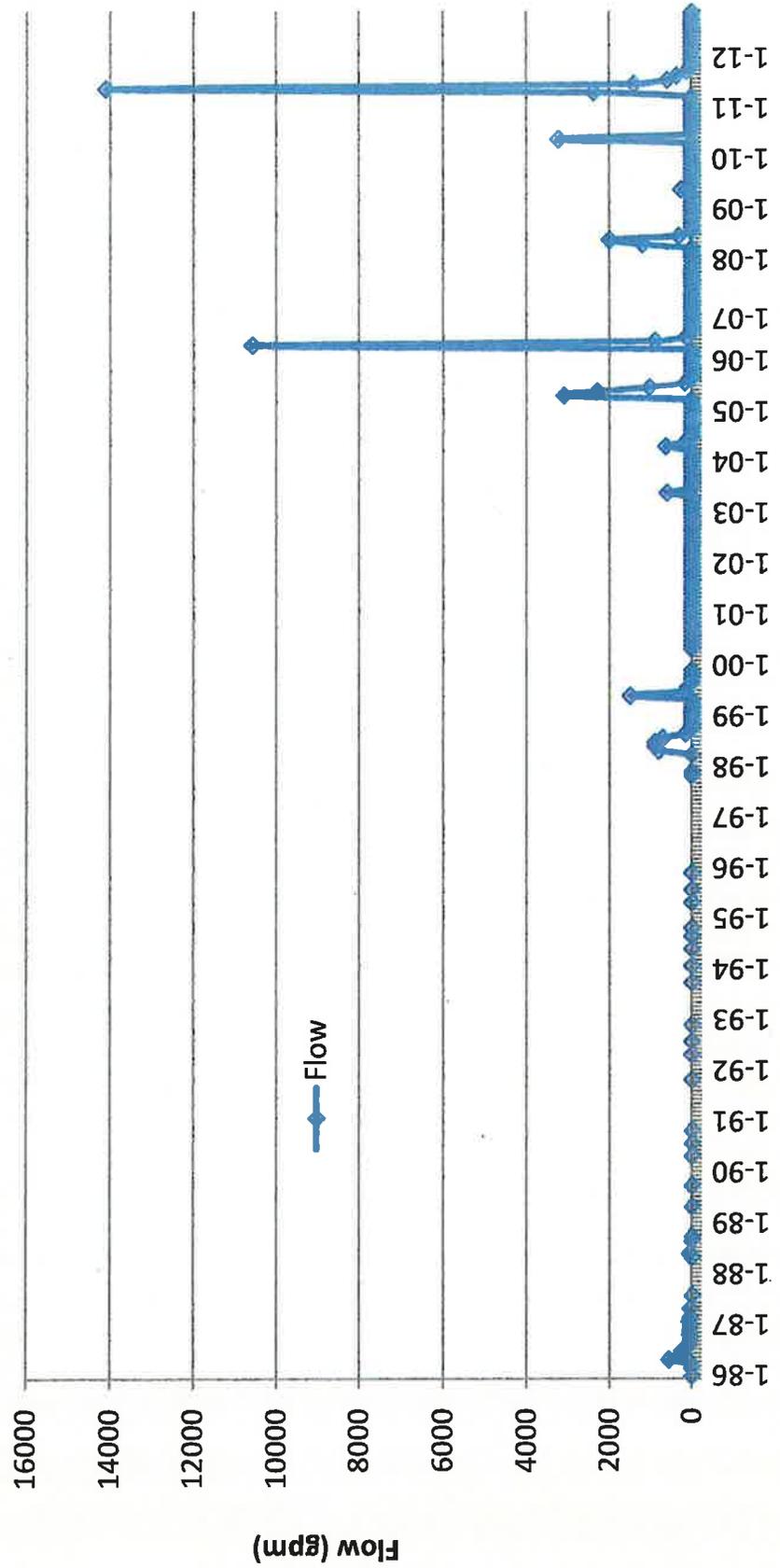
# DEER CREEK (DCR06) BELOW MINE DISCHARGE RECESSON CURVE



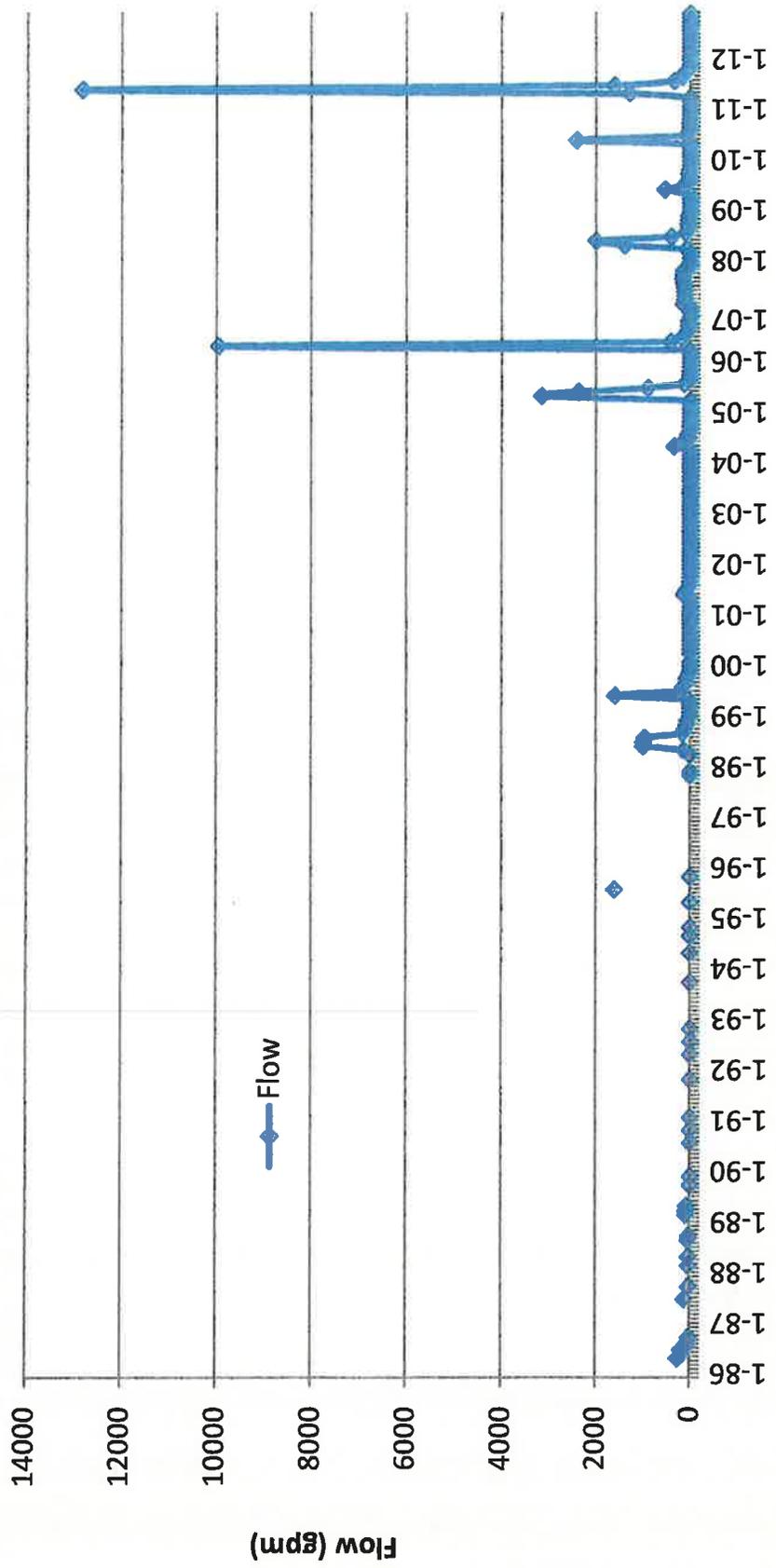
# MEETINGHOUSE CANYON (MHC01) LEFT FORK DISCHARGE RESSION CURVE



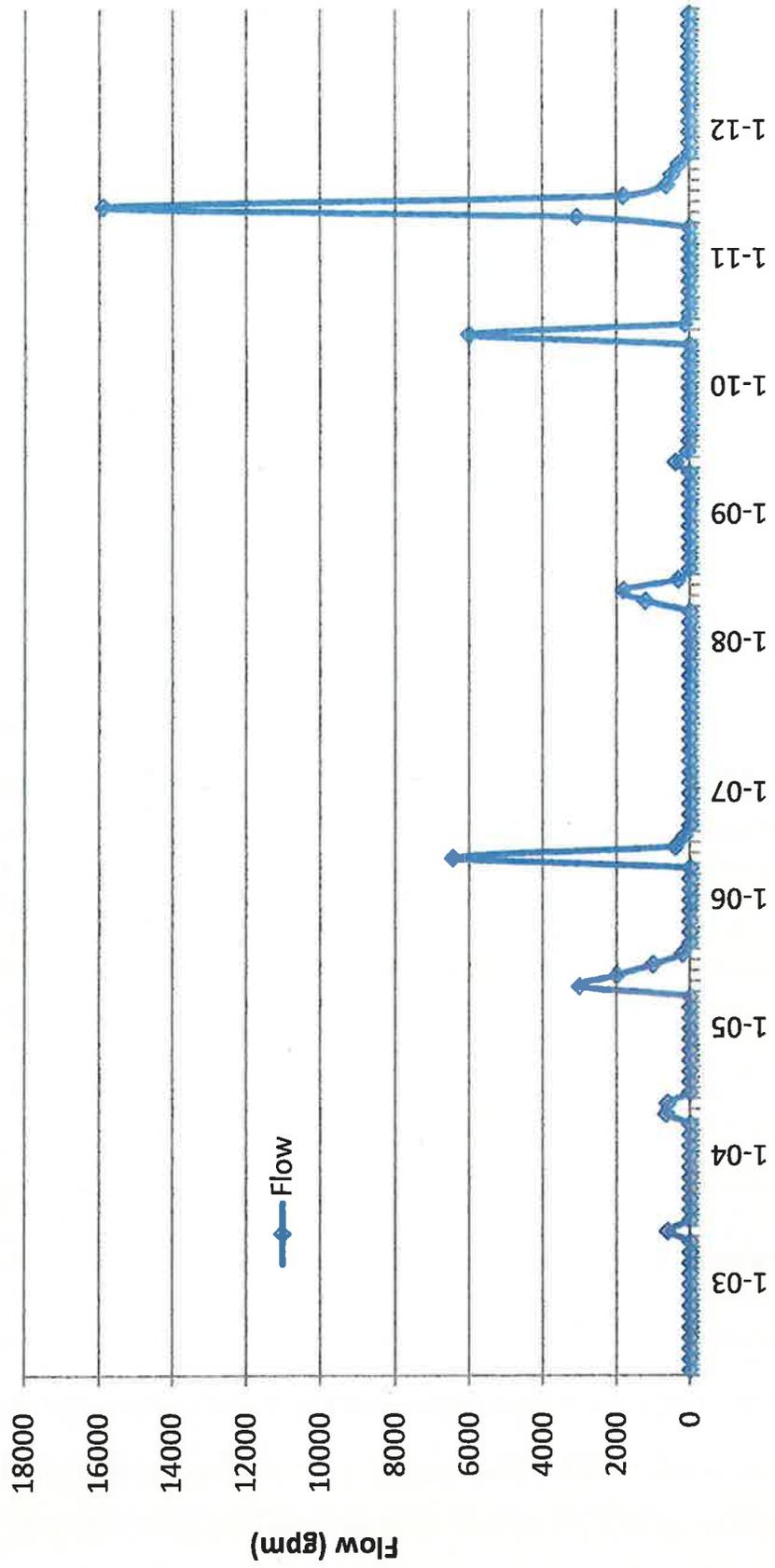
**MILL FORK  
(MFA1) ABOVE MINE  
DISCHARGE RESSION CURVE**



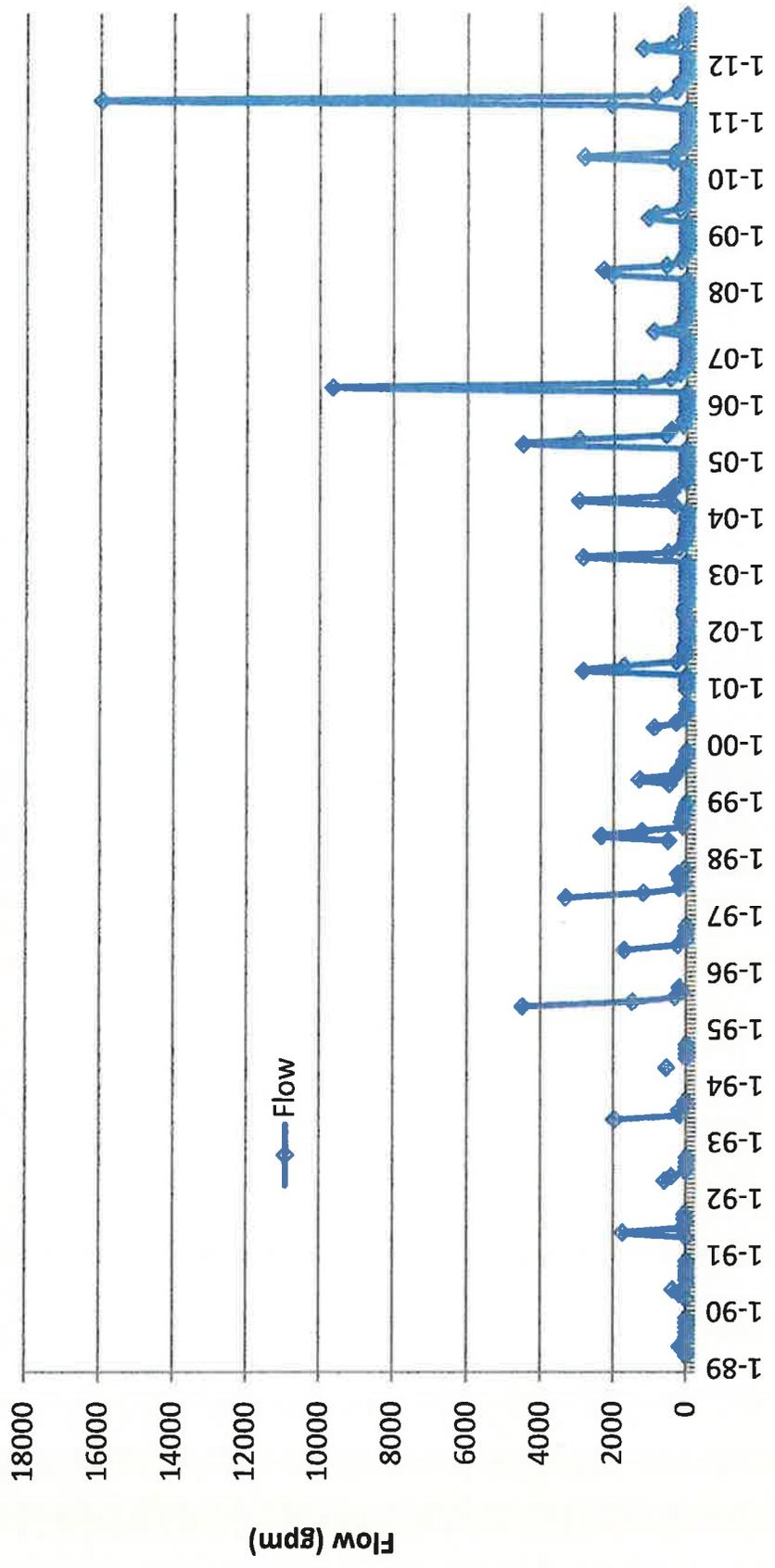
# MILL FORK (MFB2) BELOW MINE DISCHARGE RESSION CURVE



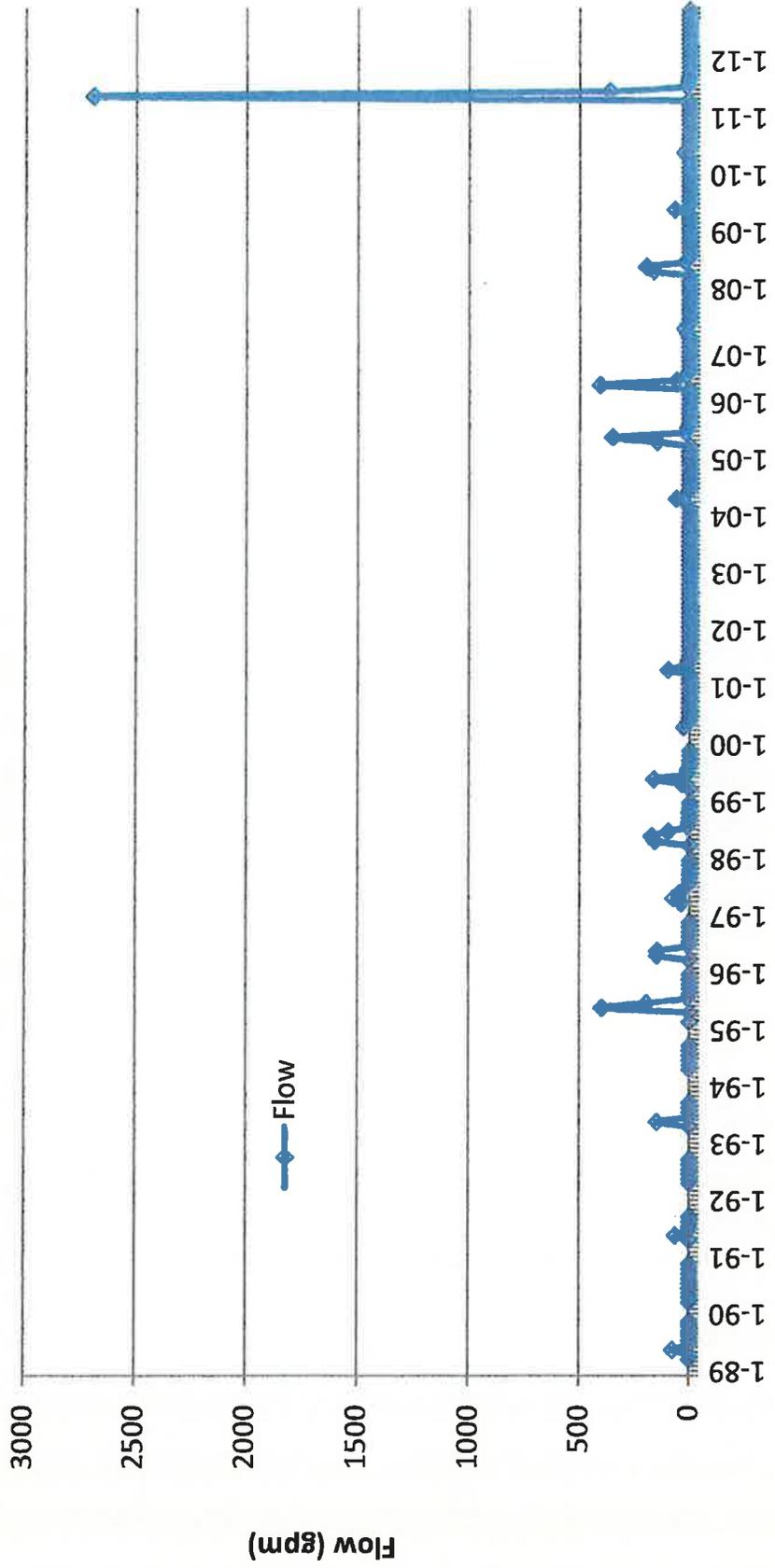
# MILL FORK (MFU03) ABOVE MILL FORK GRABEN DISCHARGE RESSION CURVE



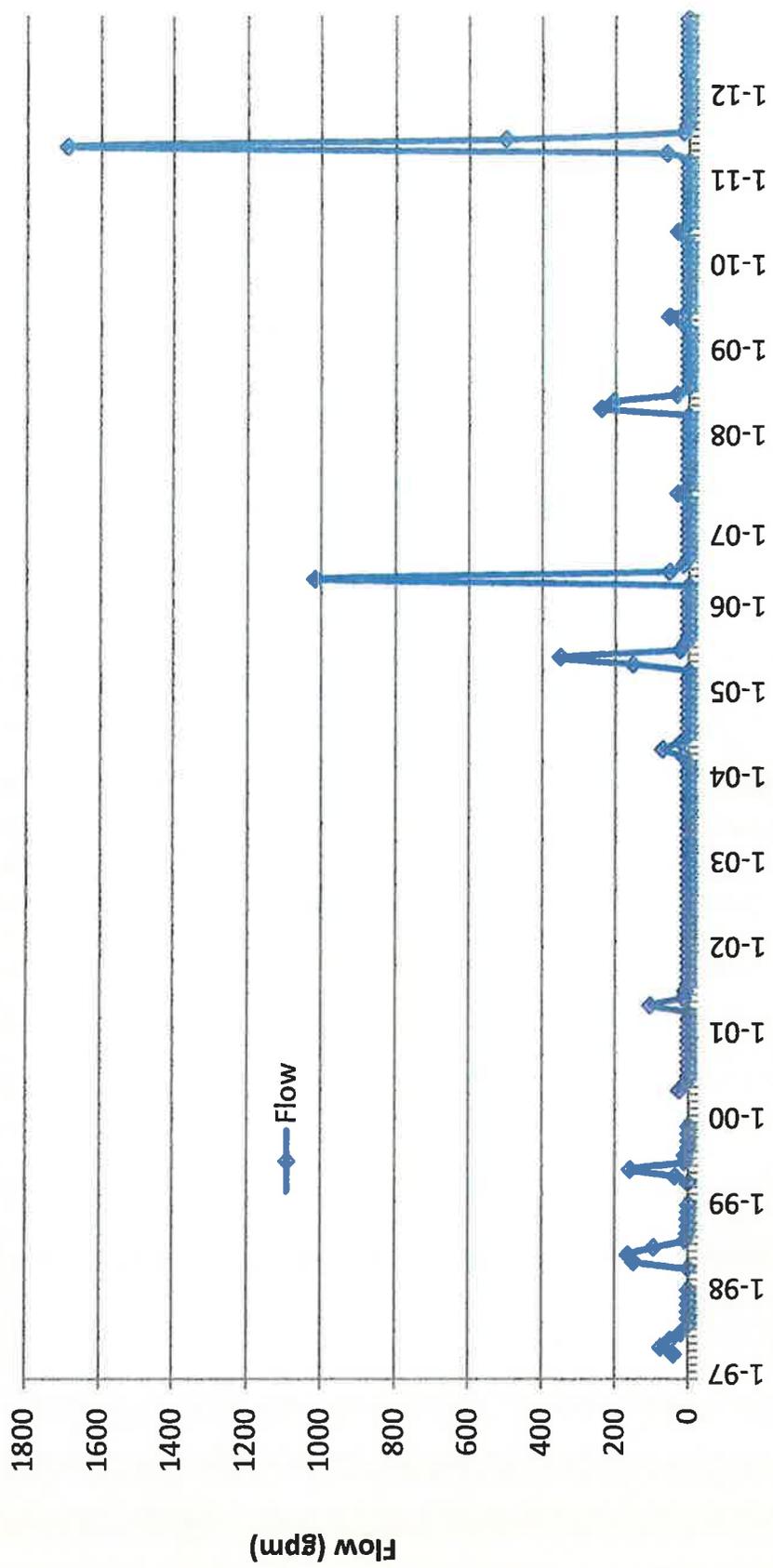
**RILDA CANYON  
(RCF1) RIGHT FORK  
DISCHARGE RESSION CURVE**



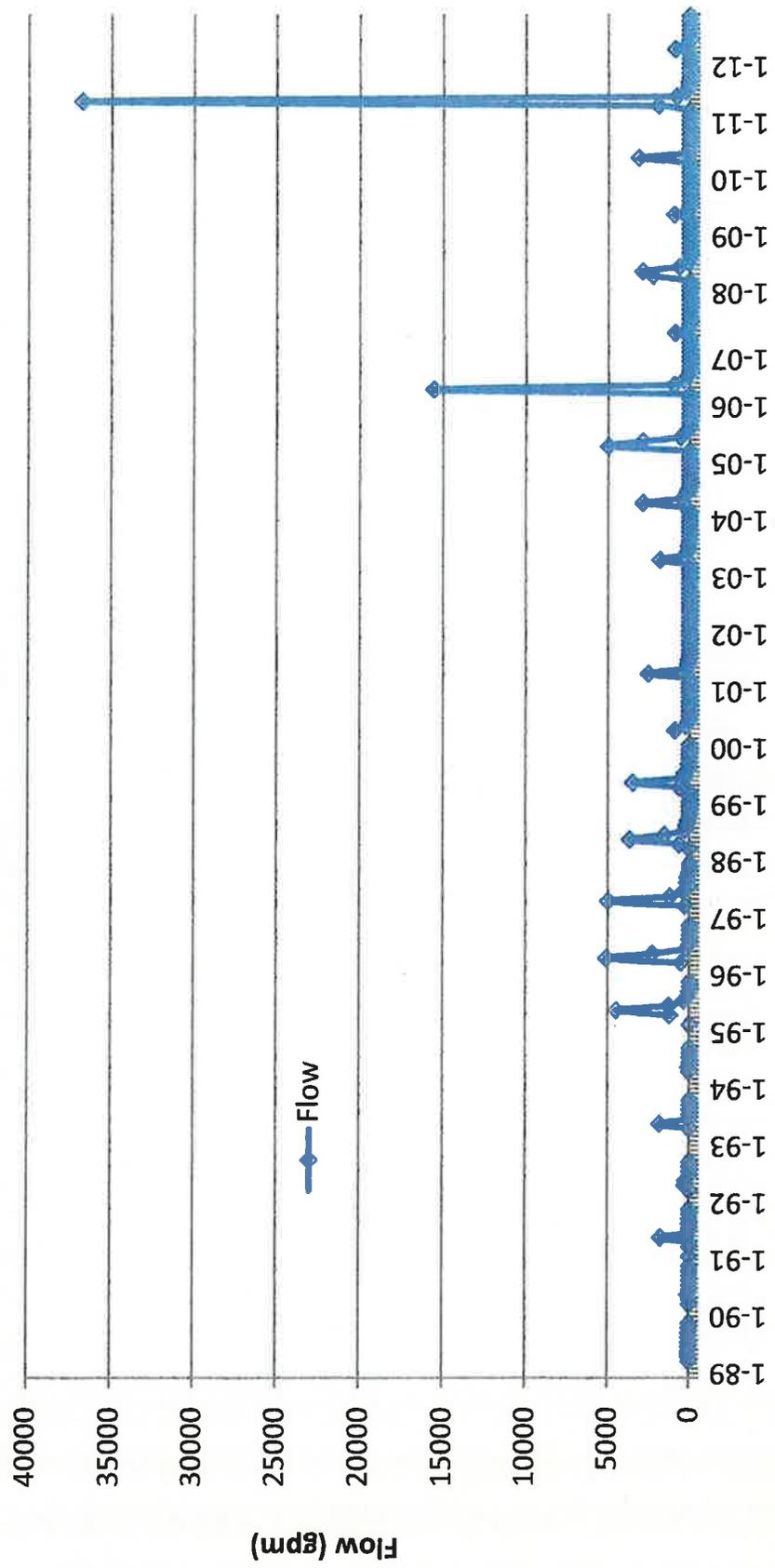
**RILDA CANYON  
(RCLF1) LEFT FORK BELOW BREAKOUTS  
DISCHARGE RESSION CURVE**



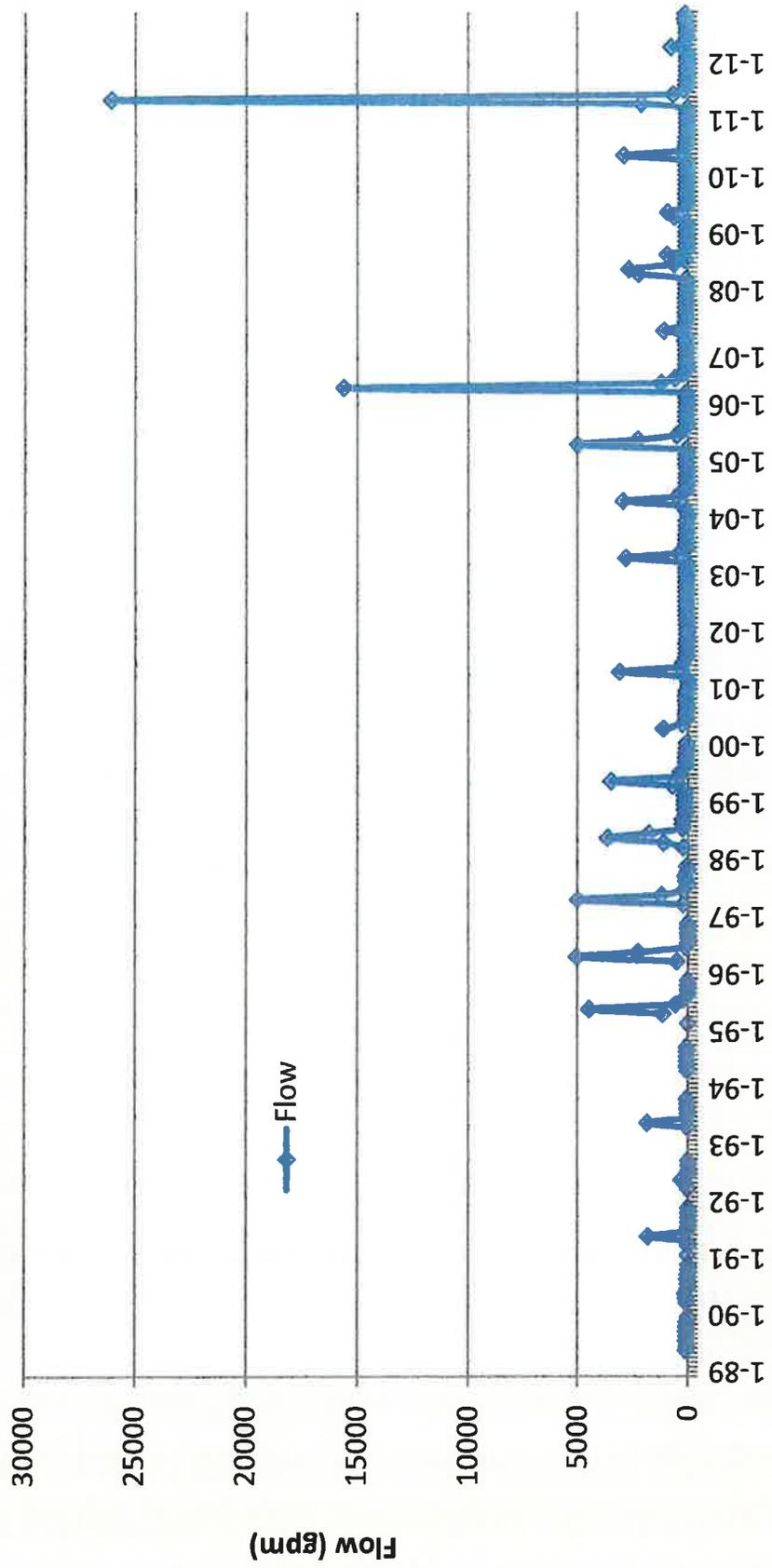
# RILDA CANYON (RCLF2) RIGHT FORK ABOVE BREAKOUTS DISCHARGE RESSION CURVE



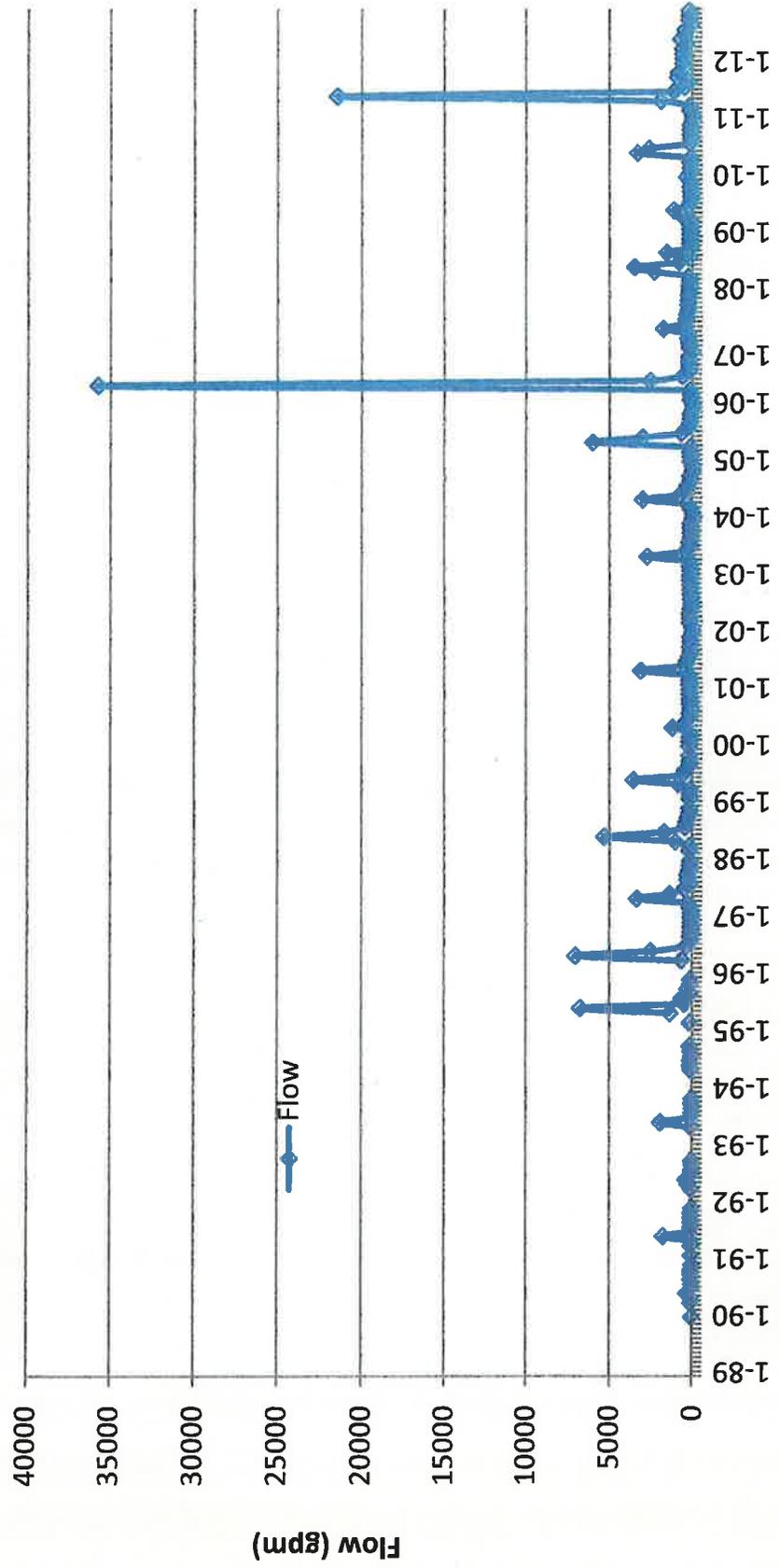
# RILDA CANYON (RCF2) ABOVE NEWUSSD SPRINGS DISCHARGE RESSION CURVE



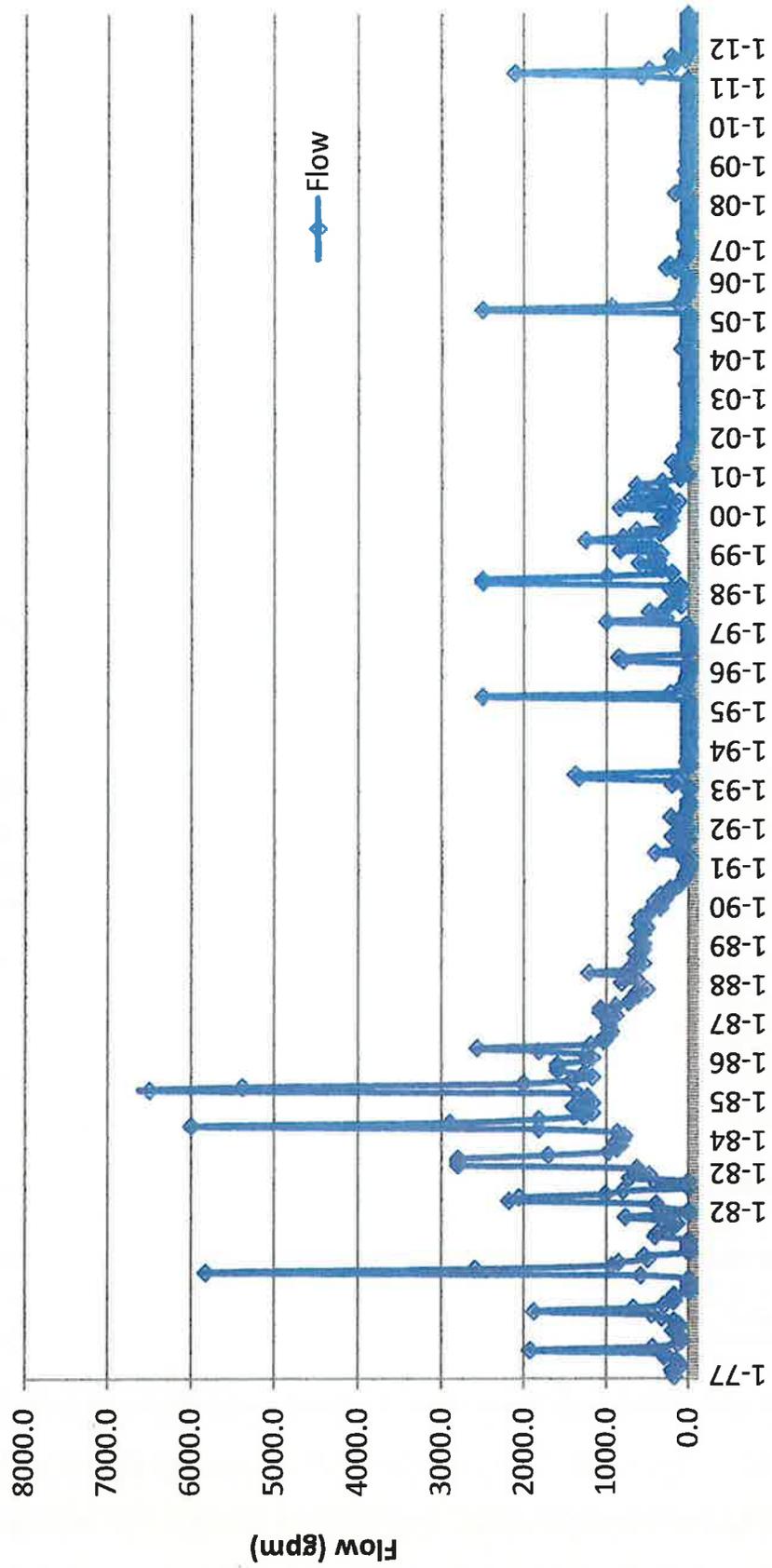
**RILDA CANYON  
(RCF3) BELOW NEWUSSD SPRINGS  
DISCHARGE RECESSION CURVE**



**RILDA CANYON  
(RCW4) NEAR HUNTINGTON CANYON  
DISCHARGE RESSION CURVE**



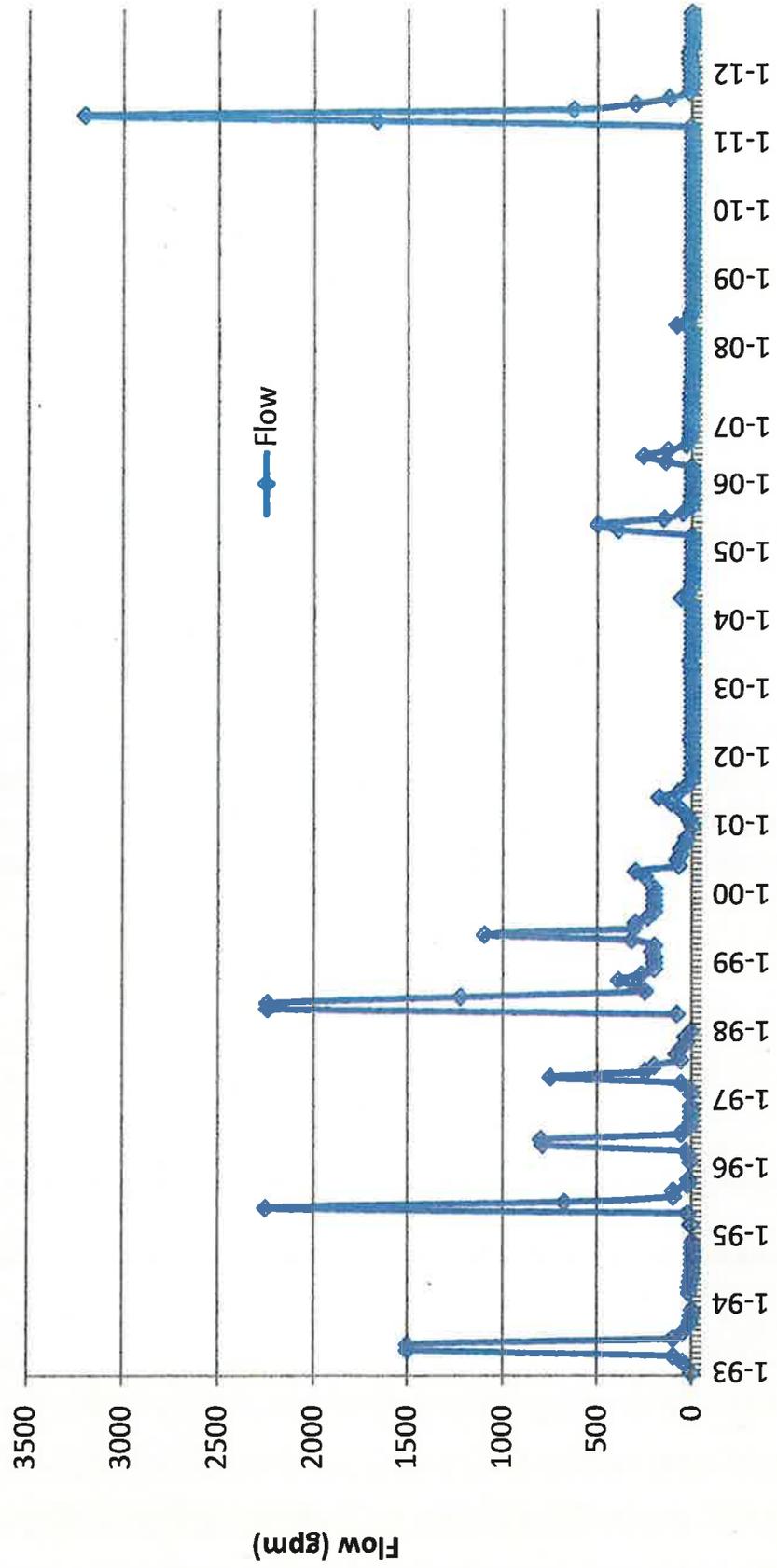
# COTTONWOOD CANYON CREEK (CCC01) AT USGS FLUME DISCHARGE RESSION CURVE



# COTTONWOOD CANYON CREEK

SW-1

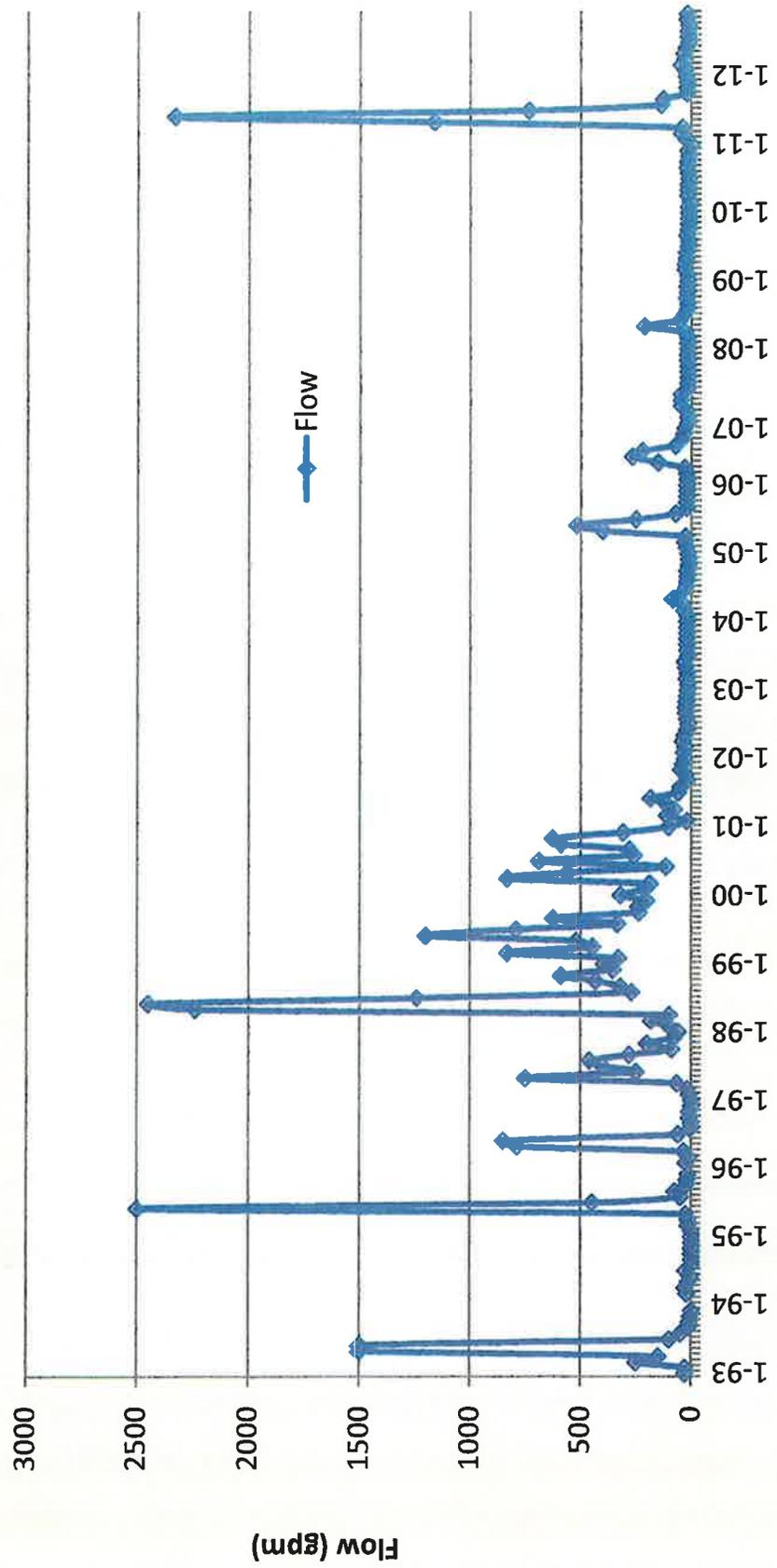
## DISCHARGE RESSION CURVE



# COTTONWOOD CANYON CREEK

SW-2

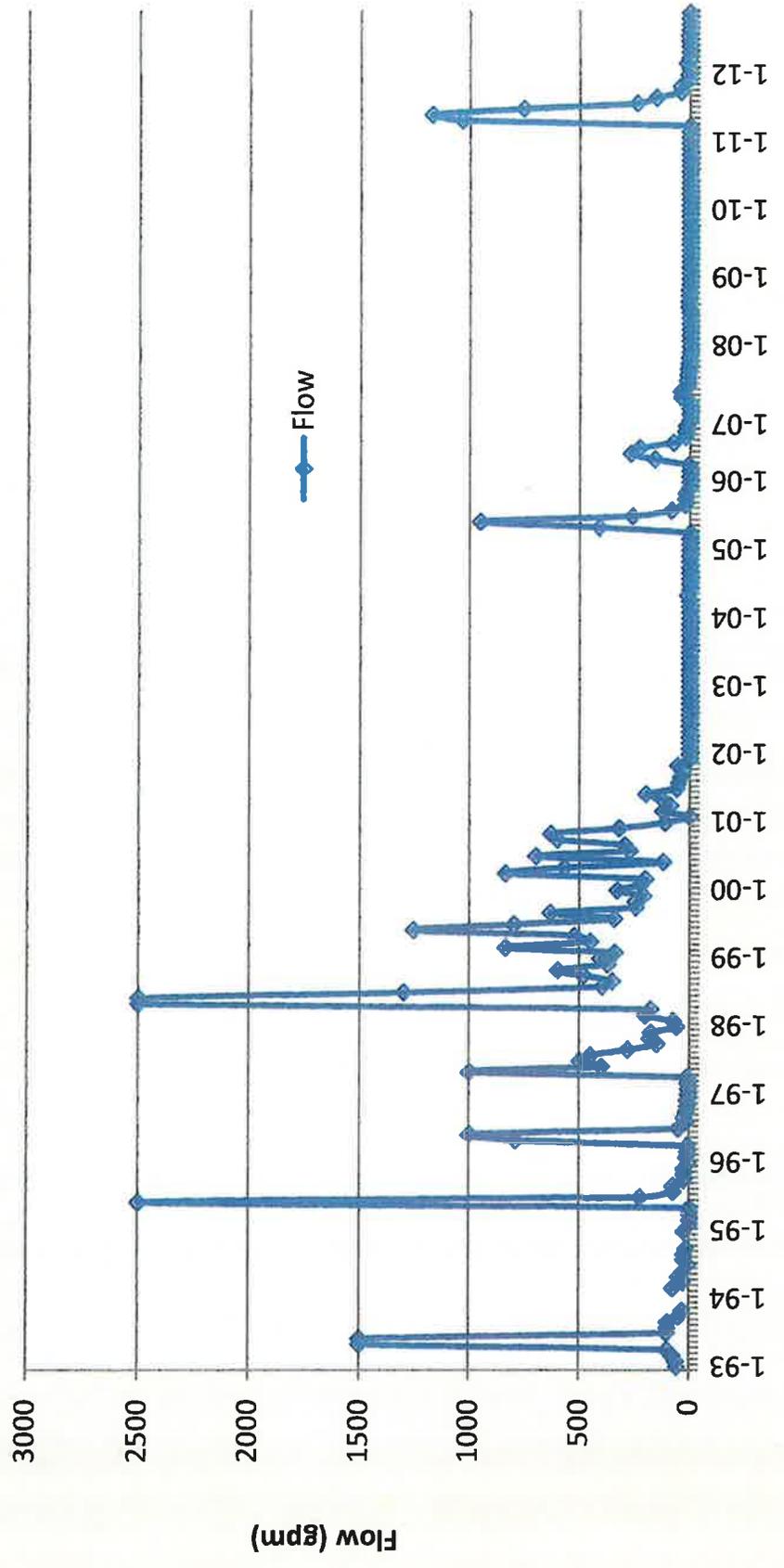
## DISCHARGE RESSION CURVE



# COTTONWOOD CANYON CREEK

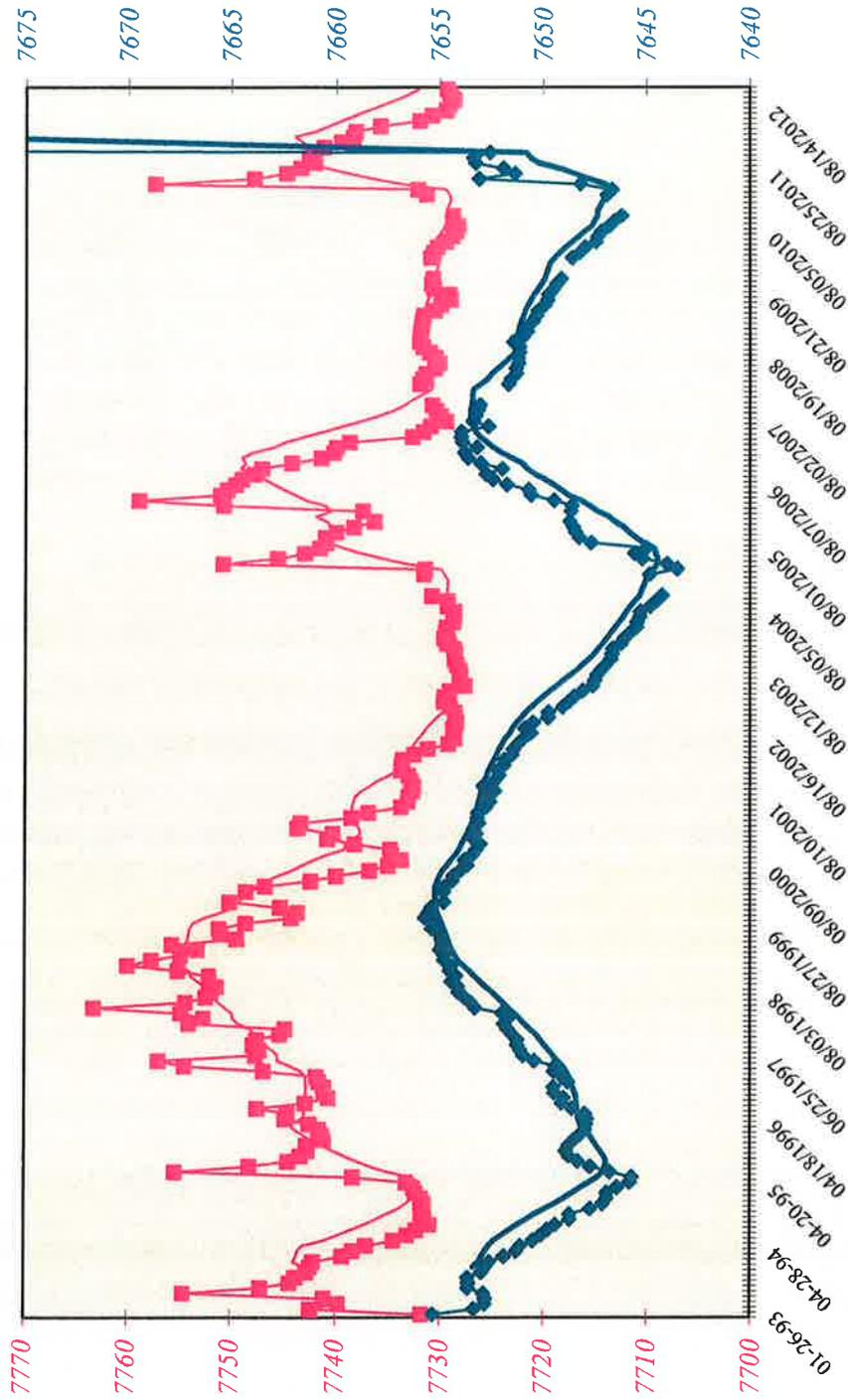
SW-3

## DISCHARGE RECESSION CURVE



# Cottonwood Wells - Site 1

## Groundwater Elevation Data with Trend Lines



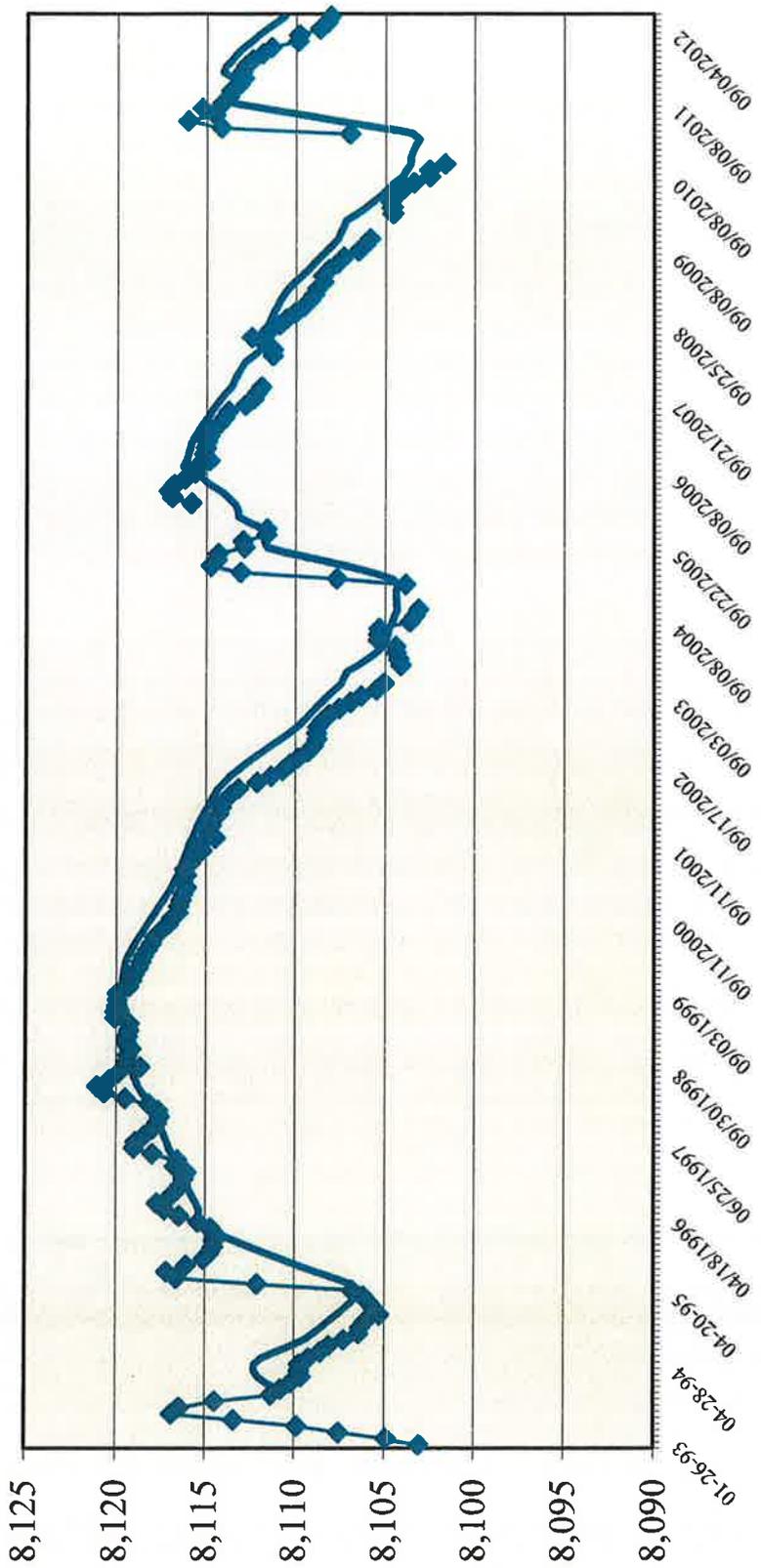
**Well Elevations:**  
 CCCW-1A = 7843'  
 CCCW-1S = 7845'

**Star Point Formation**  
 Elevation = 7232'

**Roans Canyon Spring**  
 Elevation = 7632'



# Cottonwood Well 2A Groundwater Elevation Data with Trend Line

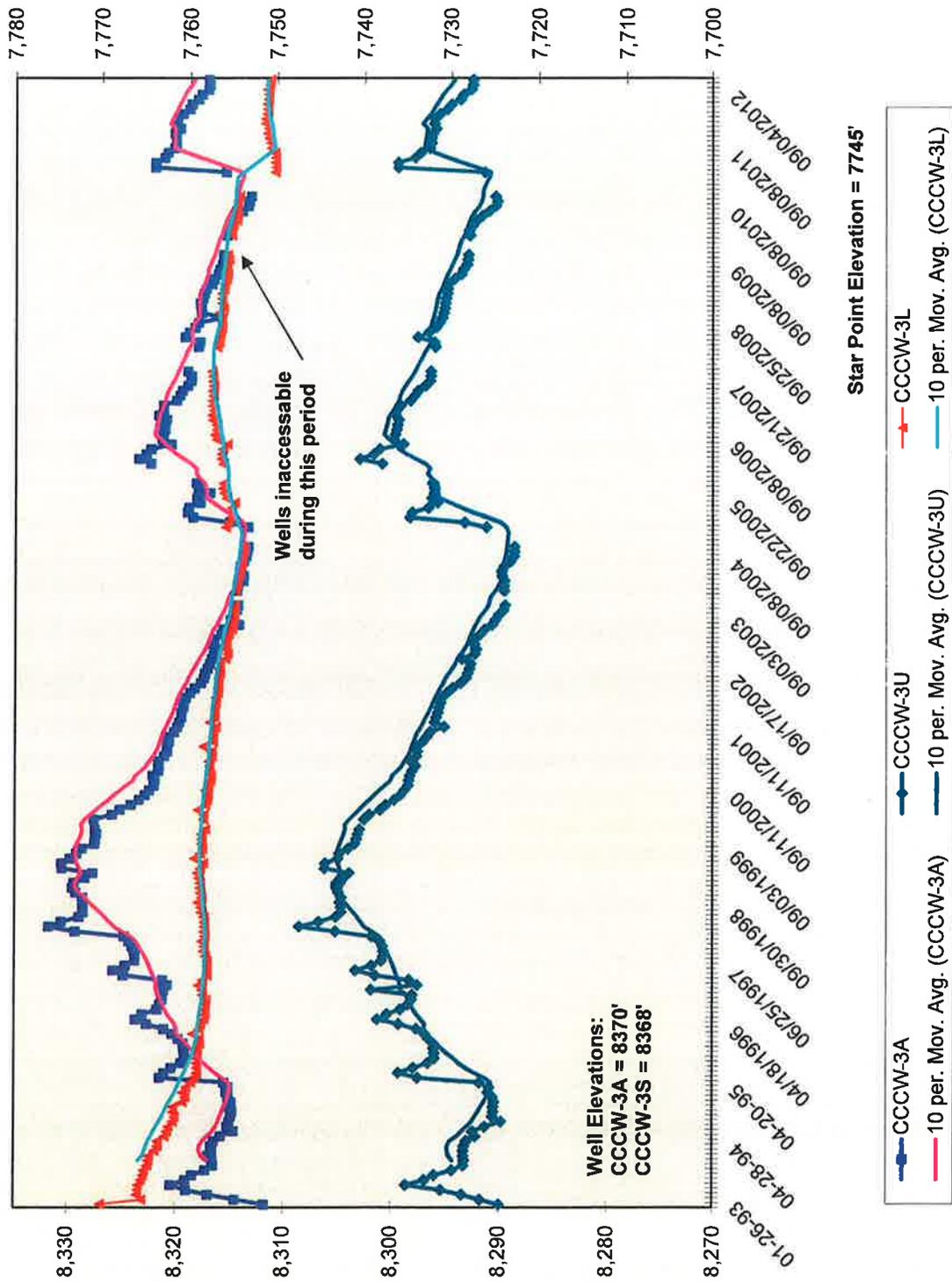


**Well Elevation:**  
**CCCW-2A = 8134'**

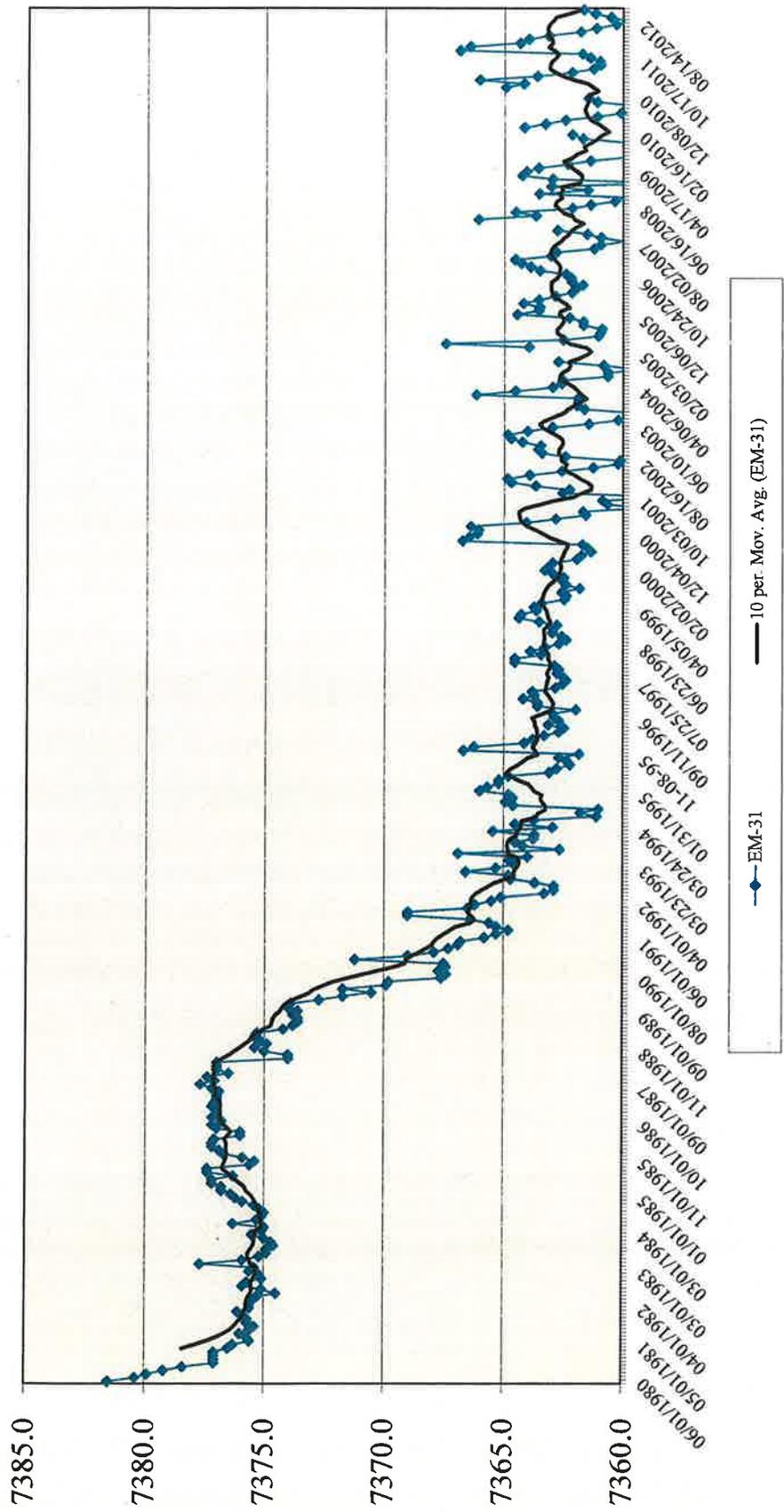
◆ Series1      — 10 per. Mov. Avg. (Series1)

# Cottonwood Wells - Site 3

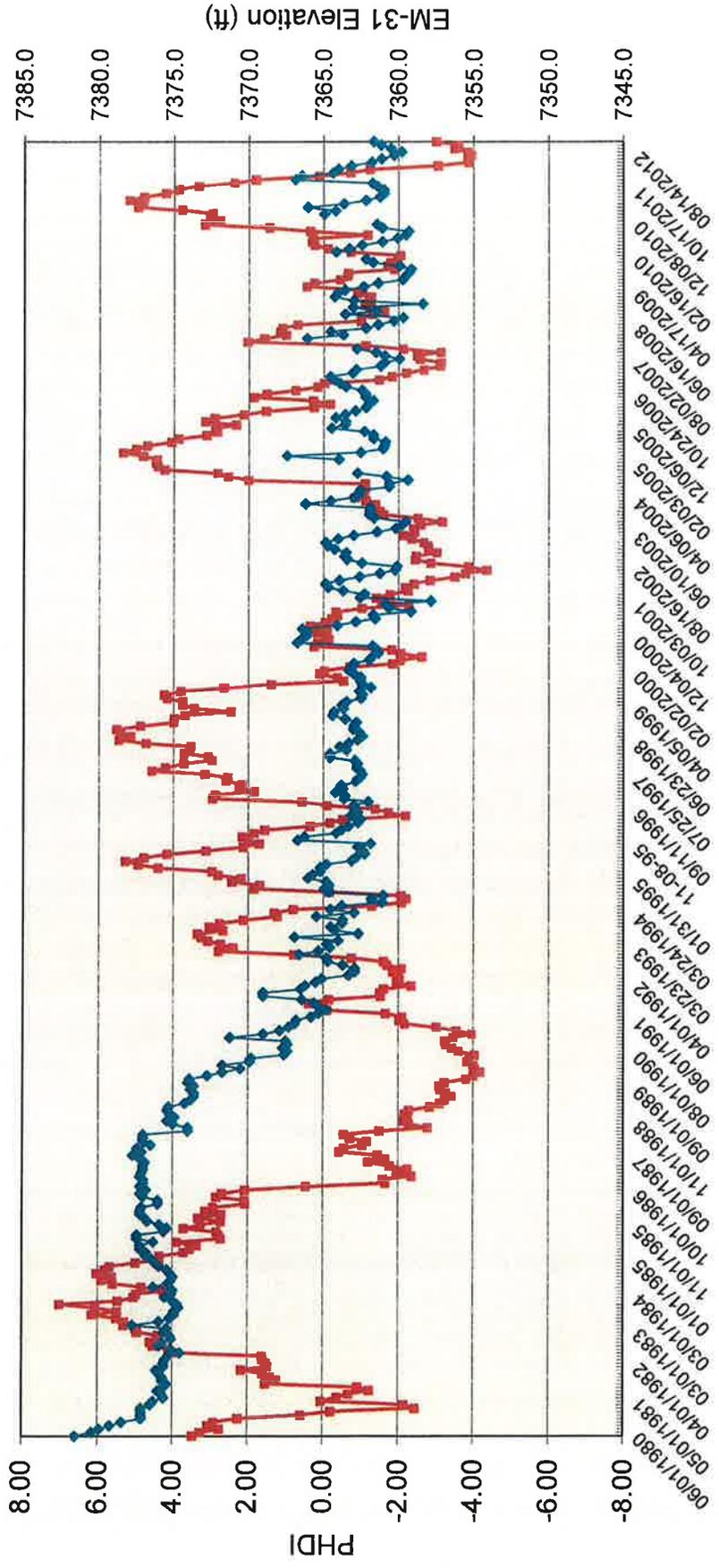
## Groundwater Elevation Data with Trend Lines



# Cottonwood Well EM-31



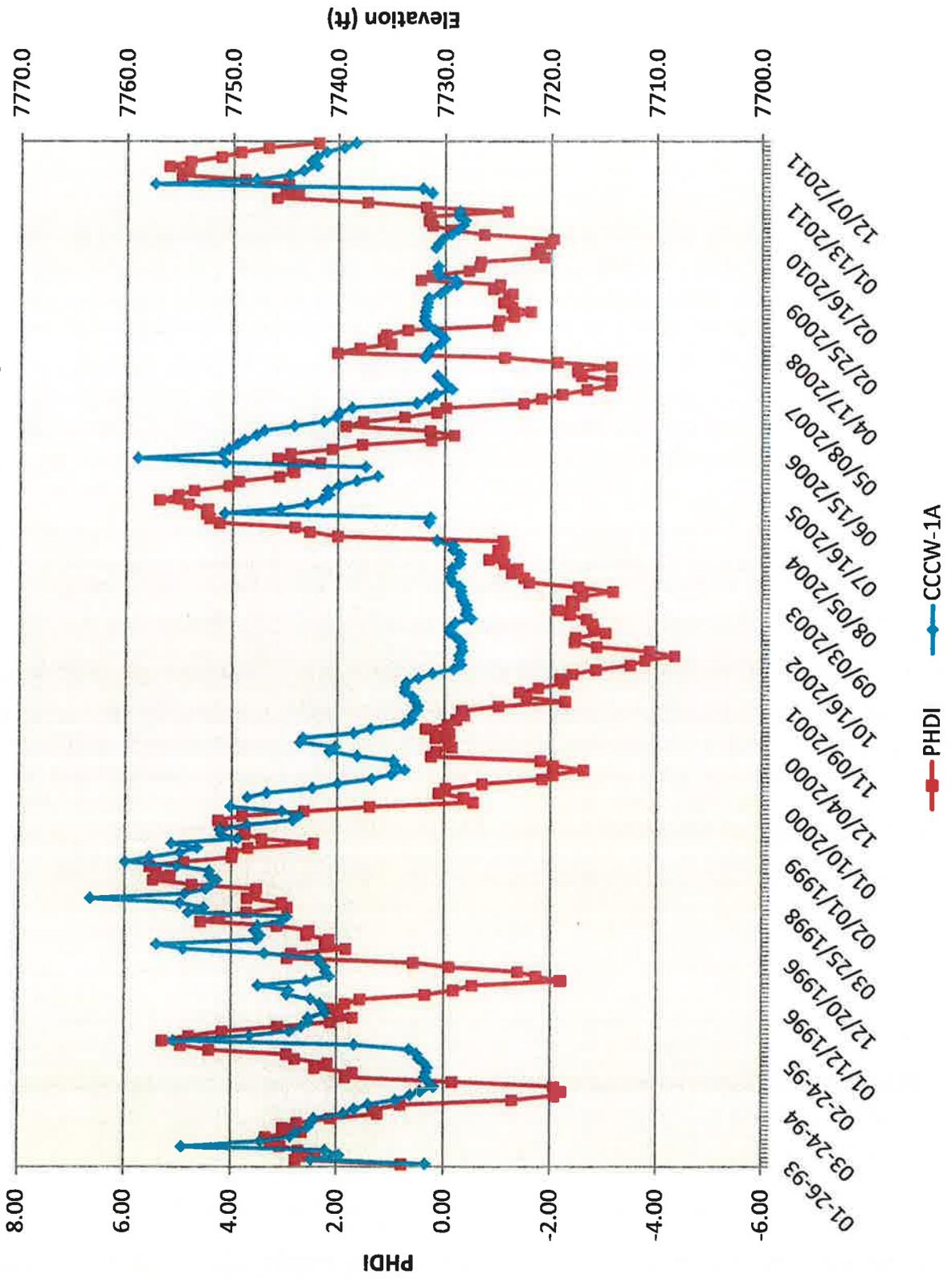
# Palmer Drought Index vs. EM-31 Well Elevation



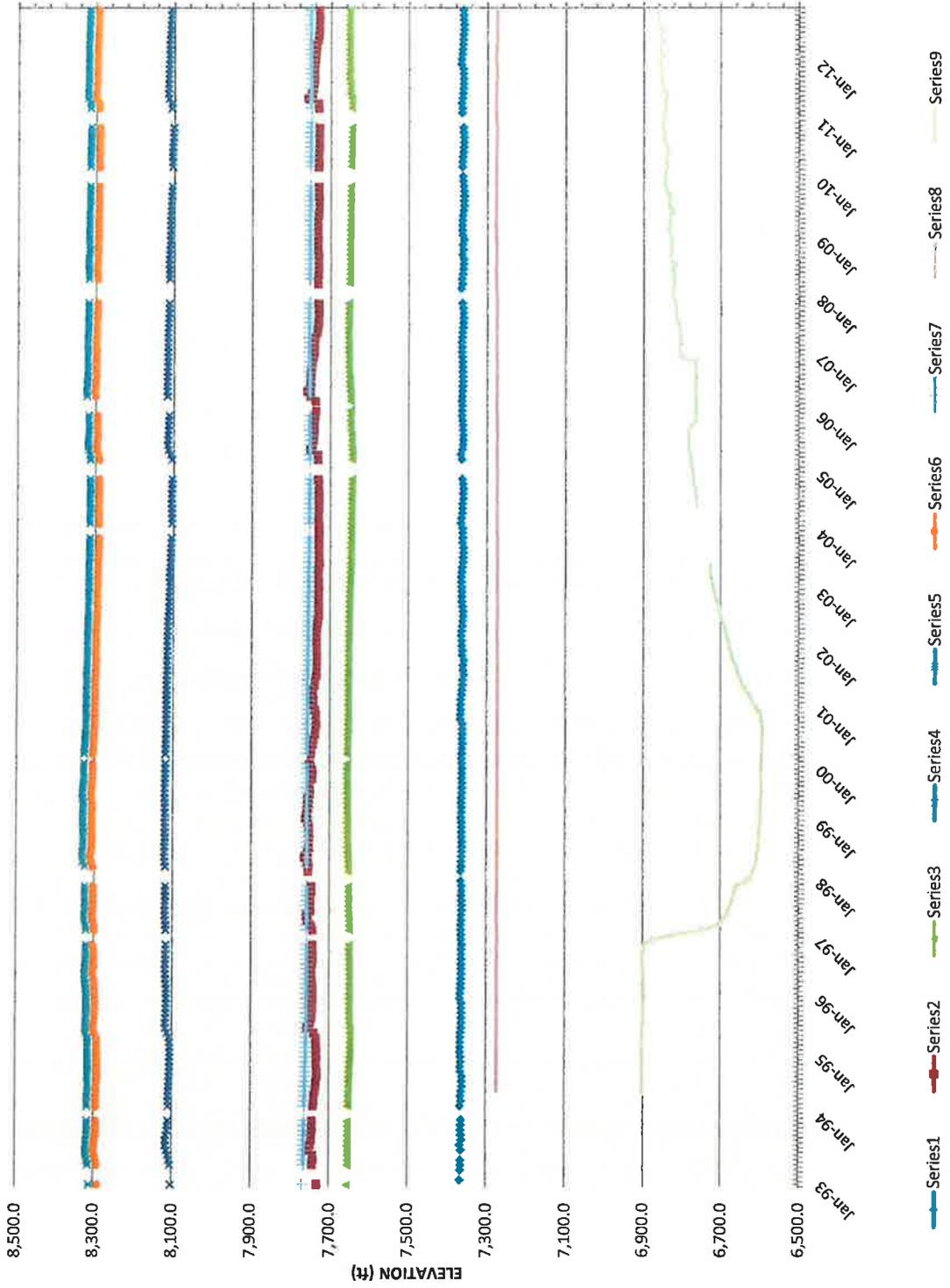
PHDI — EM-31

# PALMER DROUGHT INDEX vs. CCCW-1A WELL ELEVATION

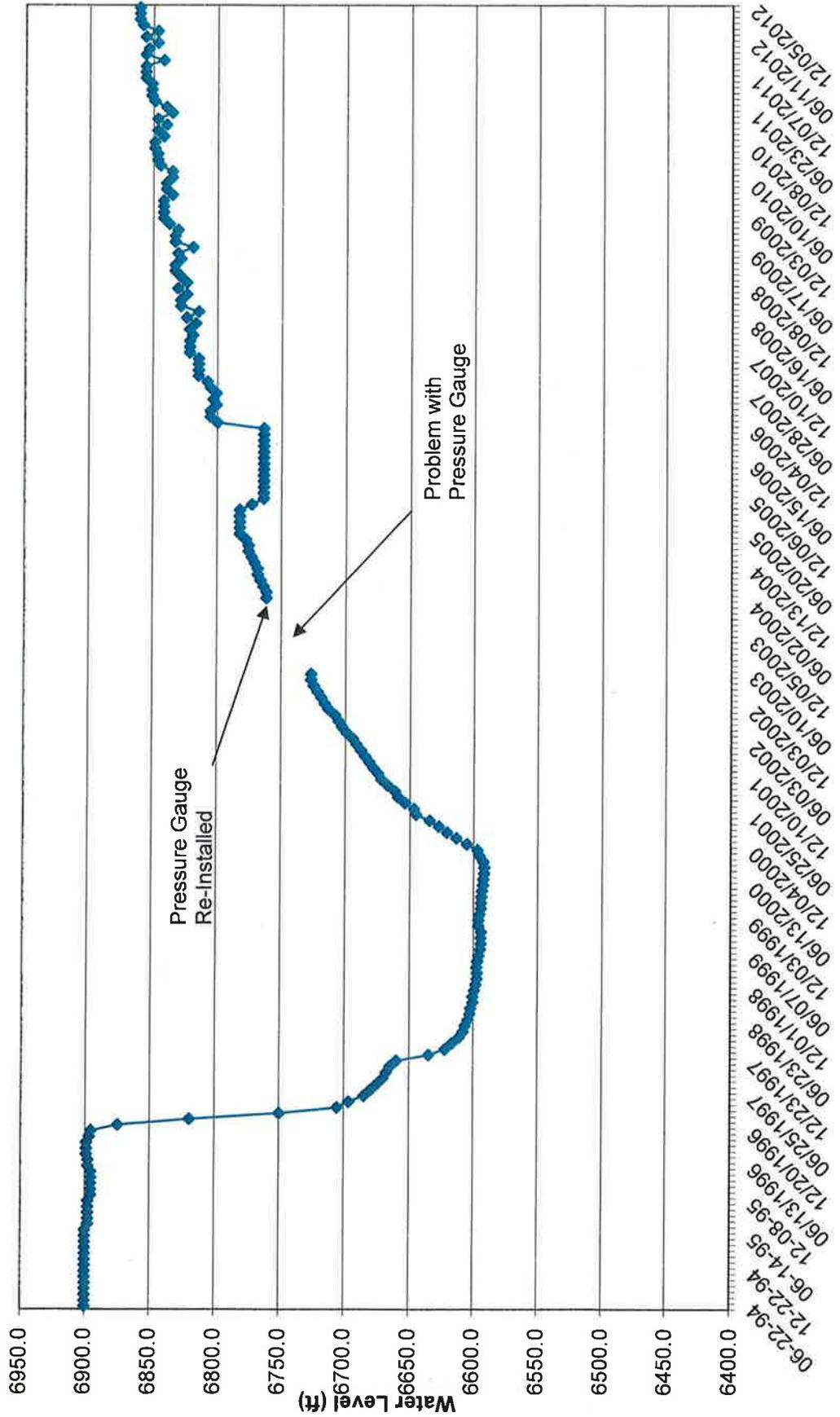
(PALMER DATA: AVERAGE OF REGIONS 4 & 5)



**COTTONWOOD CANYON  
MONITORING WELLS  
PIEZOMETRIC DATA**



Trail Mountain Mine  
Straight Canyon Well: TM-3



STRAIGHT CANYON WATER QUALITY \*

T-19

APPENDIX F

2012- SAMPLE DATES	ACIDITY		ALKALINITY		CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY		HARDNESS	IRON		MANGANESE	MANGANESE	GREASE	OIL & GREASE	PH	POTASSIUM	SODIUM	SULFATE	TSS	TDS	
	NO.	MEAN	NO.	MEAN				IRON TOTAL	DISSOLVED		IRON TOTAL	DISSOLVED											IRON TOTAL
20120315	0	277	44	18	22	746	306	0	0	0	0	0	0	0	0	0	9	2	52	105	230	447	
20120612	0	337	55	0	30	1088	475	0	0	0	0	0	0	0	0	0	9	5	71	230	6	680	
20120905	0	404	89	0	34	1538	785	0	0	0	0	0	0	0	0	0	8	10	77	439	9	1074	
20121205	0	363	71	0	31	1206	579	0	0	0	0	0	0	0	0	0	8	6	71	308	0	820	
2012**																							
MIN	0	277	44	0	22	746	306	0	0	0	0	0	0	0	0	0	8	2	52	105	0	447	
MAX	0	404	89	0	34	1538	785	2	0	0	0	0	0	0	0	0	9	10	77	439	230	1074	
MEAN	0.00	345.25	64.69	4.50	29.25	1144.50	536.25	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.50	5.77	67.61	270.50	61.25	755.25	
2011**																							
MIN	0	255	43	0	19	650	301	0	0	0	0	0	0	0	0	0	9	2	33	63	0	387	
MAX	0	334	67	0	35	1160	533	1	0	0	0	0	0	0	0	0	9	5	80	315	94	804	
MEAN	0	295	54	1.4	25	882	417	0	0	0	0	0	0	0	0	0	9	3	57	168	40	579	
2010**																							
MIN	0	310	73	0	37	1322	636	0	0	0	0	0	0	0	0	0	8	6	72	374	0	931	
MAX	0	412	88	0	38	1591	857	0	0	0	0	0	0	0	0	0	8	10	91	481	14	1158	
MEAN	0	352	78	0	37	1438	708	0	0	0	0	0	0	0	0	0	8	8	82	425	5	1018	
2009**																							
MIN	0	190	14	0	19	581	178	0	0	0	0	0	0	0	0	0	7	1	12	39	0	340	
MAX	14	500	99	78	68	1840	993	5	0	0	0	0	0	0	0	0	9	30	125	609	420	1256	
MEAN	5.76	362.59	53.42	15.06	36.63	1068.63	448.23	0.72	0.13	0.05	0.05	0.05	0.05	0.05	0.05	0.05	8.42	4.14	73.80	218.94	79.27	671.09	
2008**																							
MIN	0	286	53	0	30	959	434	0	0	0	0	0	0	0	0	0	8	4	60	182	0	577	
MAX	0	368	78	0	36	1494	732	0	0	0	0	0	0	0	0	0	9	8	78	484	7	1016	
MEAN	0	326	66	0	33	1210	538	0	0	0	0	0	0	0	0	0	8	5	70	303	4	794	
2007**																							
MIN	9	322	56	6	29	1016	420	2	0	0	0	0	0	0	0	0	8	3	68	179	158	622	
MAX	9	364	99	49	43	1840	836	2	2	2	2	2	2	2	2	2	8	9	90	518	138	1154	
MEAN	9	350	73	23	37	1398	611	2	2	2	2	2	2	2	2	2	8	6	82	355	158	898	
2006**																							
MIN	290	290	43	13	19	843	338	0	0	0	0	0	0	0	0	0	8	2	36	99	13	456	
MAX	312	62	62	13	30	1127	461	1	1	1	1	1	1	1	1	1	9	3	66	203	51	658	
MEAN	298	298	52	13	25	944	387	1	1	1	1	1	1	1	1	1	8	3	51	139	31	526	
2005**																							
MIN	287	42	42	17	22	827	360	0	0	0	0	0	0	0	0	0	9	2	44	124	33	498	
MAX	329	68	24	37	37	1493	552	1	1	1	1	1	1	1	1	1	9	5	92	341	338	879	
MEAN	306	55	20	28	28	1097	438	1	1	1	1	1	1	1	1	1	9	3	64	211	135	657	
2004**																							
MIN	334	519	8	8	33	1060	429	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	8.41	3.93	63	271	10	698	
MAX	430	95.7	8	8	38	1716	906	2.54	2.54	2.54	2.54	2.54	2.54	2.54	2.54	2.54	8.46	10.10	88	609	177	1256	
MEAN	381	70.4	8	8	36	1326	617	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	8.43	6.09	78	393	94	913	
2003**																							
MIN	376	64.1	5	5	32	1324	605	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	8.42	5.46	77	362	5	885	
MAX	500	86.7	19	43	43	1646	836	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	8.67	9.48	90	542	8	1205	
MEAN	425	74.7	12	12	36	1462	706	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	8.54	7.14	84	440	7	1026	
2002**																							
MIN	410	58.0	5	5	33	1252	495	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	8.38	4.00	88	303	46	816	
MAX	498	79.0	14	14	40	1674	786	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	8.55	9.00	80	570	46	1198	
MEAN	459	68.0	8	8	37	1423	622	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	8.46	6.00	89	397	46	983	
2001**																							
MIN	345	42.0	12	12	42	1105	400	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	8.18	3.00	103	181	7	722	
MAX	424	58.0	23	23	53	1319	516	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	8.53	5.00	109	340	309	868	
MEAN	393	50.8	16	16	48	1221	454	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	8.33	3.75	105	266	113	792	
2000**																							
MIN	345	42.0	12	12	42	1105	400	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	8.18	3.00	103	181	7	722	
MAX	424	58.0	23	23	53	1319	516	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	8.53	5.00	109	340	309	868	
MEAN	393	50.8	16	16	48	1221	454	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	8.33	3.75	105	266	113	792	
HISTORICAL 1986-2011																							
MIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	0	0	
MAX	27.0	27	27.0	27.0	27.0	27	27	27.00	27.00	27	27.00	27	27.00	27	27.00	27	27.00	27.00	27	27	27.00	27	
MEAN	5.1	5	5.1	5.1	5.1	5	5	5.08	5.08	5	5.08	5	5.08	5	5.08	5	5.08	5.08	5.08	5.1	5.1	5.08367	
No. of Analyze	29	87	87	65	87	83	87	70	29	87	36	87	85	87	87	87	86	85	87	87	68	87	

\* Quality parameters are reported as mg/l unless otherwise noted.  
 \*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

**INDIAN CREEK WATER QUALITY \***  
**ICA**

**APPENDIX F**

SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (calc)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
2012-08-20	253	74	0	2	490		281	0	0	24	0	0	8	1	3	9	0	273
MEAN	274	77	0	2	507		277	0	0	21	0	0	8	1	3	6	7	295
2010-08-20	264	72.59	0	3	512		270	0.21	0	21.56	0	0	8.19	1.05	3.26	12	0	313
MEAN	262	72.65	0	2	511		278	0.09	0	23.39	0	0	8.22	1.05	3.32	11	0	277
2008-08-20	257	74.26	0	2	499		280	0.12	0	22.97	0.002	0	8.3	0.89	3.27	10	0	286
MEAN	251	72.0	0	2	496		274	0.30	0	22.8	0.02	0	8.02	1.07	3.01	14	26	294
2006-08-20	297	77.5	0	3	554		282	0.06	0	21.5	0.01	0	7.96	0.64	2.71	8	5	282
MEAN	265	80.8	0	3	571	10	294	0.07	0	23	0	0	8.30	1.56	3.27	8	5	291
2004-08-20	262	77.4	0	2	493		281	0.08	0	21.4	0.03	0	8.06	0.79	2.92	13	7	299
MEAN	312	71.5	0	2	493		271	0.02	0	22.4	0	0	8.24	0.91	2.93	19	7	265
2002-08-20	286	67.0	0	2	483		258	0	0	22.0	0	0	8.25	4.00	4.00	23	7	304
MEAN	327	71.0	0	3	633		264	0.20	0	21.0	0	0	8.21	3.00	3.00	9	7	289
2000-08-20	313	69.0	0	2	487		255	0.20	0	20.0	0	0	8.10	3.00	3.00	10	43	274
MEAN																		
<b>HISTORICAL 2000-2011</b>																		
MIN	251.0	67.0	0.0	2	483	0	255.00	0.02	0.0	20.000	0.0	0.00	7.96	0.64	2.7	6.0	0	265
MAX	327.0	80.8	0.0	3	633	0	294.00	0.30	0.0	23.390	0.0	0.00	8.30	1.56	4.0	23.0	43	313
MEAN	1	280.8	0.0	2	520	0	273.67	0.14	0.0	21.83	0.0	0.00	8.17	1.01	3.2	11.9	11	289.08
No. of Analysis	5	13	5	13	13	0	13	12	5	13	9	4	13	10	13	13	9	13

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

INDIAN CREEK WATER QUALITY \*

ICB  
APPENDIX F

SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (min)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20121008	0	60	0	2	436		247	0	0	24	0	0	8	1	4	10	11	207
2010**																		
MEAN	0	68	0	2	484		259	0	0	21	0	0	8	1	5	11	9	271
2010**																		
MEAN	0	63.17	0	3	457		246	0.32	0	21.48	0	0	8.32	1.08	4.37	13	25	288
2009**																		
MEAN	0	68	0	2	480		267	0.41	0	24	0.000	0	8.35	1.1	4.34	13	14	261
2008**																		
MEAN	7	66	0	2	465		259	0.25	0	23	0.006	0	8.27	0.9	3.99	11	0	276
2007**																		
MEAN		64.9		2.0	466		258	1.43	0	23	0.046	0	8.09	1.01	3.73	14.0	37	286
2006**																		
MEAN		72.0		3.0	527		268	0.24	0	22	0.005	0	8.25	0.61	3.62	9.0	0	278
2005**																		
MEAN		68.2	5	2.0	534	9	258	0.20	0	21	0.013	0	8.41	1.00	4.29	10.0	9	268
2004**																		
MEAN		73.4		2.0	490		271	0.72	0	21	0.025	0	7.94	0.75	3.29	12.0	10	284
2003**																		
MEAN		59.3		2.0	427		236	0.37	0	21	0	0	8.13	0.93	3.41	11.0	21	216
2002**																		
MEAN		57.0		2.0	432		233	0.40	0	22	0	0	8.21		4.00	8.0		235
2001**																		
MEAN		59.0		2.4	559		234	0.20	0	21	0	0	8.26		3.00	7.7	6	253
2000**																		
MEAN	12	65.0		2.0	468		245	0.10	0	20	0	0	8.19	1.00	3.00	9.0	9	266
HISTORICAL 2000-2011																		
MIN	0.0	57.0	0.0	2.0	427	0	233	0.10	0.00	20	0.000	0.0	7.94	0.61	3.00	7.7	0.0	216
MAX	12.0	73.4	5.0	3.0	559	0	271	1.43	0.00	24	0.023	0.0	8.44	1.08	5.38	14.0	37.0	288
MEAN	3.8	65.3	1.0	2.2	482		253	0.43	0.00	22	0.007	0.0	8.24	0.93	3.87	10.7	14.0	265.17
No. of Analysis	6	13	6	13	13	0	13	13	5	13	9	4	13	11	13	13	11	13

\* Quality parameters are reported as mg/l unless otherwise noted.

\*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

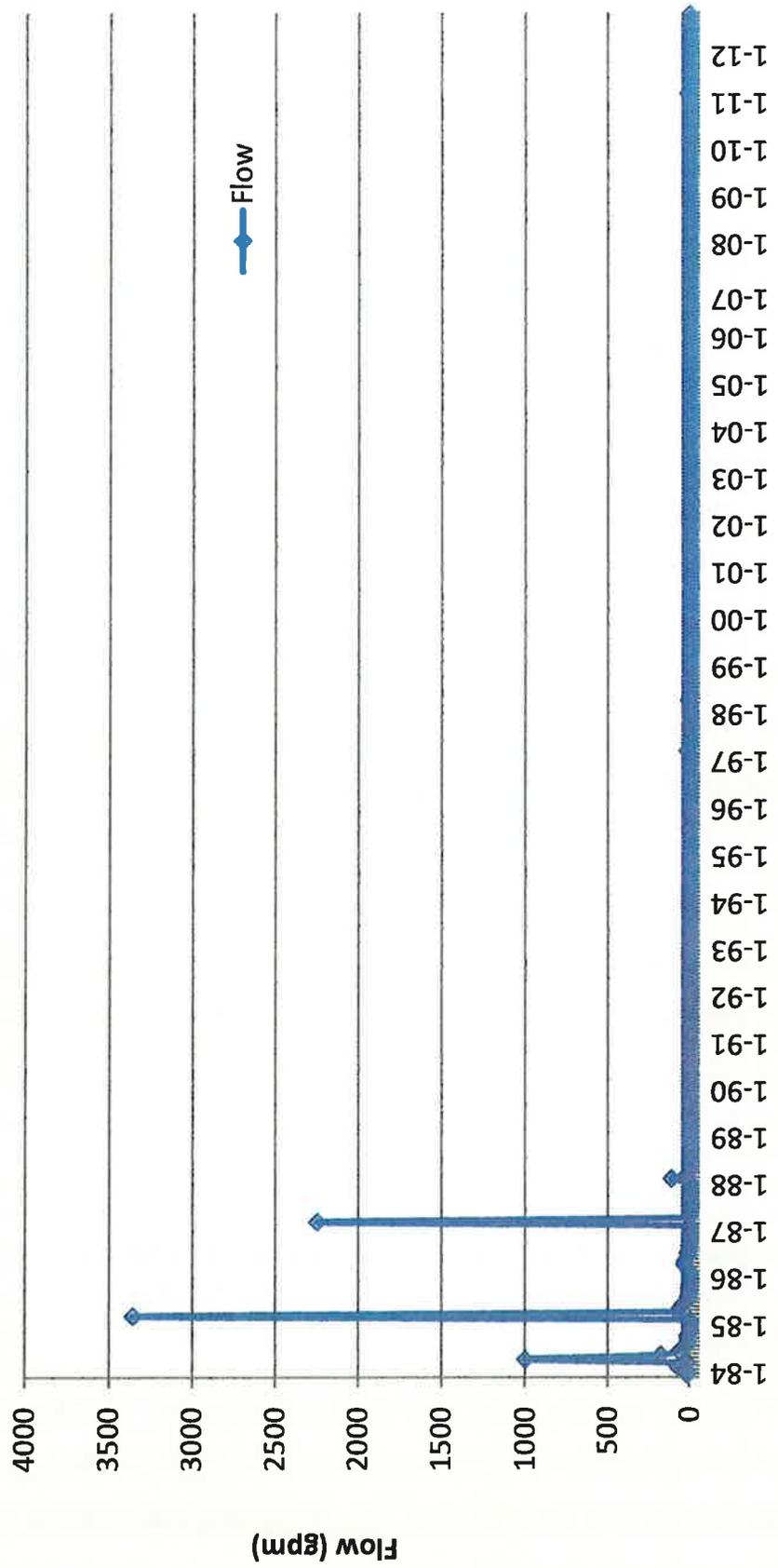
INDIAN CREEK WATER QUALITY \*

ICD  
APPENDIX F

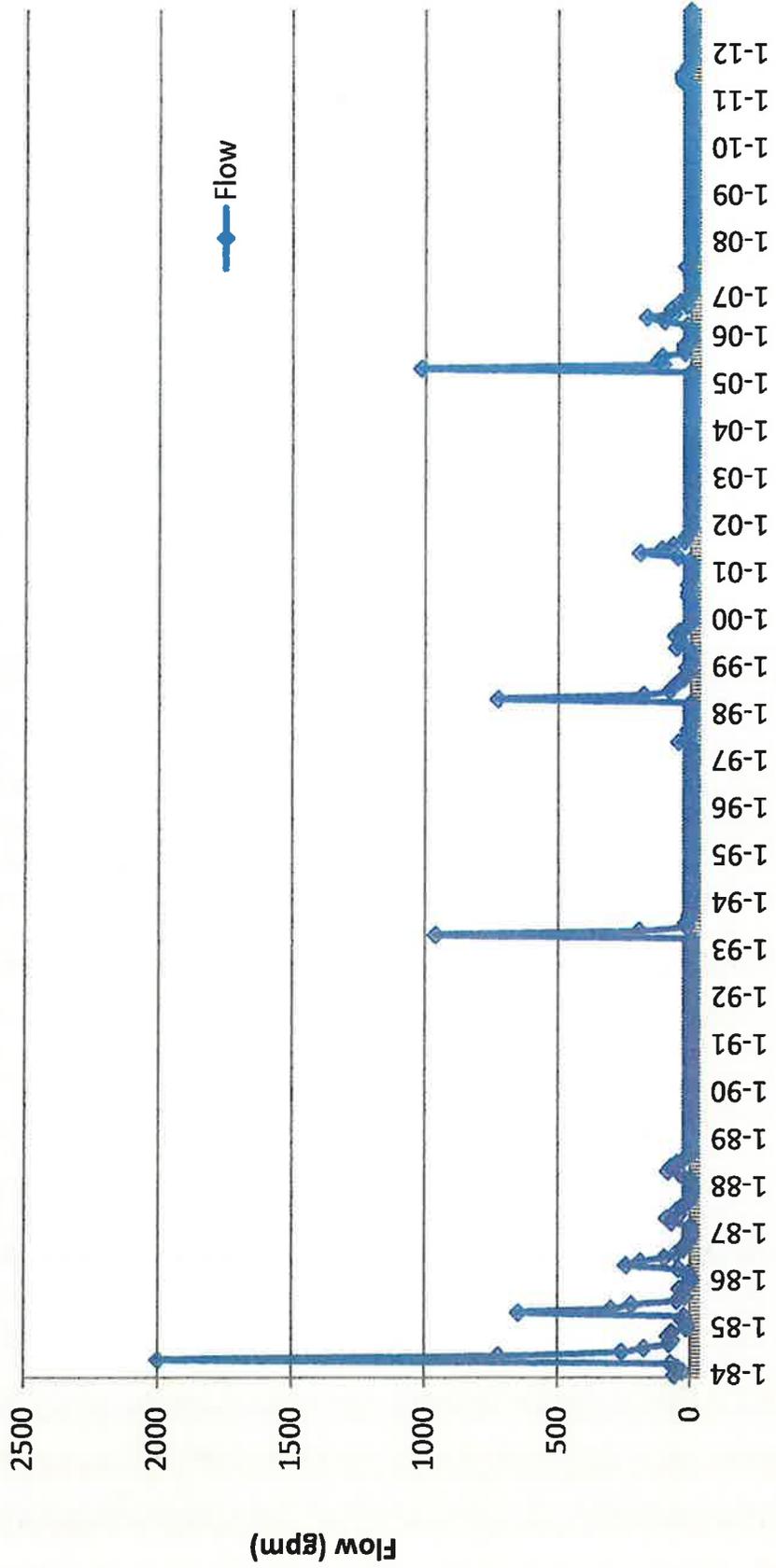
SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhsc/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (min)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
2012** 20121008	0	303	95.16	0	4	670		386	0.11	0	36.15	0.023	0	8.26	1.03	11.14	72	0	388
2011** MEAN	0	324	93.37	0	5	670		370	0.06	0	31.99	0.005	0	8.33	1.58	11.38	47	0	414
2010** MEAN	0	373	93.71	0	5	671		365	0.28	0	31.72	0	0	8.3	1.11	10.72	108	10	456
2009** MEAN	9	269	89.02	0	4	662		363	0.21	0	34.29	0.007	0	8.19	1.51	10.11	87	8	407
2008** MEAN		279	85.77		4	628		350	0.06		33.04	0.005	0	9.43	1.19	10.15	66	0	395
2007** MEAN		256	96.8	6.0	4.0	717		388	0.12		35.60	0.02		8.17	1.39	10.30	130.0		484
2006** MEAN		361	108.0		7	813	9	413	0.14		35	0.06	4.00	8.04	2.45	11.20	47	7	450
2005** MEAN		361	108.0		7	813	9	413	0.14		35	0.06	4.00	8.04	2.45	11.20	47	7	450
No Flow During 200-4																			
2003** MEAN		307	81.5		3	624		329	0.13		30	0.009		8.21	1.05	8.87	108		367
2002** MEAN		266	96.0		3	740		384	0.30		35			8.28		10.00	188		528
2001** MEAN		379	80.0		4	753		323	0.10		30			8.29		10.00	43	10	369
2000** MEAN		321	92.0		5	689		362			32			8.00	1.00	10.00	125		459
HISTORICAL 2000-2011																			
MIN	0	256.0	80.0	0.0	3	624	0	323.00	0.06	0	30.00	0.000	0.00	8.00	1.00	8.86	23.0	0	367
MAX	9	379.0	108.0	6.0	7	813	0	413.00	0.38	0.0	35.60	0.054	4.00	9.43	2.45	11.4	188.0	10	528
MEAN	2	305.55	91.68	1.2	4.46	700		363.64	0.18	0.0	32.72	0.018	1.00	8.30	1.38	10.14	88.36	5.83	428.00
No. of Analysis	5	12	12	6	12	12	0	12	11	5	12	9	5	12	10	12	12	7	12

\* Quality parameters are reported as mg/l unless otherwise noted.  
 \*\* Data: Database input restricted to values greater than laboratory minimum detection limit.

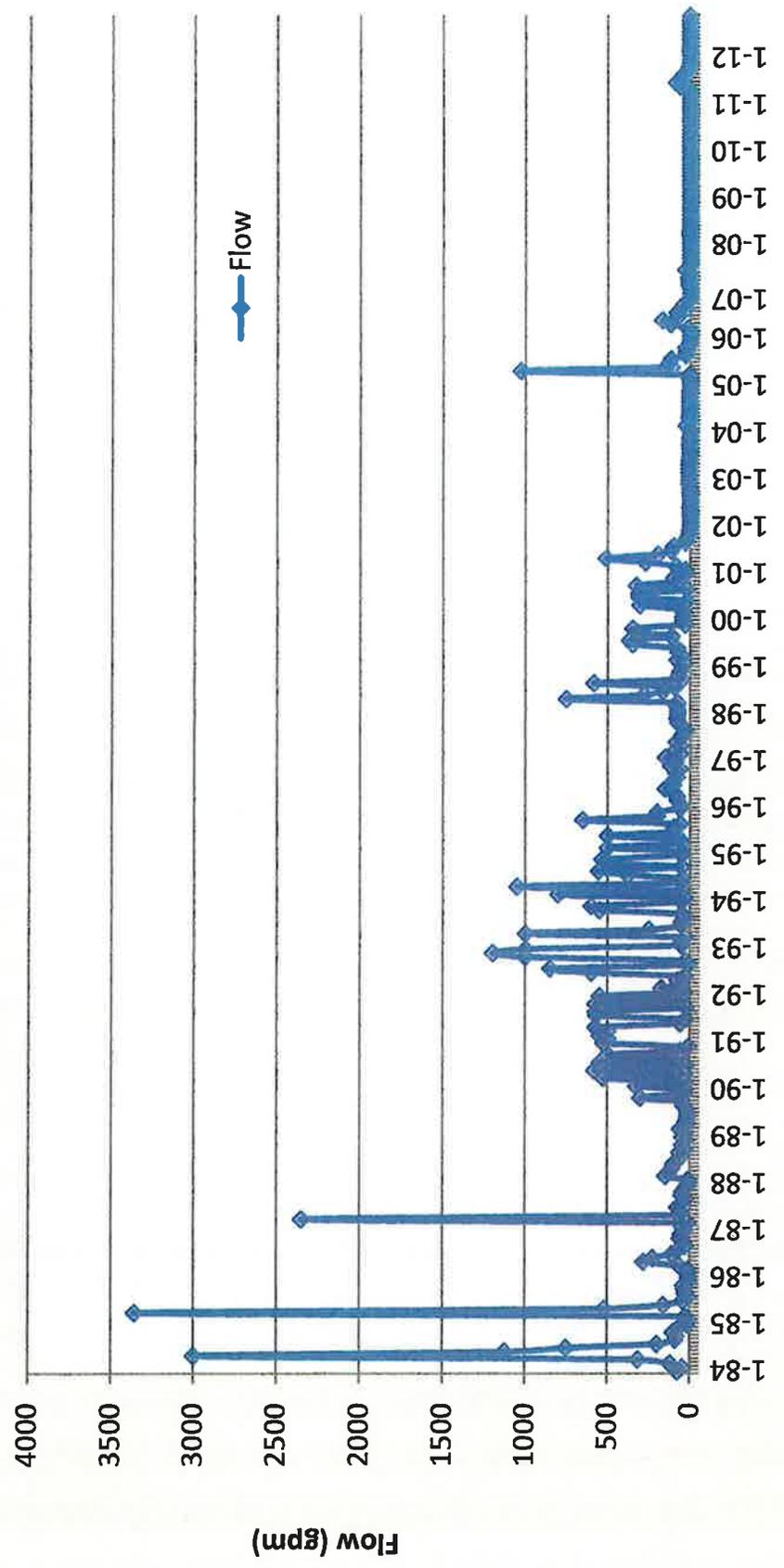
# GRIMES WASH (GWR01) RIGHT FORK DISCHARGE RESSION CURVE



**GRIMES WASH  
(GWR02) LEFT FORK  
DISCHARGE RESSION CURVE**



# GRIMES WASH (GWR03) BELOW MINE DISCHARGE RESSION CURVE

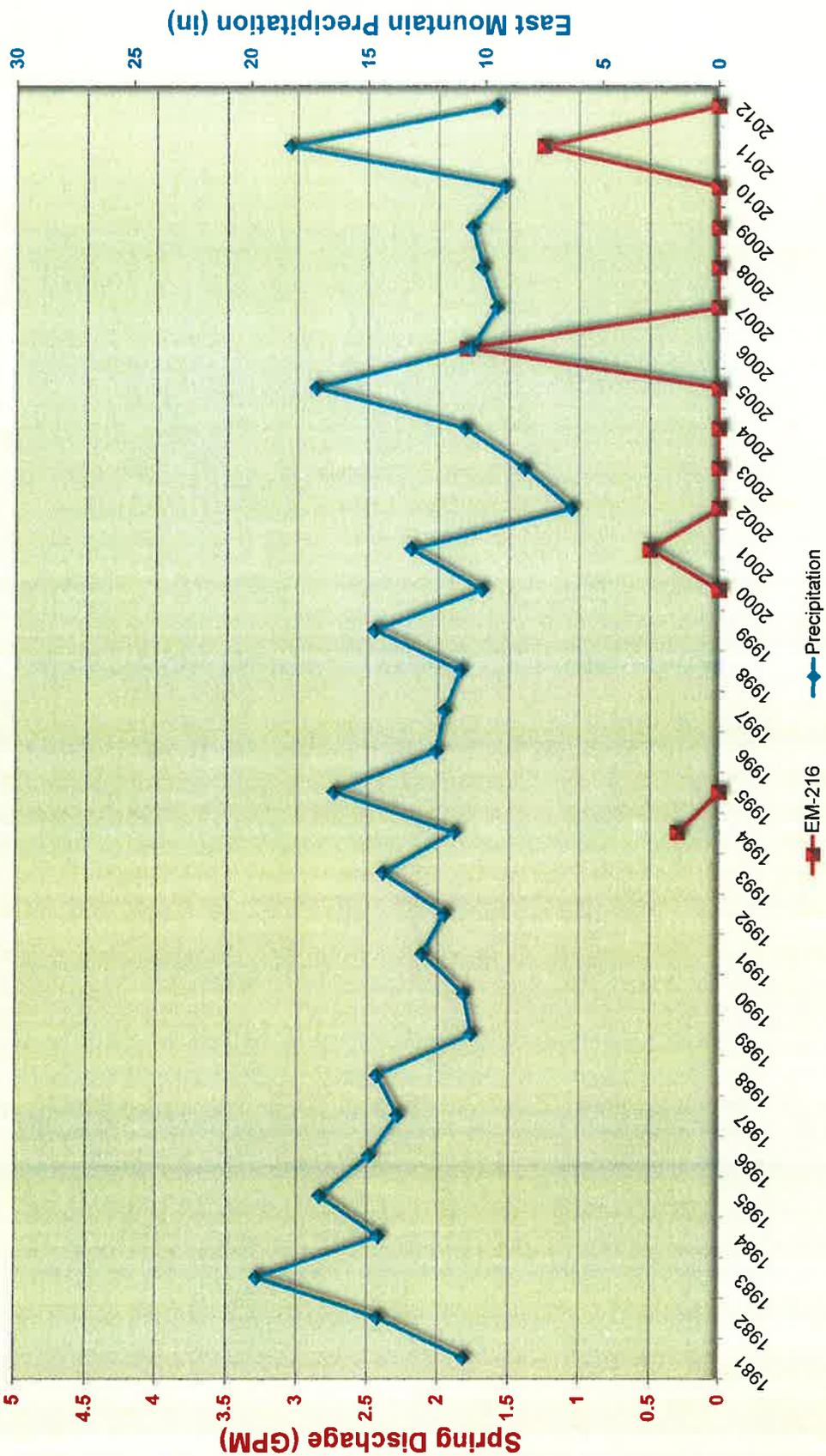


**East Mountain Springs  
Northern Area**

# EAST MOUNTAIN SPRINGS

## SPRING: EM-216 vs. PRECIPITATION

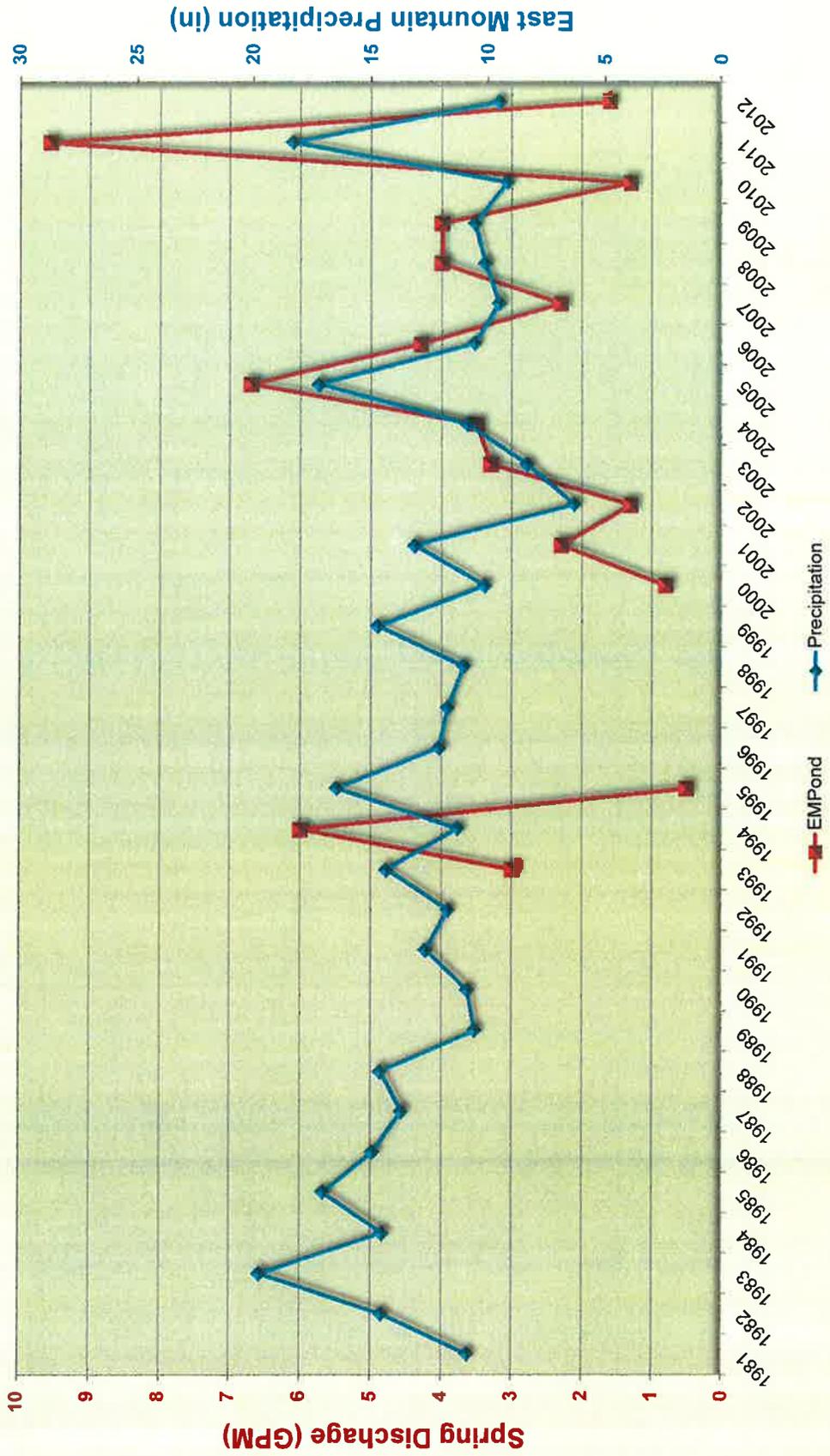
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# EAST MOUNTAIN SPRINGS

## SPRING: EMPOND VS. PRECIPITATION

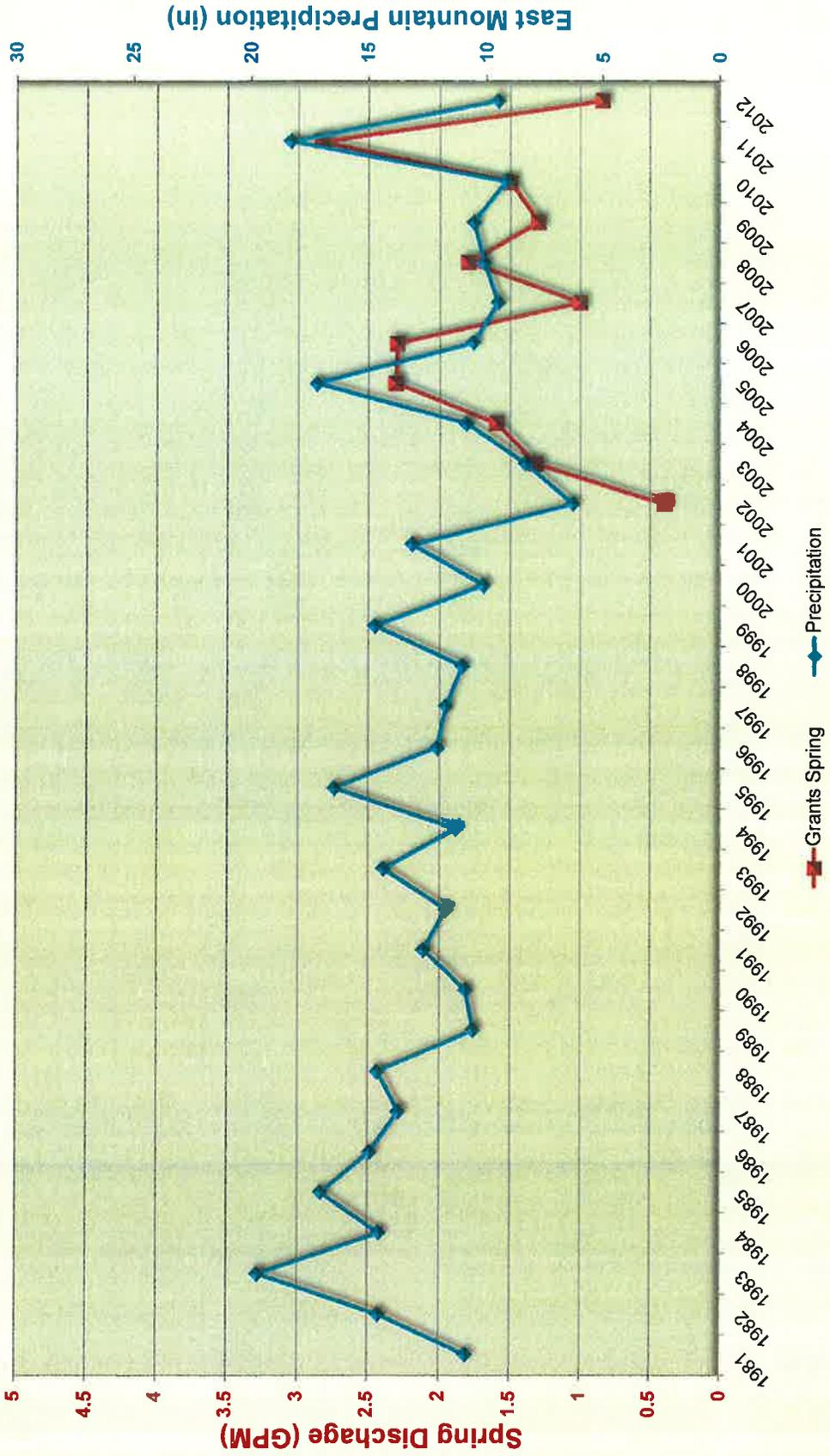
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# EAST MOUNTAIN SPRINGS

## SPRING: GRANT'S SPRING vs. PRECIPITATION

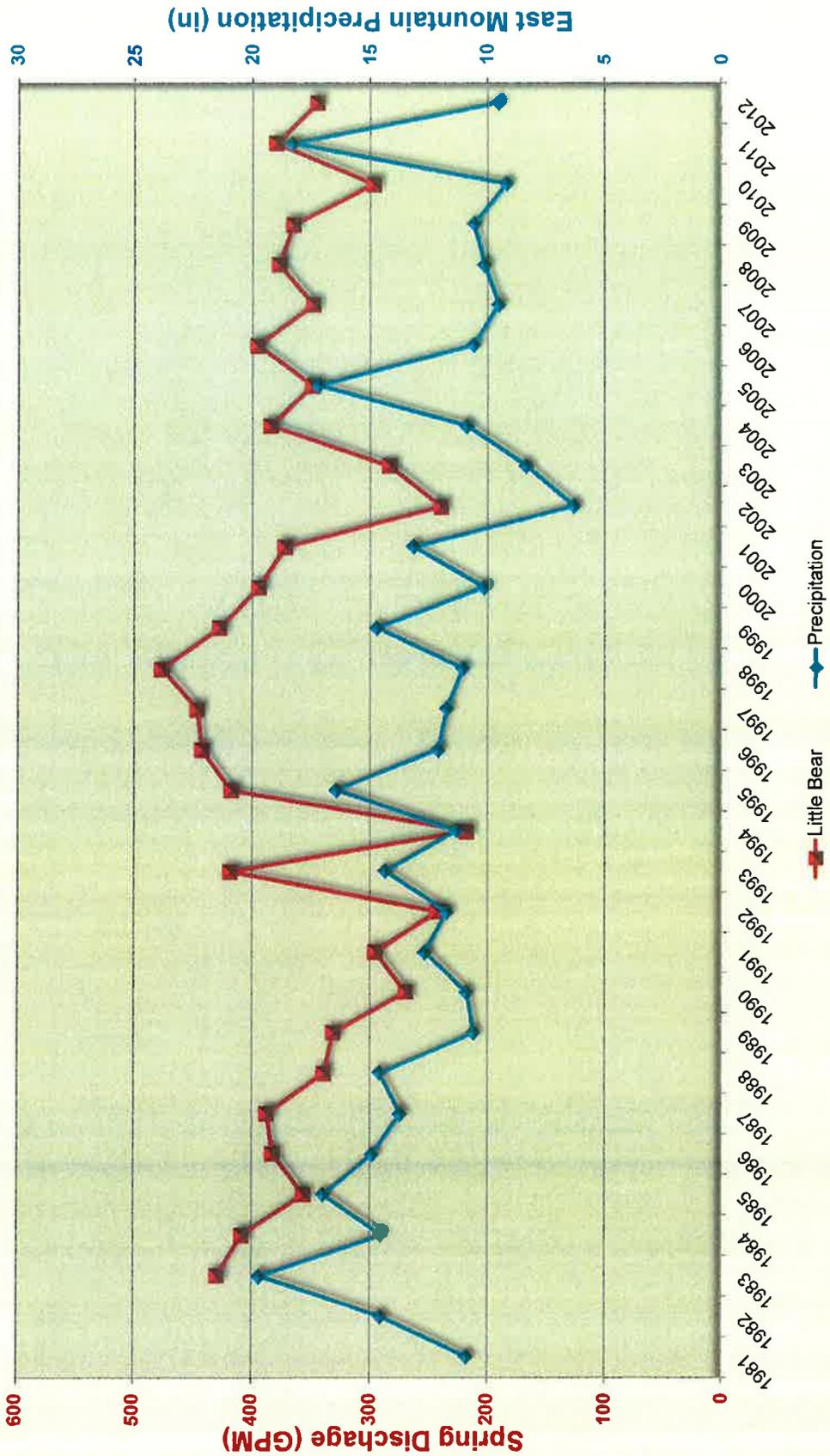
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# EAST MOUNTAIN SPRINGS

## SPRING: LITTLE BEAR VS. PRECIPITATION

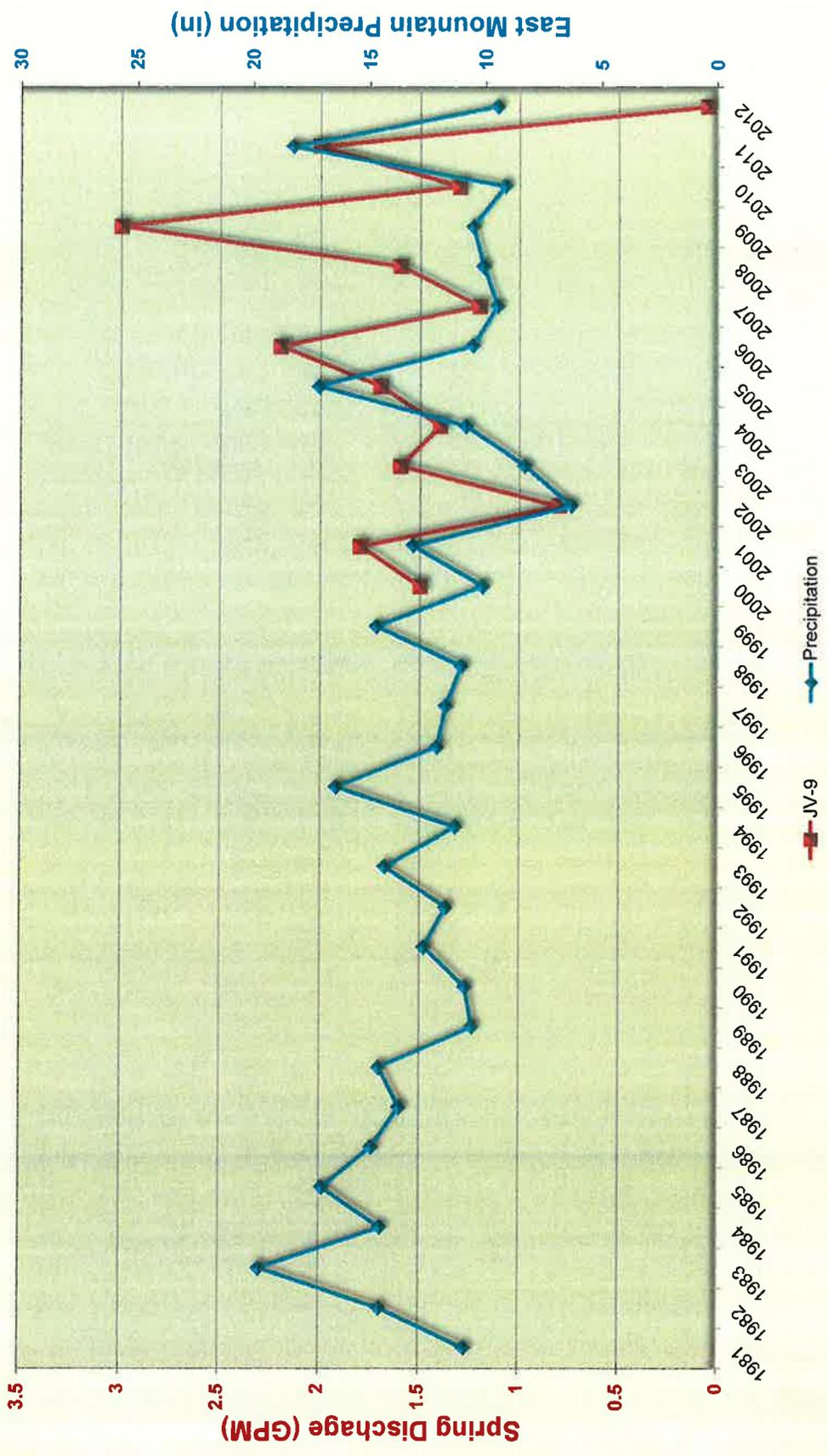
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



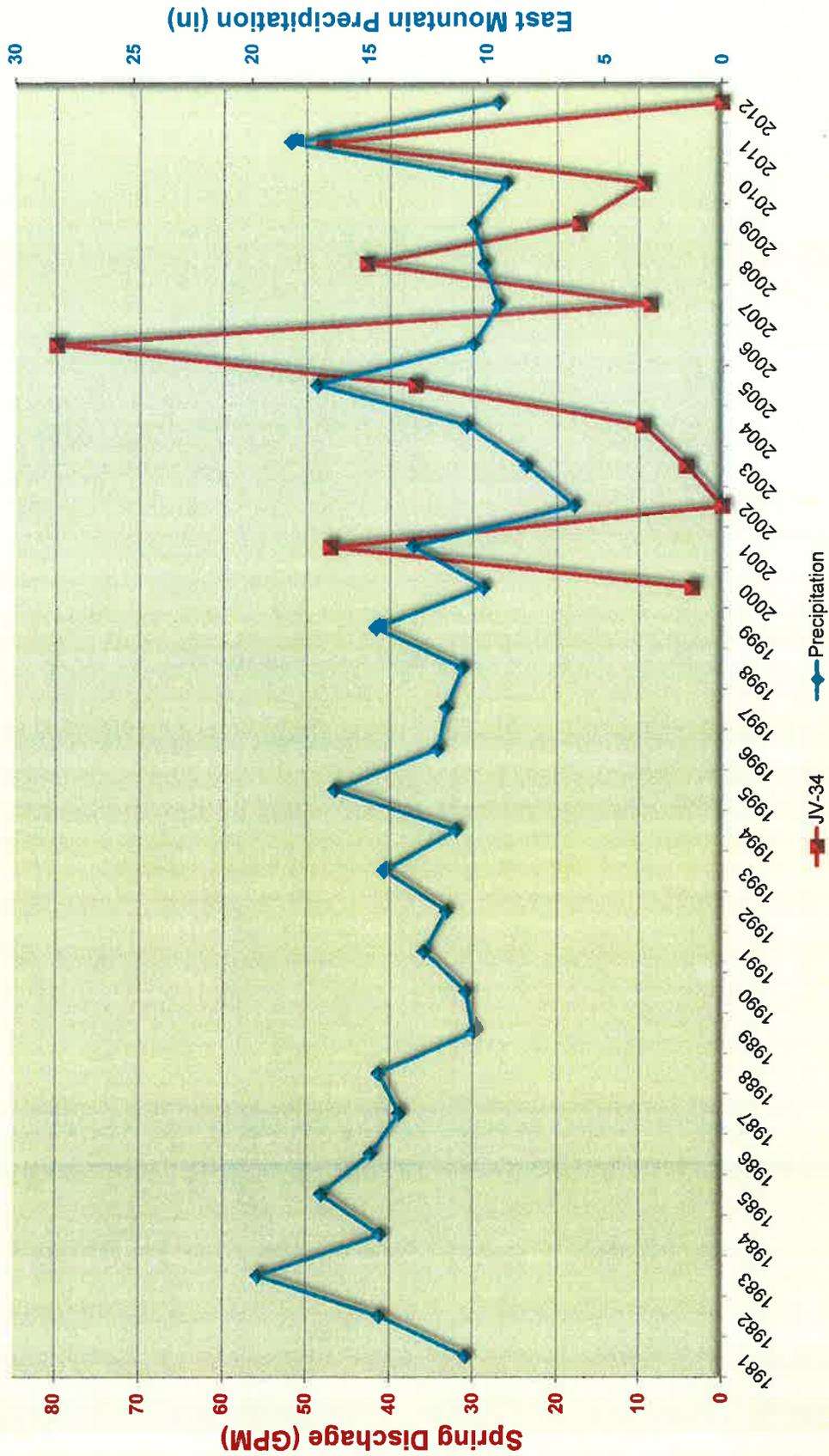
# EAST MOUNTAIN SPRINGS

## SPRING: JV-9 vs. PRECIPITATION

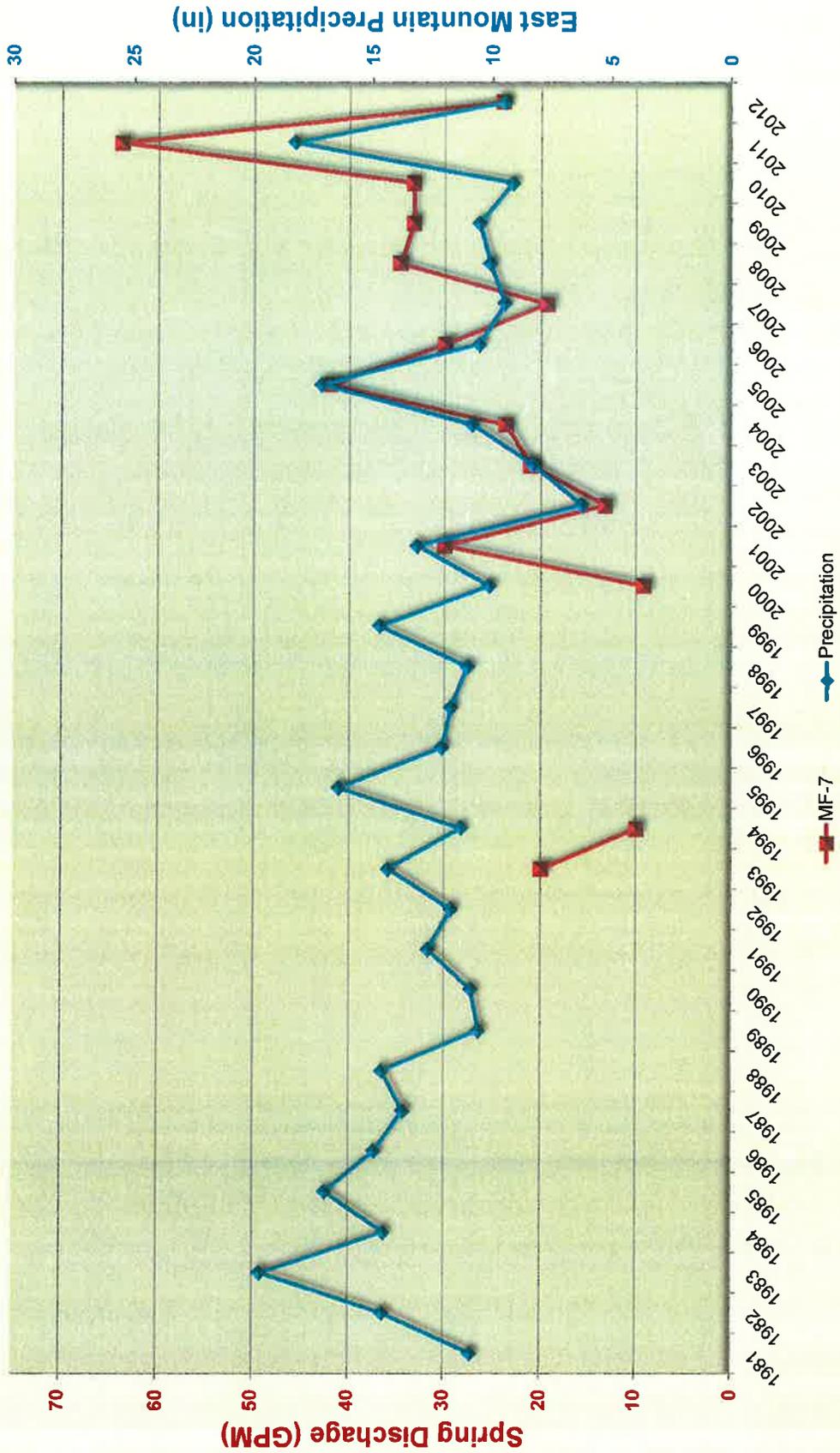
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



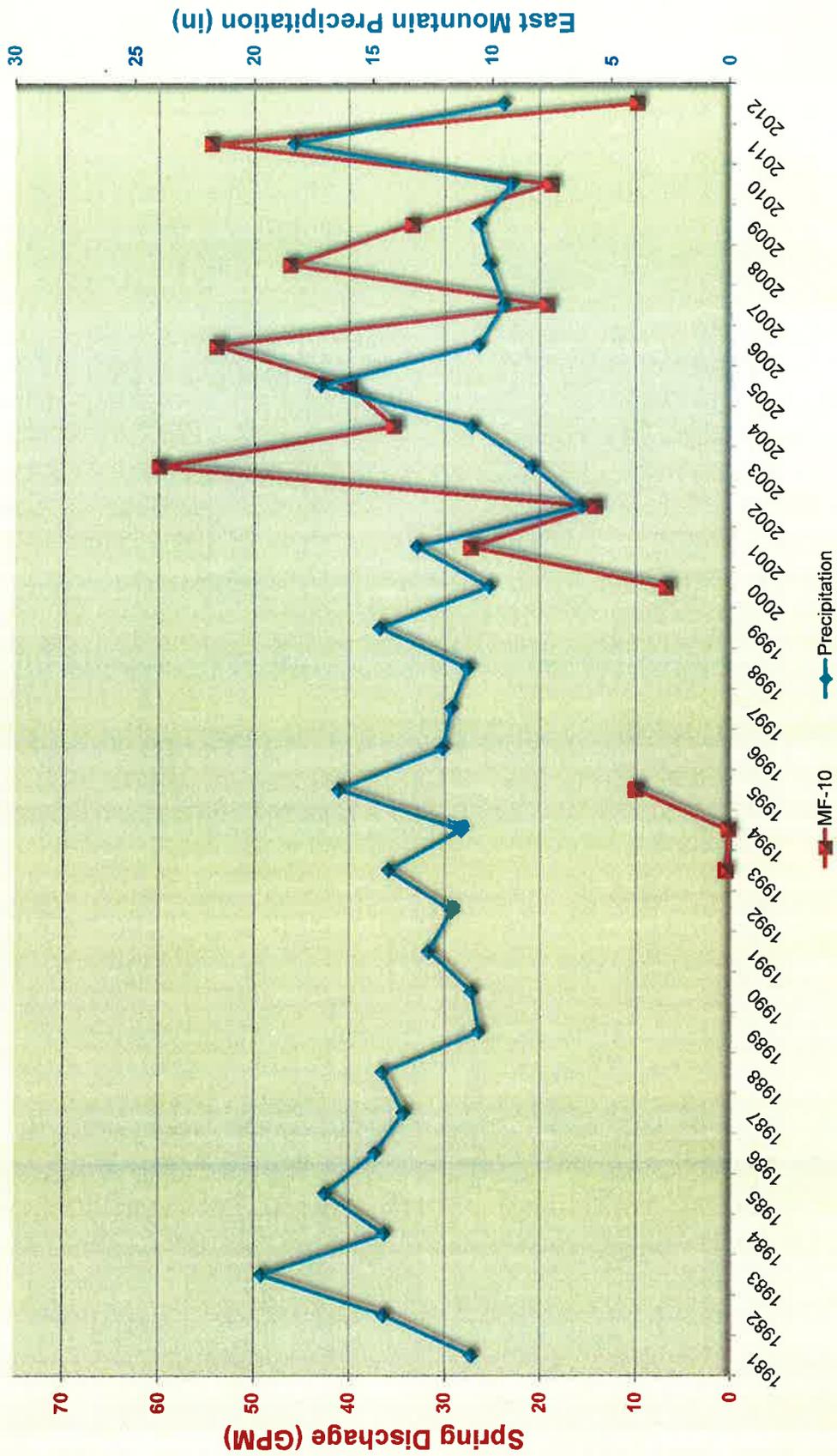
**EAST MOUNTAIN SPRINGS  
 SPRING: JV-34 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



**EAST MOUNTAIN SPRINGS  
 SPRING: MF-7 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



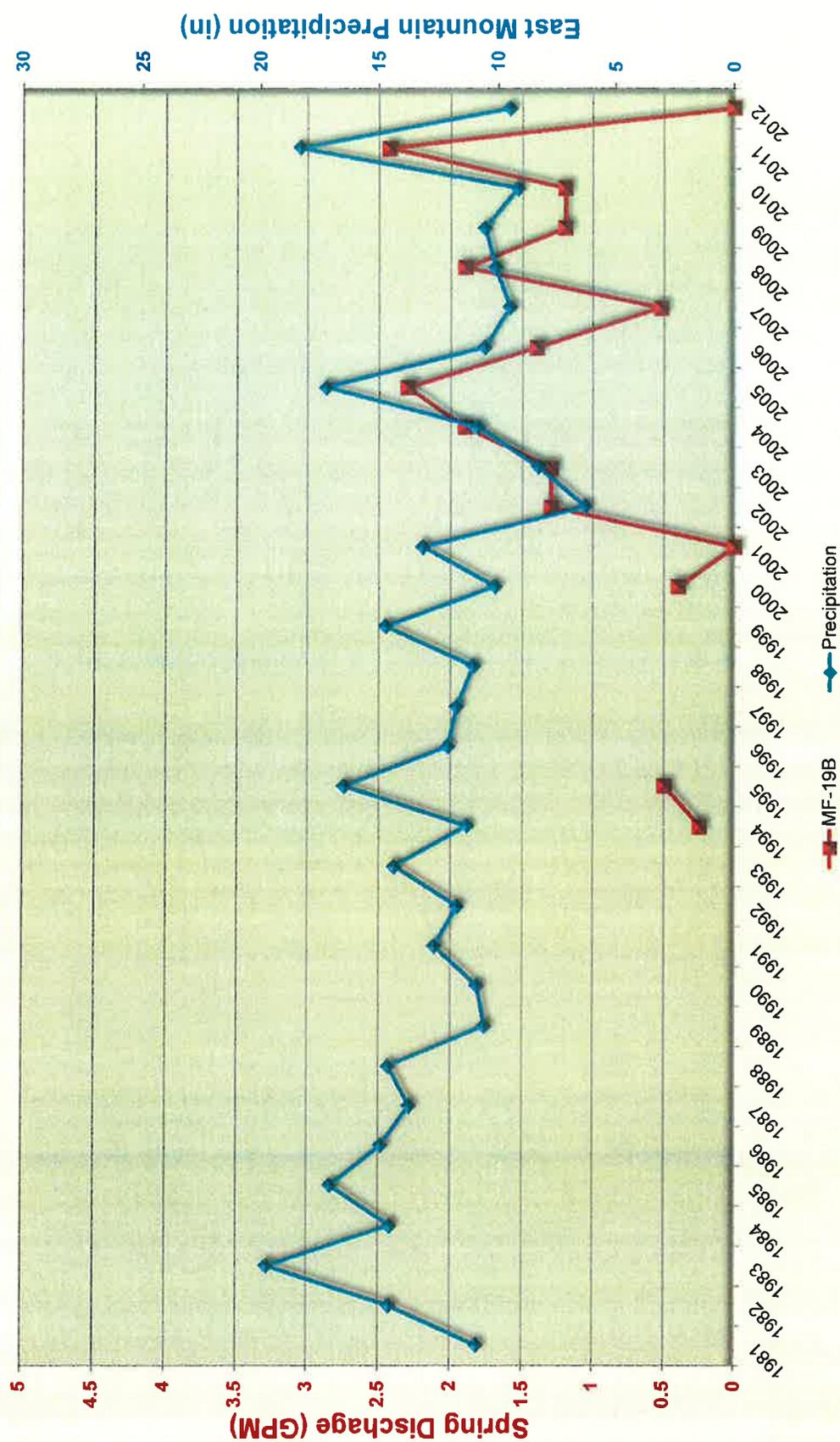
# EAST MOUNTAIN SPRINGS SPRING: MF-10 vs. PRECIPITATION PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



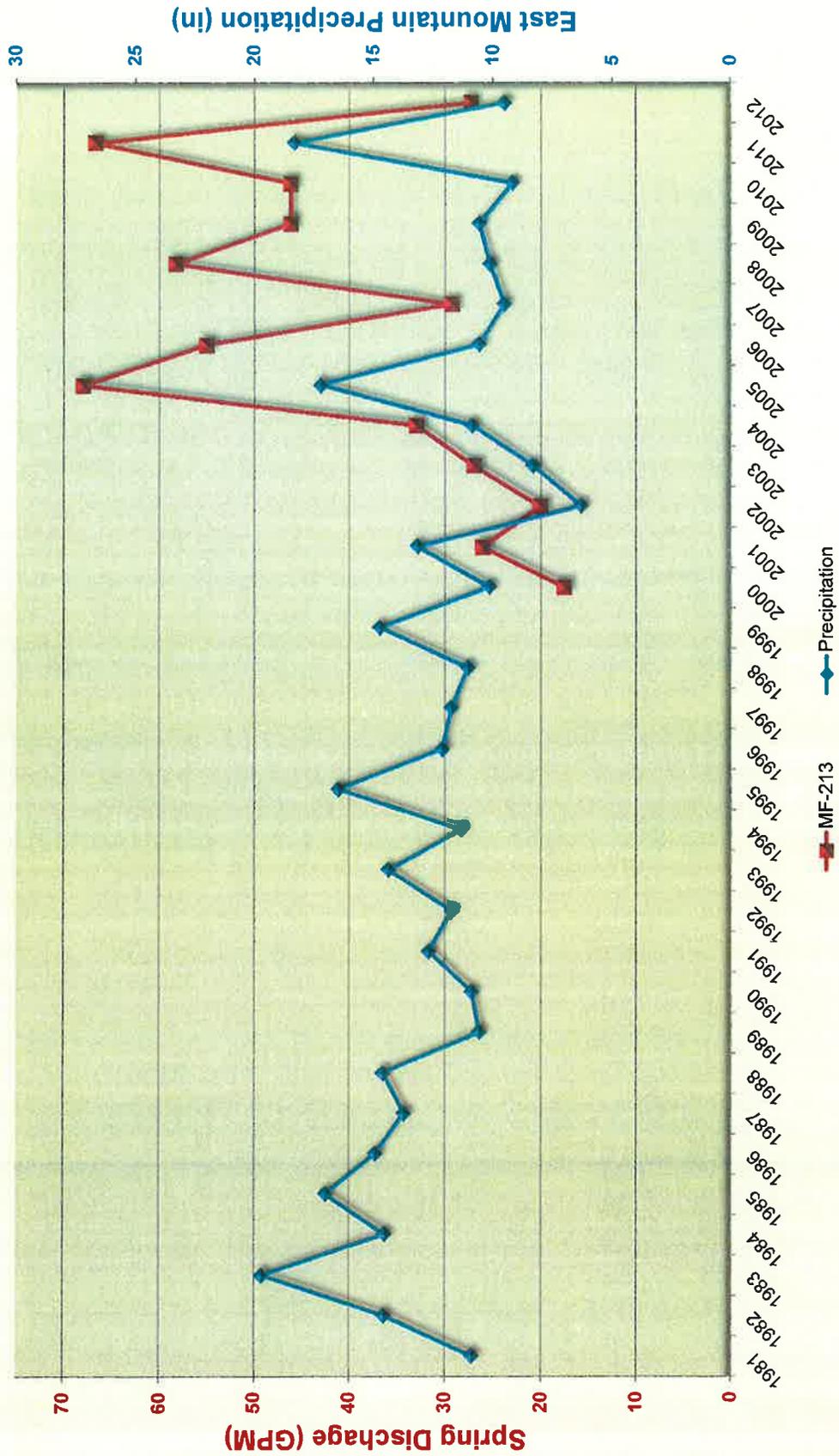
# EAST MOUNTAIN SPRINGS

## SPRING: MF-19B vs. PRECIPITATION

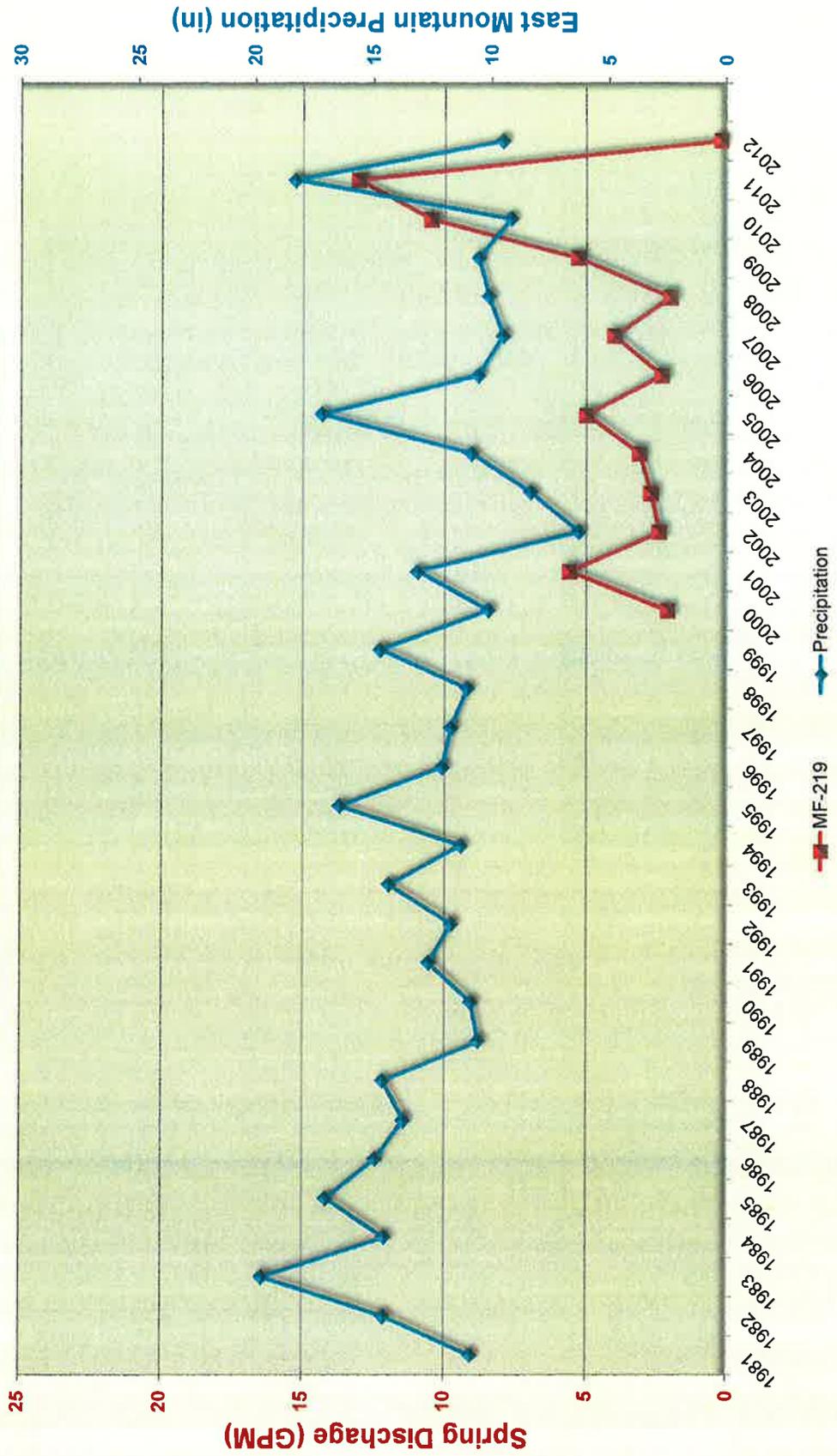
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# EAST MOUNTAIN SPRINGS SPRING: MF-213 vs. PRECIPITATION PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



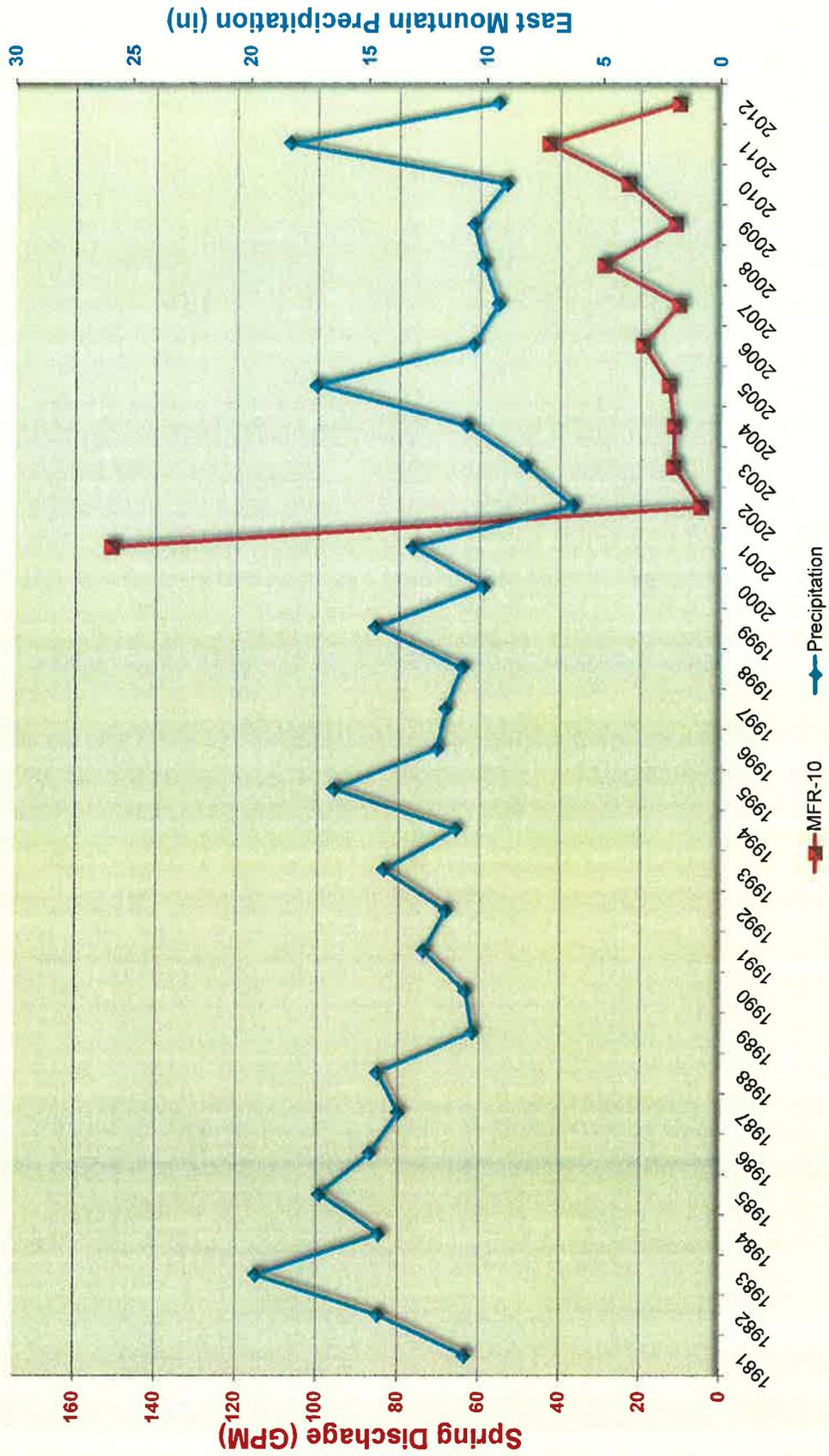
**EAST MOUNTAIN SPRINGS  
 SPRING: MF-219 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



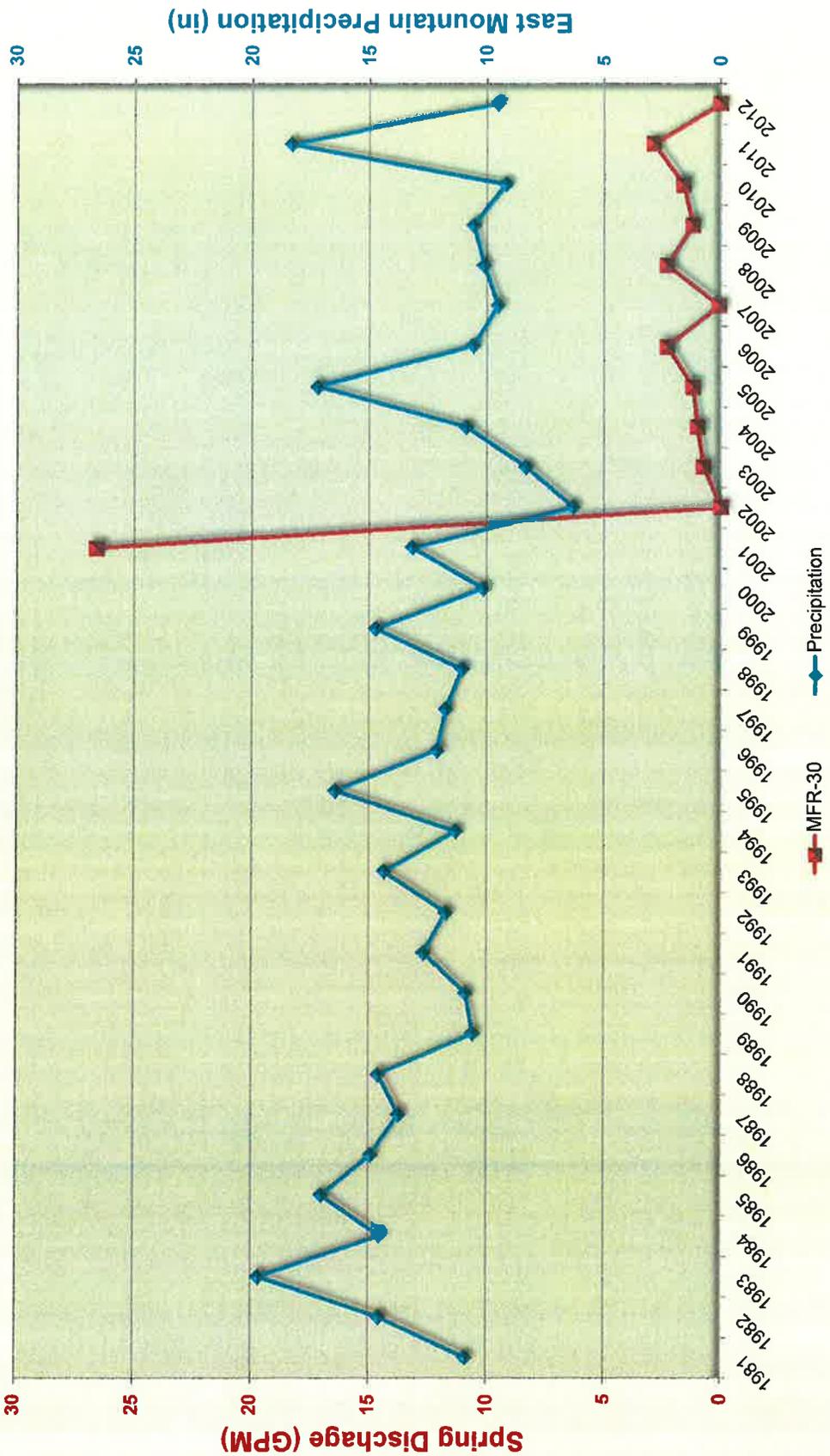
# EAST MOUNTAIN SPRINGS

## SPRING: MFR-10 vs. PRECIPITATION

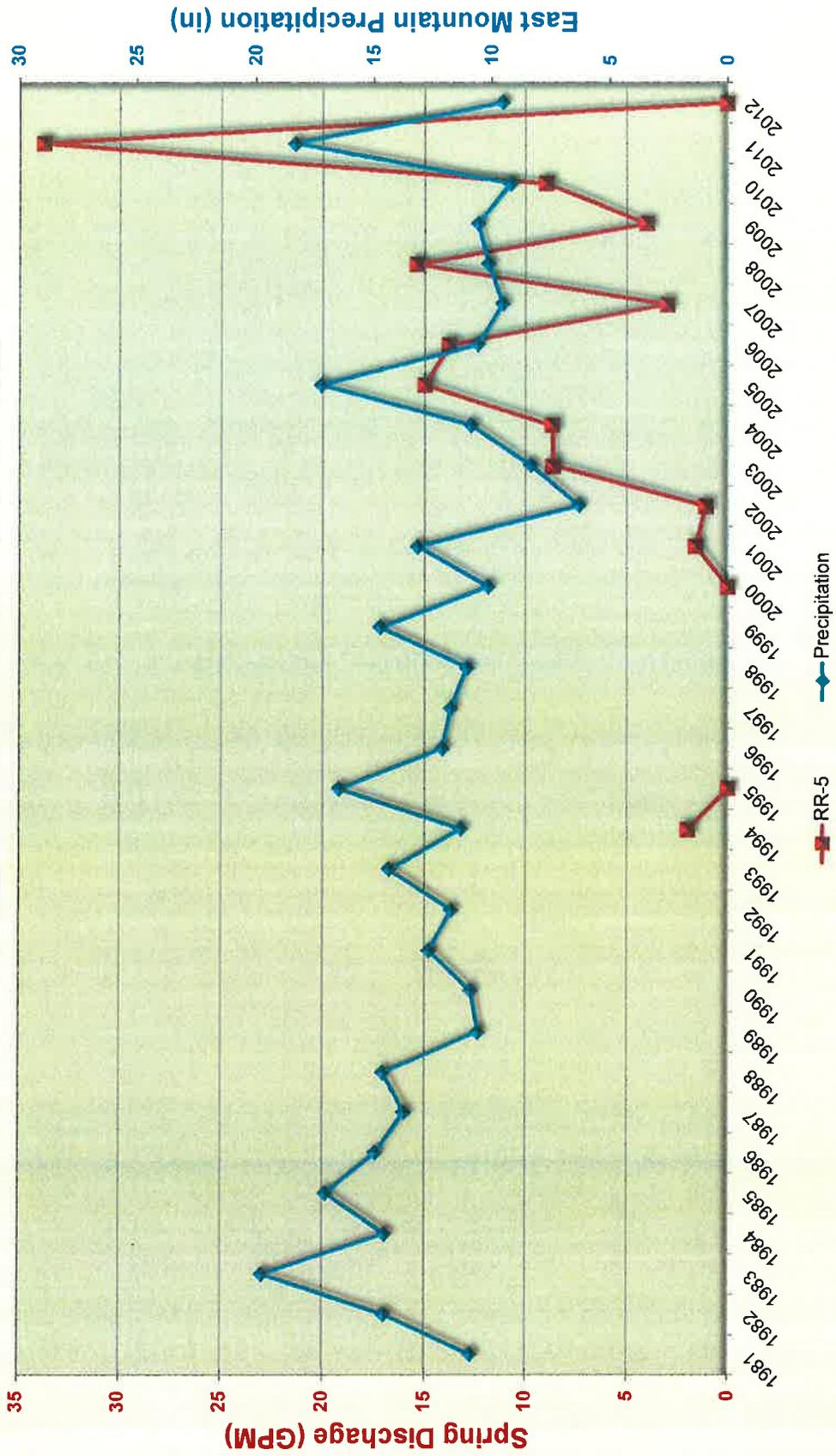
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



**EAST MOUNTAIN SPRINGS**  
**SPRING: MFR-30 vs. PRECIPITATION**  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



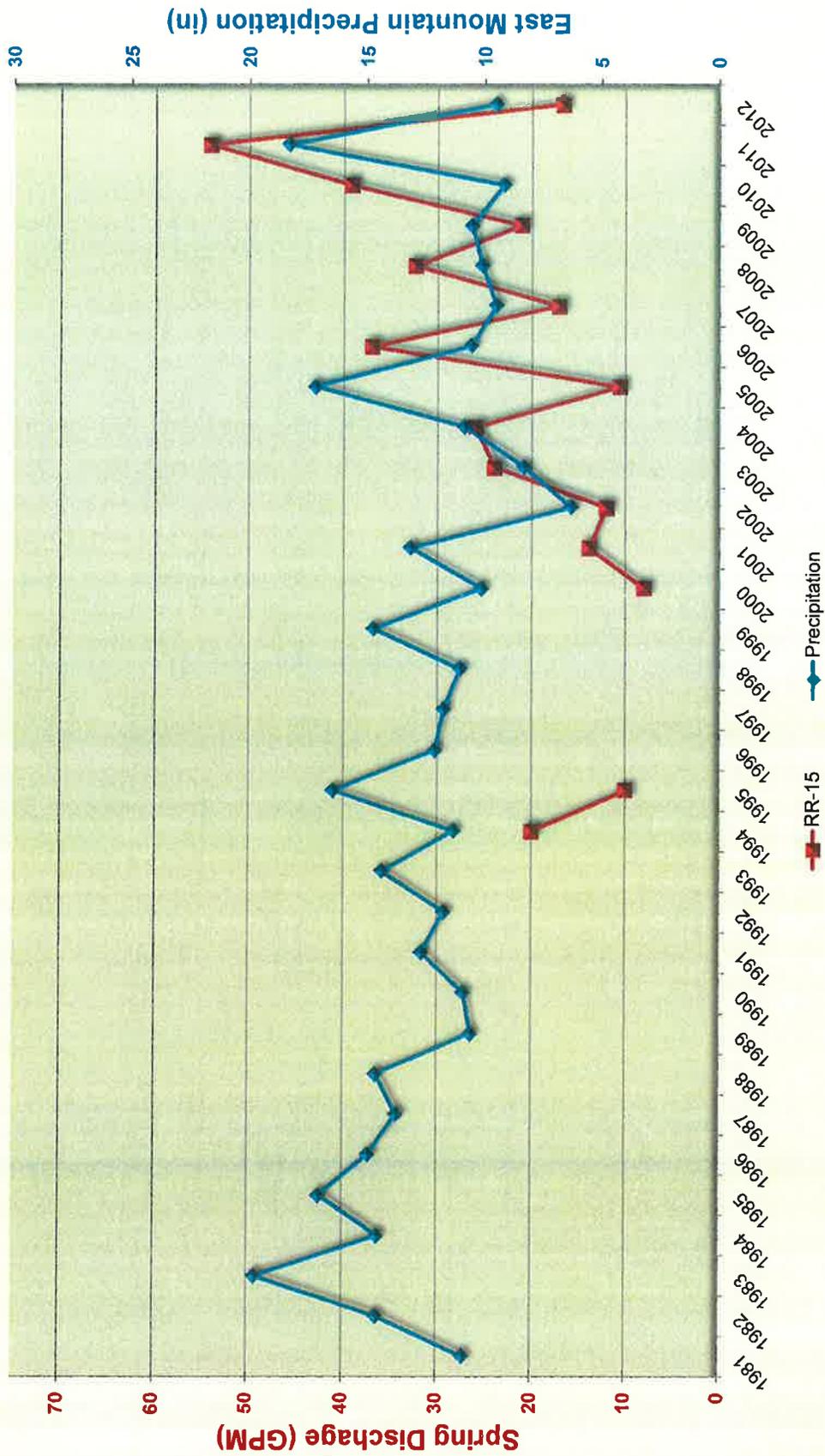
**EAST MOUNTAIN SPRINGS  
 SPRING: RR-5 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



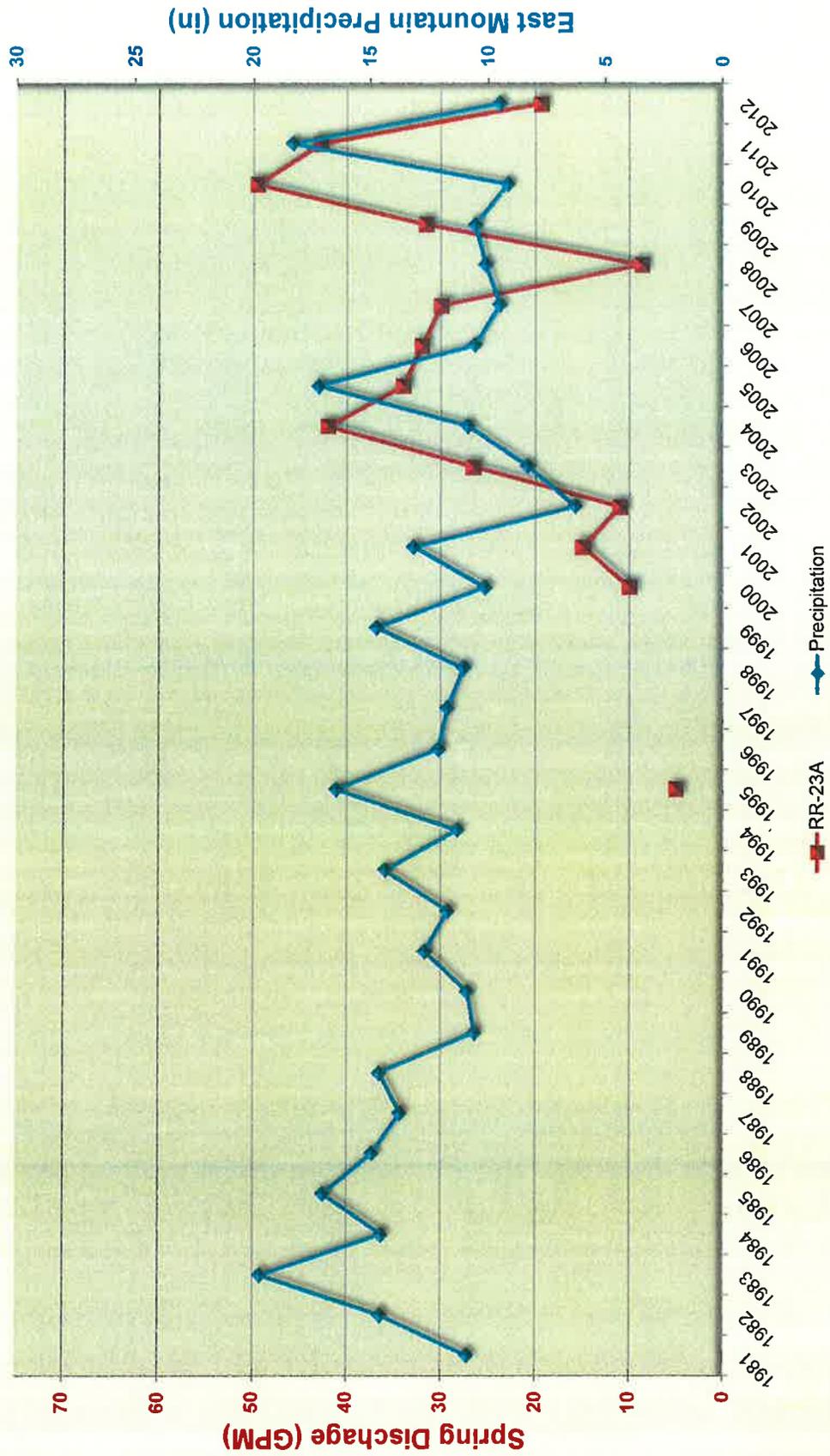
# EAST MOUNTAIN SPRINGS

## SPRING: RR-15 vs. PRECIPITATION

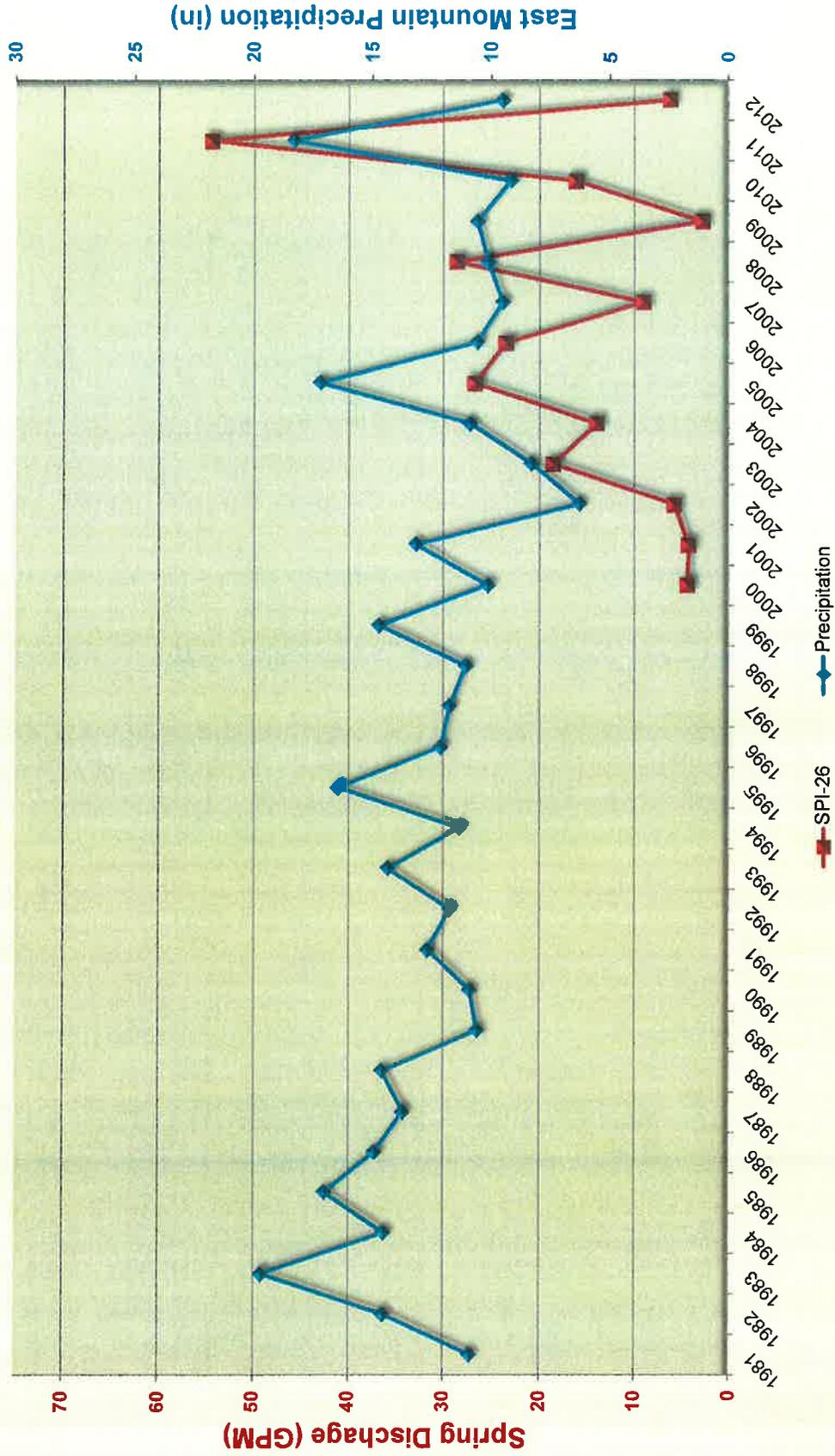
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



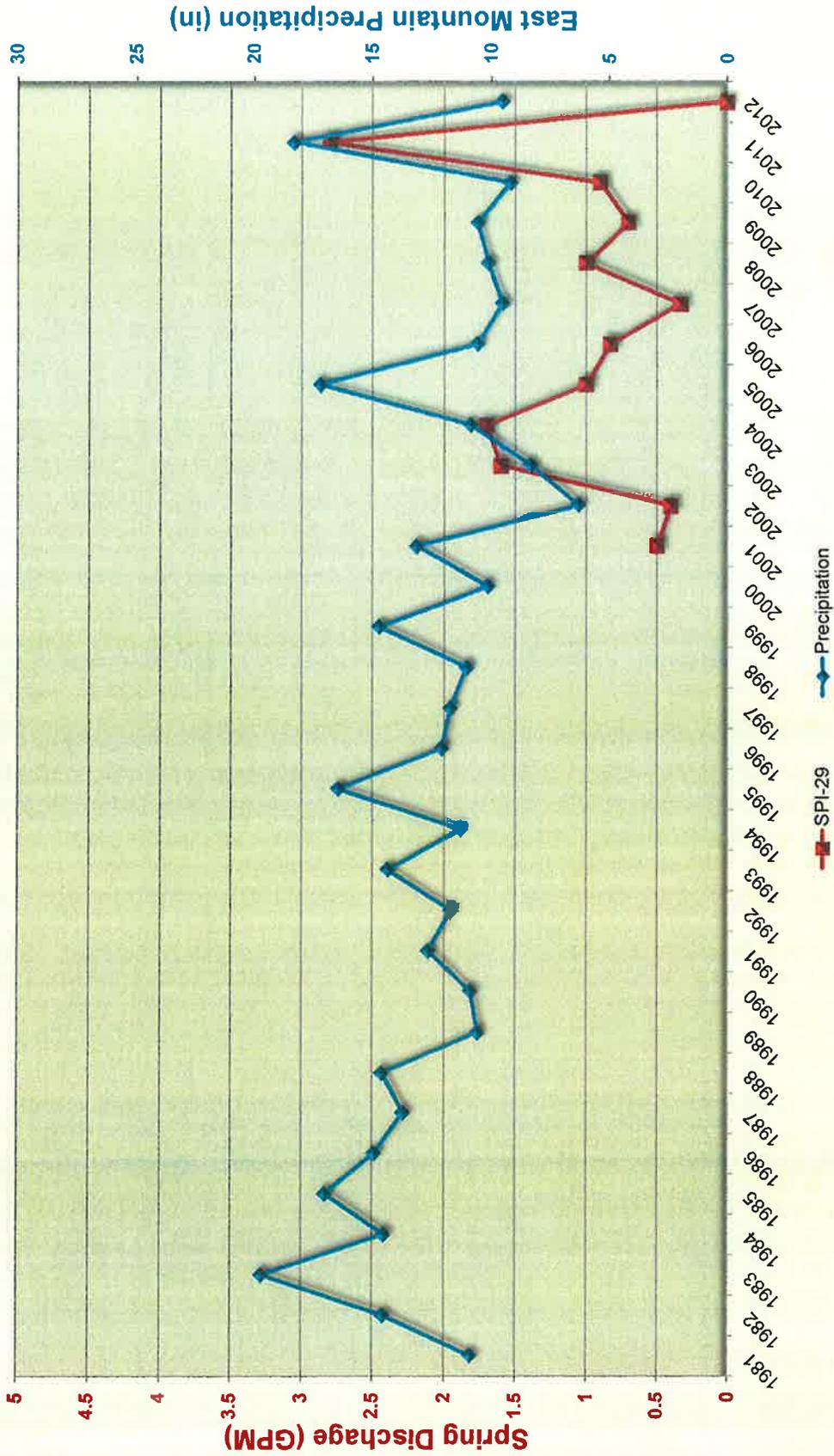
**EAST MOUNTAIN SPRINGS  
 SPRING: RR-23A vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



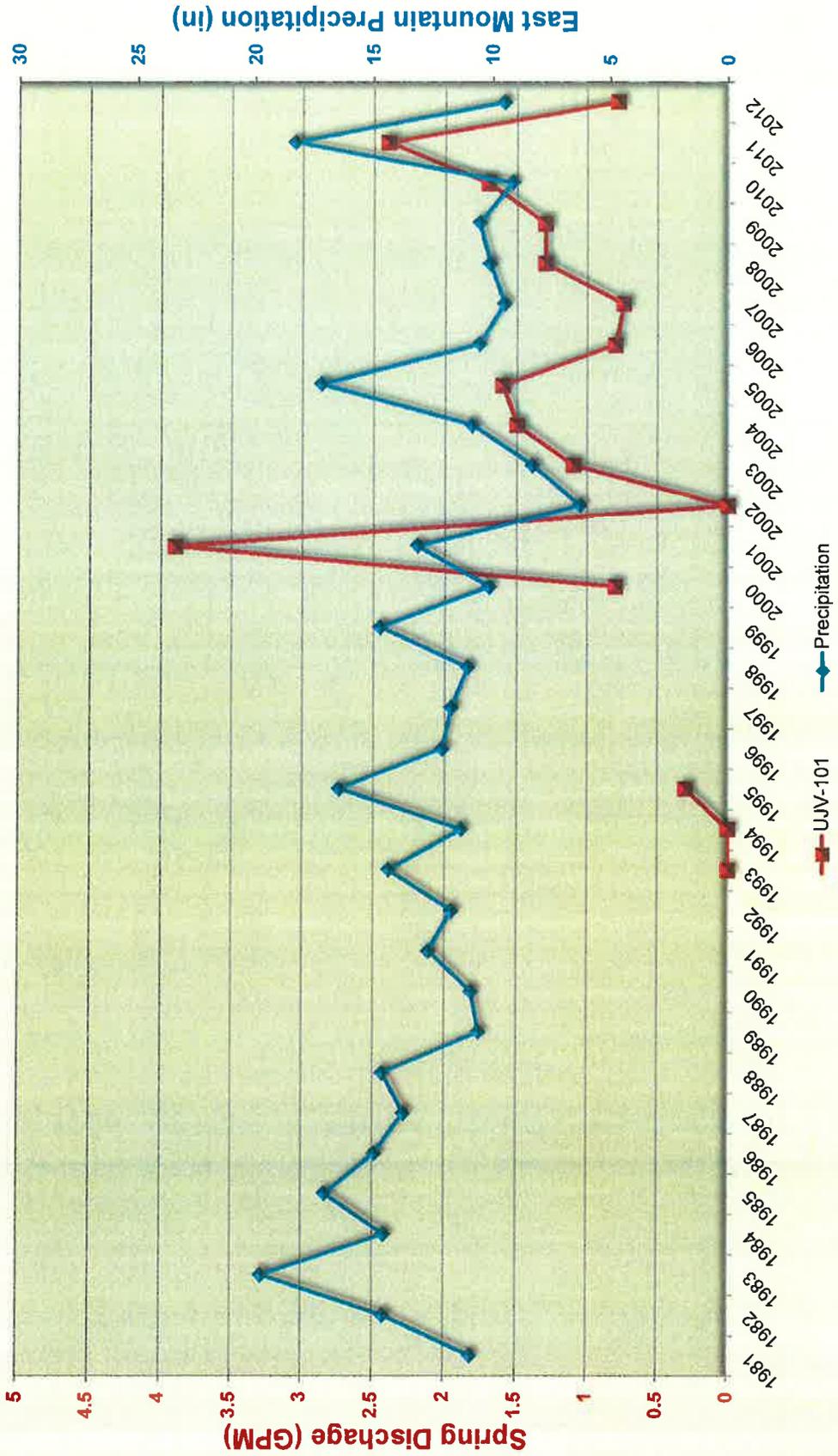
**EAST MOUNTAIN SPRINGS  
 SPRING: SPI-26 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



# EAST MOUNTAIN SPRINGS SPRING: SPI-29 vs. PRECIPITATION PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



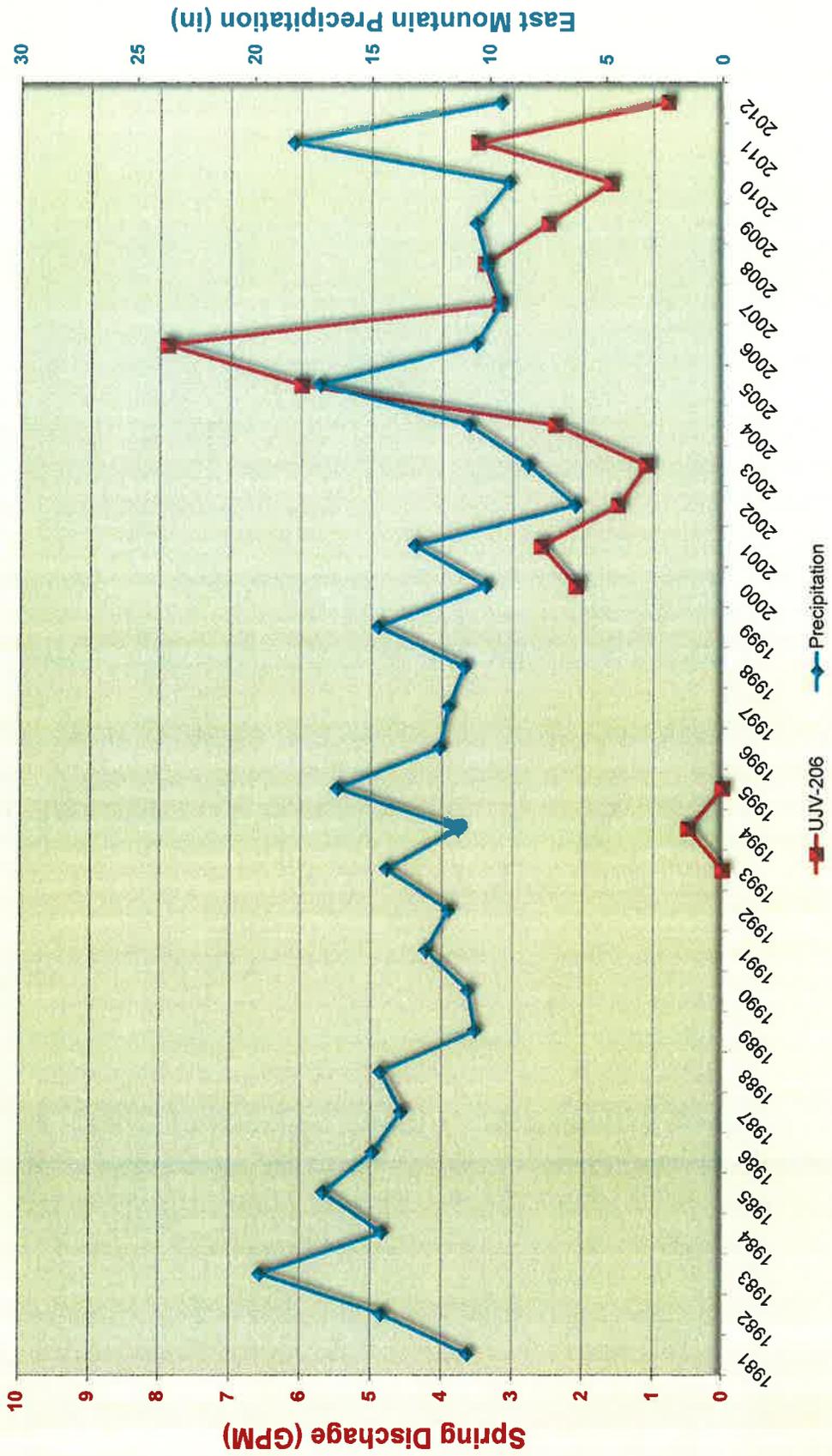
# EAST MOUNTAIN SPRINGS SPRING: UJV-101 vs. PRECIPITATION PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# EAST MOUNTAIN SPRINGS

## SPRING: UJV-206 vs. PRECIPITATION

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION

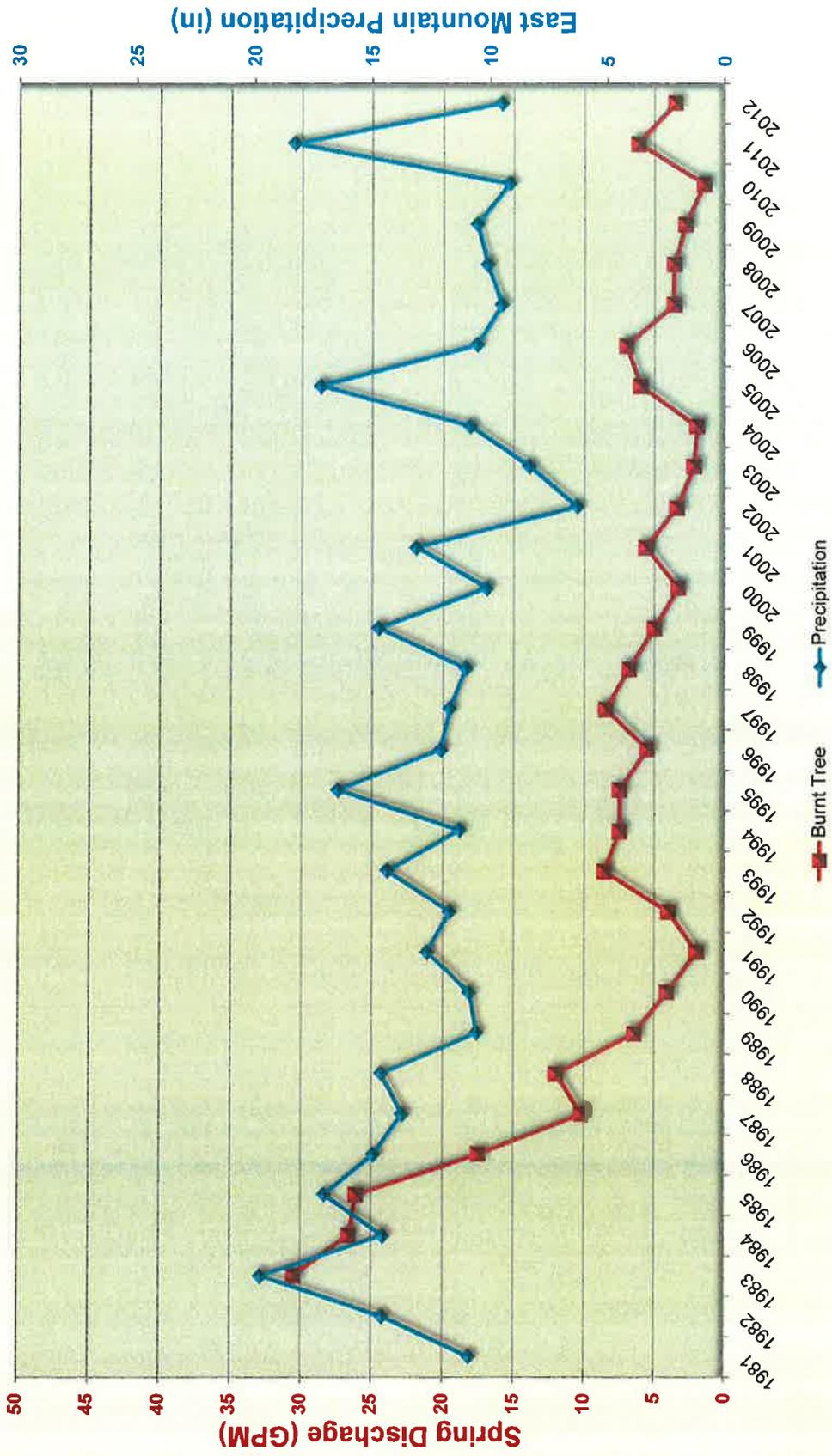


**East Mountain Springs  
Southern Area**

# EAST MOUNTAIN SPRINGS

## SPRING: BURNT TREE VS. PRECIPITATION

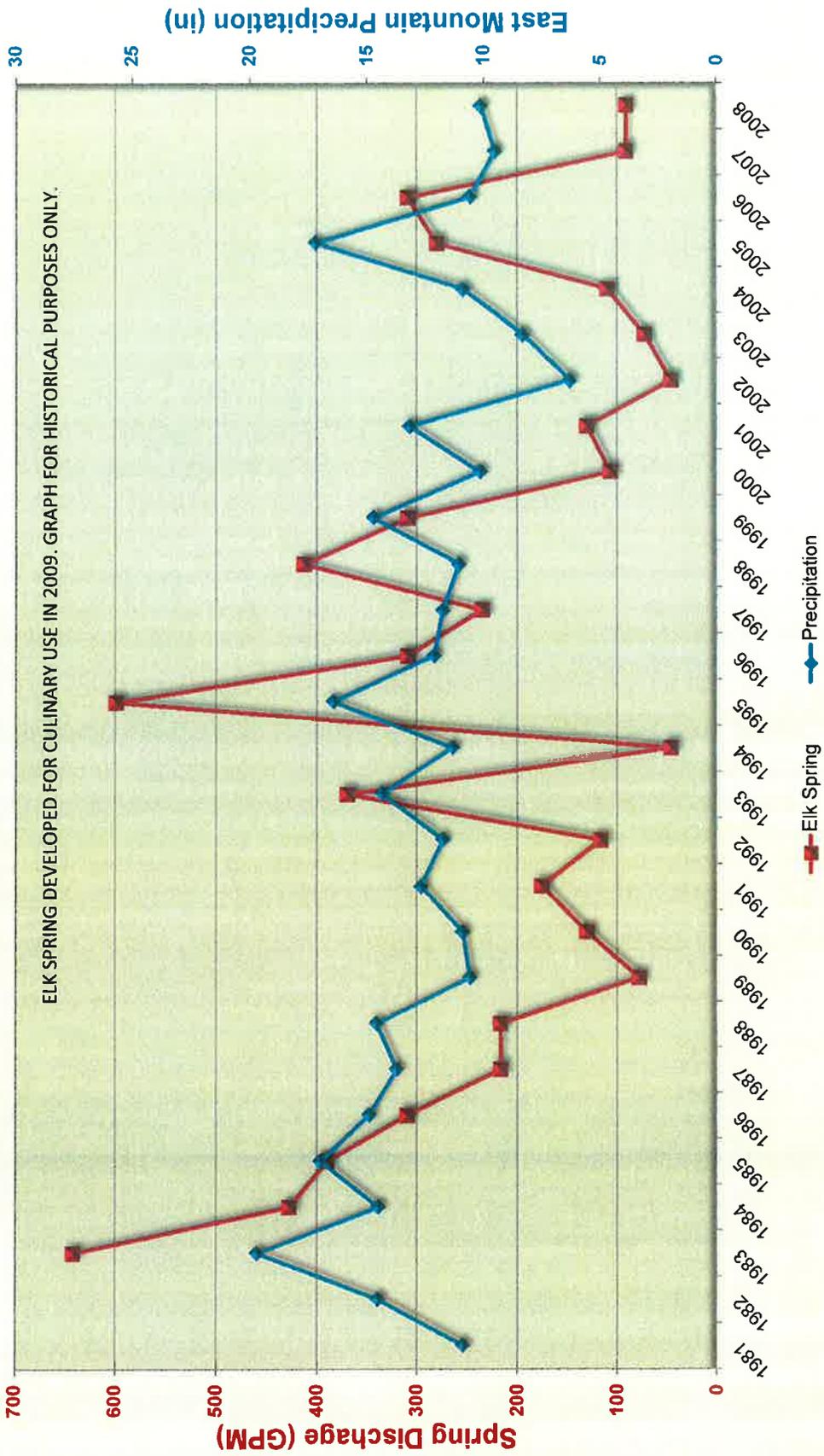
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# EAST MOUNTAIN SPRINGS

## SPRING: ELK SPRING vs. PRECIPITATION

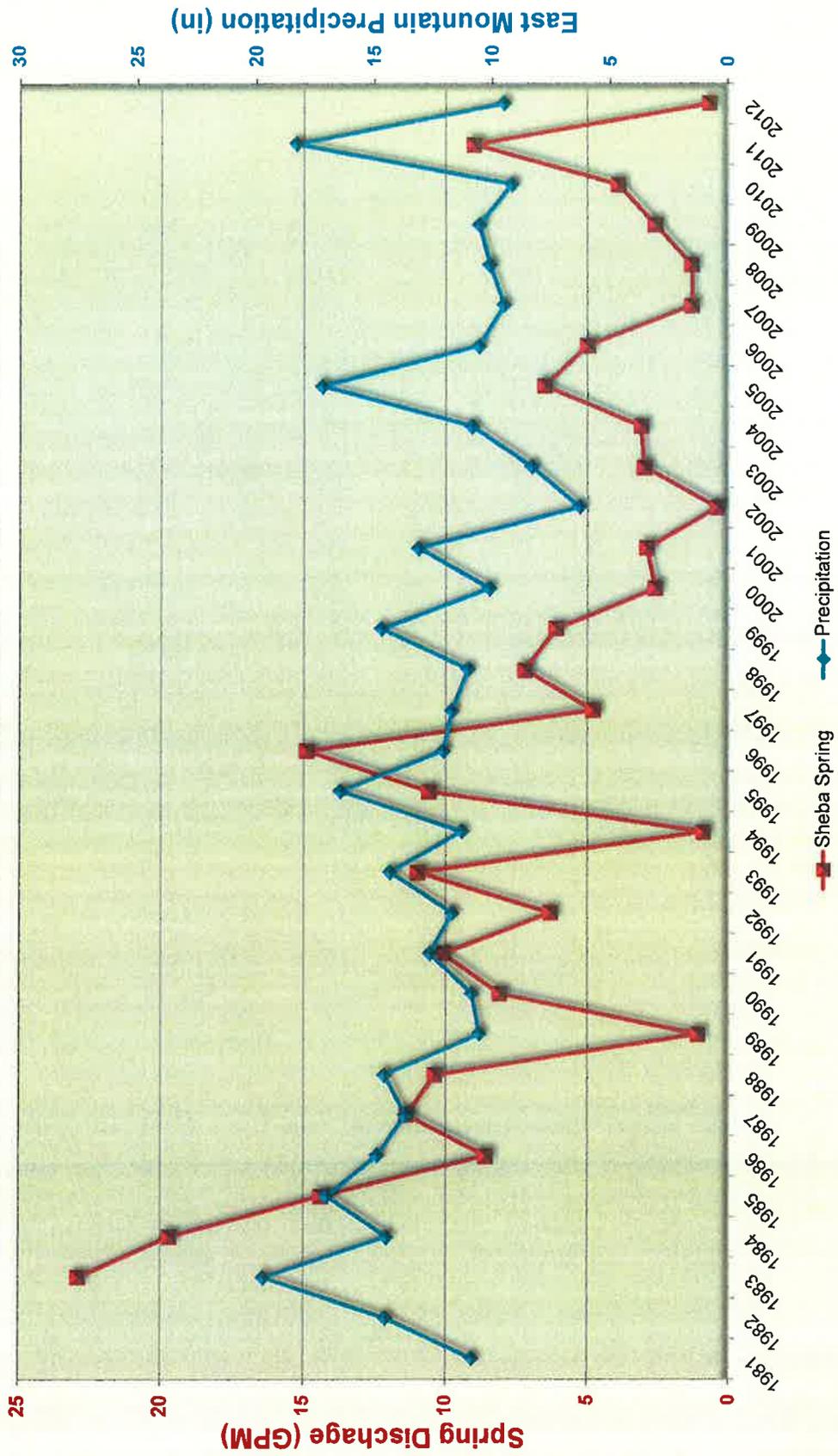
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# EAST MOUNTAIN SPRINGS

## SPRING: SHEBA SPRING vs. PRECIPITATION

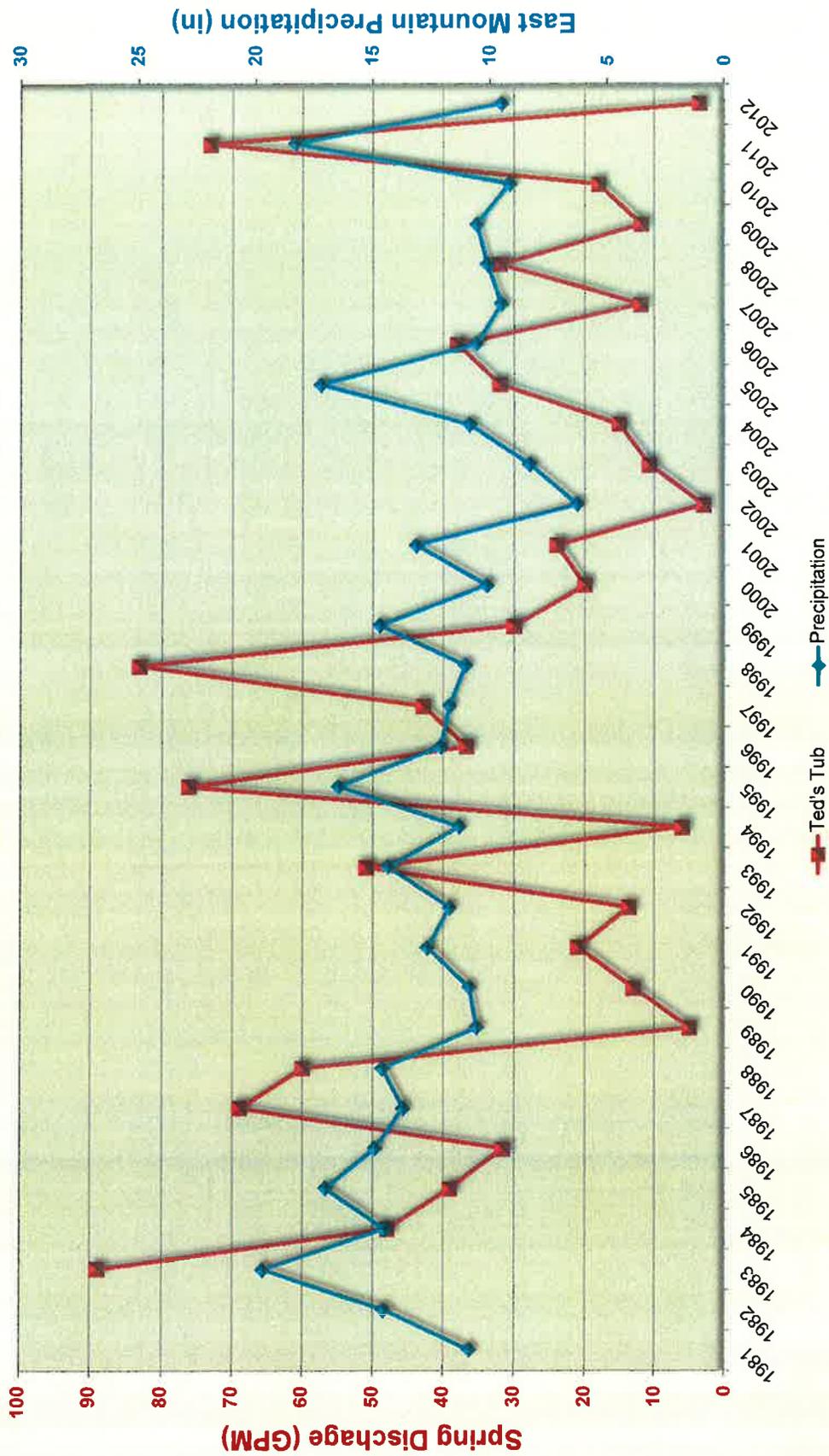
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



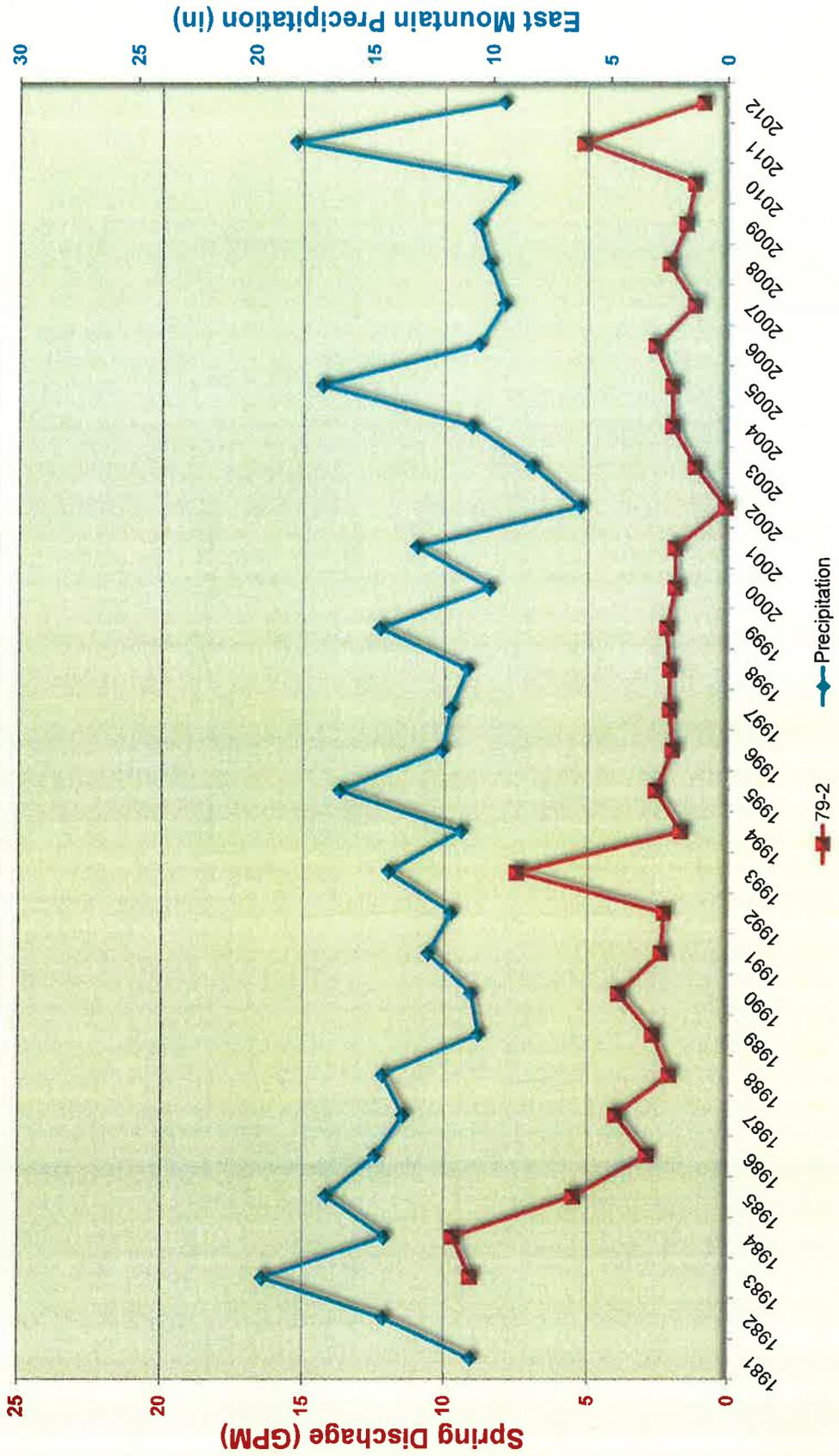
# EAST MOUNTAIN SPRINGS

## SPRING: TED'S TUB vs. PRECIPITATION

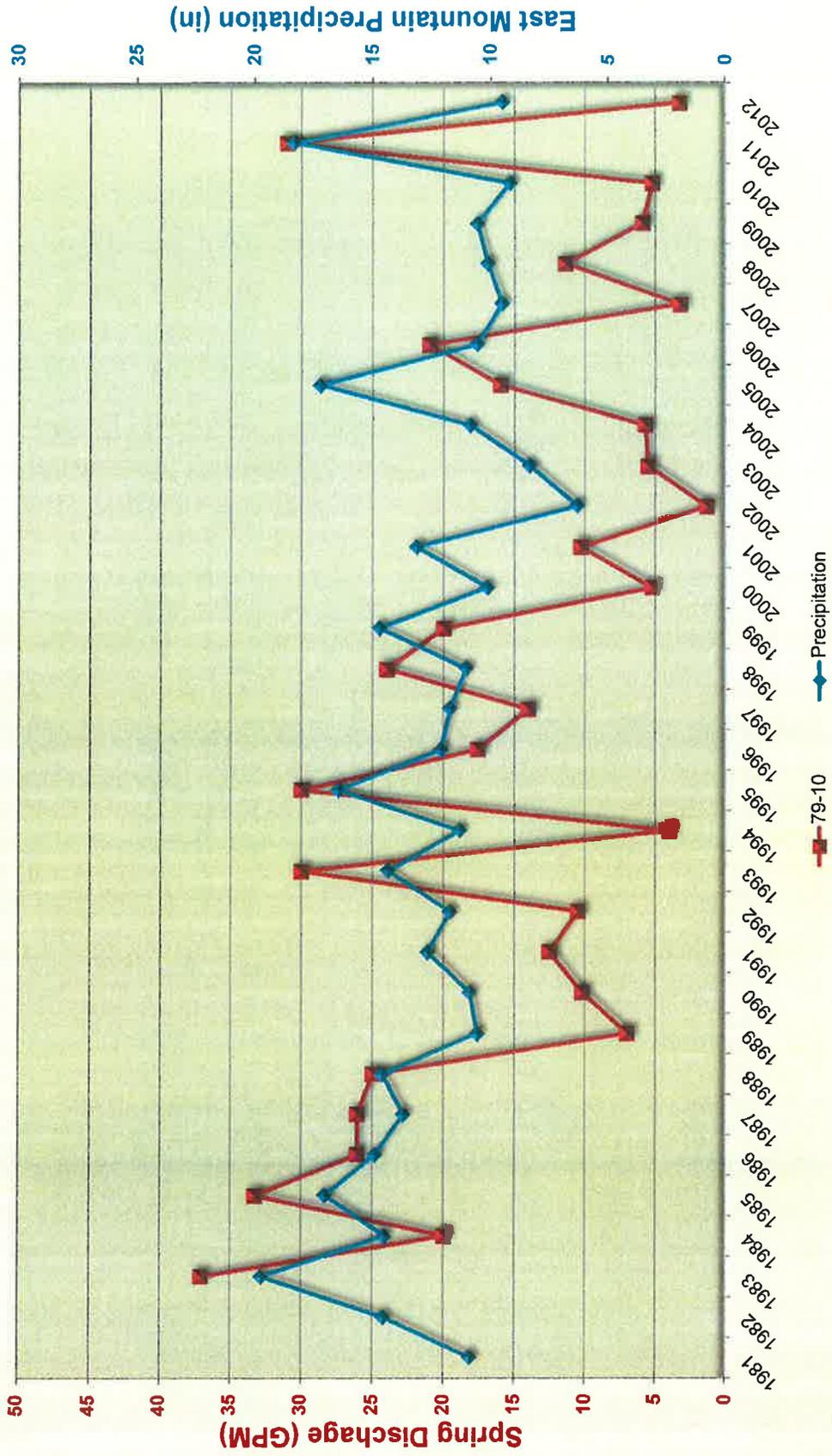
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# EAST MOUNTAIN SPRINGS SPRING: 79-2 vs. PRECIPITATION PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



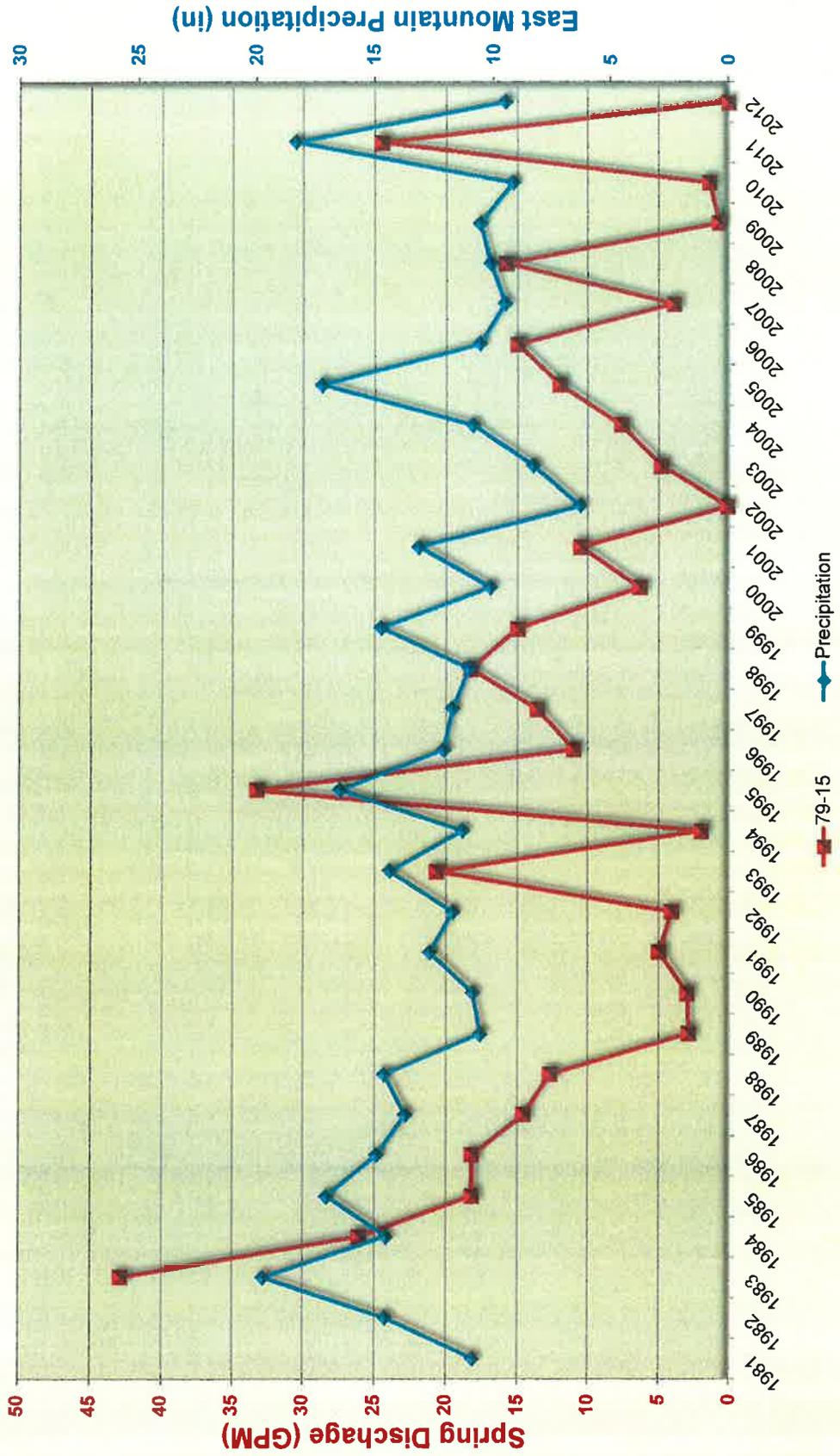
# EAST MOUNTAIN SPRINGS SPRING: 79-10 vs. PRECIPITATION PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



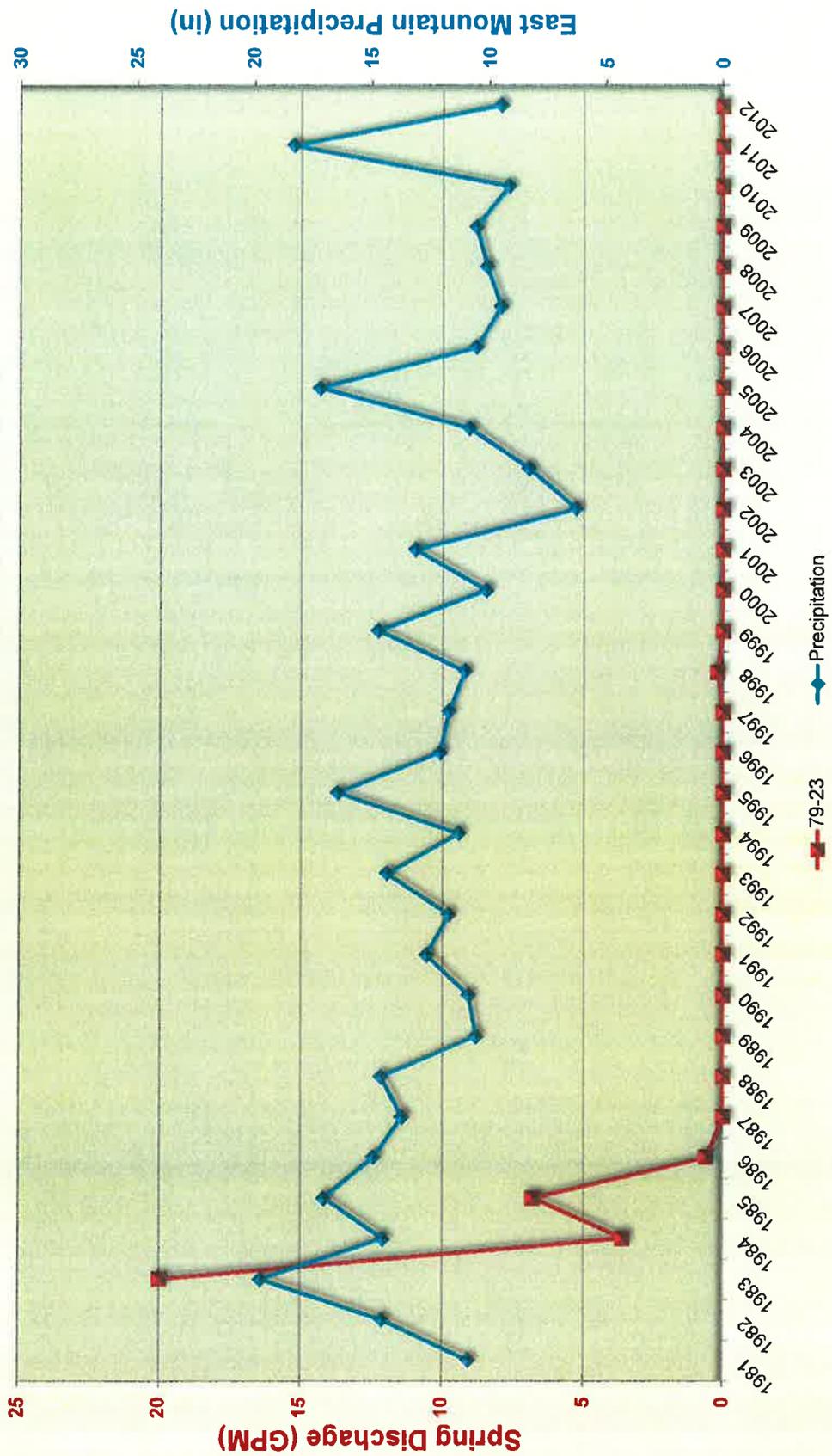
# EAST MOUNTAIN SPRINGS

## SPRING: 79-15 vs. PRECIPITATION

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



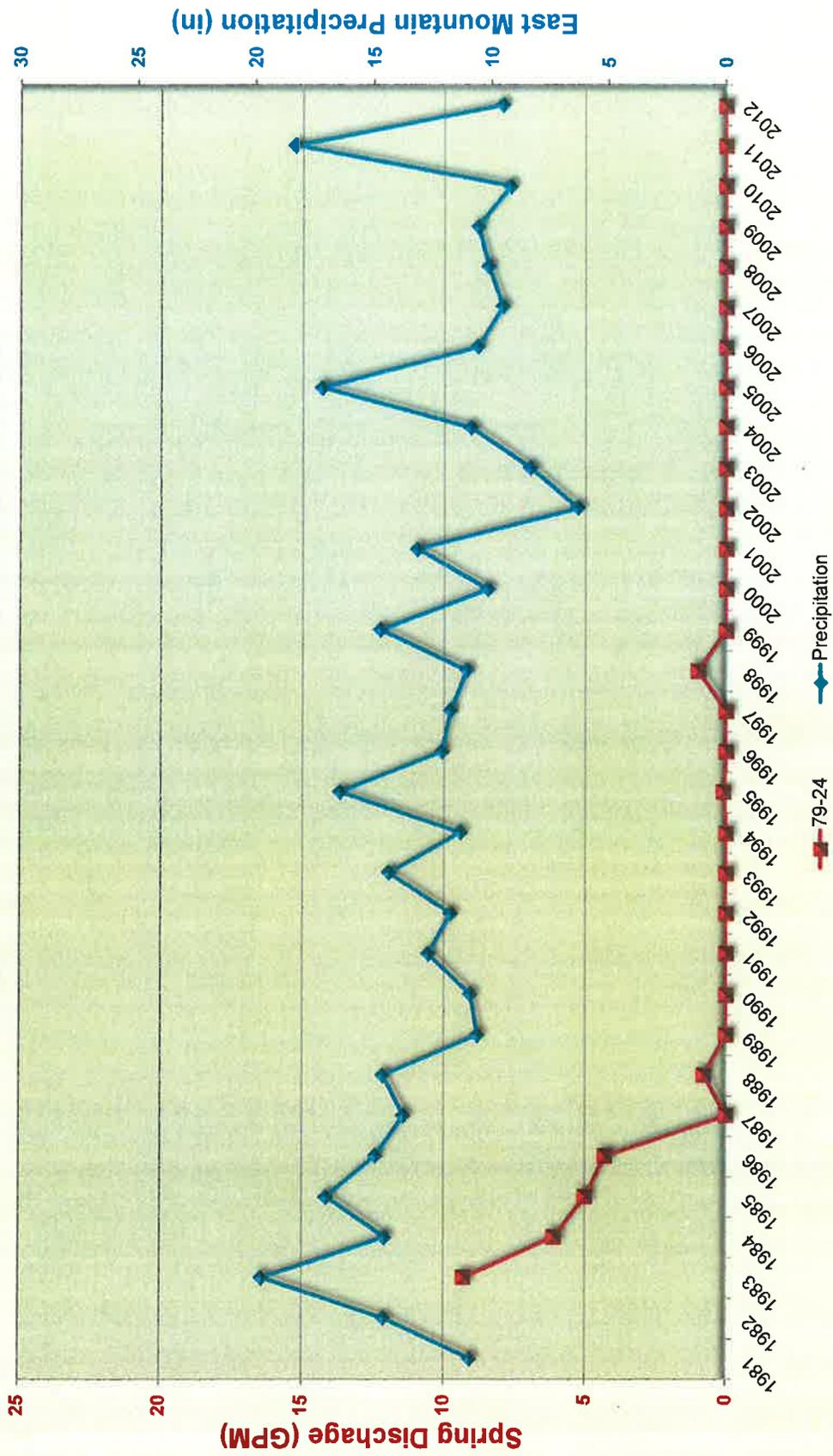
**EAST MOUNTAIN SPRINGS  
 SPRING: 79-23 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



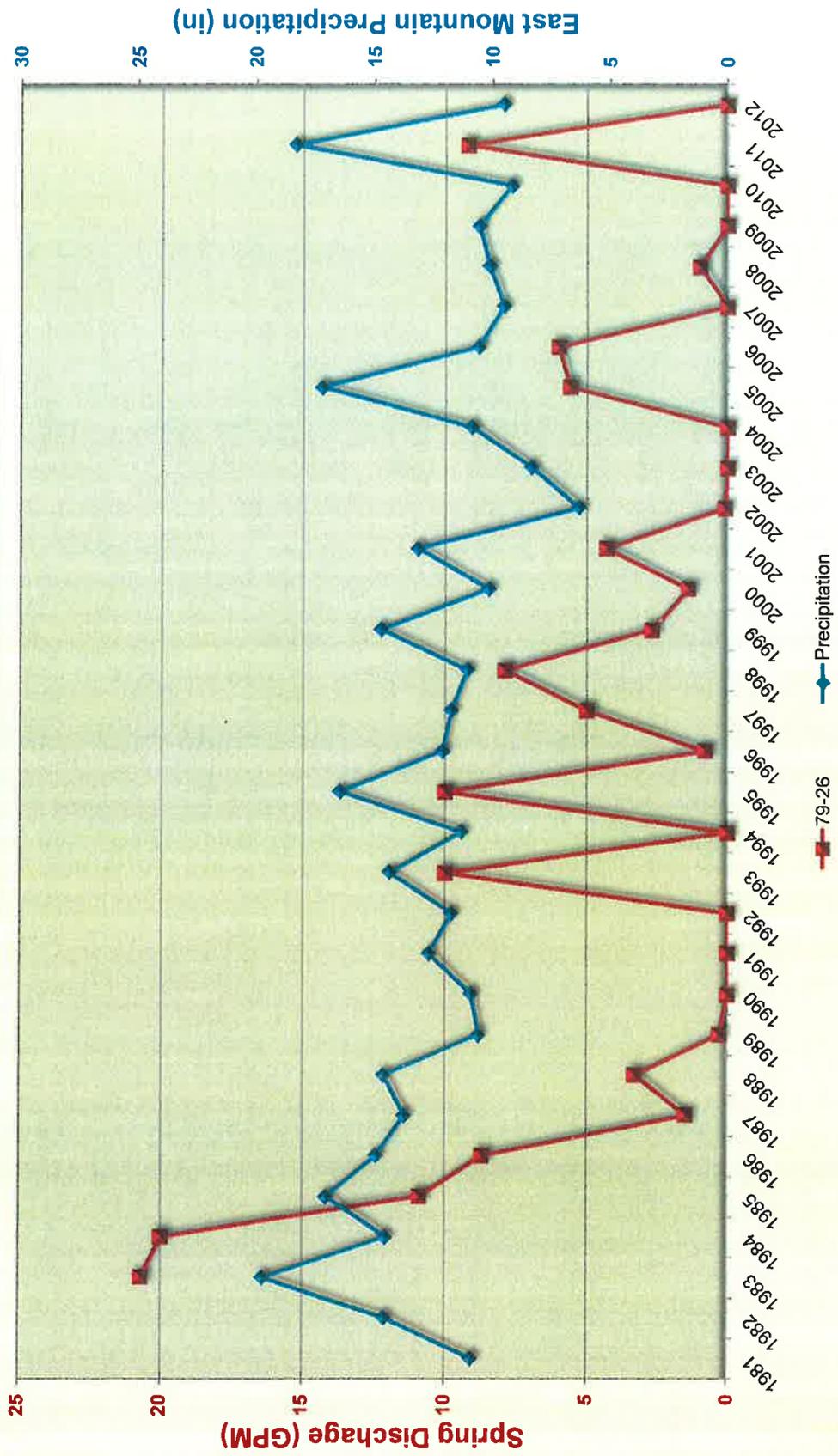
# EAST MOUNTAIN SPRINGS

## SPRING: 79-24 vs. PRECIPITATION

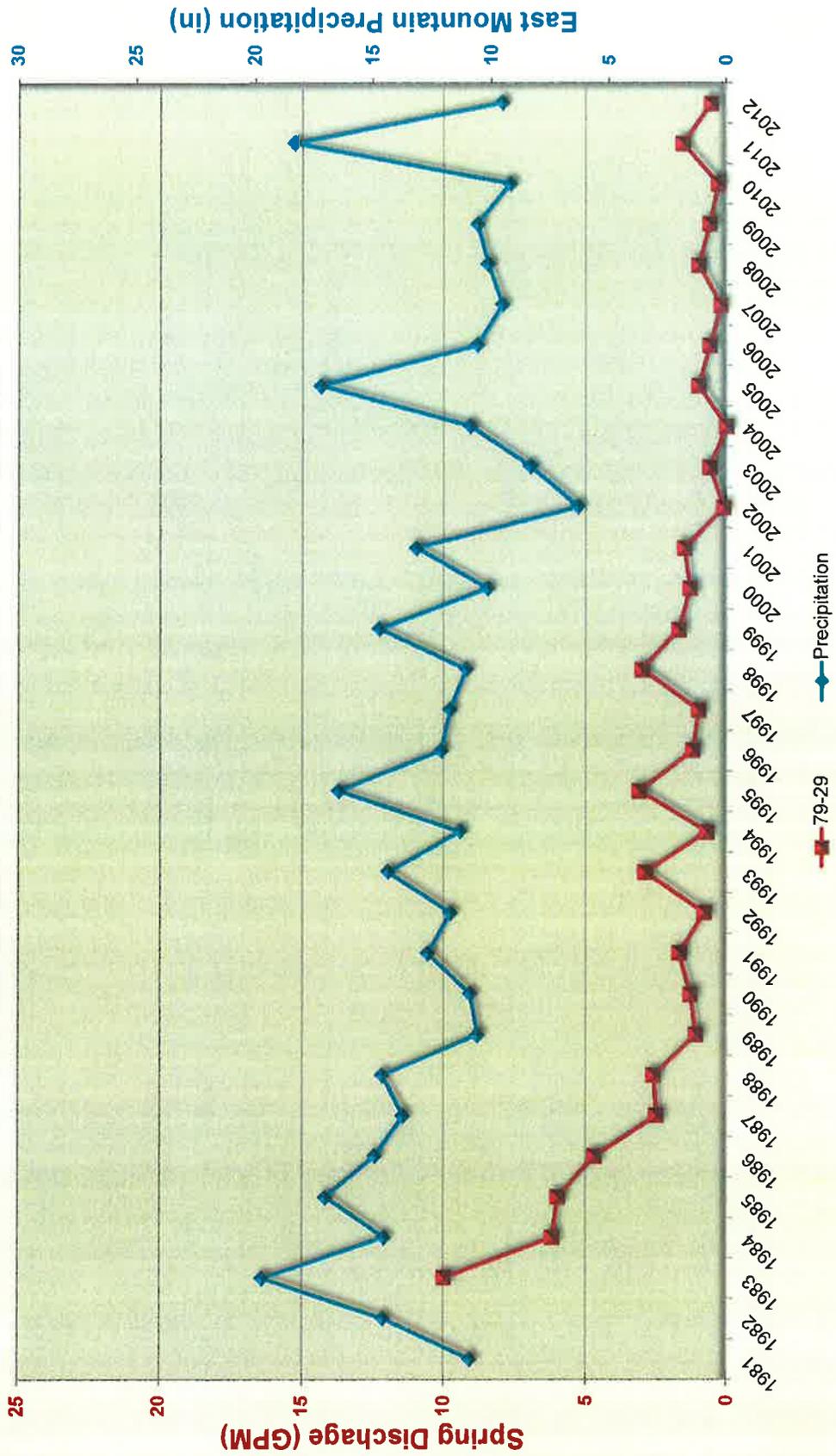
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



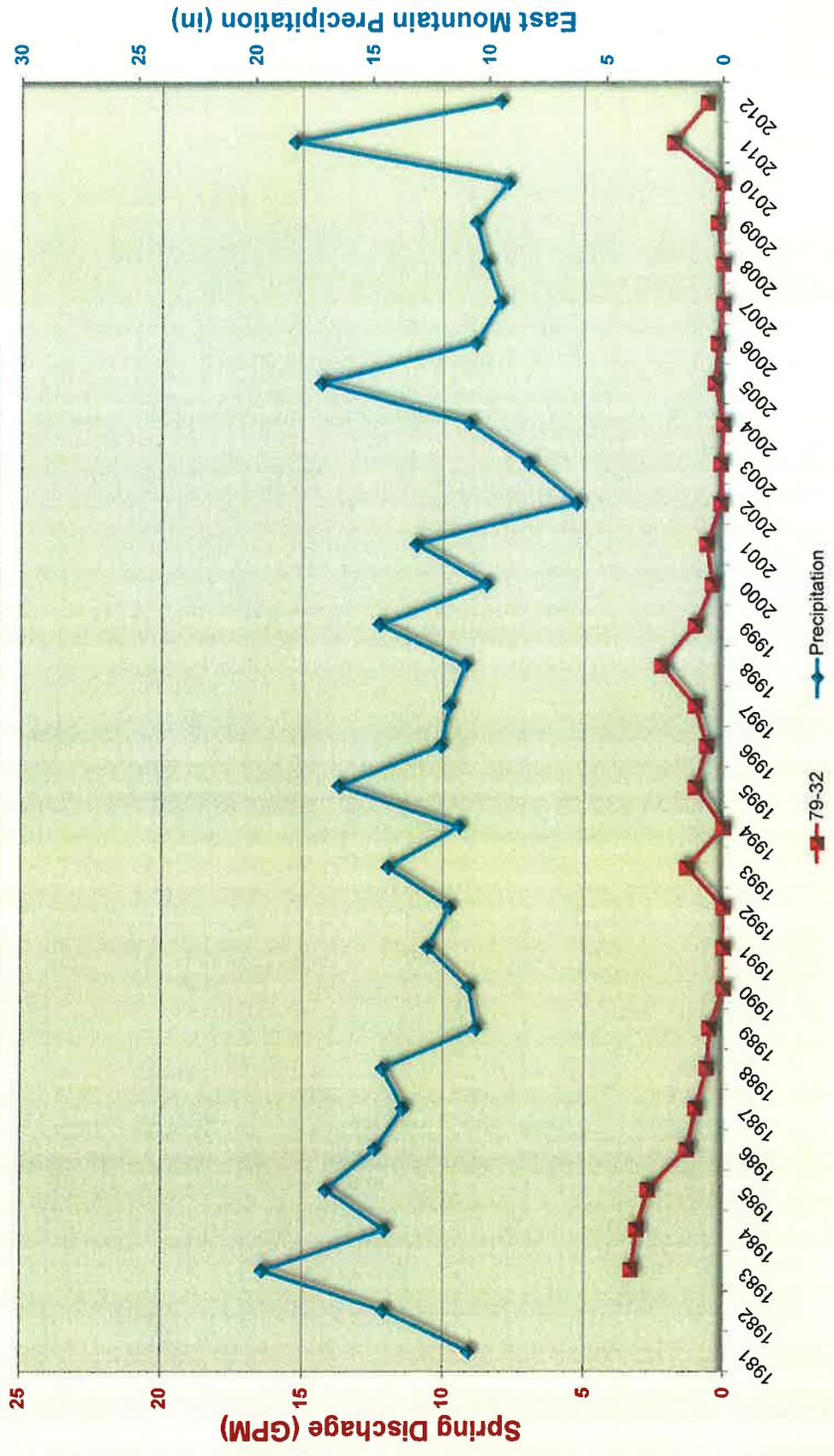
**EAST MOUNTAIN SPRINGS  
 SPRING: 79-26 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



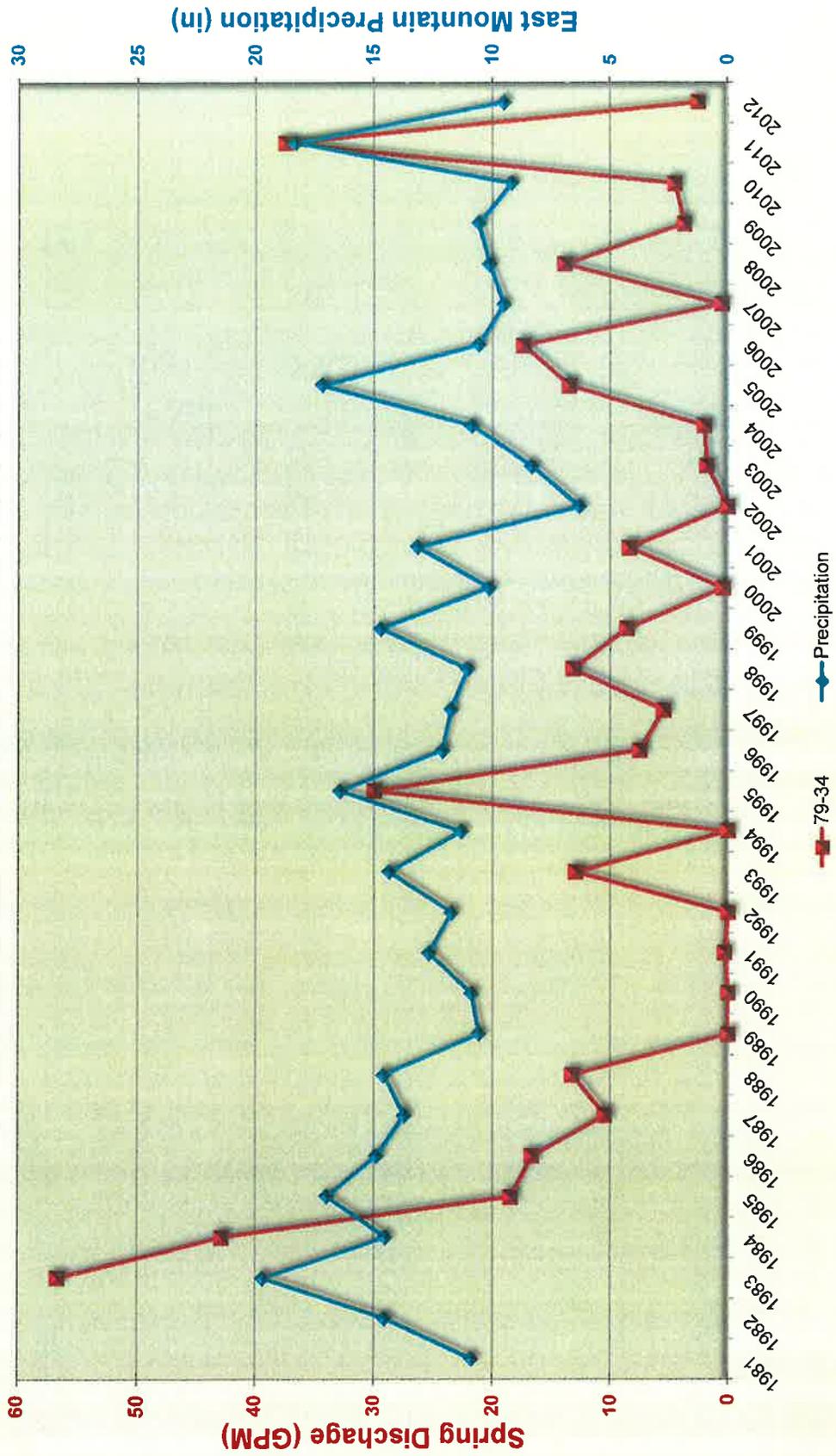
**EAST MOUNTAIN SPRINGS  
 SPRING: 79-29 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



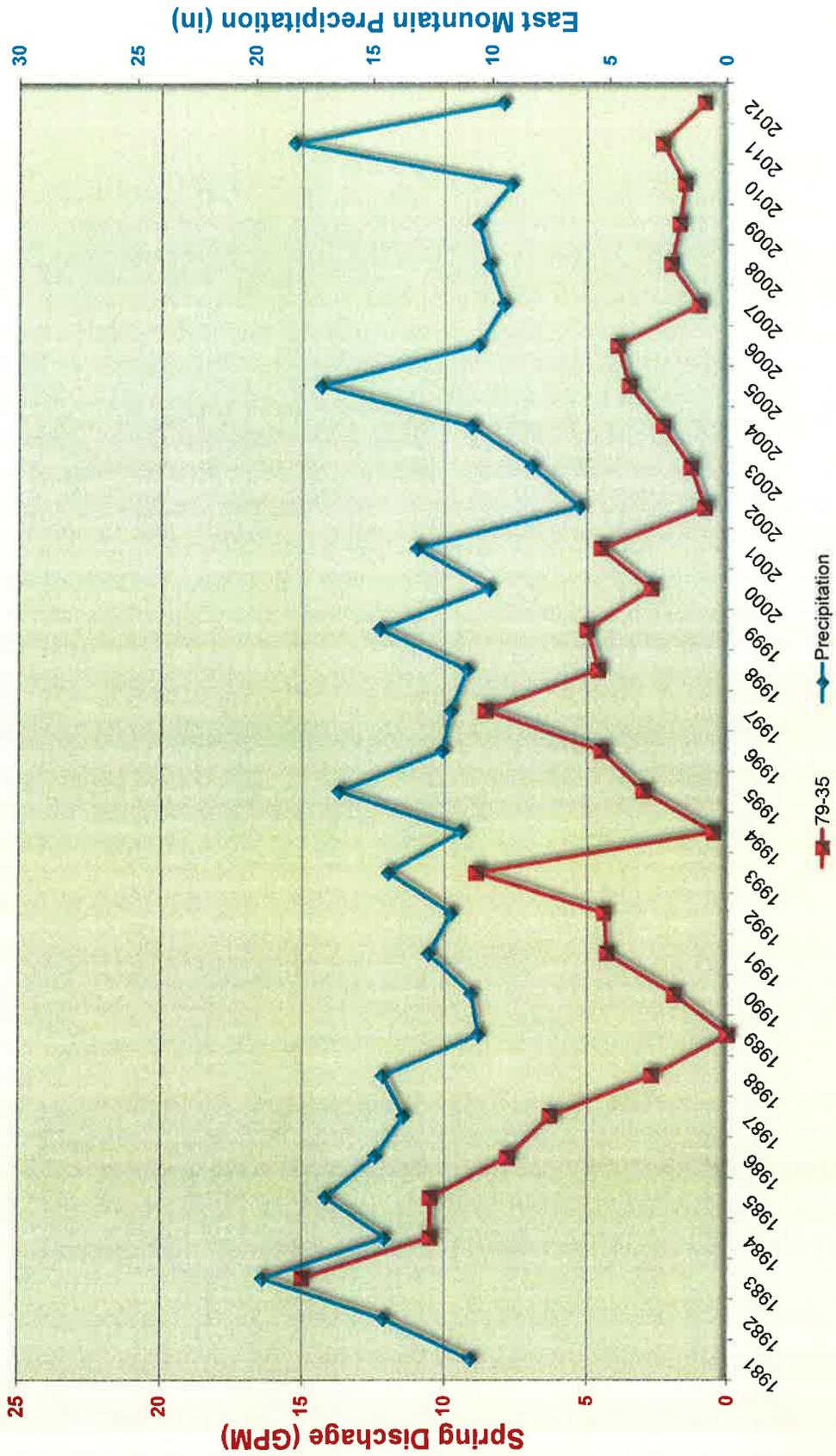
**EAST MOUNTAIN SPRINGS**  
**SPRING: 79-32 vs. PRECIPITATION**  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



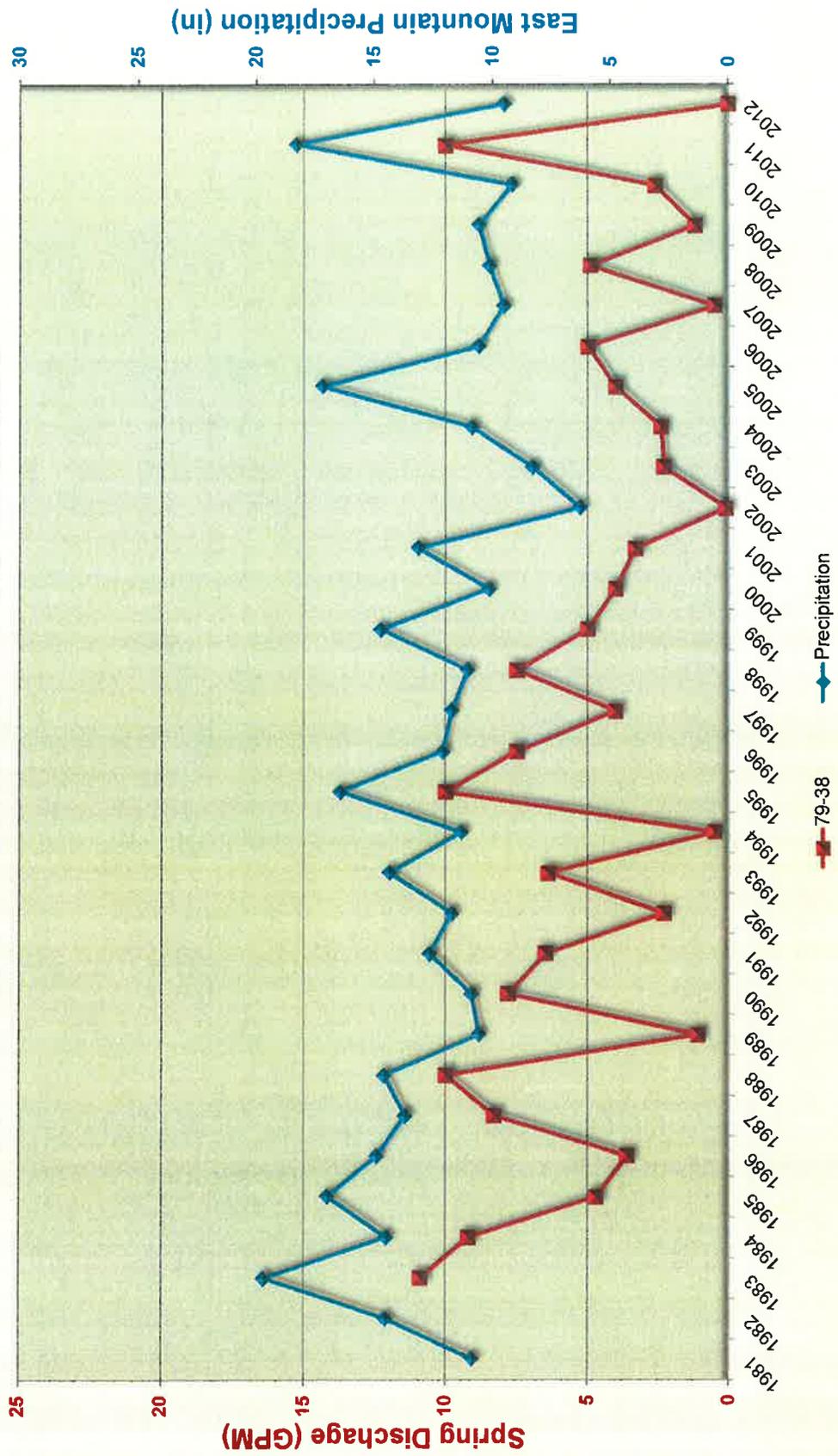
**EAST MOUNTAIN SPRINGS  
 SPRING: 79-34 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



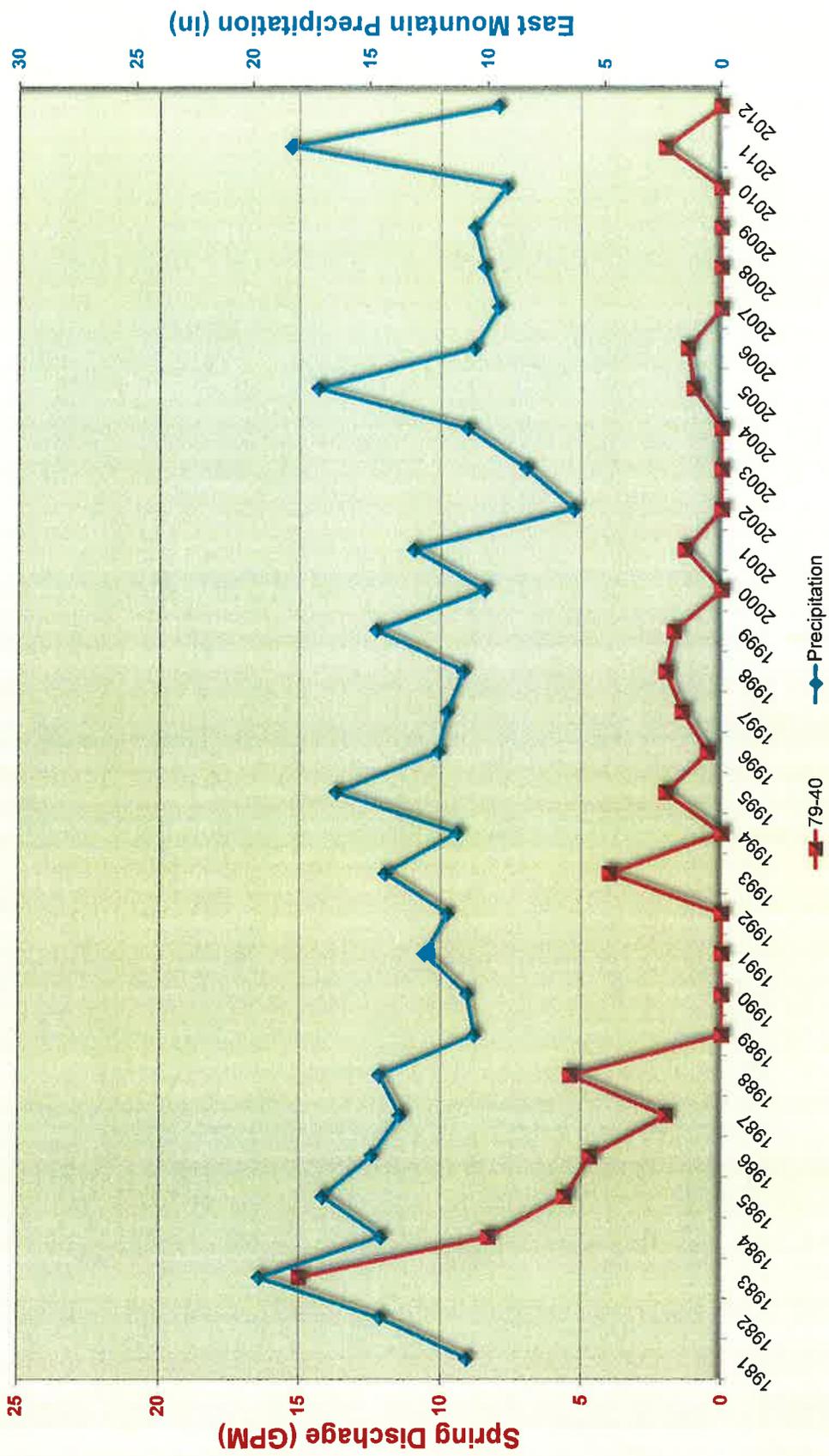
**EAST MOUNTAIN SPRINGS**  
**SPRING: 79-35 vs. PRECIPITATION**  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



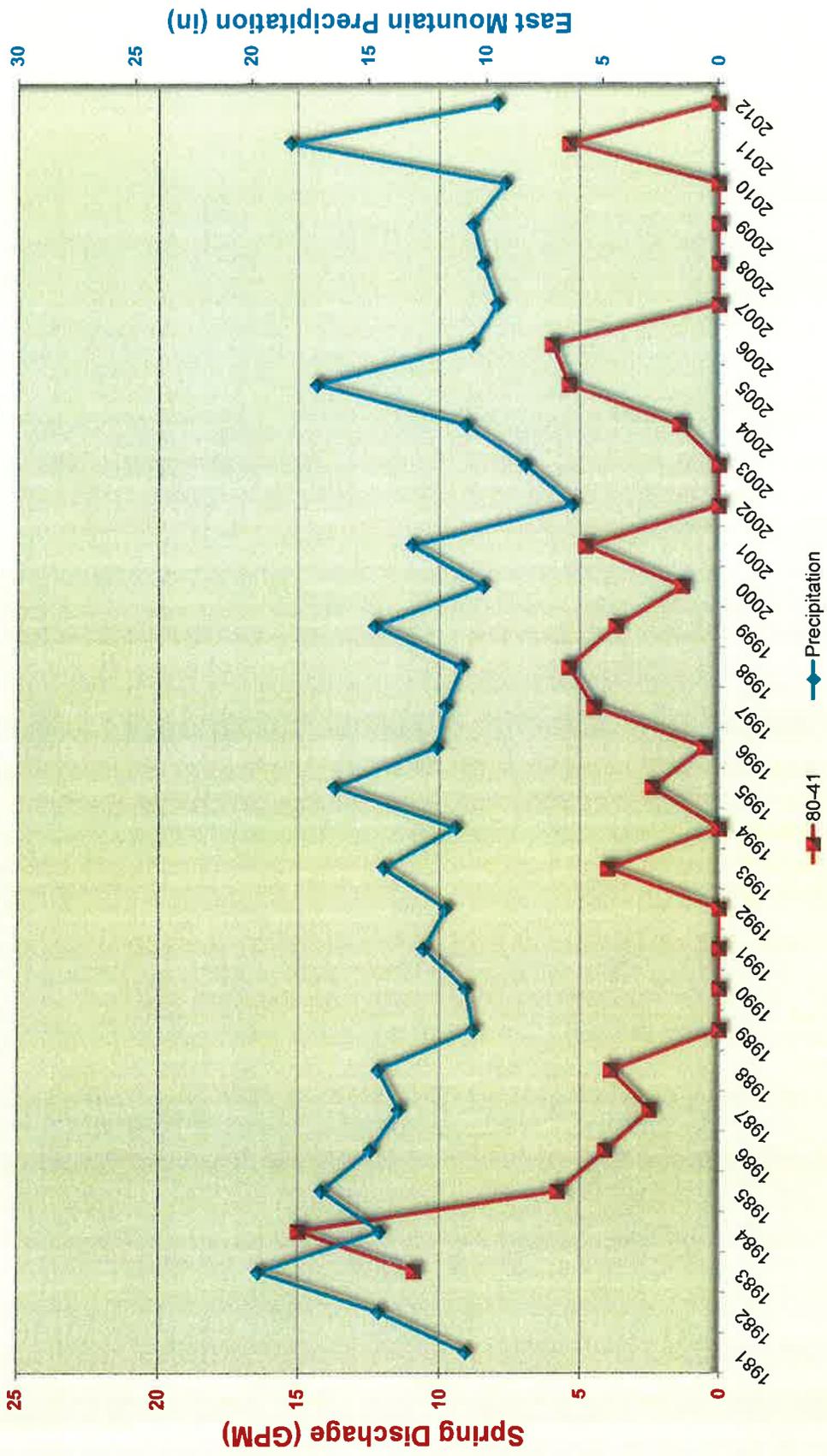
# EAST MOUNTAIN SPRINGS SPRING: 79-38 vs. PRECIPITATION PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



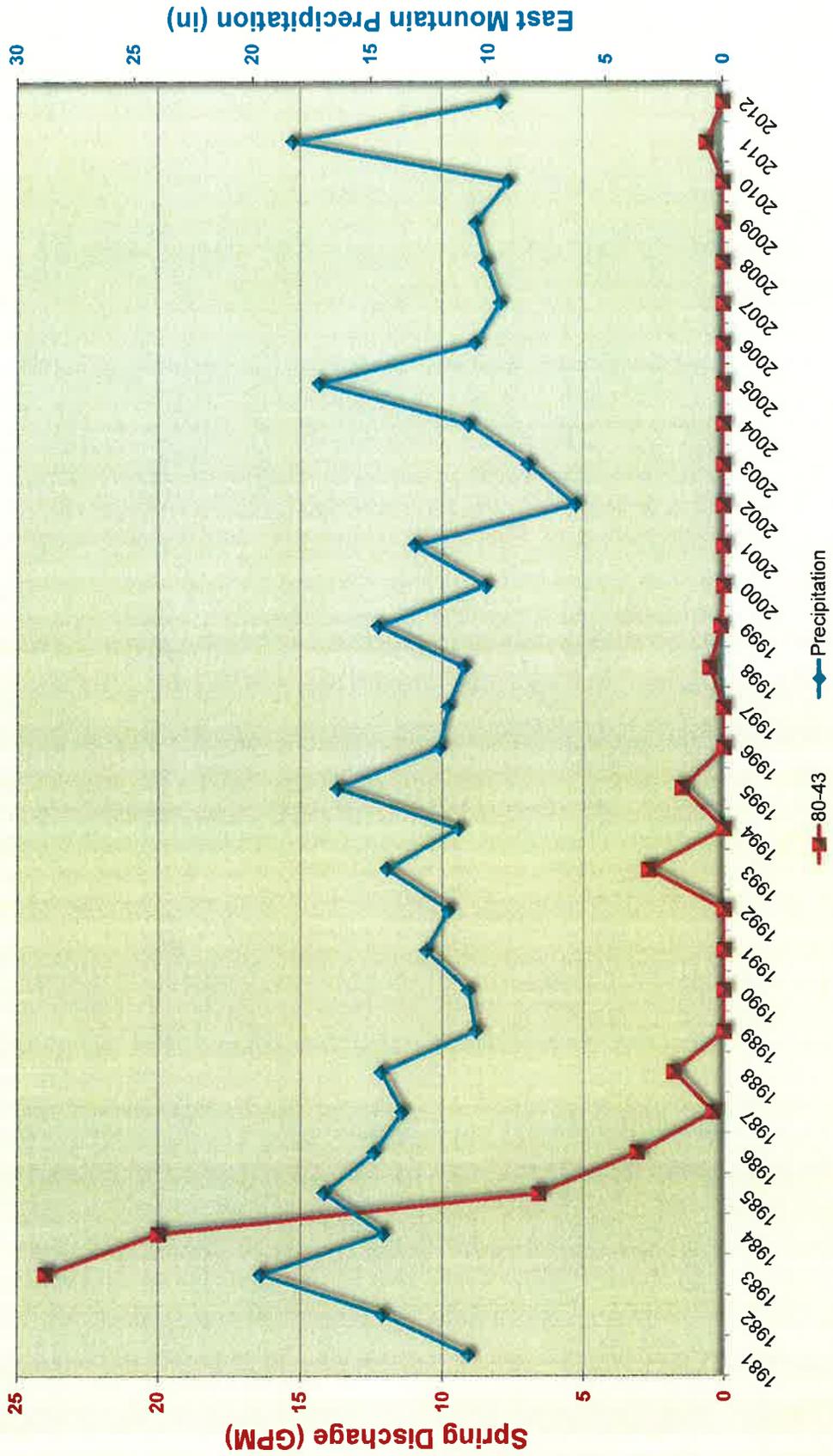
**EAST MOUNTAIN SPRINGS  
 SPRING: 79-40 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



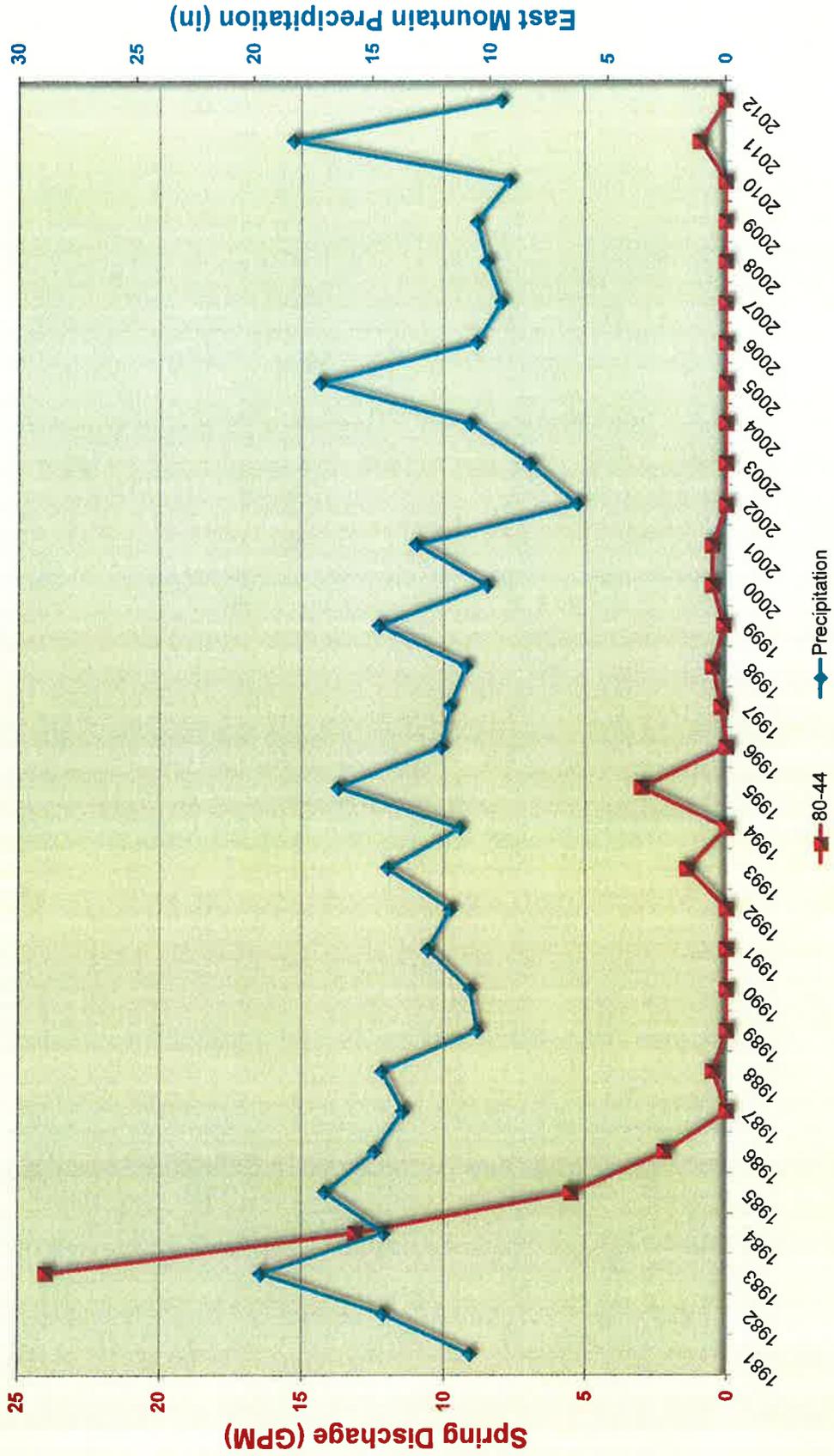
# EAST MOUNTAIN SPRINGS SPRING: 80-41 vs. PRECIPITATION PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



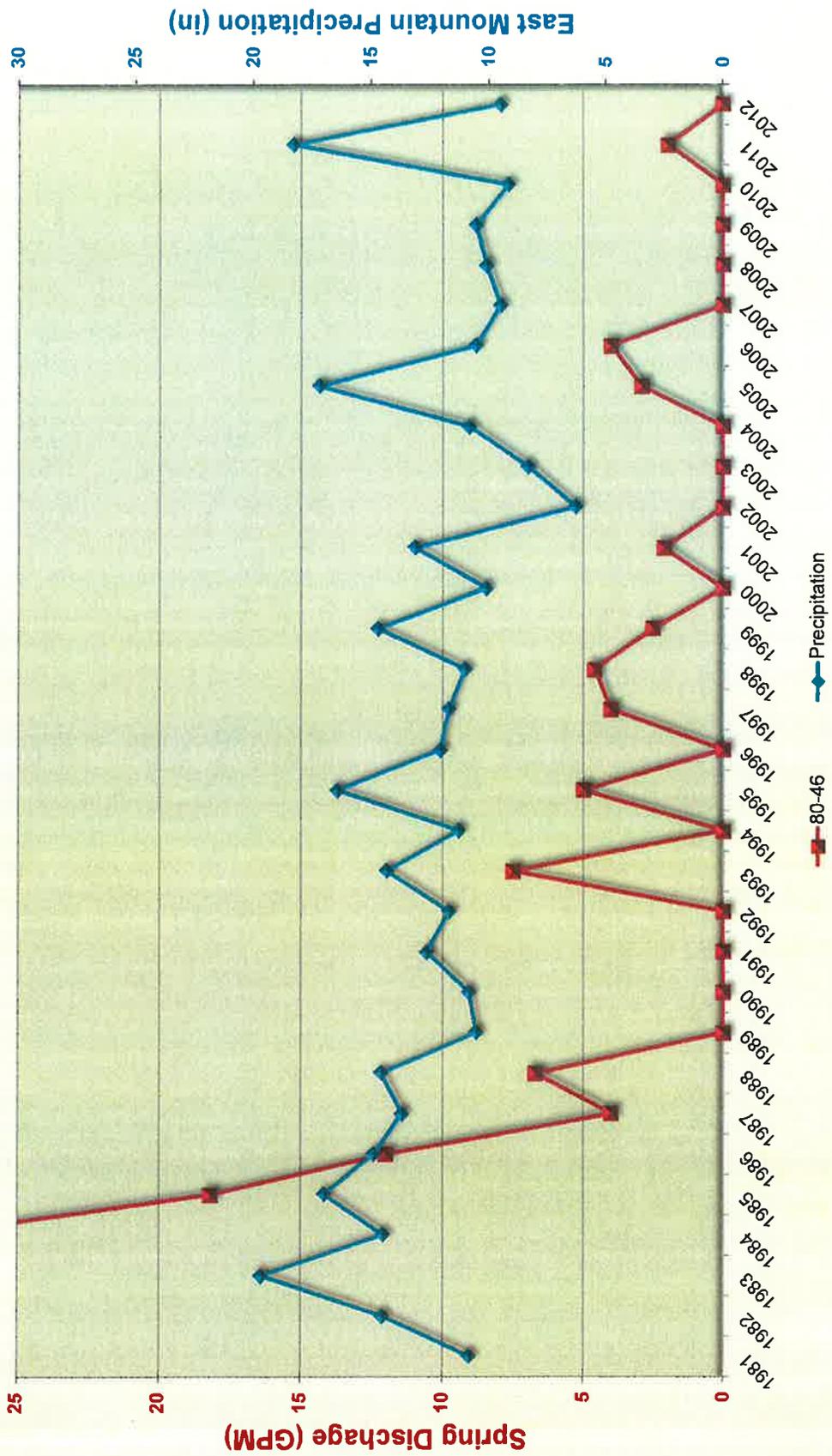
**EAST MOUNTAIN SPRINGS  
 SPRING: 80-43 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



**EAST MOUNTAIN SPRINGS  
 SPRING: 80-44 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



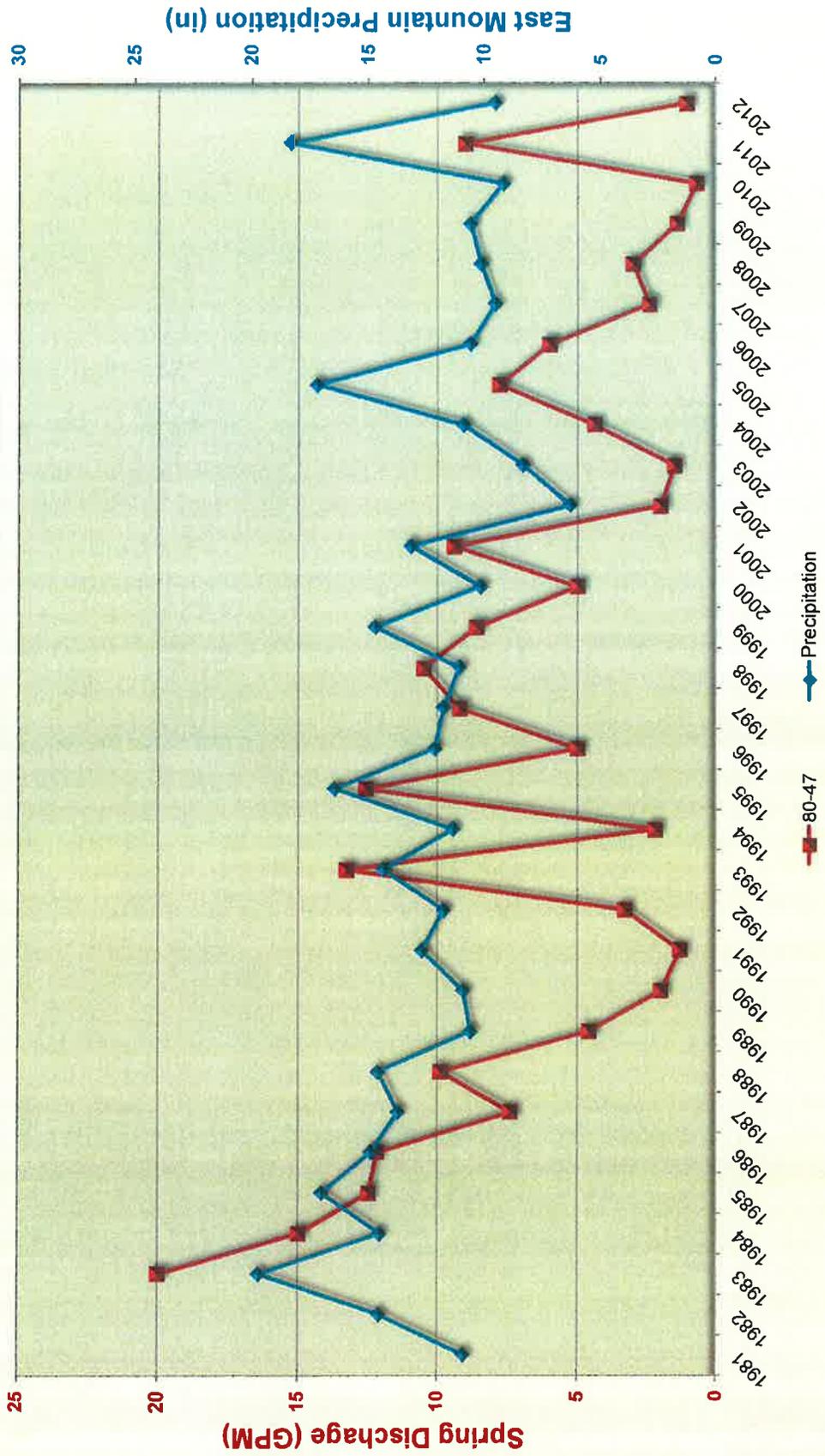
**EAST MOUNTAIN SPRINGS  
 SPRING: 80-46 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



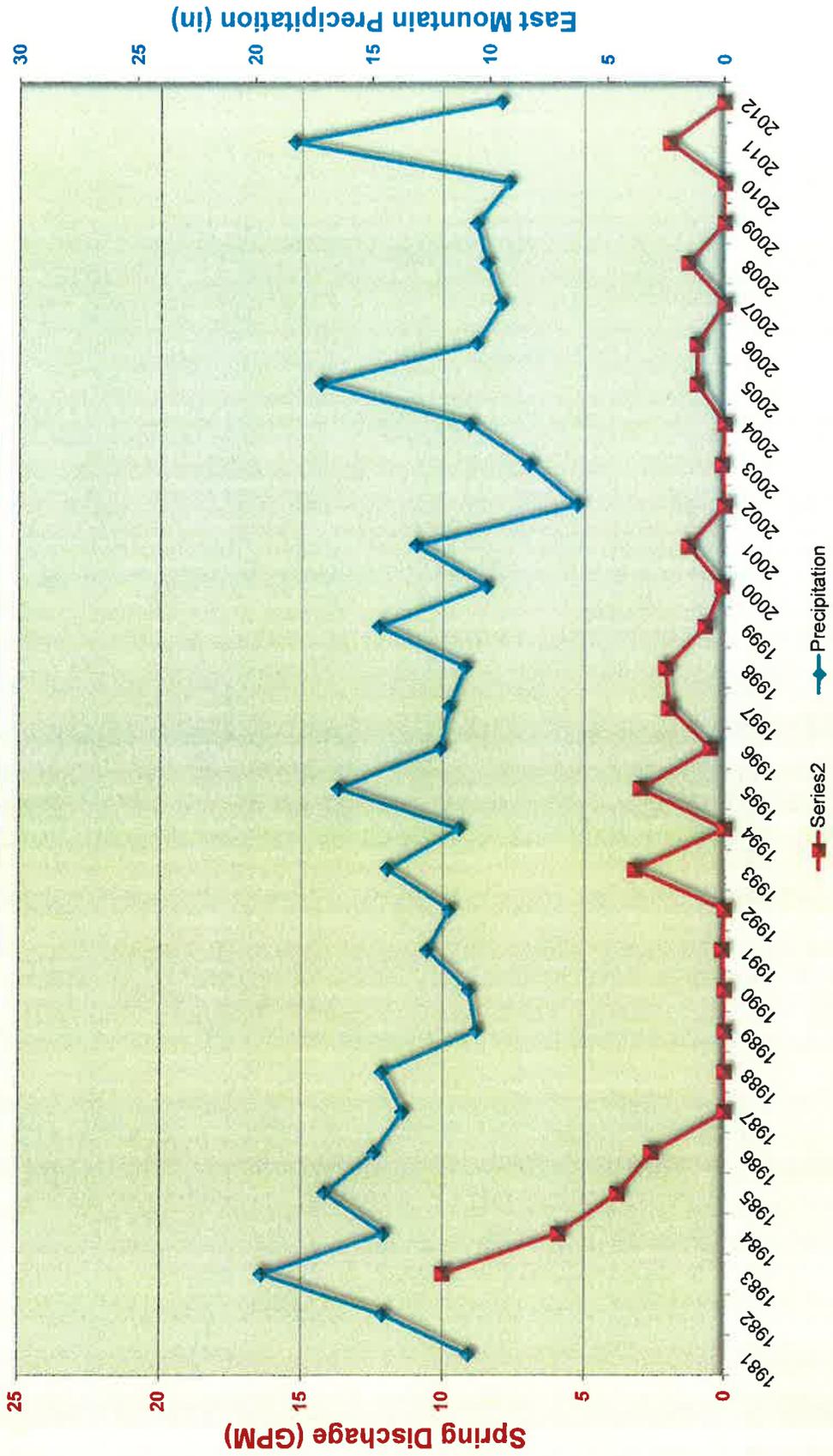
# EAST MOUNTAIN SPRINGS

## SPRING: 80-47 vs. PRECIPITATION

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



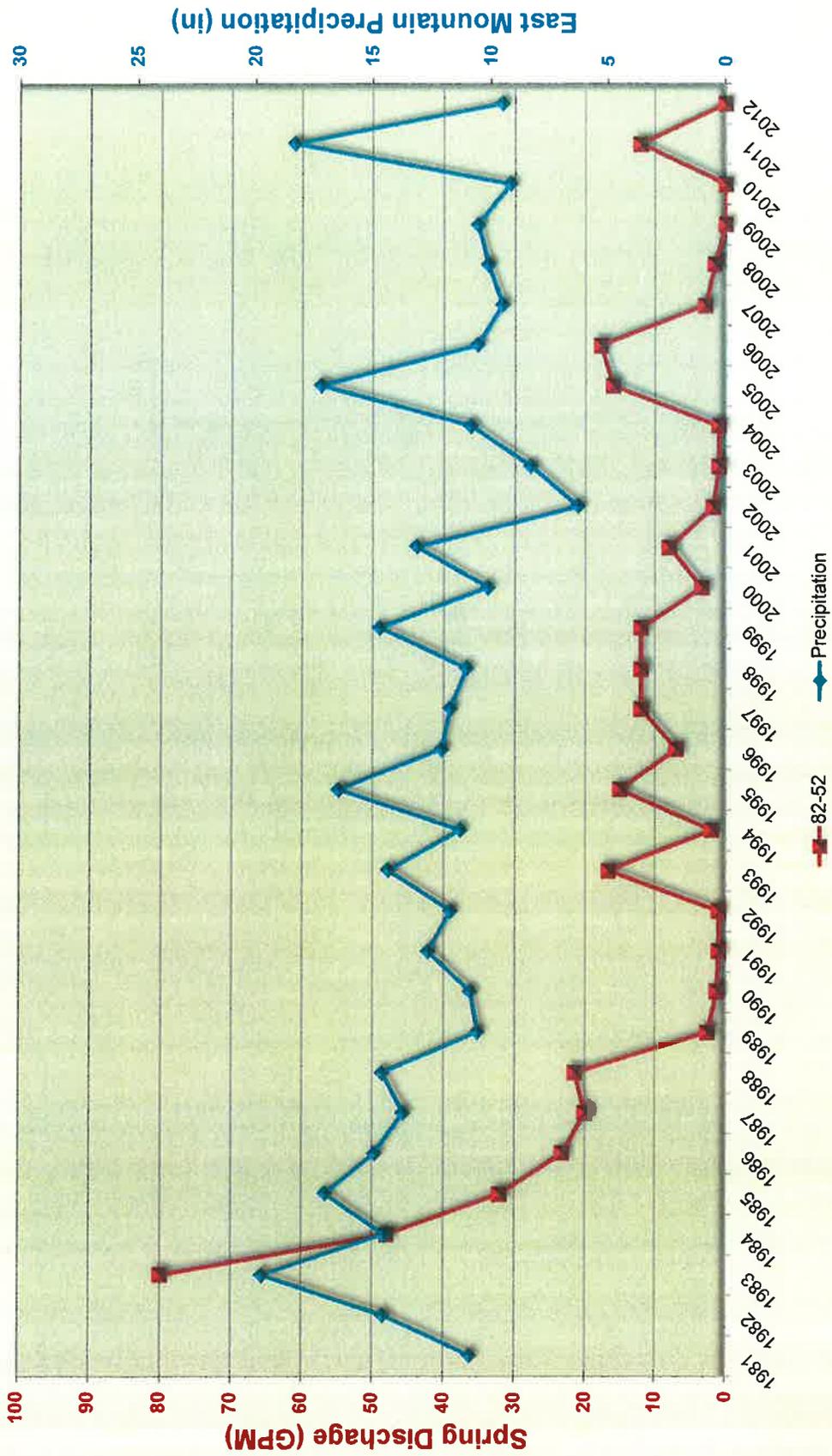
**EAST MOUNTAIN SPRINGS  
 SPRING: 82-51 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



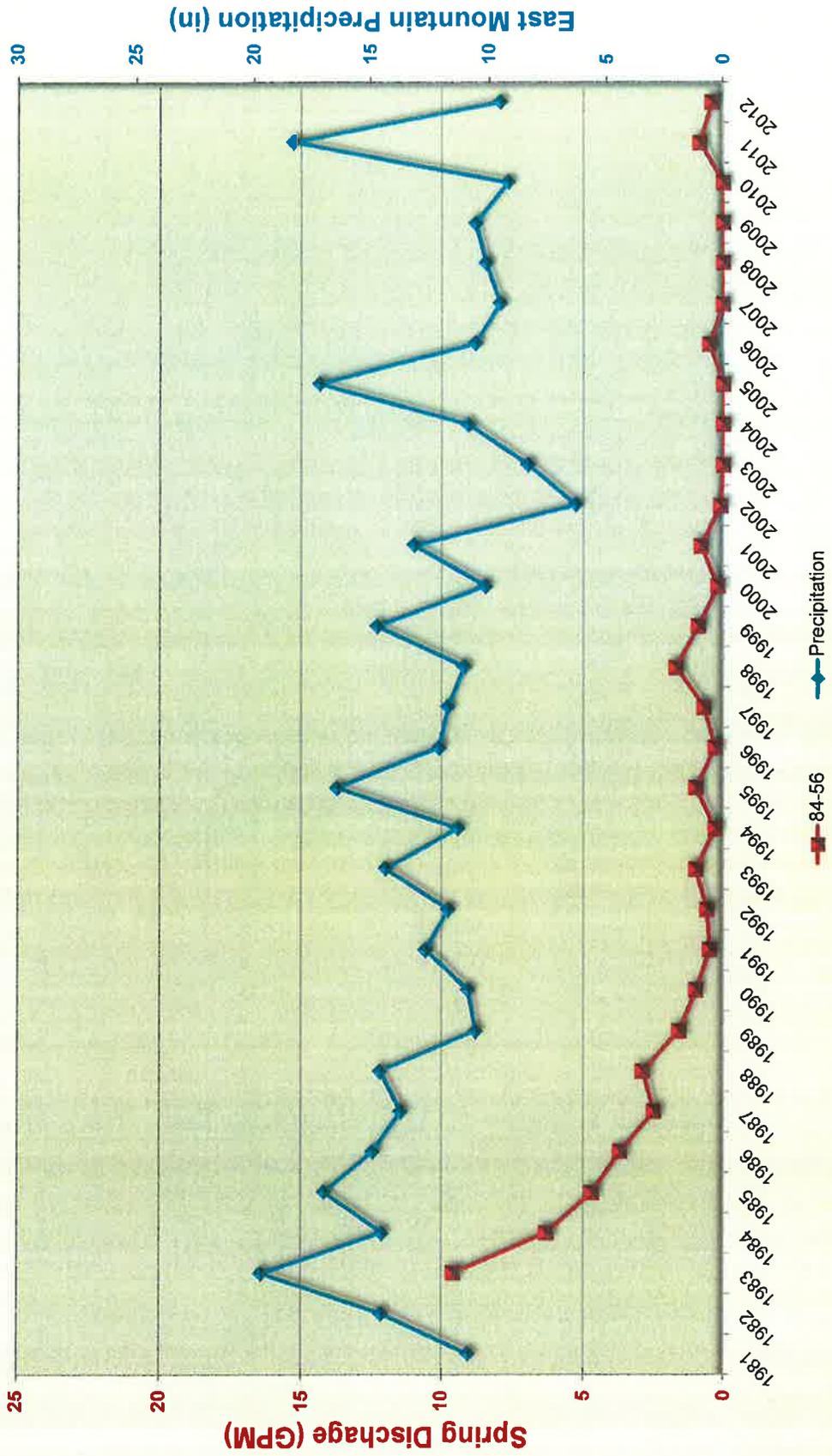
# EAST MOUNTAIN SPRINGS

## SPRING: 82-52 vs. PRECIPITATION

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



**EAST MOUNTAIN SPRINGS**  
**SPRING: 84-56 vs. PRECIPITATION**  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



**East Mountain Springs  
Stiff Diagrams  
Alluvium**

# East Mountain Springs

JV-9

Cations

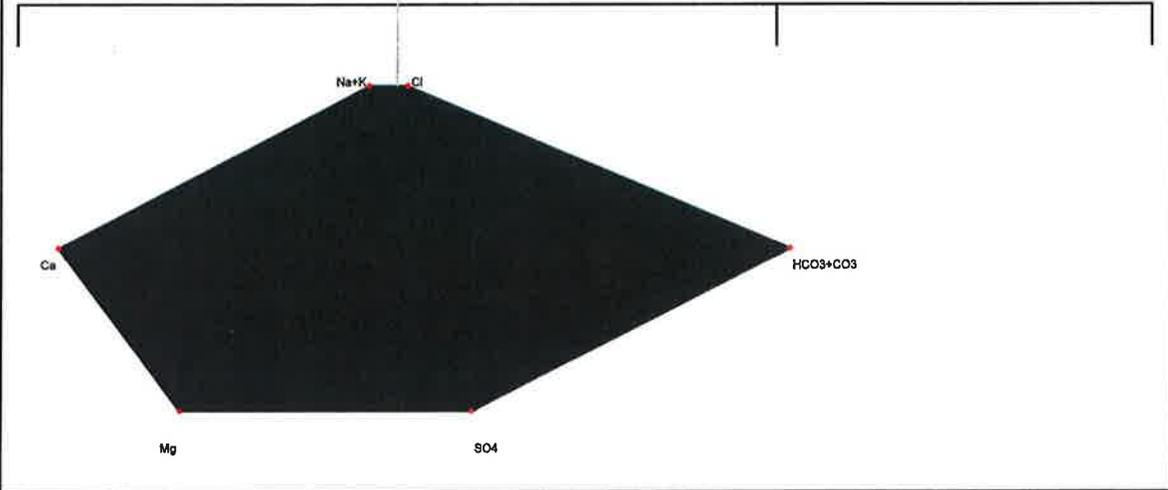
meq/l

Anions

5

5

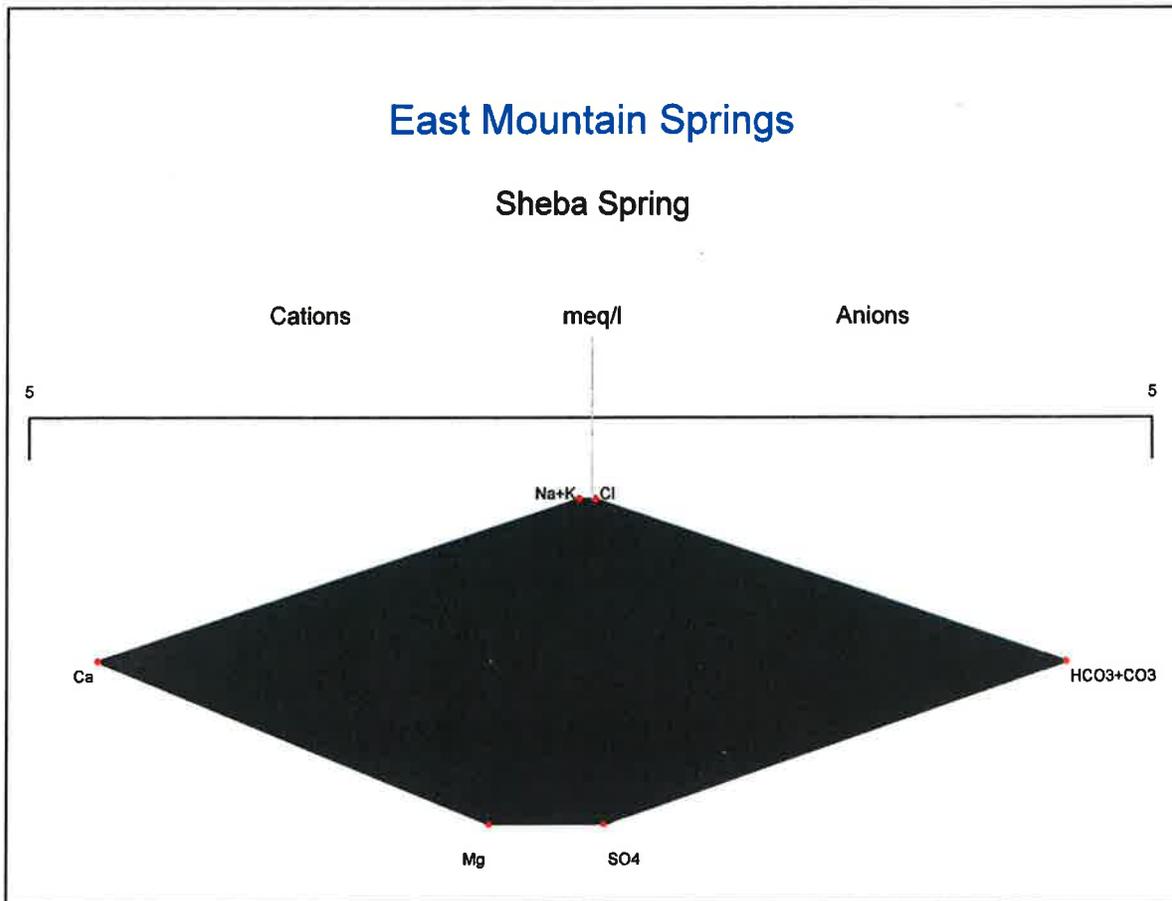
10



**East Mountain Springs  
Stiff Diagrams  
Flagstaff Limestone**

# East Mountain Springs

## Sheba Spring



# East Mountain Springs

79-35

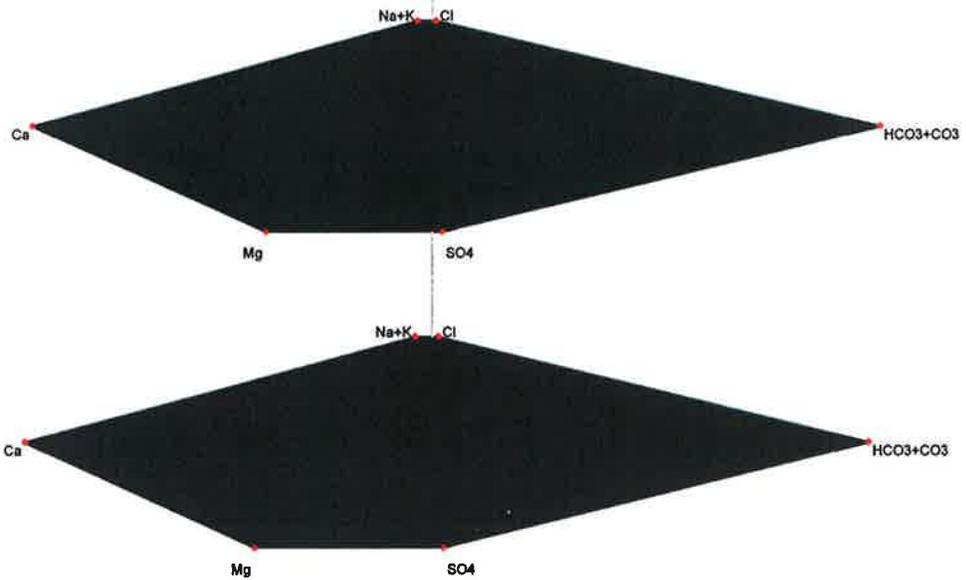
Cations

meq/l

Anions

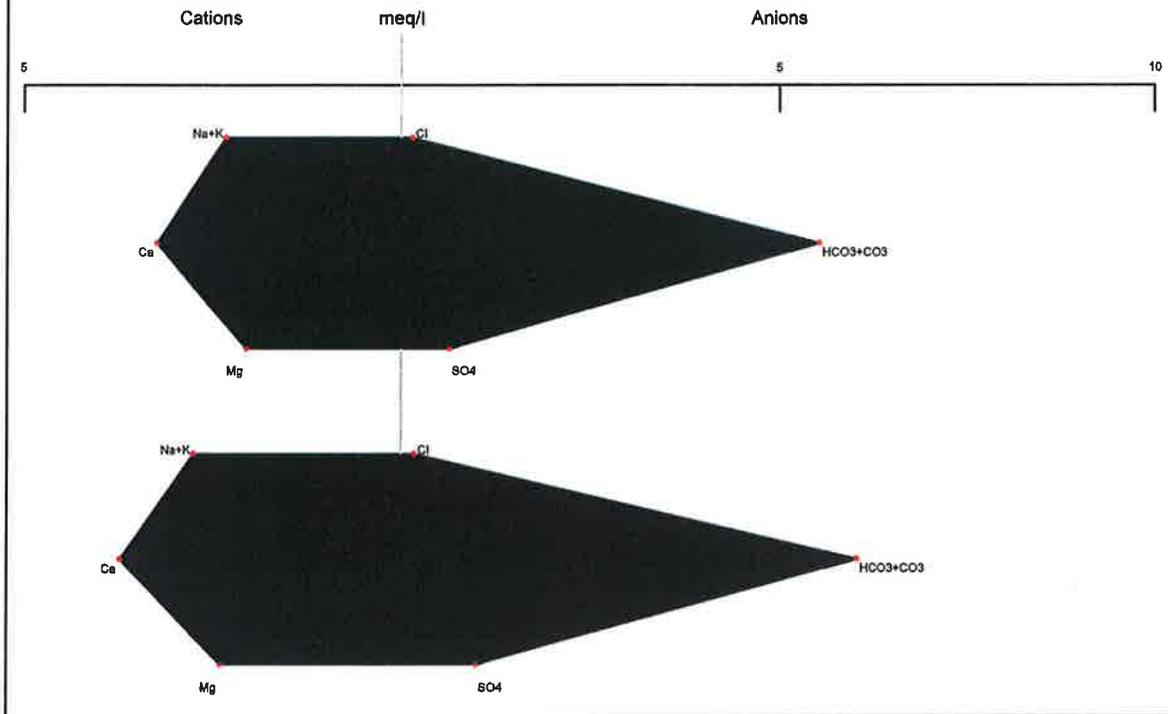
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5



# East Mountain Springs

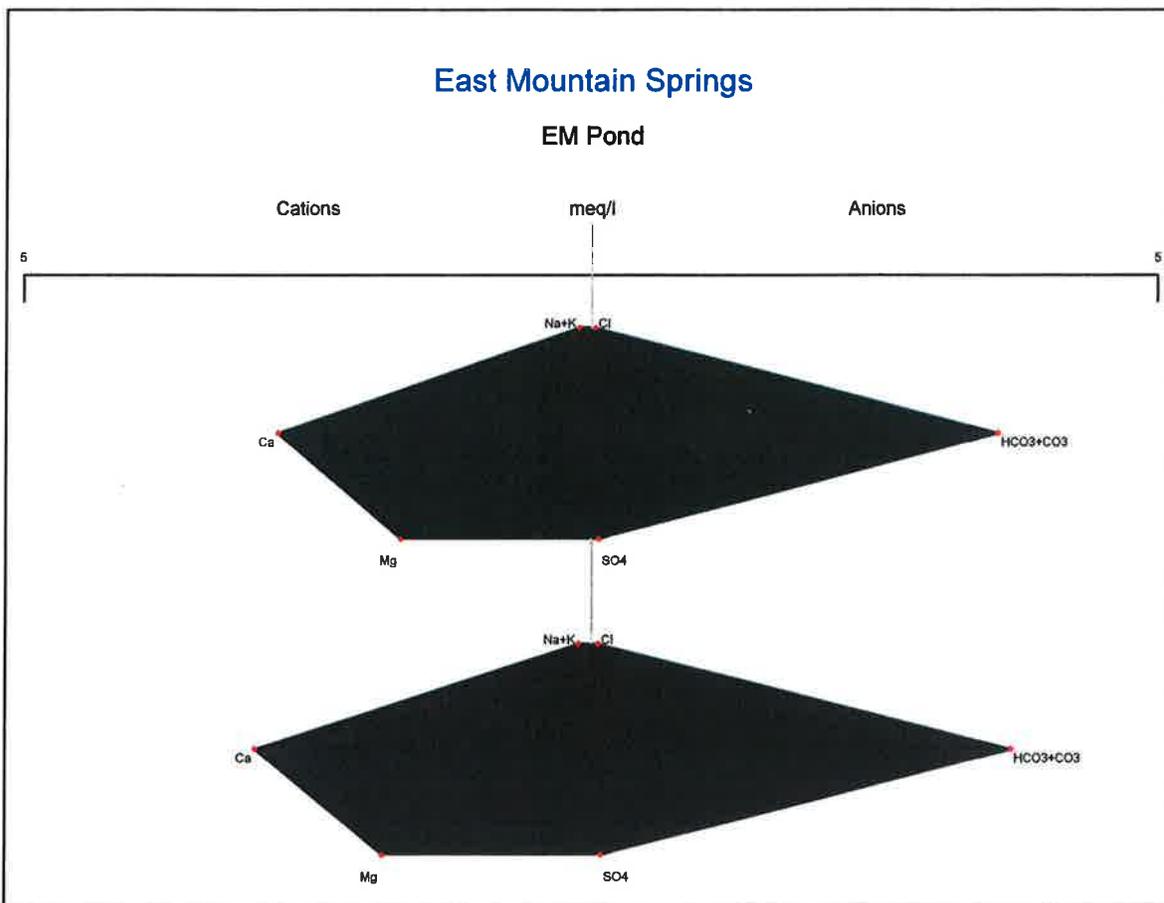
89-60



**East Mountain Springs  
Stiff Diagrams  
North Horn Formation**

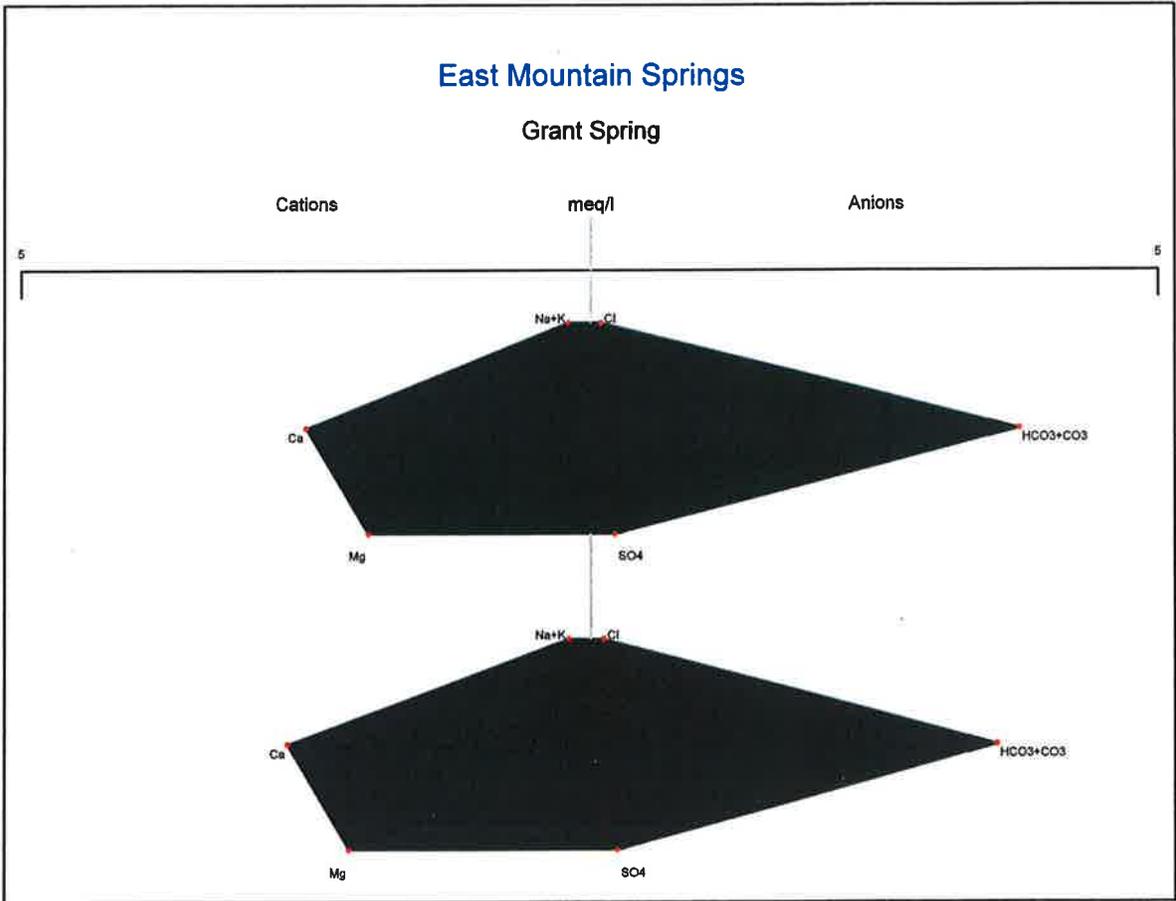
# East Mountain Springs

## EM Pond



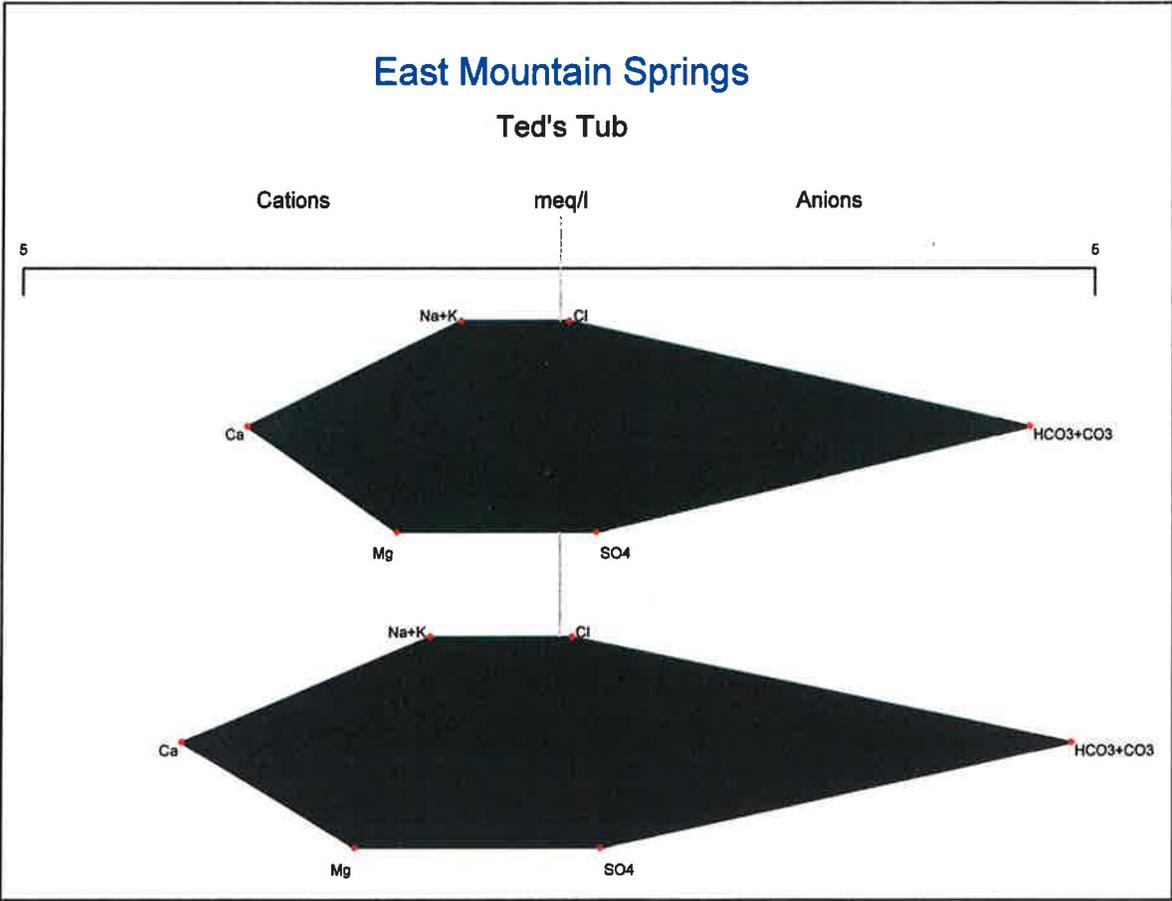
# East Mountain Springs

## Grant Spring



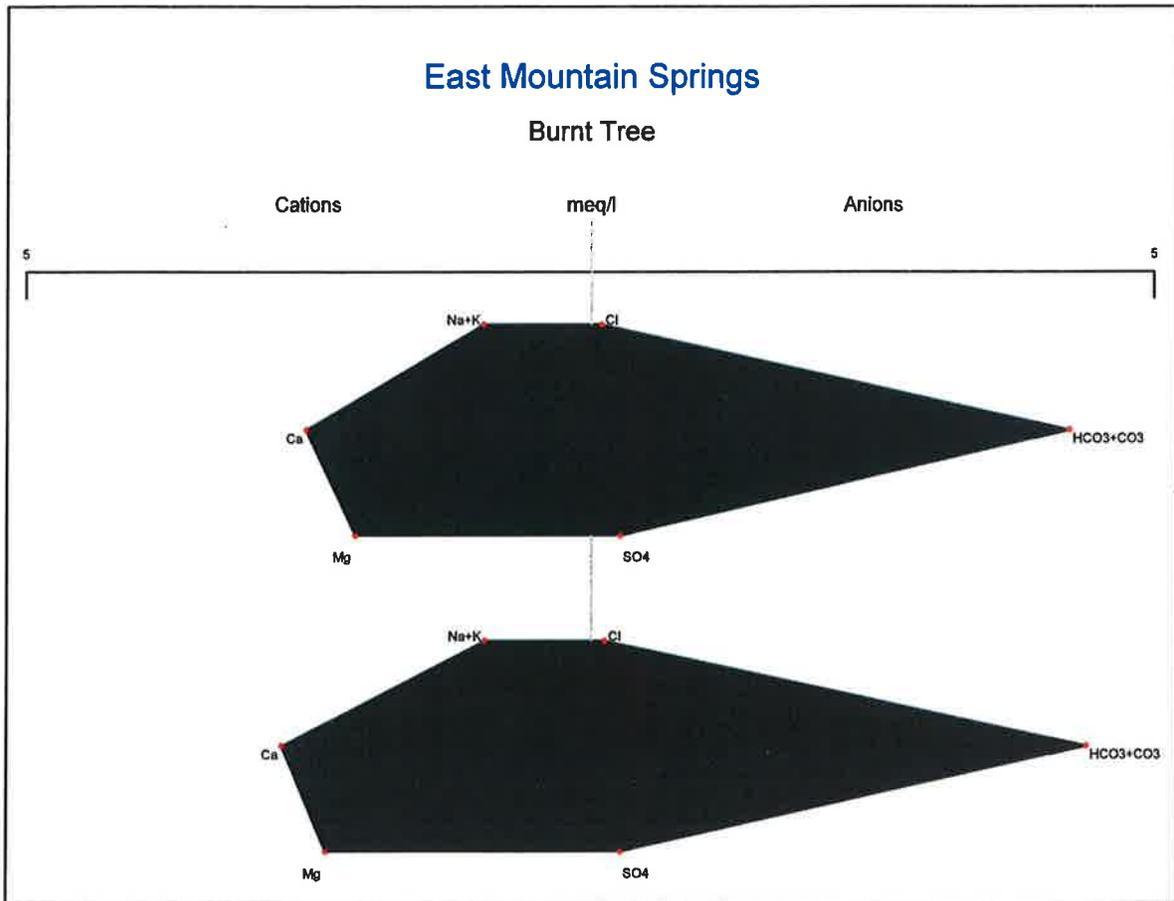
# East Mountain Springs

## Ted's Tub



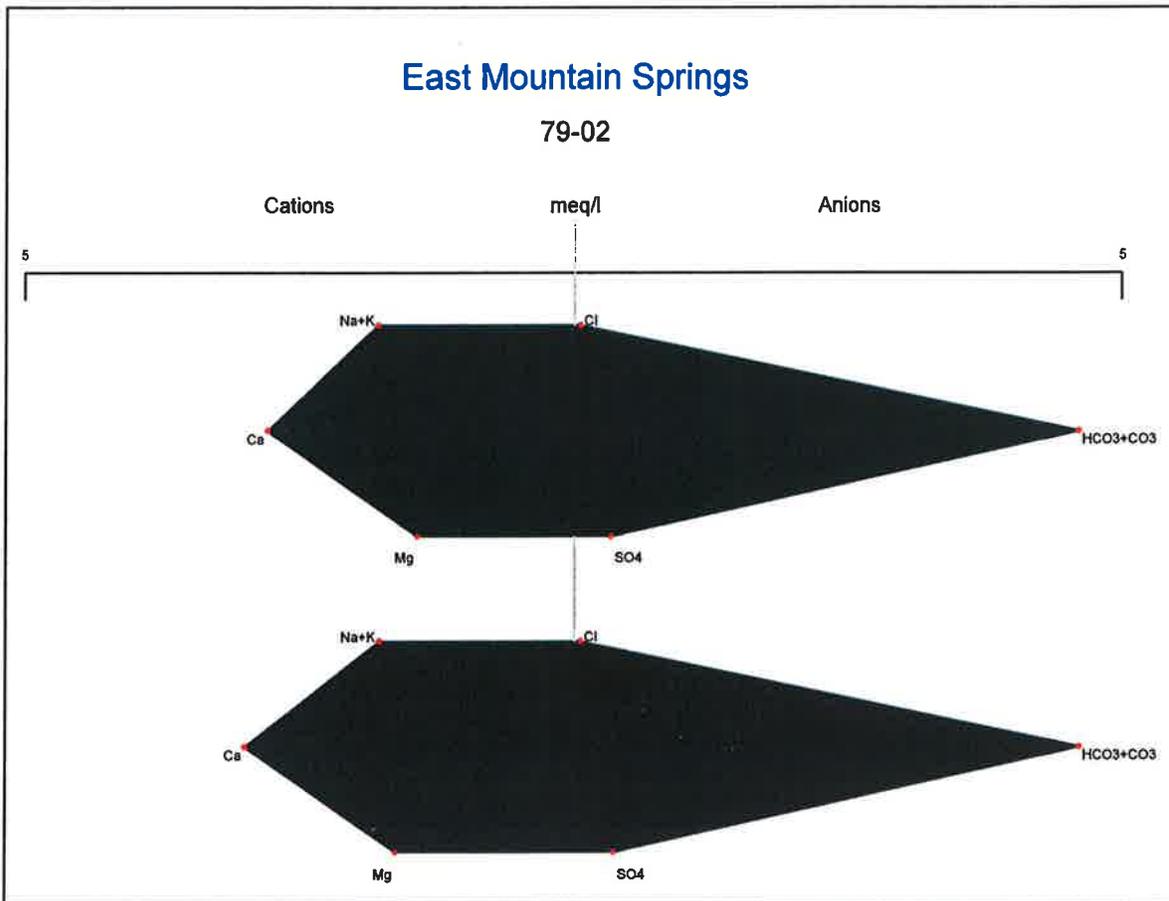
# East Mountain Springs

## Burnt Tree



# East Mountain Springs

79-02



# East Mountain Springs

79-10

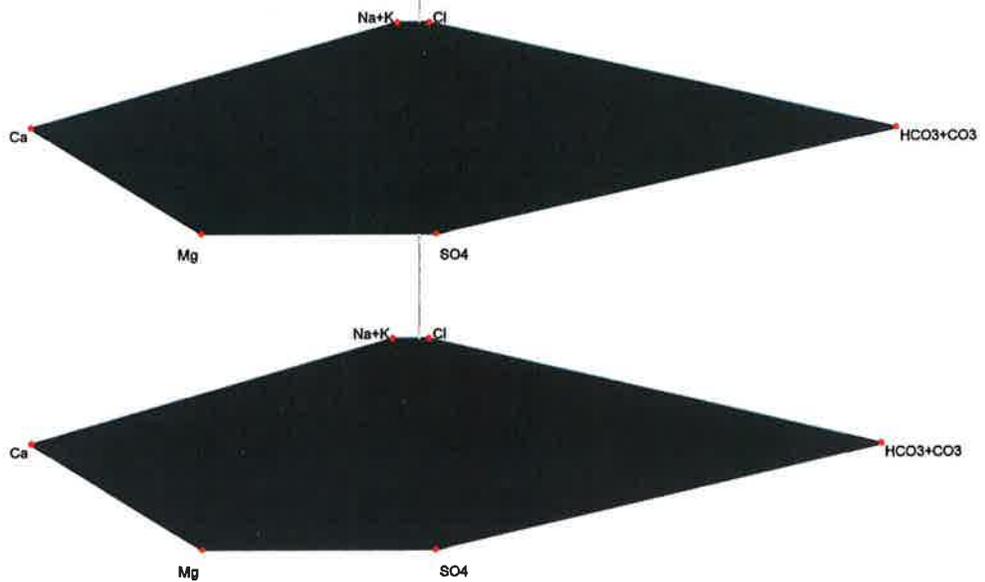
Cations

meq/l

Anions

5

5



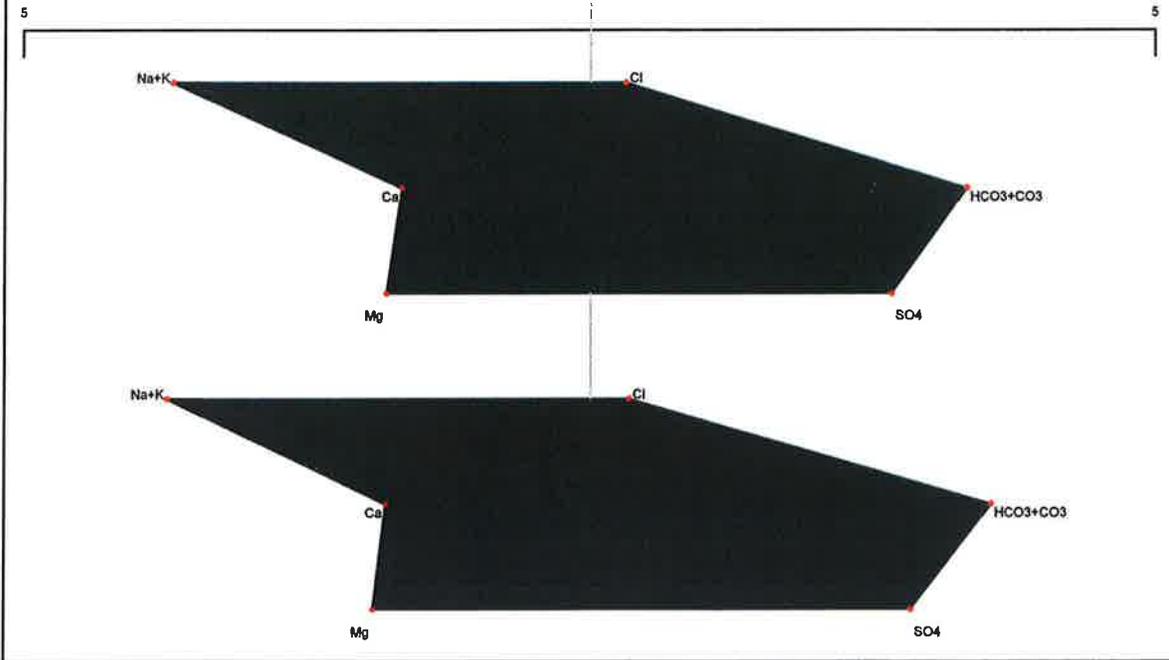
# East Mountain Springs

79-28

Cations

meq/l

Anions



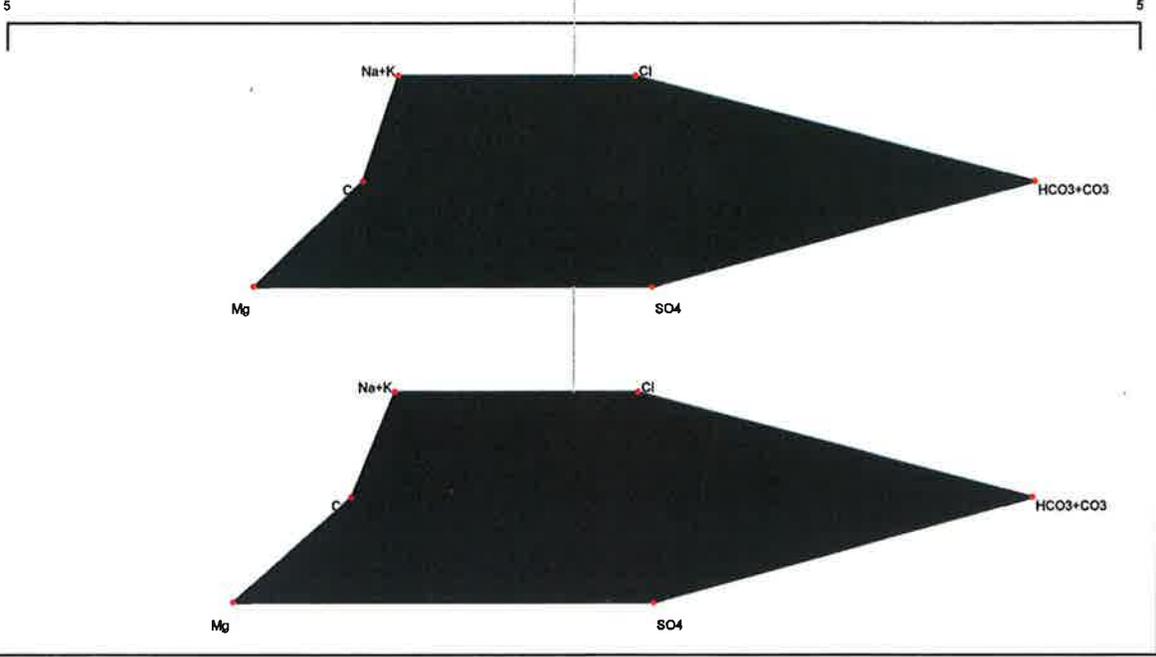
# East Mountain Springs

79-29

Cations

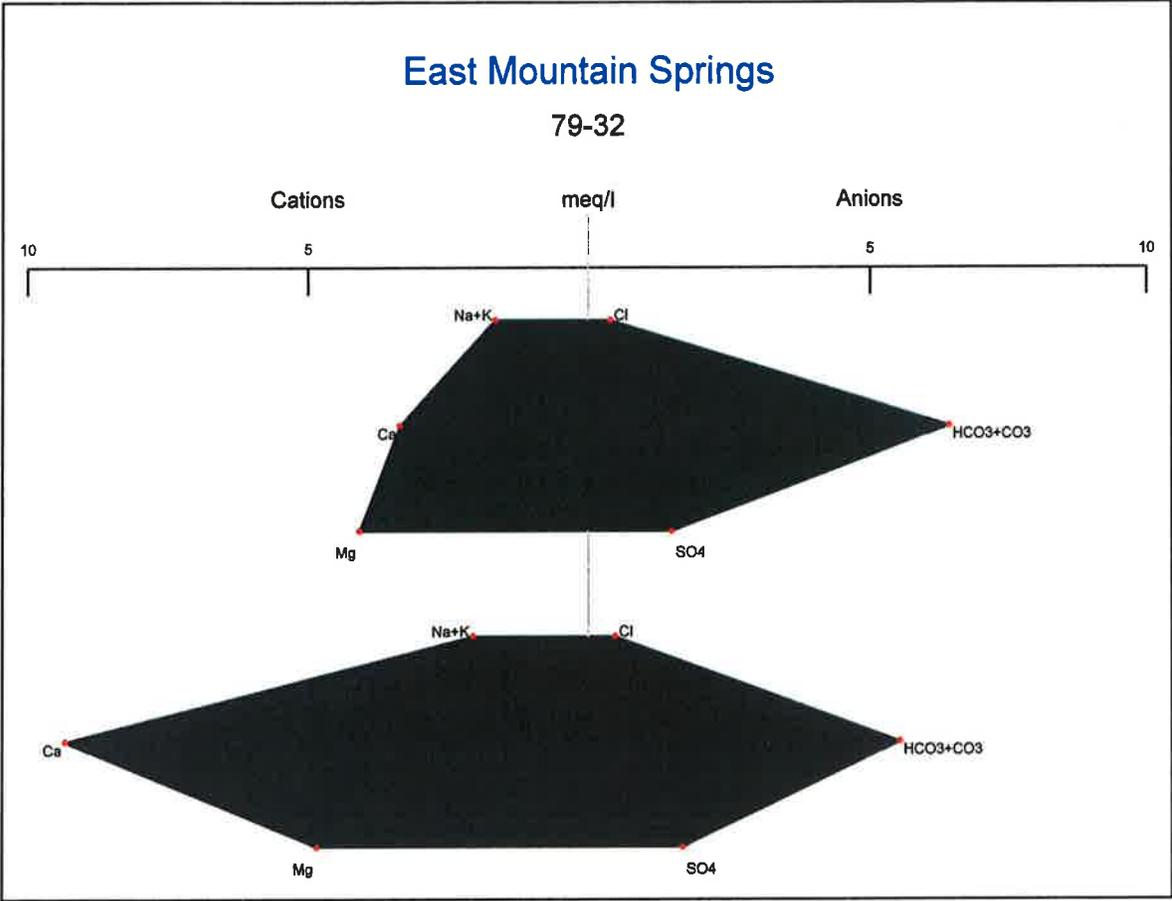
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Anions



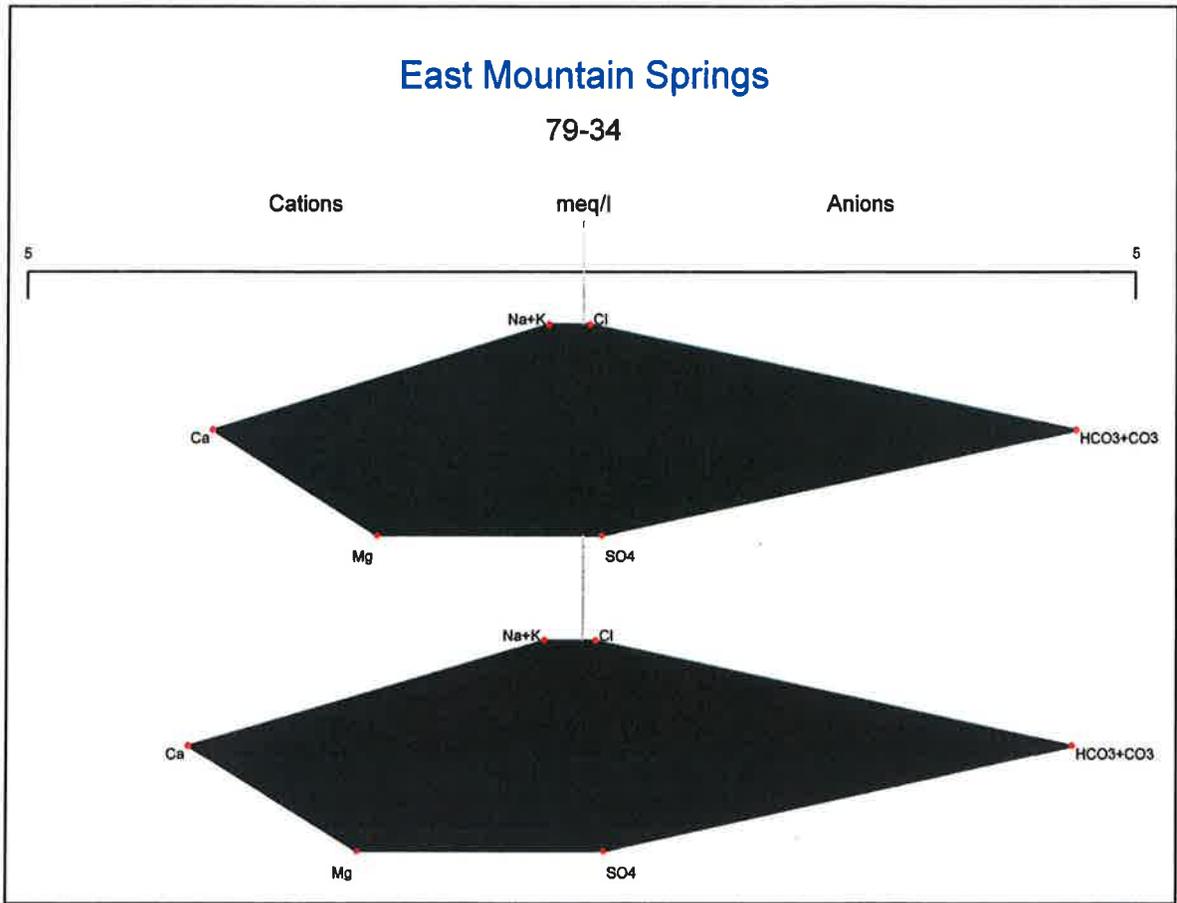
# East Mountain Springs

79-32



# East Mountain Springs

79-34



# East Mountain Springs

80-47

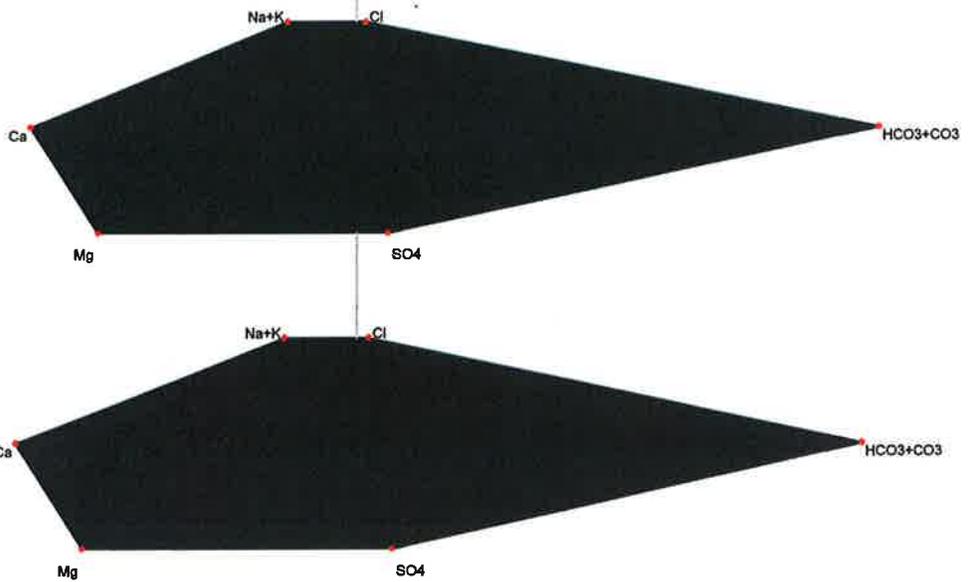
Cations

meq/l

Anions

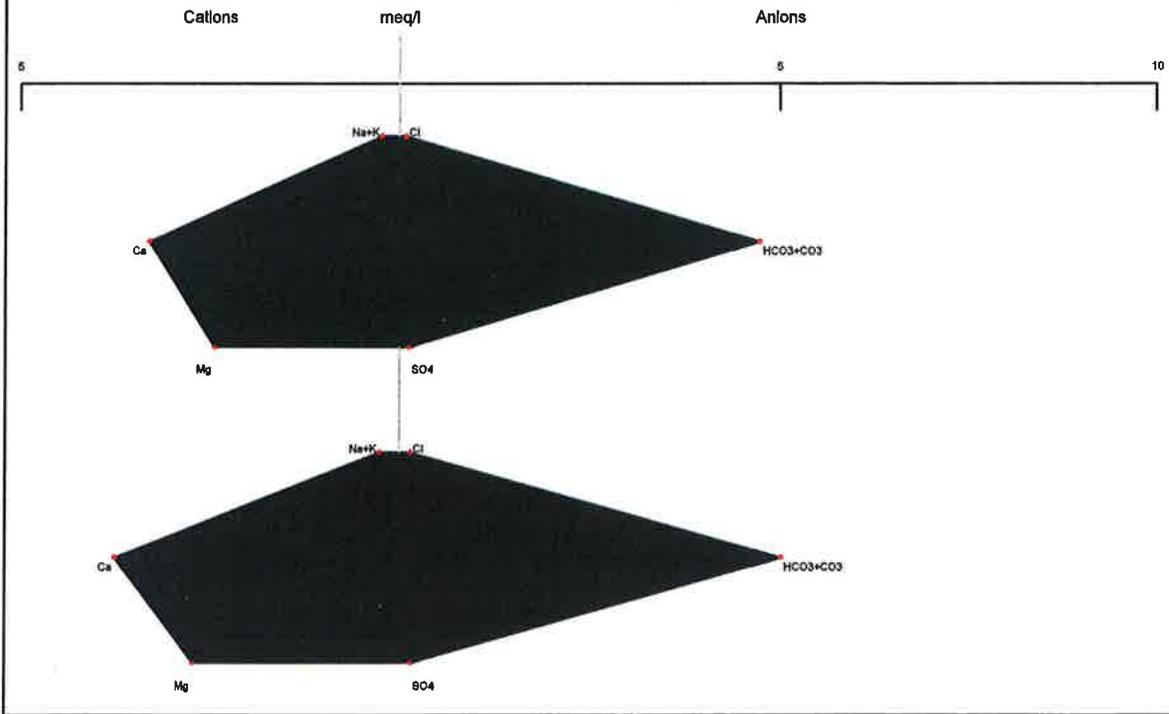
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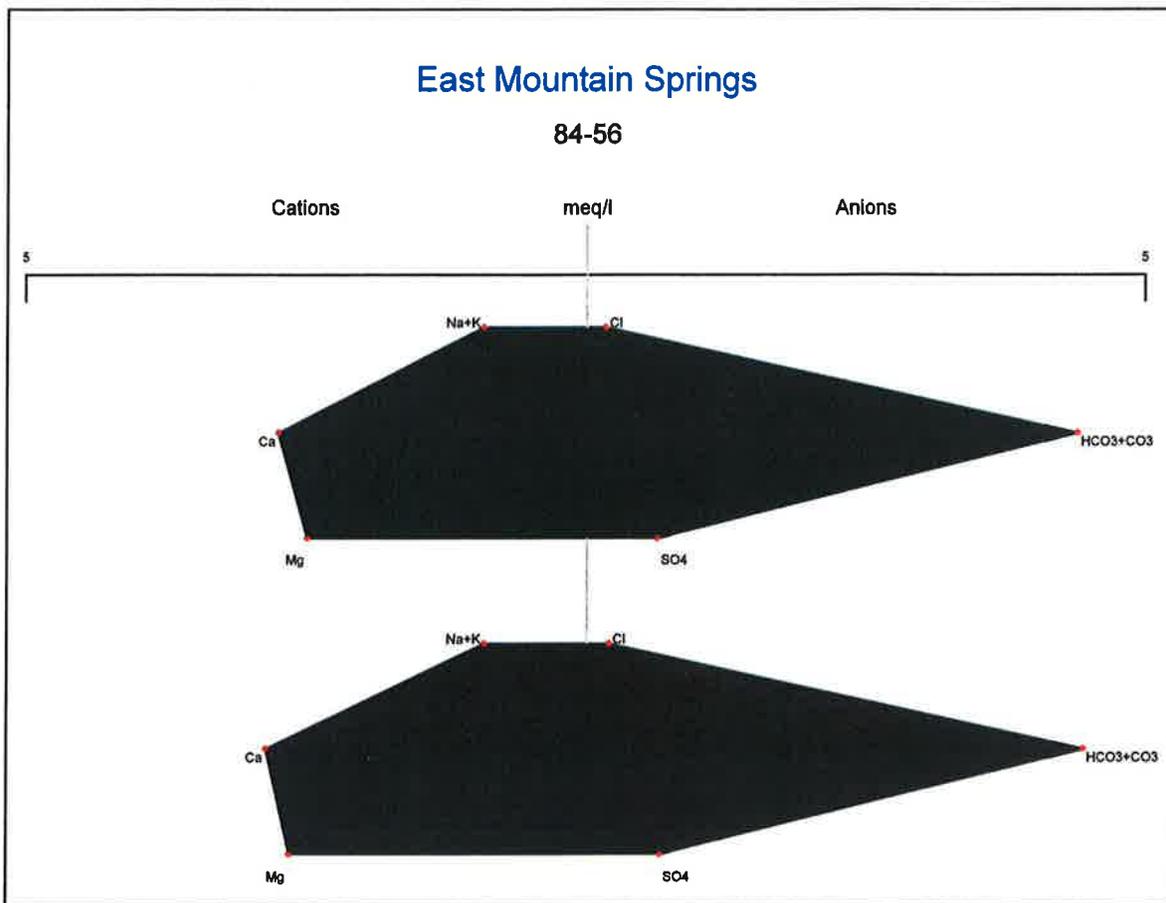
# East Mountain Springs

80-48



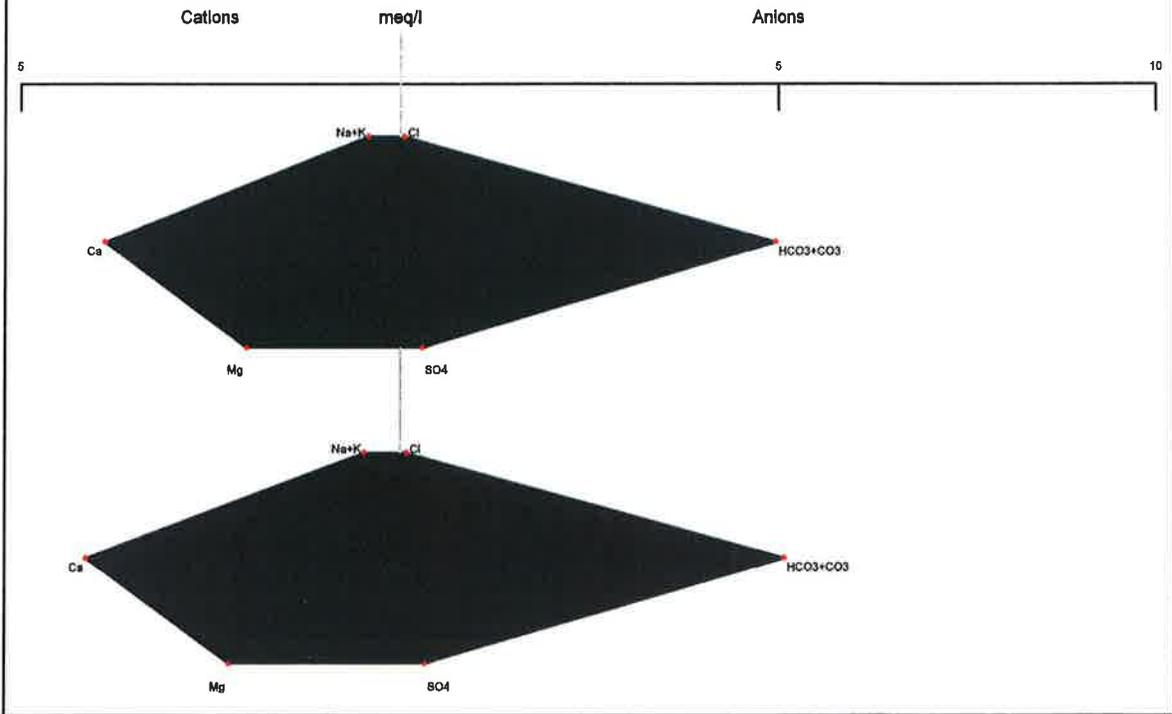
# East Mountain Springs

84-56



# East Mountain Springs

89-65



# East Mountain Springs

89-67

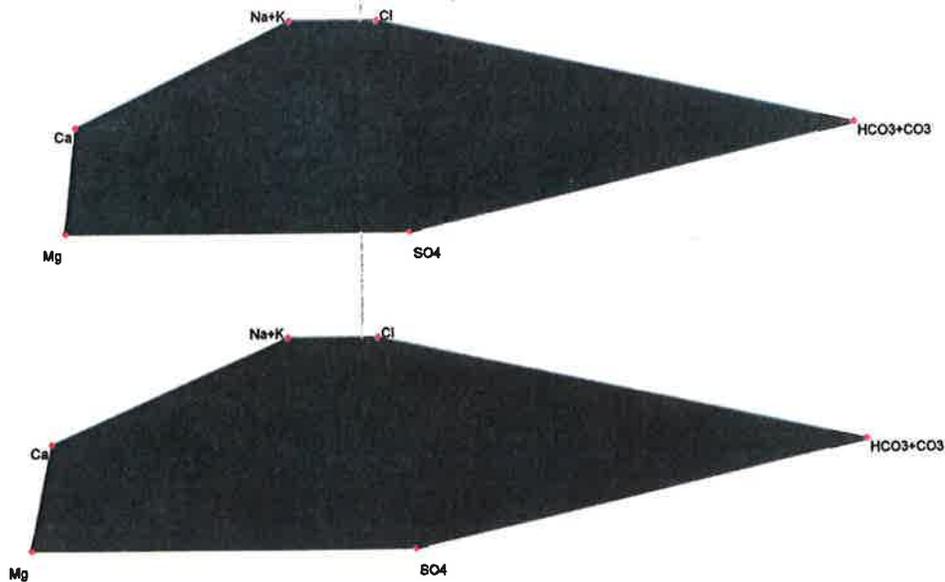
Cations

meq/l

Anions

5

5



# East Mountain Springs

89-68

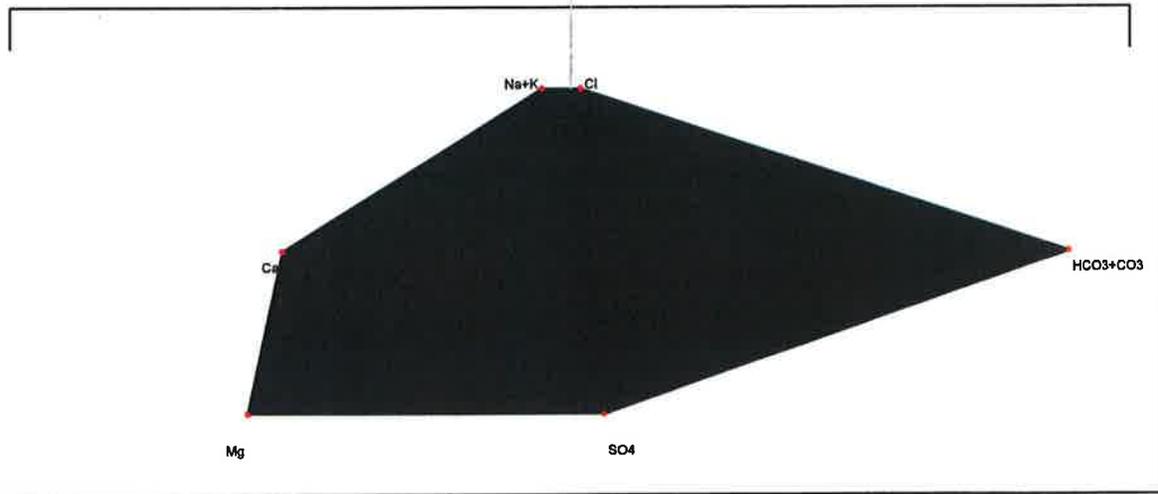
Cations

meq/l

Anions

5

5



2

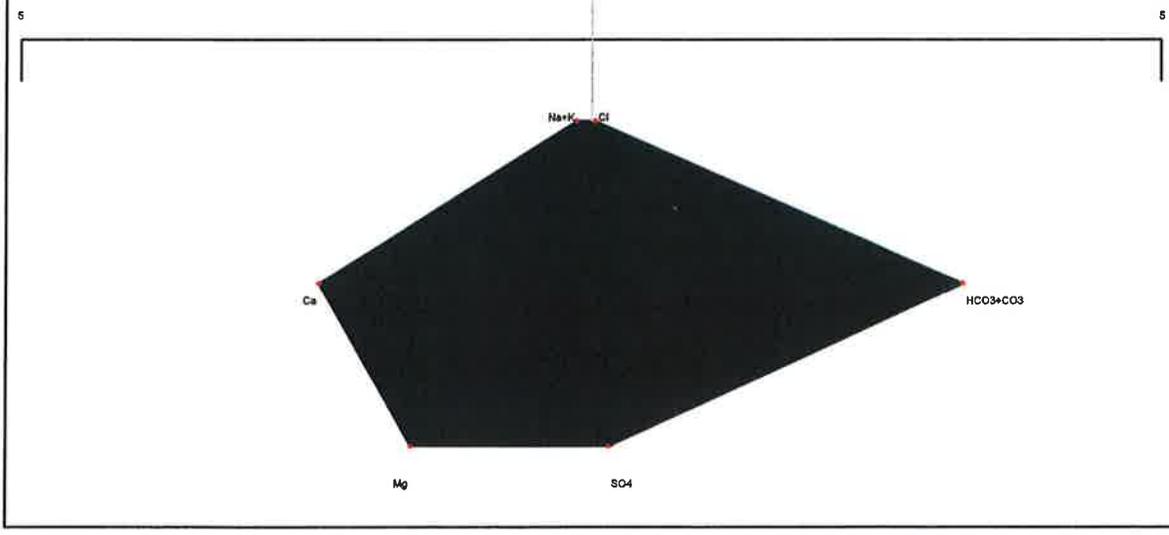
# East Mountain Springs

MF-10

Cations

meq/l

Anions



# East Mountain Springs

MF-219

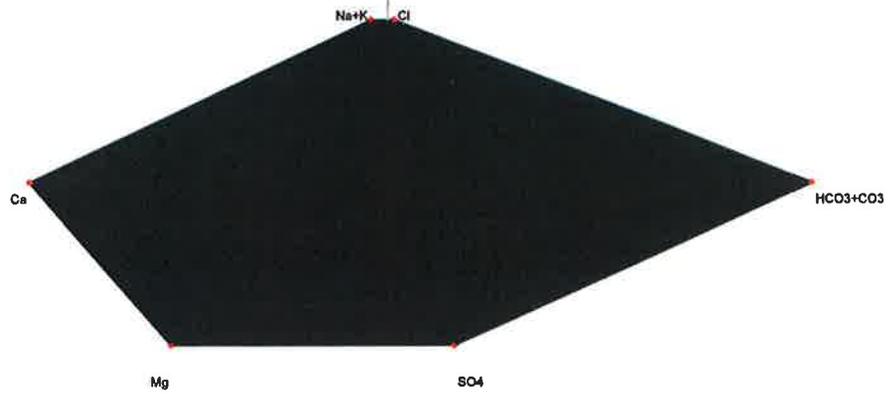
Cations

meq/l

Anions

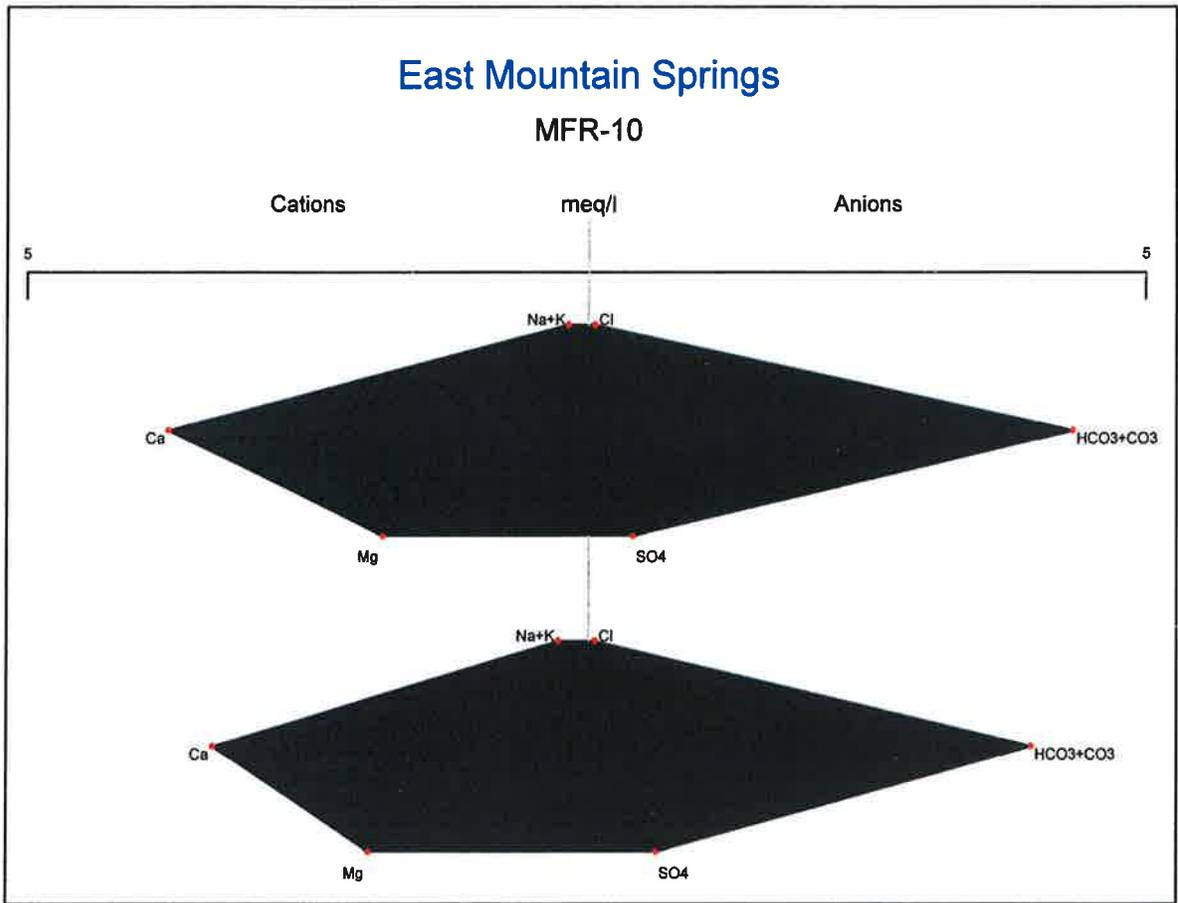
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5



# East Mountain Springs

MFR-10



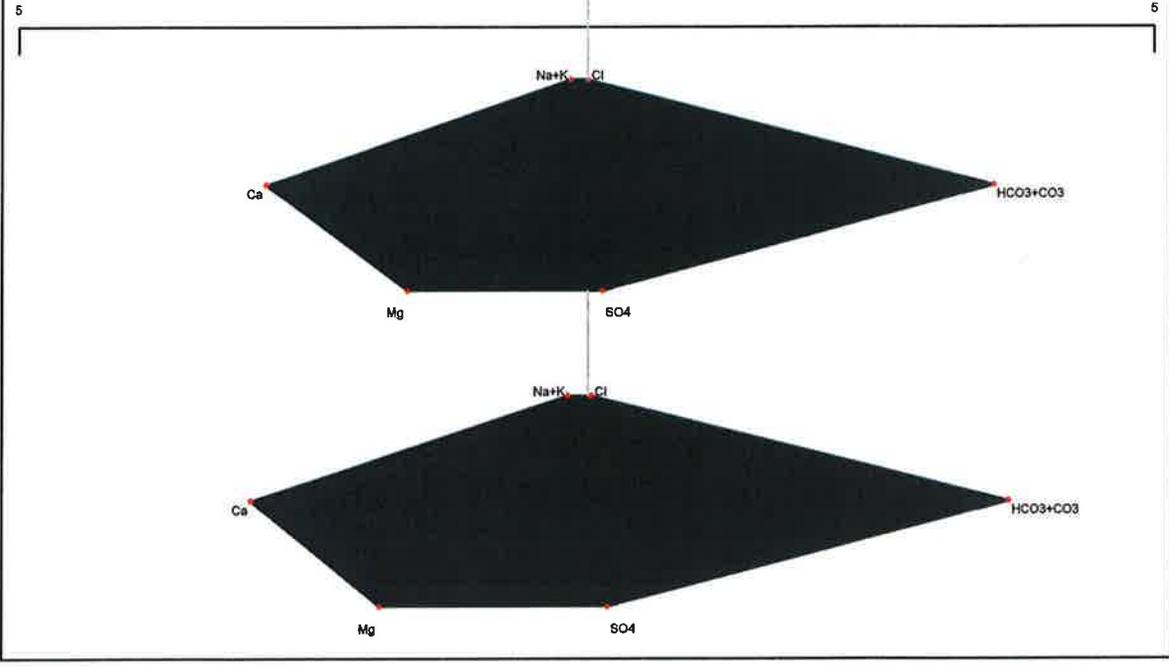
# East Mountain Springs

RR-15

Cations

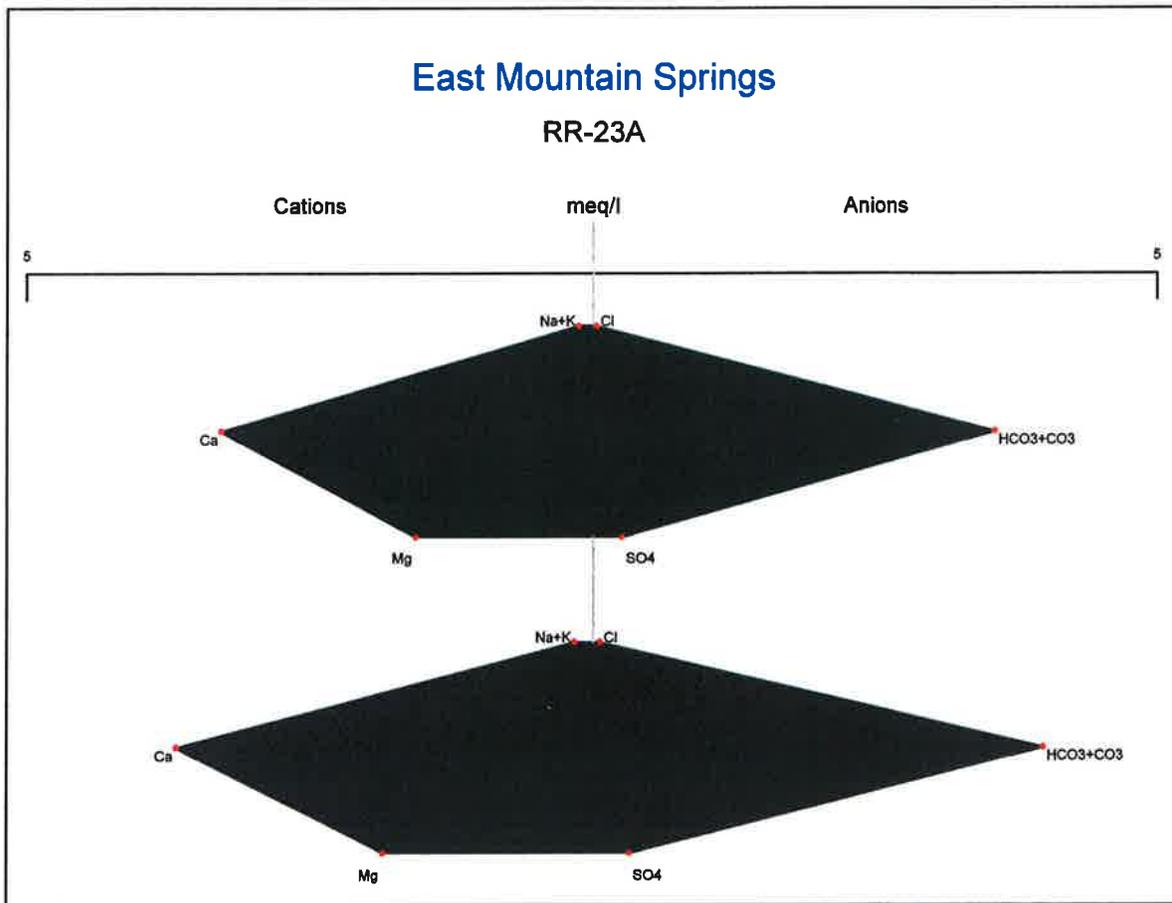
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Anions



# East Mountain Springs

RR-23A



2

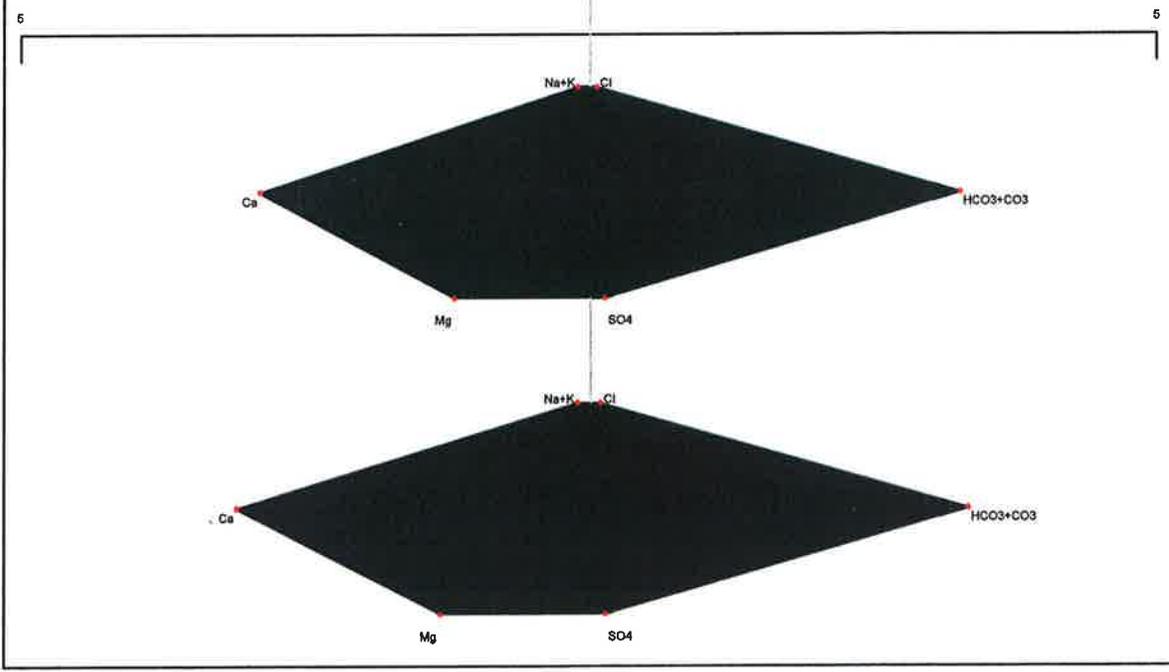
# East Mountain Springs

SPI-26

Cations

meq/l

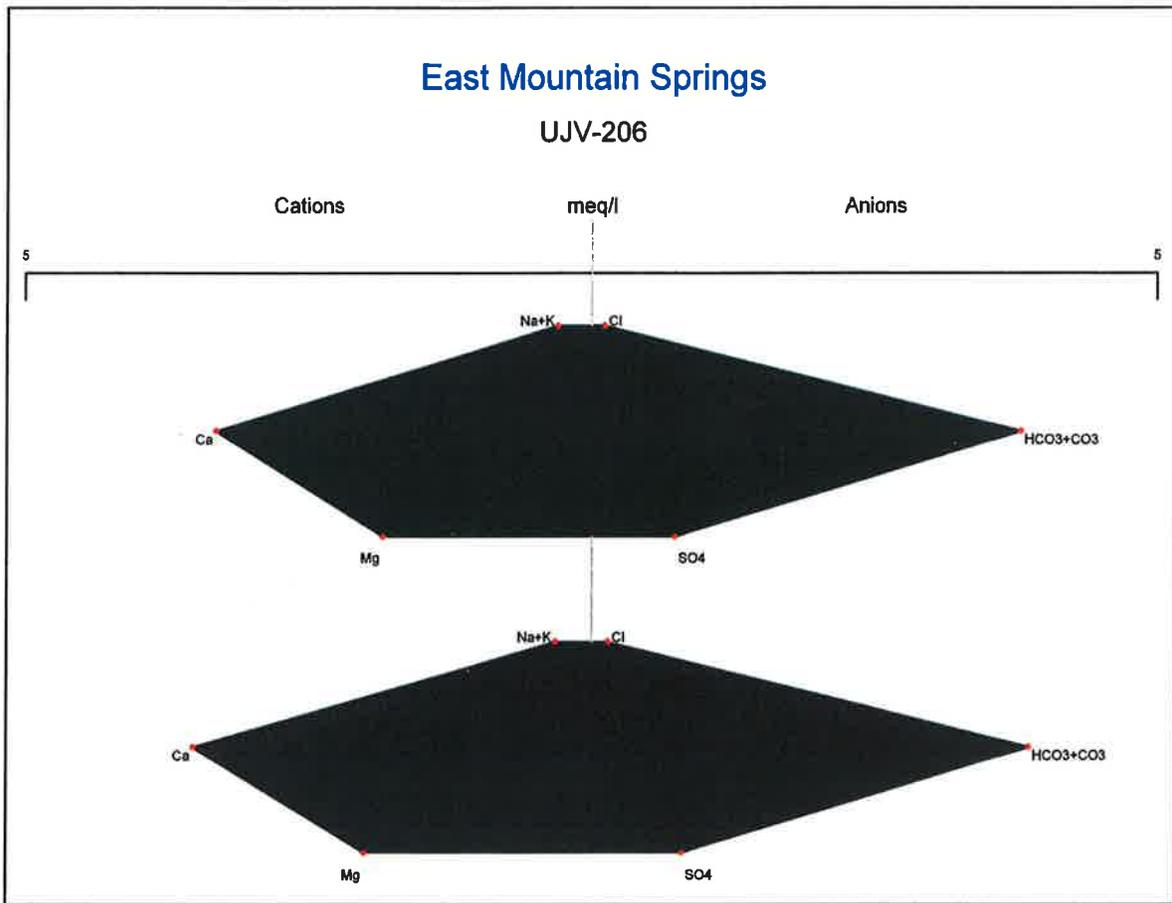
Anions



**East Mountain Springs  
Stiff Diagrams  
Price River Formation**

# East Mountain Springs

UJV-206



**East Mountain Springs  
Stiff Diagrams  
Castlegate Sandstone**

# East Mountain Springs

UJV-101

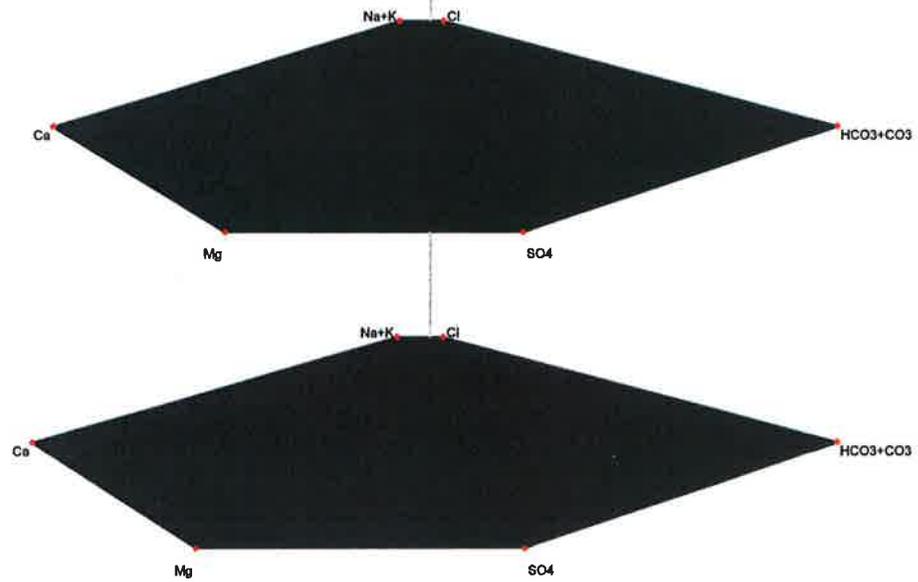
Cations

meq/l

Anions

5

5



# East Mountain Springs

UJV-213

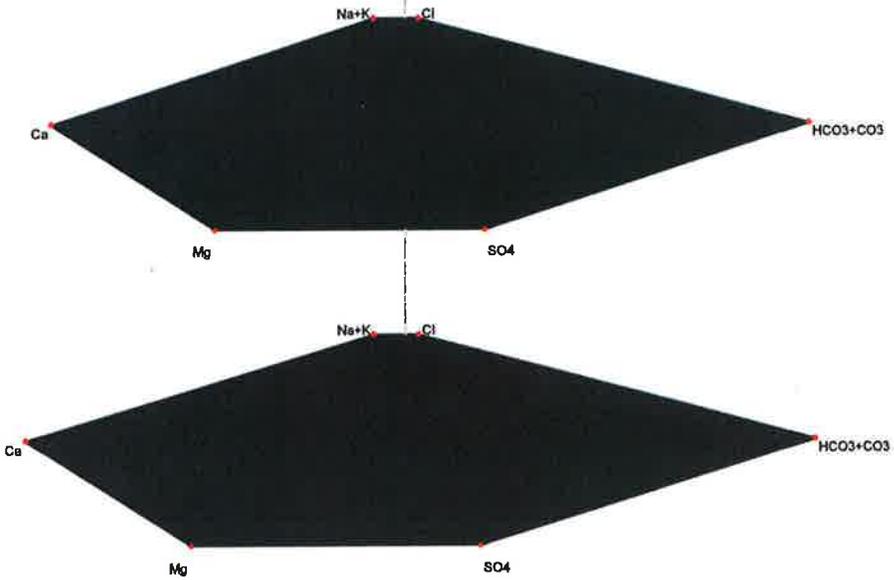
Cations

meq/l

Anions

5

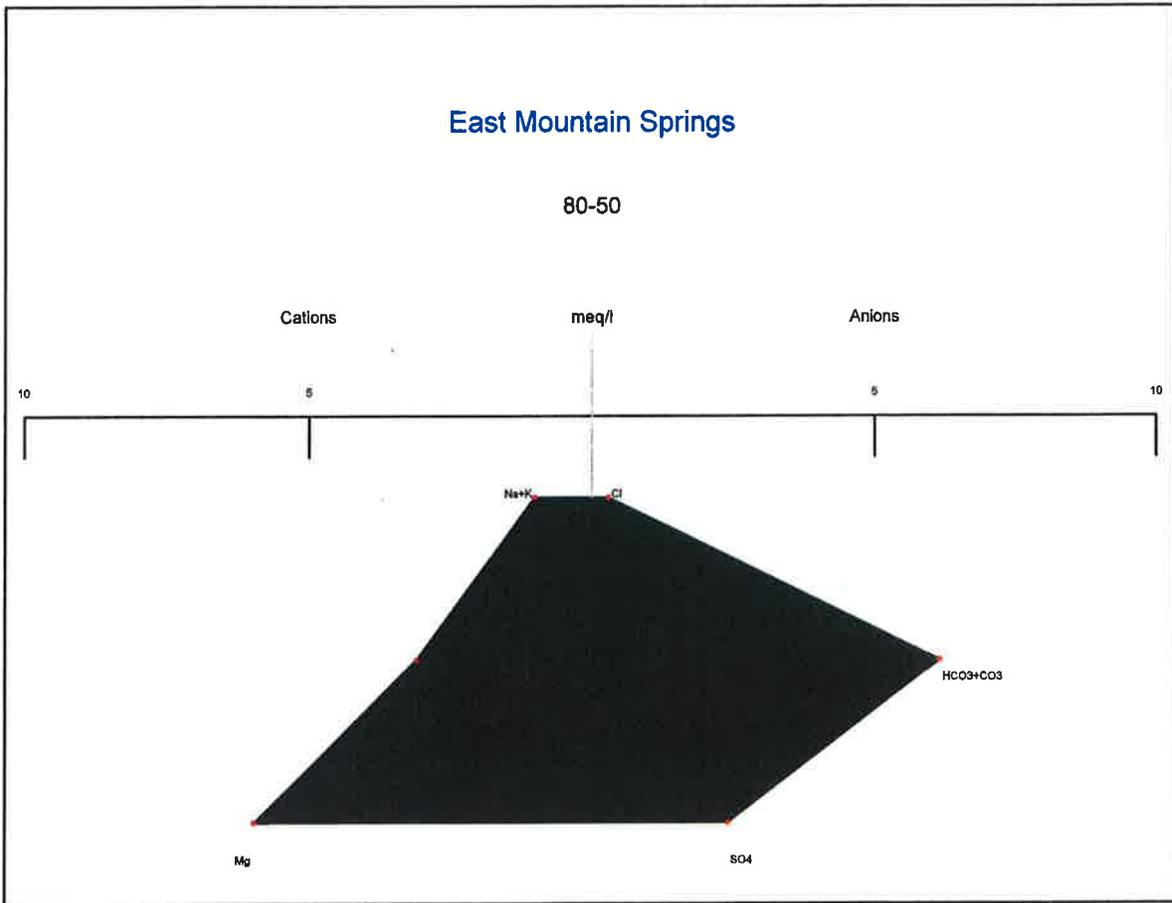
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**East Mountain Springs  
Stiff Diagrams  
Blackhawk Formation**

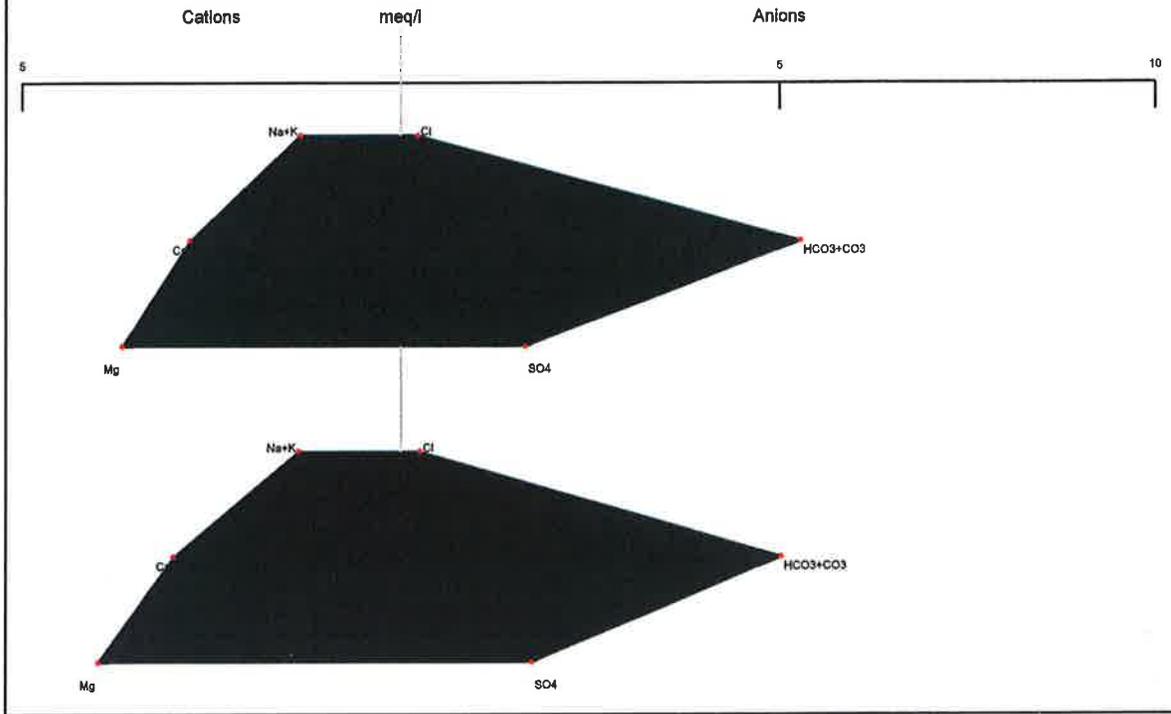
# East Mountain Springs

80-50



# East Mountain Springs

91-72



# East Mountain Springs

MF-7

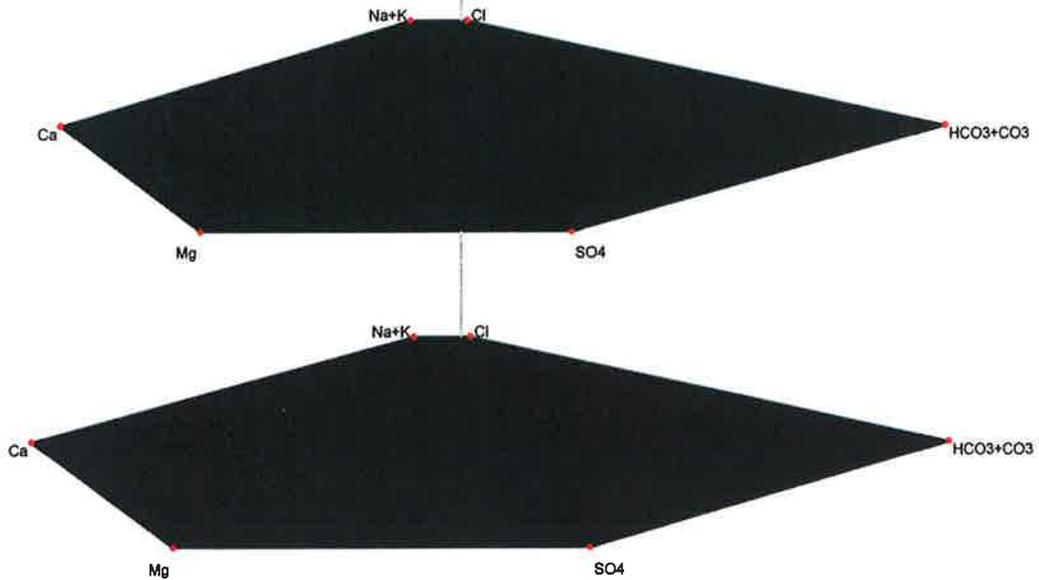
Cations

meq/l

Anions

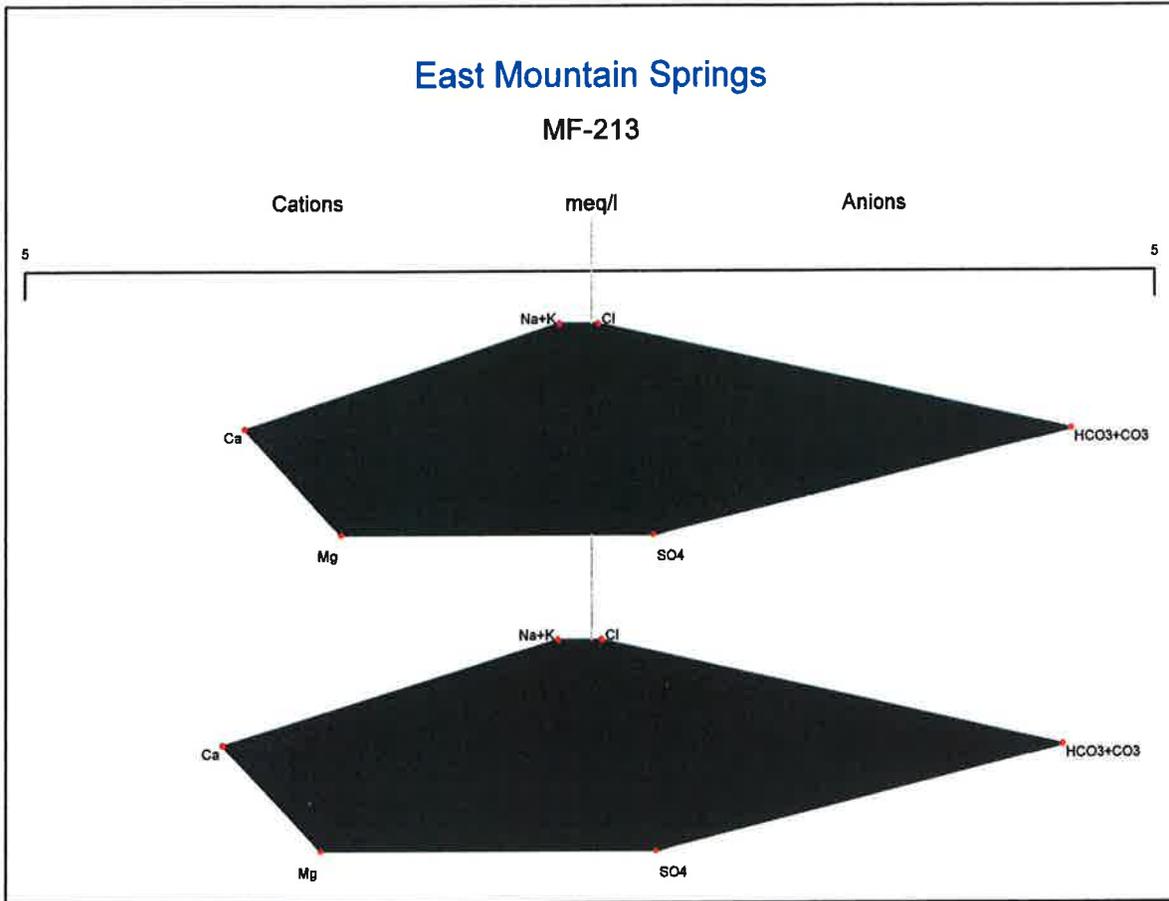
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5



# East Mountain Springs

MF-213

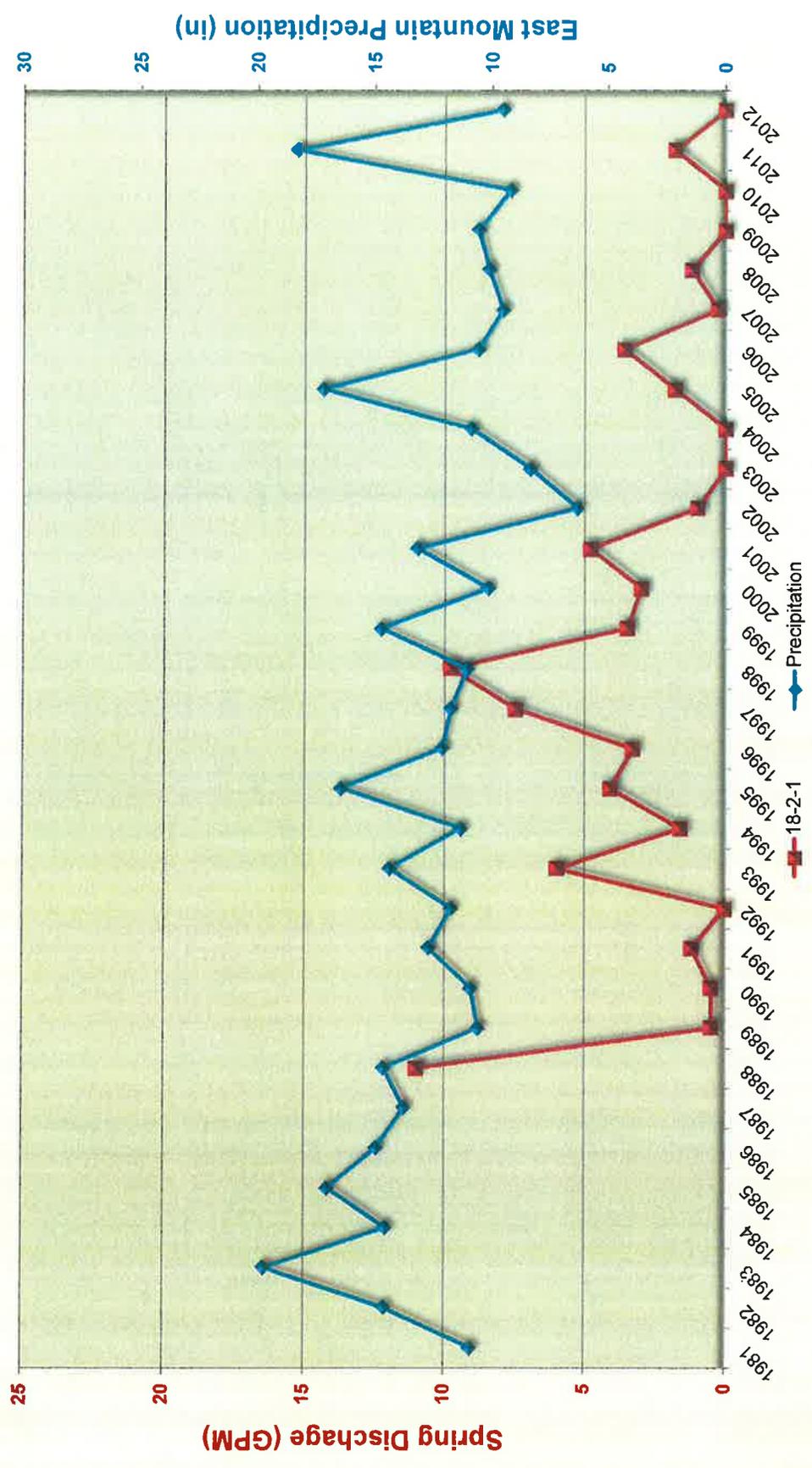


**East Mountain Springs  
Stiff Diagrams  
Star Point Sandstone**



# **Trail Mountain Springs Flow vs Precipitation**

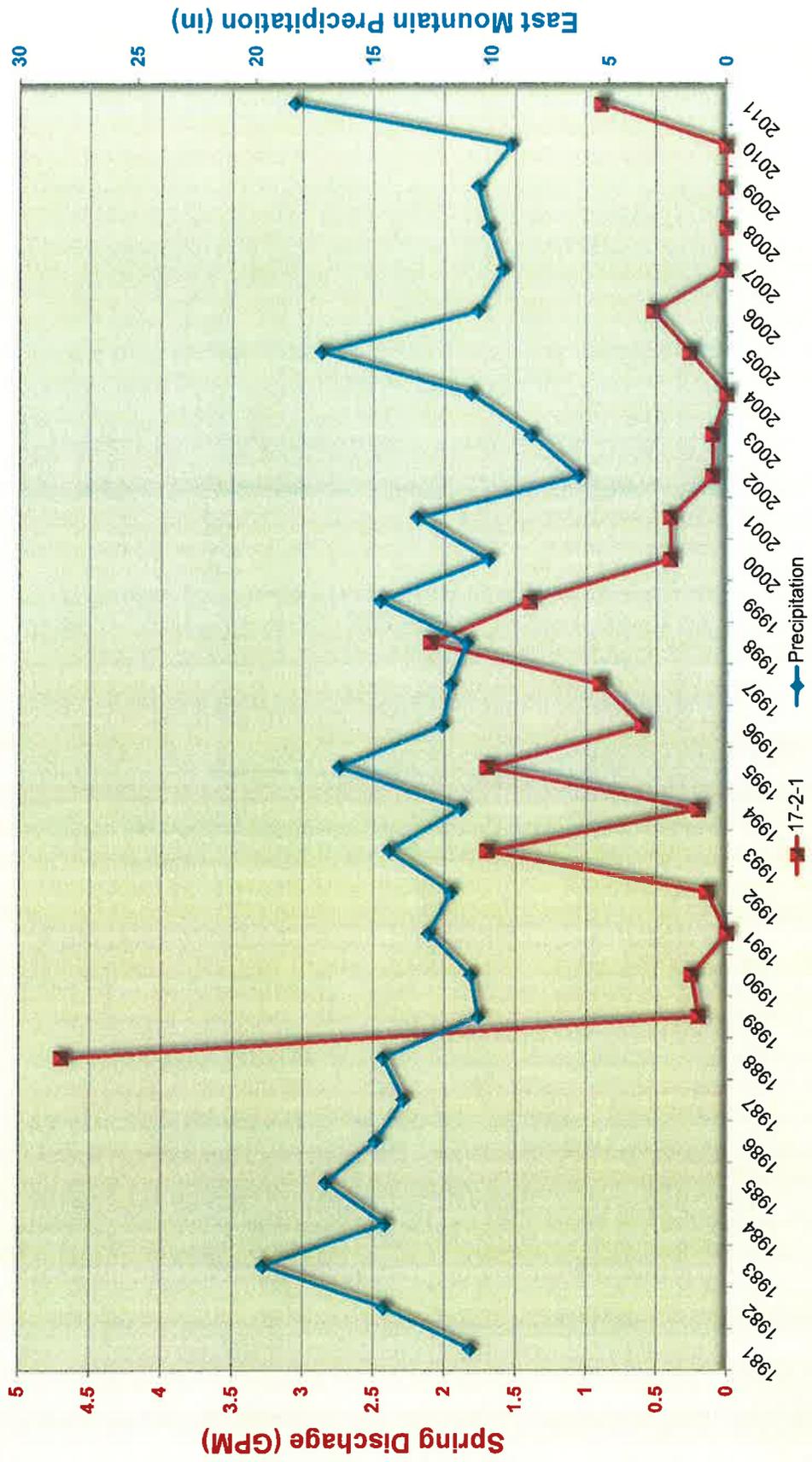
**TRAIL MOUNTAIN SPRINGS  
 SPRING: 18-2-1 VS. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



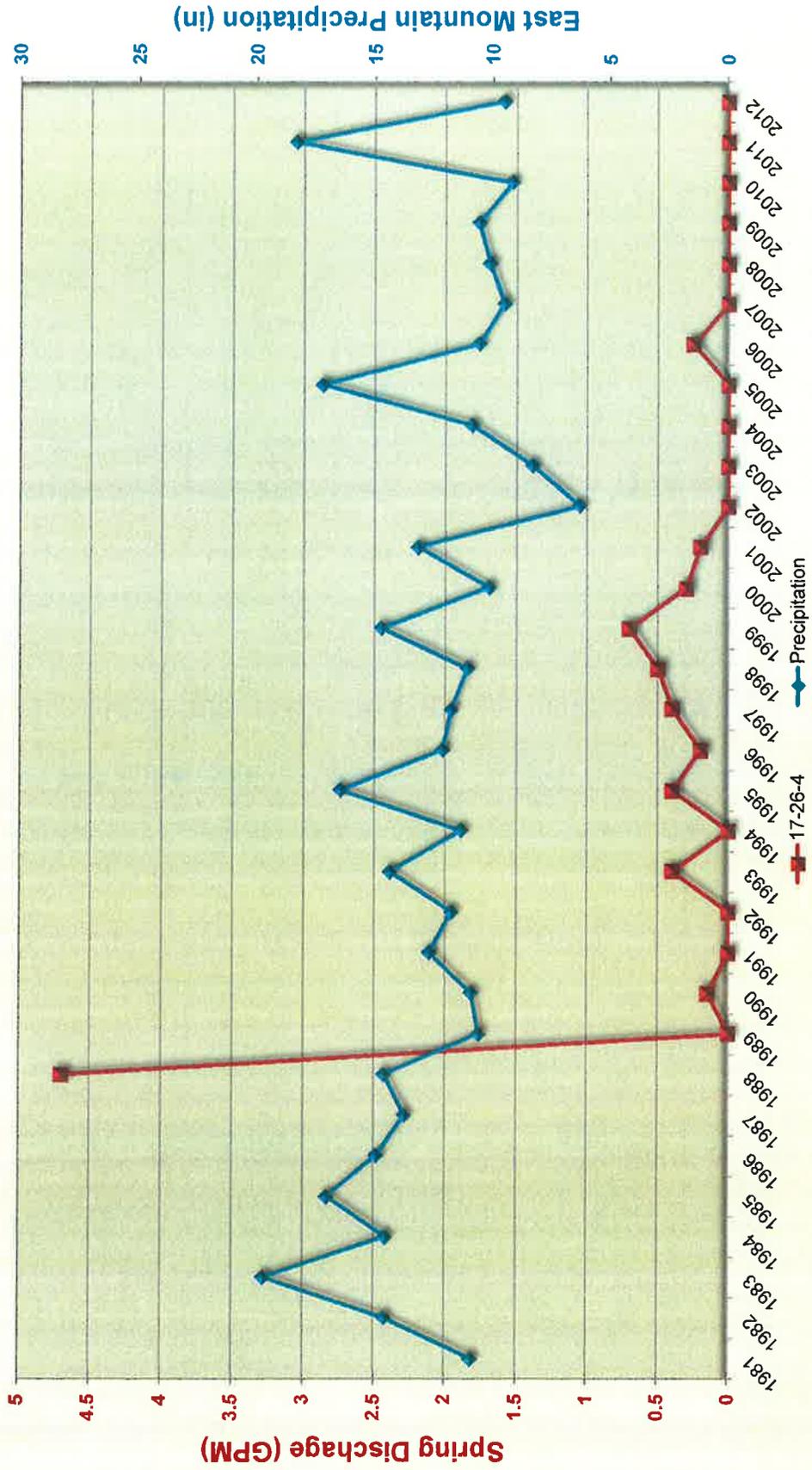
# TRAIL MOUNTAIN SPRINGS

## SPRING: 17-21-1 vs. PRECIPITATION

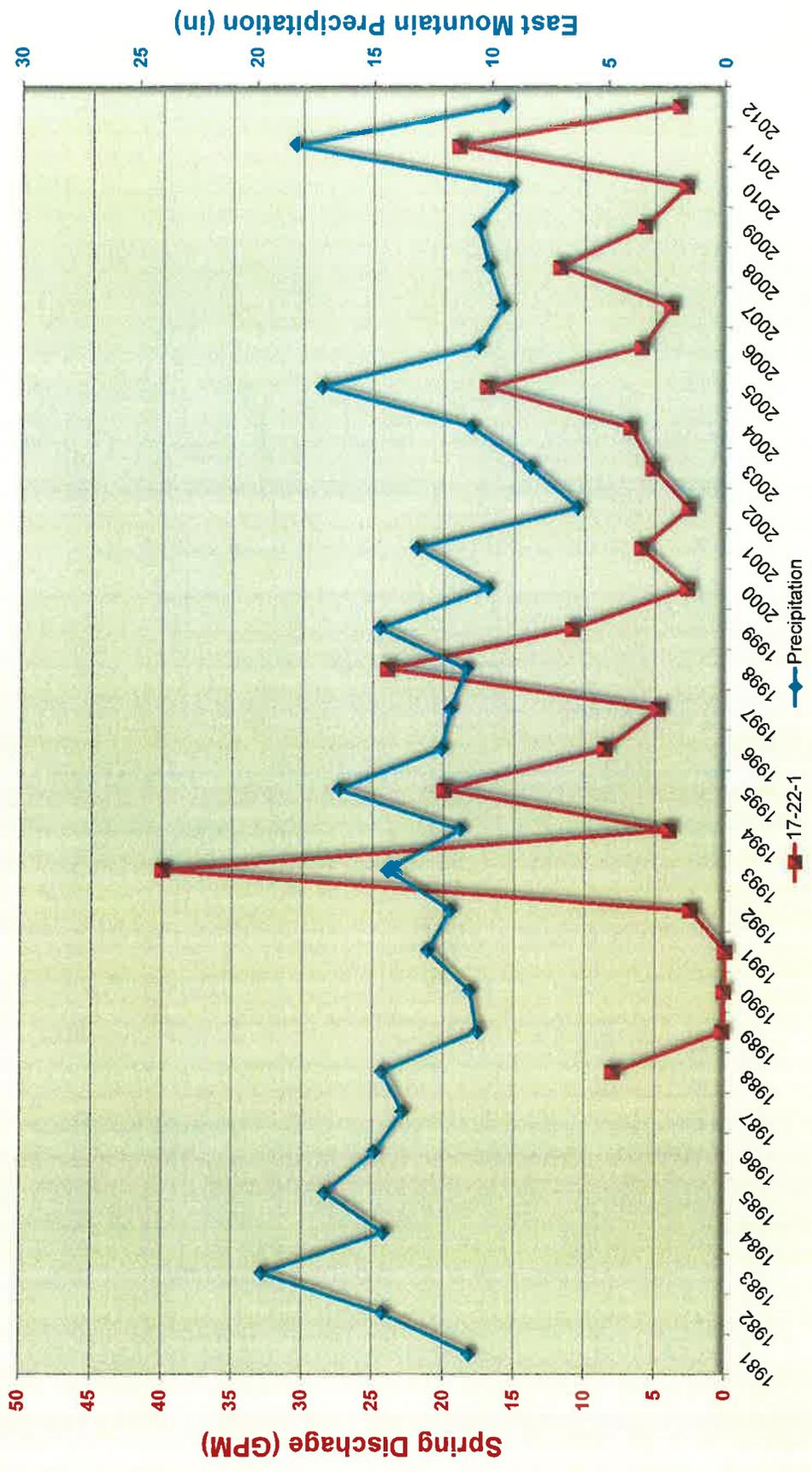
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



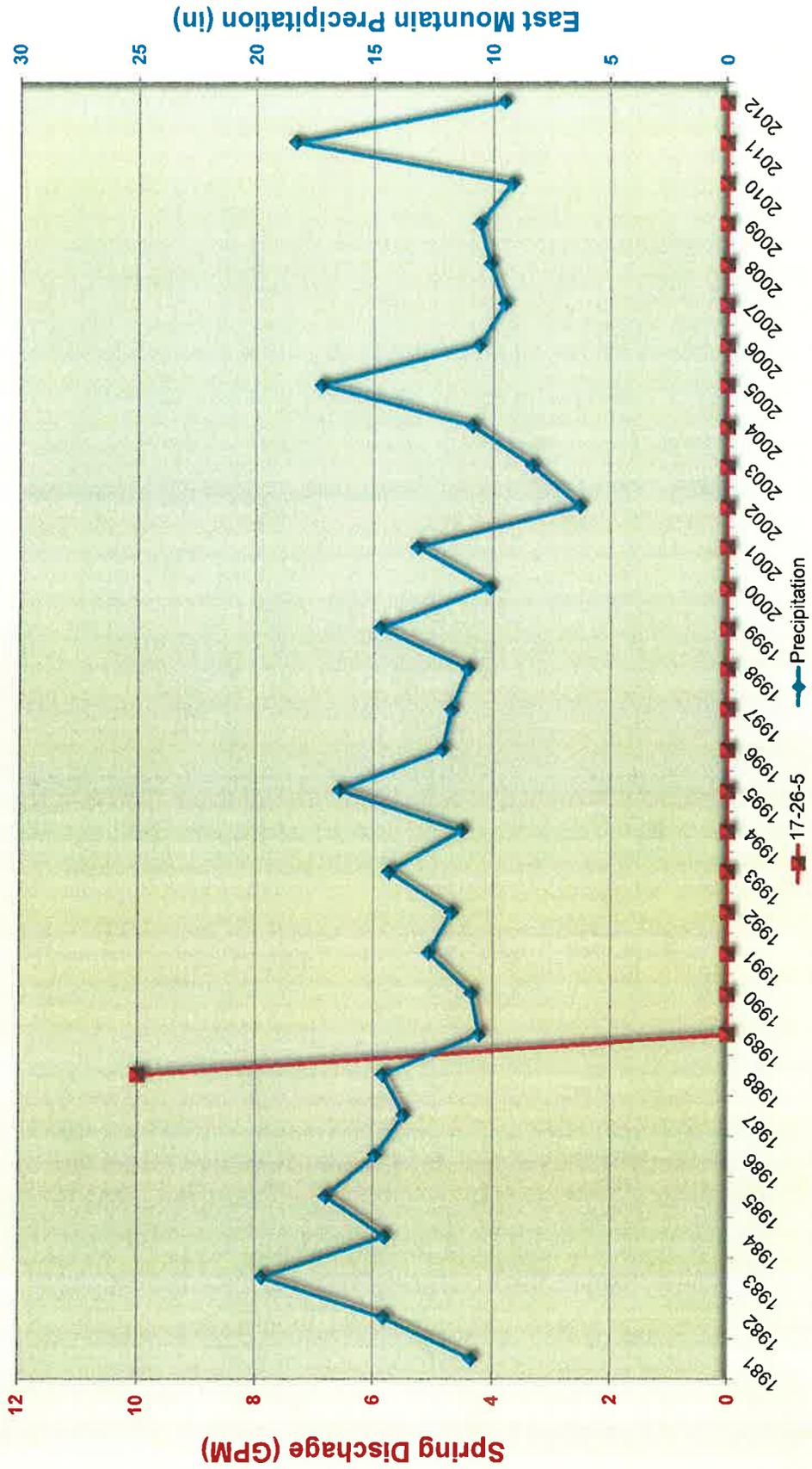
**TRAIL MOUNTAIN SPRINGS  
 SPRING: 17-26-4 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



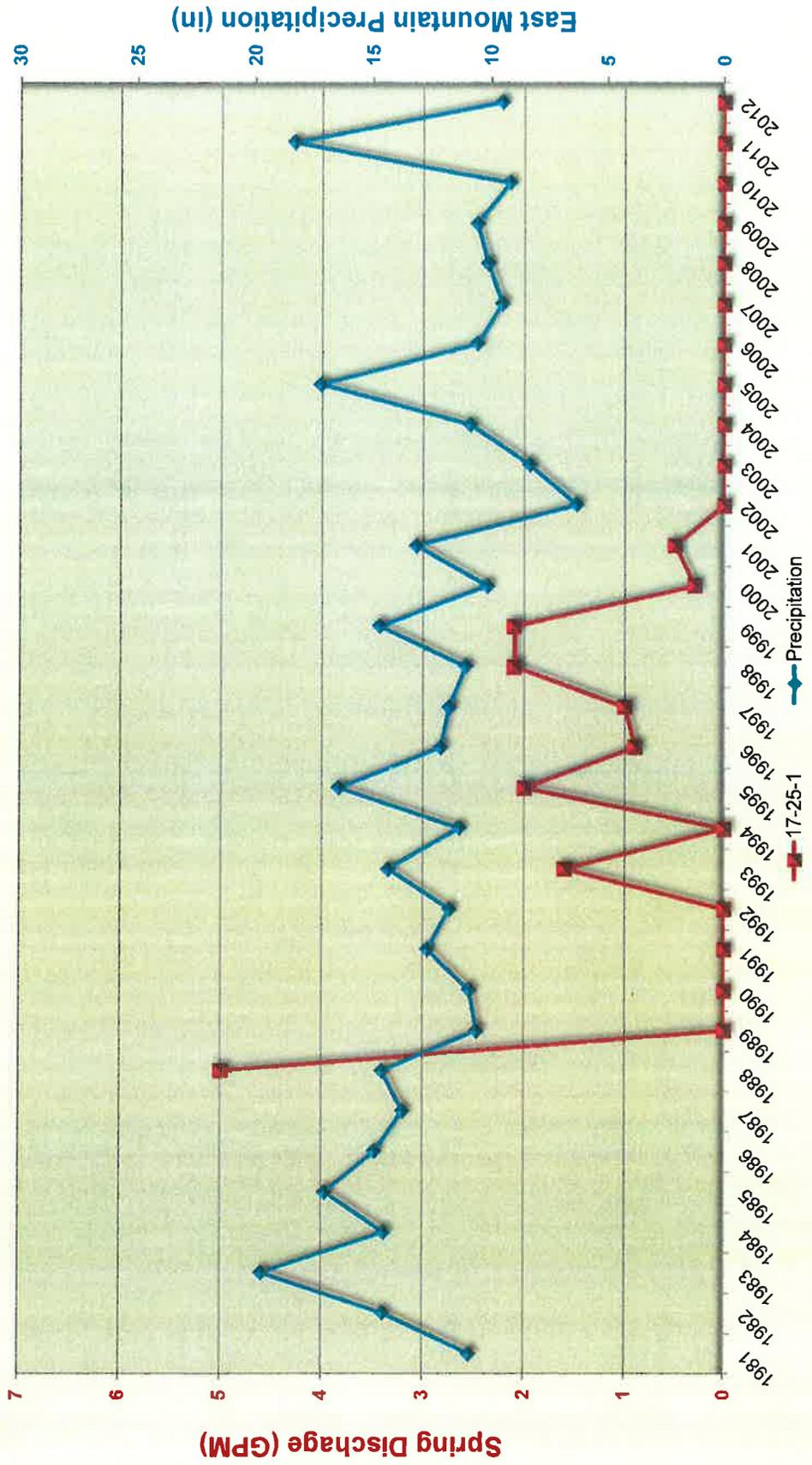
**TRAIL MOUNTAIN SPRINGS**  
**SPRING: 17-22-1 vs. PRECIPITATION**  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



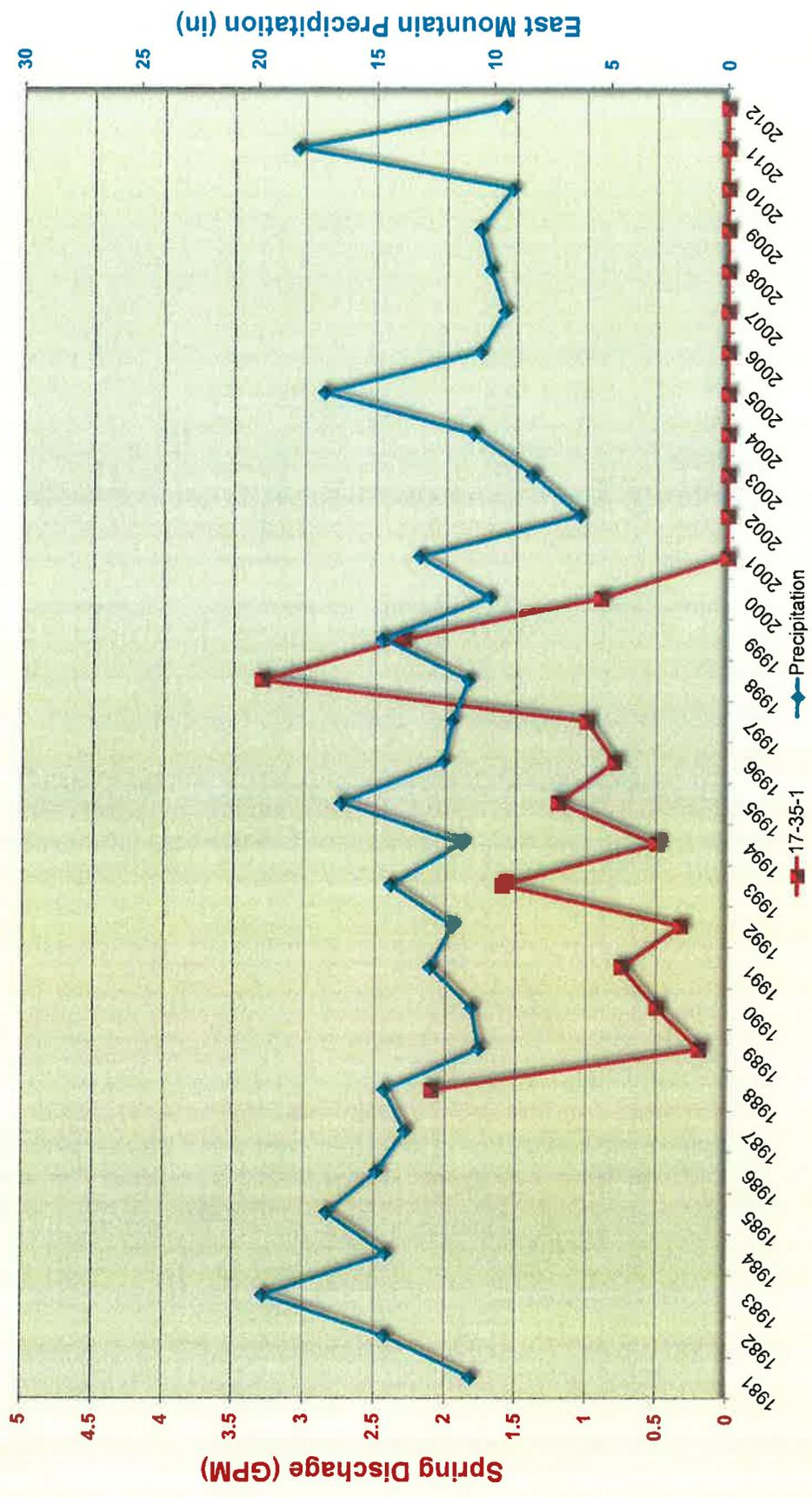
**TRAIL MOUNTAIN SPRINGS**  
**SPRING: 17-26-5 vs. PRECIPITATION**  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



**TRAIL MOUNTAIN SPRINGS  
 SPRING: 17-25-1 vs. PRECIPITATION  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION**



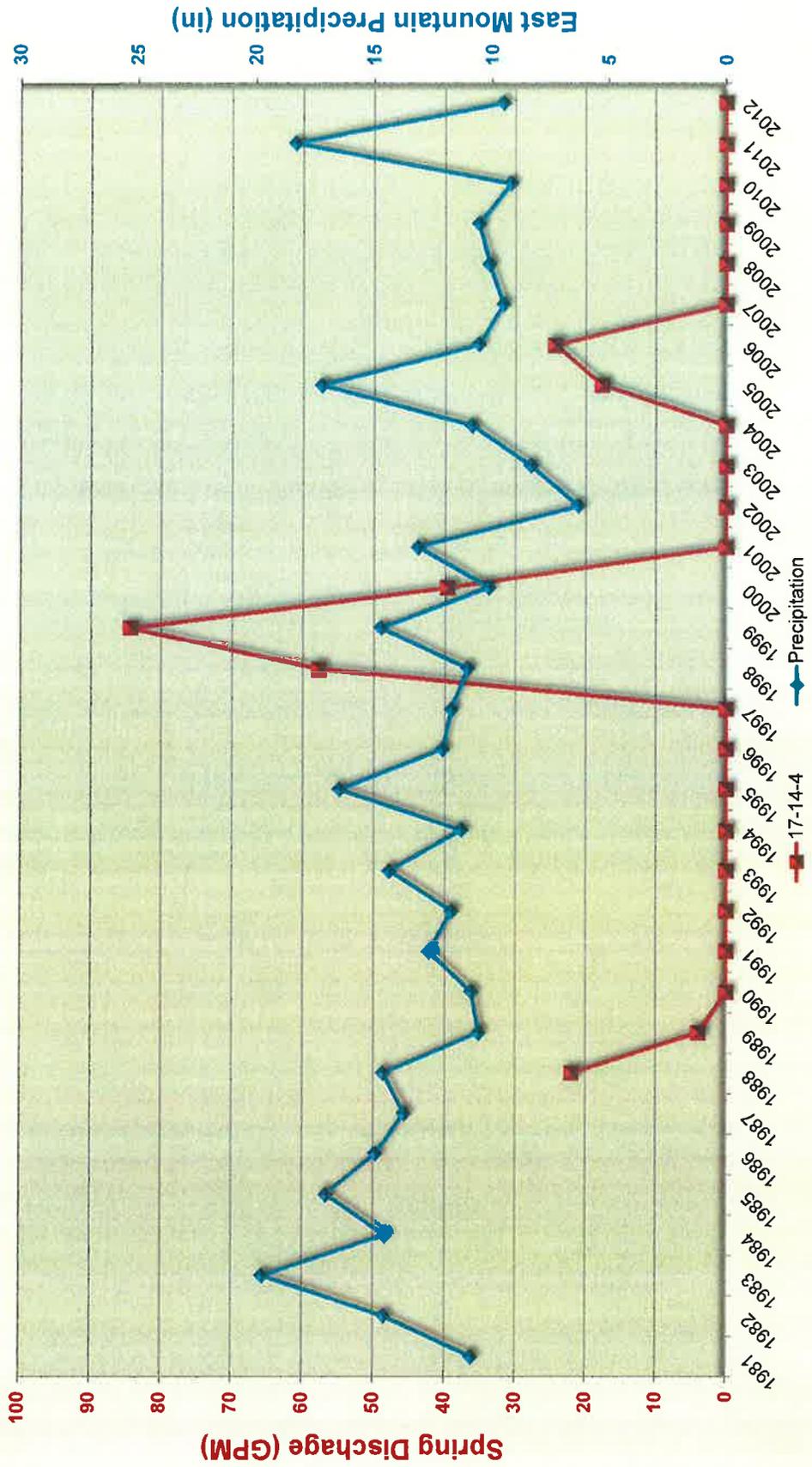
**TRAIL MOUNTAIN SPRINGS**  
**SPRING: 17-35-1 vs. PRECIPITATION**  
 PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



# TRAIL MOUNTAIN SPRINGS

## SPRING: 17-14-4 vs. PRECIPITATION

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



**Trail Mountain Springs  
Stiff Diagrams  
North Horn Formation**

# Trail Mountain Springs

17-22-1

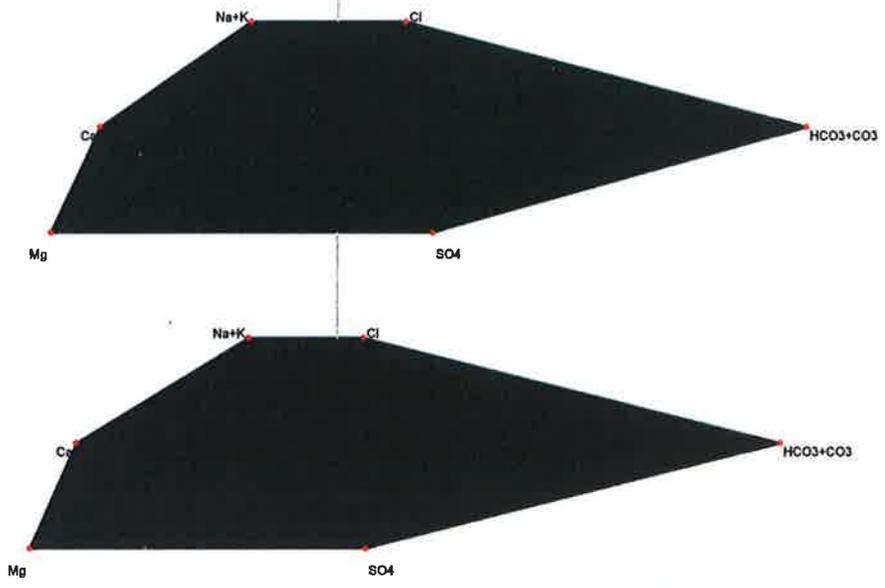
Cations

meq/l

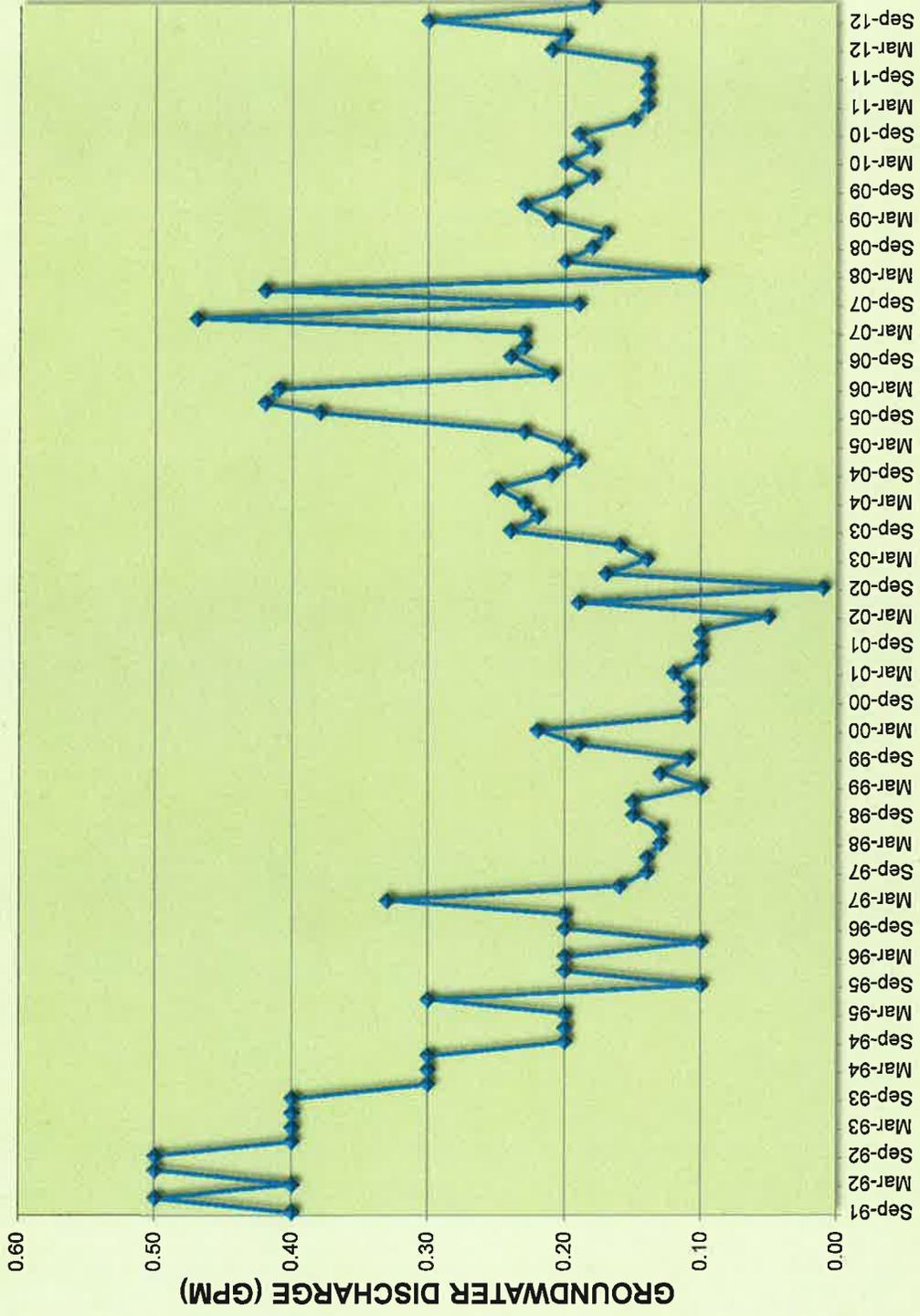
Anions

5

5



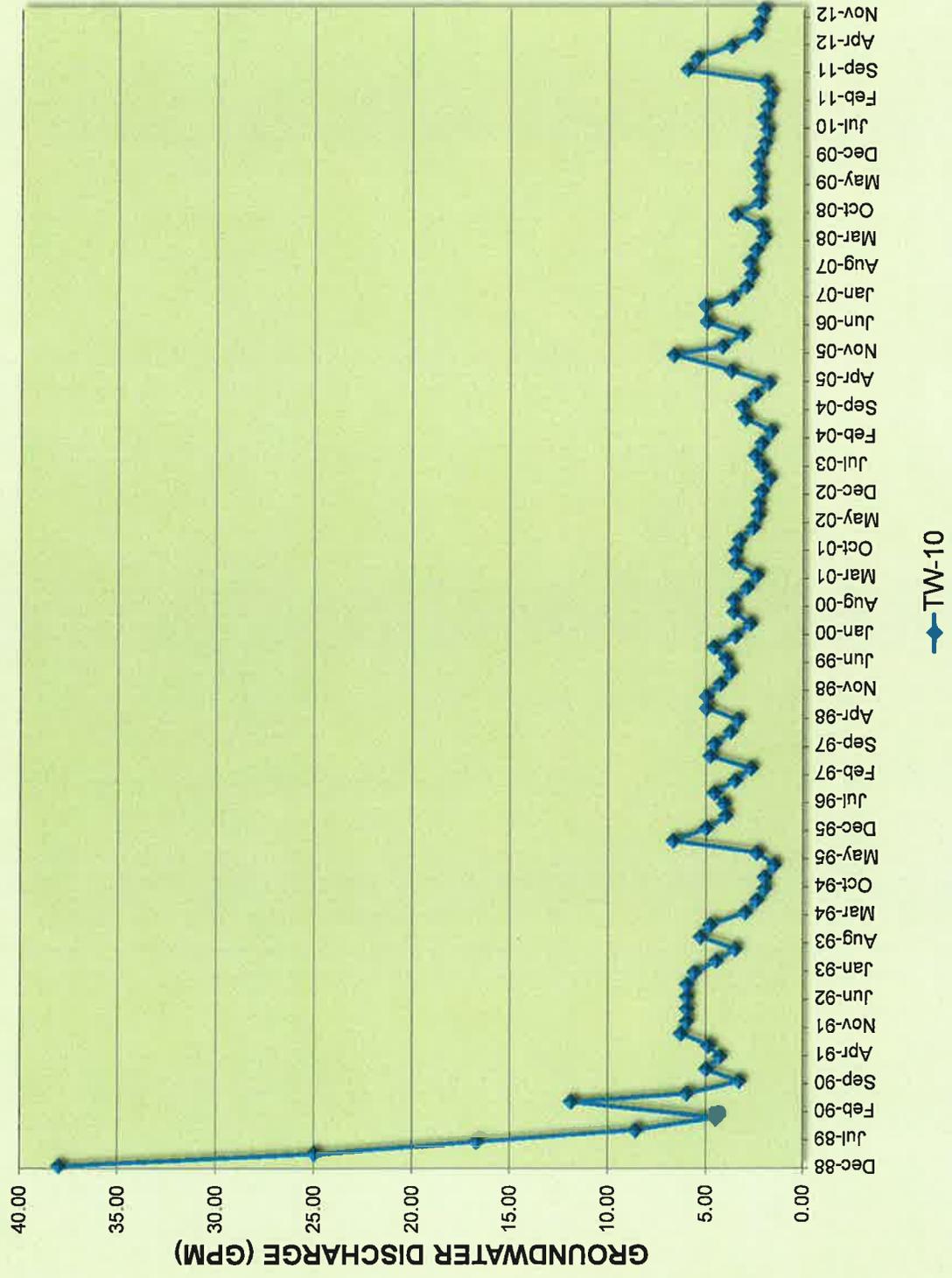
# DEER CREEK IN-MINE MONITORING MAIN NORTH - MAIN EAST



MN-ME

# DEER CREEK IN-MINE MONITORING

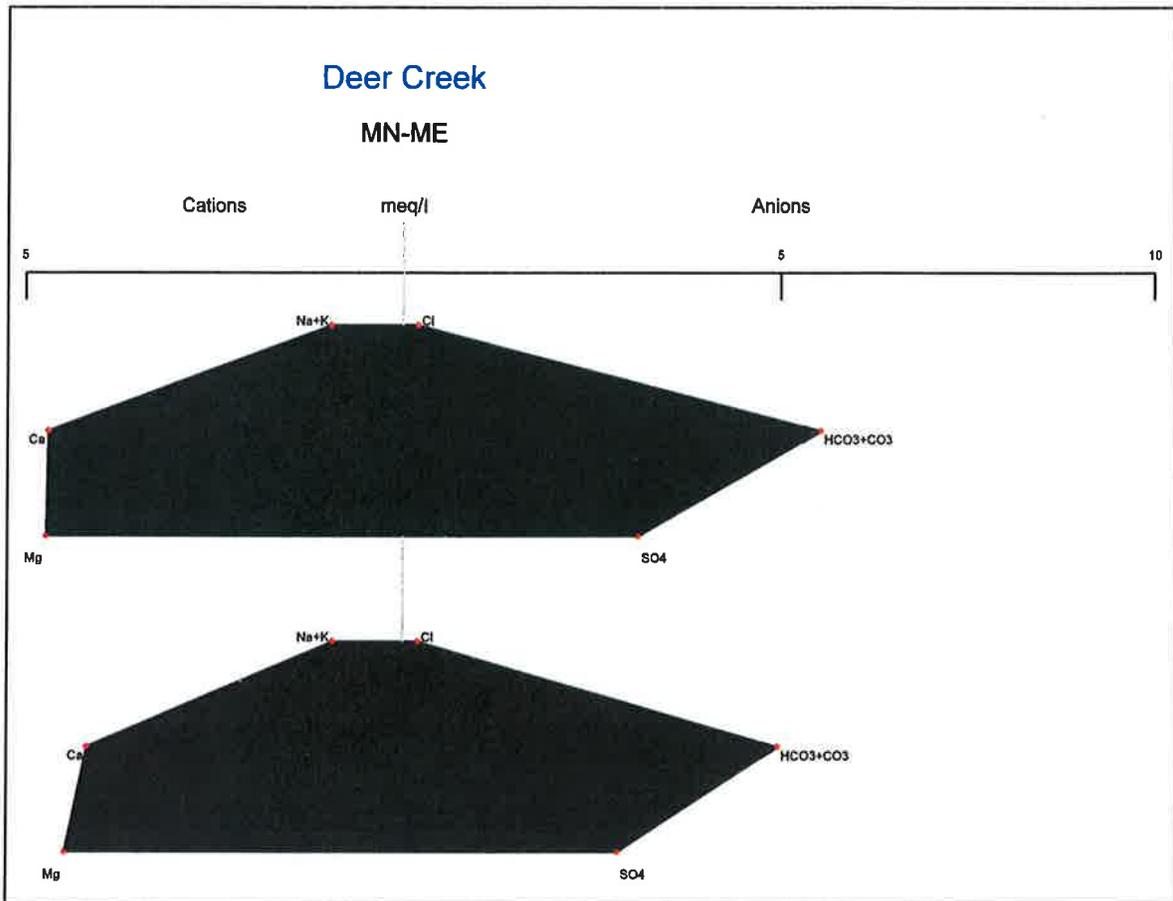
## 3RD NORTH XC-65 (TW-10)



**Deer Creek In-Mine  
Stiff Diagrams  
MN-ME, TW-10**

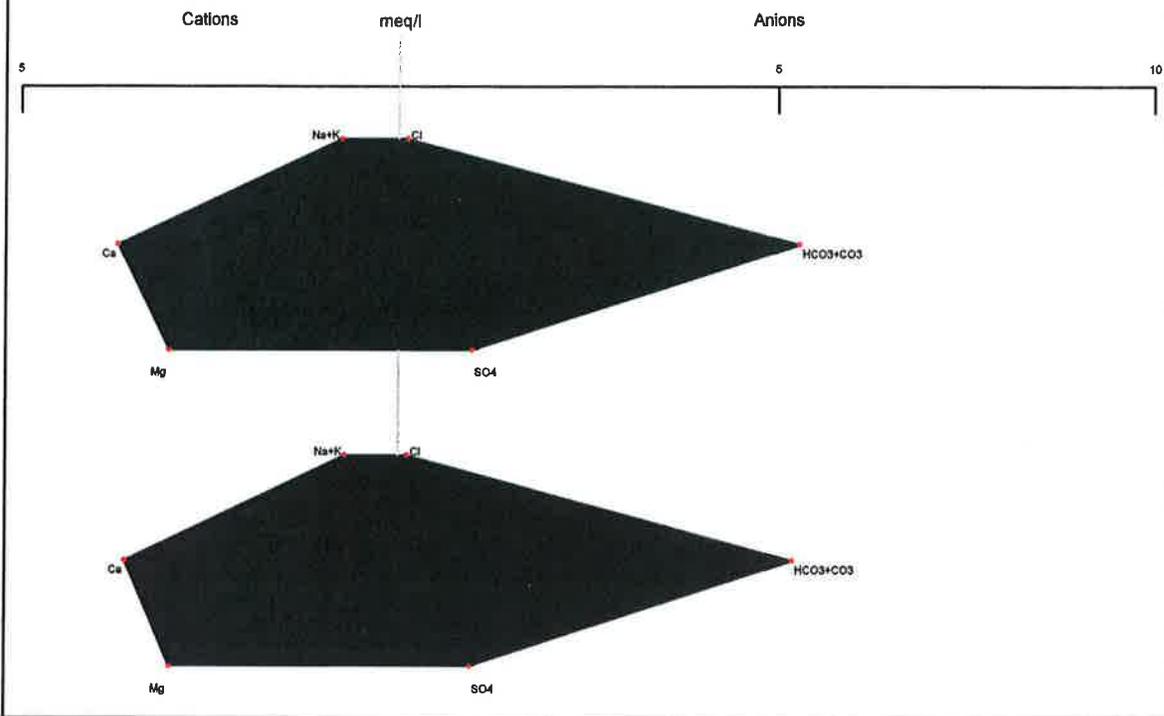
# Deer Creek

MN-ME



# Deer Creek

TW-10



**PACIFICORP**  
**ENERGY WEST**  
HYDROLOGIC MONITORING PROGRAM  
DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE  
and TRAIL MOUNTAIN MINES

**I. MONITORING LOCATIONS**

**A. Surface Water Hydrology** (for maps refer to Deer Creek, Wilberg/Cottonwood, Des-Bee-Dove Mine: Volume 9 Map HM-1, Deer Creek Volume 12 R645-301-700: Hydrologic Monitoring Map MFS1851D Mill Fork Lease for East Mountain locations listed below / Trail Mountain Mine: Volume 3 Plate 7-1 and Plate 7-2 for Trail Mountain locations listed below)

**1. Cottonwood Creek Drainage System**

a. **Cottonwood Canyon Creek** (refer to Deer Creek, Wilberg/Cottonwood, Des-Bee-Dove Mine: Volume 9 Map HM-1 or Trail Mountain Mine Permit Volume 3 Plate 7-1)

- (1) SW-1 - Above Trail Mtn. Mine  
(Approximately 5000 feet upstream from the inlet culvert for the disturbed area.) 2150 feet South, 2000 feet East of the Northwest corner of Section 24, Township 17 South, Range 6 East.
- (2) SW-2 - Below Trail Mtn. Mine  
(Approximately 200 feet downstream from the outlet culvert for the disturbed area.) 1300 feet South, 1750 feet West of the Northeast corner of Section 25, Township 17 South, Range 6 East.
- (3) CCC01 - USGS Flume:  
(Approximately 7800 feet downstream from the outlet culvert for the disturbed area.) 1500 feet North, 200 feet East of the Southwest corner of Section 31, Township 17 South, Range 7 East.
- (4) SW-3 - Below Trail Mtn. Mine  
(Approximately 3800 feet above confluence with Straight Canyon) 2400 feet South, 2400 feet East of the Northeast corner of Section 6, Township 18 South, Range 6 East.

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- b. ***Unnamed Drainage off Straight Canyon*** (refer to Trail Mountain Mine Permit Volume 3 Plate 7-1)
  - (1) T-19  
(Approximately 200 feet upstream from the from confluence with Straight Canyon) 2500 feet South, 1100 feet East of the Northeast corner of Section 3, Township 18 South, Range 6 East.
  
- c. ***Grimes Wash*** (refer to Deer Creek, Wilberg/Cottonwood, Des-Bee-Dove Mine: Volume 9 Map HM-1)
  - (1) GWR01 - Right Fork:  
(Approximately 1500 feet upstream of the inlet culvert for the disturbed area.) 550 feet North, 1500 feet West of the Southwest corner of Section 22, Township 17 South, Range 7 East.
  - (2) GWR02 - Left Fork:  
(Approximately 50 feet upstream of the inlet culvert for the disturbed area.) 200 feet South, 2350 feet East of the Northwest corner of Section 27, Township 17 South, Range 7 East.
  - (3) GWR03 - Below the mine:  
(Approximately 500 feet downstream of the outlet culvert below the disturbed area.) 1770 feet South, 1820 feet West of the Northeast corner of Section 27, Township 17 South, Range 7 East.
  
- d. ***Indian Creek*** (refer to Deer Creek Volume 12 R645-301-700: Hydrologic Monitoring Map MFS1851D)
  - (1) ICA - Indian Creek Above  
(Approximately 2500 feet northwest of the Mill Fork permit boundary) 400 feet North, 2350 feet West of the Southwest corner of Section 3, Township 16 South, Range 6 East.

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- (2) ICF - Indian Creek Flume  
(Approximately 2100 feet west of the Mill Fork permit boundary) 300 feet North, 3400 feet West of the Southwest corner of Section 10, Township 16 South, Range 6 East.
- (3) ICD - Indian Creek Ditch  
(Approximately 1600 feet west of the Mill Fork permit boundary, irrigation ditch for Upper Joes Valley) 240 feet North, 2850 feet West of the Southwest corner of Section 15, Township 16 South, Range 6 East.
- (4) ICB - Indian Creek Below  
(Approximately 3700 feet west of the Mill Fork permit boundary, junction of Indian Creek and FDR040) 70 feet North, 120 feet West of the Southwest corner of Section 16, Township 16 South, Range 6 East.

**2. Huntington Creek Drainage System**

- a. **Huntington Creek** (refer to Deer Creek, Wilberg/Cottonwood, Des-Bee-Dove Mine: Volume 9 Map HM-1)
  - (1) HCC01 - Above Deer Creek Confluence:  
1400 feet north, 2200 feet west of the southeast corner of Section 36, Township 16 South, Range 7 East.
  - (2) HCC02 - Below Deer Creek Confluence:  
300 feet north, 300 feet west of the southwest corner of Section 31, Township 16 South, Range 8 East.
  - (3) HCC04 - @ Research Farm\*  
800 feet north, 200 feet east of the southwest corner of Section 5, Township 17 South, Range 8 East.  
\*Not listed on map due to scale.
- b. **Deer Creek** (refer to Deer Creek, Wilberg/Cottonwood, Des-Bee-Dove Mine: Volume 9 Map HM-1)
  - (1) DCR01 - Above the mine:  
(Approximately 600 feet upstream from the mine facility.) 200 feet North, 800 feet West of the

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Southeast corner of Section 10, Township 17 South,  
Range 7 East.

(2) DCR04 - Near C1/C2 Belt Intersection:  
(Approximately 5,000 feet downstream from the mine facility.) 300 feet North, 2000 feet East of the Southeast corner of Section 2, Township 17 South, Range 7 East.

(3) DCR06 - @ Huntington Creek Confluence:  
(Approximately 15,000 feet downstream from the facility) 1400 feet north, 1100 feet east of the southeast corner of Section 6, Township 16 South, Range 7 East.

c. ***Meetinghouse Canyon - South Fork*** (refer to Deer Creek, Wilberg/Cottonwood, Des-Bee-Dove Mine: Volume 9 Map HM-1)

(1) MHC01 - Meetinghouse Canyon South Fork  
(Approximately 200 feet upstream from the north and south convergence.) 800 feet North, 1500 feet East of the Southwest corner of Section 35, Township 16 South, Range 7 East.

d. ***Rilda Canyon*** (refer to Deer Creek, Wilberg/Cottonwood, Des-Bee-Dove Mine: Volume 9 Map HM-1)

(1) RCF-1 - Rilda Canyon - Right Fork:  
(Approximately 4000 feet upstream from the Right and Left fork convergence.) 400 feet South, 200 feet West of the Northeast corner of Section 30, Township 16 South, Range 7 East.

(2) RCLF1 - Rilda Canyon - Left Fork, below Rilda Canyon Portals: (Approximately 200 feet upstream from the Right and Left fork convergence.) 2400 feet North, 2100 feet West of the Southeast corner of Section 29, Township 16 South, Range 7 East.

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- (3) RCLF2 - Rilda Canyon - Left Fork, above Rilda Canyon Portals: (Approximately 1600 feet upstream from the Right and Left fork convergence.) 1600 feet North, 2300 feet West of the Southwest corner of Section 29, Township 16 South, Range 7 East.
  - (4) RCF2 - Rilda Canyon - Above NEWUSSD springs: 2500 feet South, 400 feet West of the Northeast corner of Section 29, Township 16 South, Range 7 East.
  - (5) RCF3 - Rilda Canyon - Below NEWUSSD springs: 2550 feet South, 1000 feet East of the Northeast corner of Section 28, Township 16 South, Range 7 East.
  - (6) RCW4 - Rilda Canyon: (Approximately 1000 feet upstream from the confluence with Huntington Creek.) 850 feet North, 1900 feet West of the Southeast corner of Section 26, Township 16 South, Range 7 East.
- e. **Mill Fork Canyon** (refer to Deer Creek Volume 12 R645-301-700: Hydrologic Monitoring Map MFS1851D)
- (1) MFA01 - Mill Fork Canyon - Above Old Mine: (Approximately 2000 feet above old mine portals @ end of USFS development road.) 100 feet North, 1500 feet West of the Southeast corner of Section 17, Township 16 South, Range 7 East.
  - (2) MFB02 - Mill Fork Canyon - Above Huntington Creek Confluence: (Approximately 200 feet above confluence with Huntington Creek @ culvert outfall.) 100 feet South, 1900 feet East of the Northwest corner of Section 22, Township 16 South, Range 7 East.
  - (3) MFU03 - Mill Fork Canyon - Above Mill Fork Fault Crossing: (Approximately 700 feet upstream of projected Mill Fork Fault crossing) 1150 feet North, 1700 feet East of the Southwest corner of Section 17, Township 16 South, Range 7 East.

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3. **Reclamation Monitoring:** Following final reclamation, backfilling and grading monitoring will be conducted at points immediately above and below the reclaimed site.

**B. Groundwater Hydrology**

1. **East Mountain Springs** (refer to Deer Creek, Wilberg/Cottonwood, Des-Bee-Dove Mine Permit : Volume 9 maps HM-4 and HM-5)

Burnt Tree *	80-41
Elk Spring <sup>1</sup> *	80-43
Sheba Springs *	80-44*
Ted's Tub	80-46*
79-2	80-47
79-10 *	80-48
79-15	80-50
79-23 *	82-51
79-24	82-52*
79-26 *	84-56*
79-28 (Flag Lake)	89-60(Alpine Spring)
79-29 *	89-61 <sup>1</sup>
79-32	89-65
79-34	89-66
79-35 *	89-67
79-38	89-68
79-40	Rilda Canyon-(Meters 2&3) <sup>2</sup>

\* Recession Study Springs (Flow August & September)

<sup>1</sup>-Developed by NEWUSSD in 2009

<sup>2</sup>-NEWUSSD controls Rilda Canyon meters. Monitoring will be conducted when meters are functioning.

2. **Trail Mountain Springs** (refer to Trail Mountain Mine Permit Volume 3 Plate 7-1)

T-6	T-14
T-8	T-15
T-9	T-16
T-10	T-18 (Oliphant Mine Discharge)

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**3. East Mountain Springs - Mill Fork Area** (refer to Deer Creek Permit Volume 12 R645-301-700: Hydrologic Monitoring Map MFS1851D)

EM-216	MFR-30
JV-9	RR-5
JV-34	RR-15
MF-7	RR-23A
MF-10	SP1-26
MF-19B	SP1-29
MF-213	UJV-101
MF-219	UJV-206
MFR-10	UJV-213
EMPOND	Grants Spring
Little Bear Spring	

**4. Piezometric Data**

a. Surface

- (1) Rilda Canyon (refer to Deer Creek, Wilberg/Cottonwood, Des-Bee-Dove Mine: Volume 9 Map HM-1)

P1  
P5  
P6  
P7  
EM-47

- (2) Cottonwood Canyon Creek

*East Mountain (refer to Deer Creek, Wilberg/Cottonwood, Des-Bee-Dove Mine: Volume 9 Map HM-1)*

EM-31  
CCCW-1A  
CCCW-1S  
CCCW-2A  
CCCW-3A  
CCCW-3S U  
CCCW-3S L

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*Trail Mountain (refer to Trail Mountain Mine Permit Volume 3 Plate 7-1)*

TM-1B  
TM-3

- b. Underground: In-Mine
  - (1) Deer Creek Mine (Refer to Annual Hydrologic Reports for Locations : Map HM-2)

**5. In-Mine Water Locations**

- a. Deer Creek Mine (Refer to Annual Hydrologic Reports for Locations : Map HM-2)
- b. Wilberg/Cottonwood Mines (Refer to Annual Hydrologic Reports for Locations : Map HM-3)
- c. Trail Mountain Mine (Refer to Annual Hydrologic Reports for Locations : PLATE 7-3)

**6. Waste Rock Wells (refer to Deer Creek, Wilberg/Cottonwood, Des-Bee-Dove Mine: Volume 9 Map HM-1)**

- a. Deer Creek
- b. Cottonwood

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and TRAIL MOUNTAIN MINES

**C. UPDES Monitoring Locations**

- a. ***Deer Creek Mine***  
UPDES UT0023604  
001- Sediment Pond  
002- Mine Discharge
  
- b. ***Wilberg/Cottonwood Mines***  
UPDES UT0022896  
001- Mine Discharge @ Cottonwood Canyon (TMA)  
003- Sediment Pond @ Mine Facilities  
005- Sediment Pond Discharge @ Waste Rock Site
  
- d. ***Trail Mountain Mine***  
UPDES UT0023728  
001- Sediment Pond  
002- Mine Discharge

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**II. MONITORING SCHEDULE** *(see enclosed monitoring schedules for operational, baseline, and reclamation monitoring)*

**A. Field Measurements**

Field Measurements collected during quality sampling: Listed below are the sites which will be monitored by PacifiCorp - Energy West in accordance with the guidelines established by DOGM; i.e.

- Date and Time
- Flow
- pH
- Temperature
- Conductivity
- Dissolved oxygen (perennial streams only)

**Surface Monitoring**

Surface monitoring locations will be field monitored quarterly for all field parameters, except Indian Creek - monitoring to be conducted during baseflow only.

**1. Cottonwood Canyon Creek**

a. Cottonwood Canyon Creek

- (1) SW-1
- (2) SW-2
- (3) CCC01 - USGS Flume
- (4) SW-3

b. Grimes Wash

- (1) GWR01
- (2) GWR02
- (3) GWR03

c. Indian Creek

- (1) ICA
- (2) ICF
- (3) ICD
- (4) ICB

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and TRAIL MOUNTAIN MINES

- d. Straight Canyon
  - (1) T-19 ( Unnamed Side Drainage)

**2. Huntington Canyon Drainage**

- a. Deer Creek
  - (1) DCR01
  - (2) DCR04
  - (3) DCR06
- b. Huntington Creek
  - (1) HCC01
  - (2) HCC02
  - (3) HCC04

Flow in Huntington Creek is measured only at HCC01 by Utah Power, and will be reported in the Annual Hydrologic Report.

- c. Meetinghouse Canyon - South Fork:
  - (1) MCH01
- d. Rilda Canyon
  - (1) RCF1\*
  - (2) RCLF 1
  - (3) RCLF 2
  - (4) RCF2
  - (5) RCF3
  - (6) RCW4

\* Baseline flow will be measured adjacent to EM-163

- e. Mill Fork Canyon
  - (1) MFA01
  - (2) MFB02
  - (3) MFU03

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**Groundwater Monitoring**

1. East Mountain Springs (see monitoring location list I.B.1)
2. Trail Mountain Springs (see monitoring location list I.B.2)
3. East Mountain Springs - Mill Fork Area (see monitoring location list I.B.3)

East/Trail Mountain Springs will be field monitored during the months of July and October. In addition, the East Mountain Recession Study Springs (denoted by asterisks in the Monitoring Location section) and Trail Mountain Springs will be field monitored for flow only from July through October. T-18: Oliphant Mine Discharge will be collected and analyzed quarterly. Rilda Canyon Springs - (NEWUSSD: Meters 2 & 3; when functioning) will be field monitored monthly depending upon access.

4. In-Mine
  - a. Deer Creek
  - b. Wilberg/Cottonwood
  - c. Trail Mountain

In-mine locations will be field monitored quarterly for all field parameters except pH, conductivity, and dissolved oxygen.

5. Piezometric Wells
  - a. Surface

Piezometric surface wells will be field monitored for level only on a monthly basis depending upon access.

- (1) Rilda Canyon (see Map HM-1 for locations)

P1  
P5  
P6  
P7  
EM-47

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(2) Cottonwood Canyon Creek (see Map HM-1 for locations)

EM-31  
CCCW-1A  
CCCW-1S  
CCCW-2A  
CCCW-3A  
CCCW-3S U  
CCCW-3S L  
TM-1B  
TM-3

6. Waste Rock Wells
  - a. Deer Creek
  - b. Cottonwood

**UPDES Monitoring**

1. Deer Creek
2. Wilberg/Cottonwood
3. Trail Mountain

UPDES sites will be monitored as specified in the individual permits.

**Reclamation Monitoring**

Surface Water Resources: (see enclosed summary of operational, baseline, and reclamation monitoring schedules)

Surface monitoring locations will be field monitored monthly for flow and all field parameters quarterly until bond release.

Ground Water Resources: (see enclosed summary of operational, baseline, and reclamation monitoring schedules)

Springs East/Trail Mountain Springs will be field monitored during the months of July and October.

Rilda Canyon Springs (NEWUSSD: Meters 2 & 3; when functioning)) will be field monitored monthly for flow depending upon access. East/Trail Mountain Springs (including Rilda

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Springs and T-18 [Oliphant Mine]) monitoring will be conducted until permit area reduction approval or unless otherwise approved by the Division.

Wells: Piezometric surface wells (Rilda Canyon and Cottonwood Canyon including TM-3 in Straight Canyon): will be field monitored for level only on a monthly basis depending upon access. Piezometric surface well monitoring will be conducted until permit area reduction approval or unless otherwise approved by the Division.

Waste Rock Wells and TM-1B: will be field monitored for level only on a quarterly basis. Monitoring will be conducted until sealing during final reclamation.

UPDES: Sites will be monitored as specified in the individual permits

**B. Quality Sampling (Laboratory Measurements)**

a. **Surface Water Hydrology:** Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter, except for Indian Creek - quality samples will be collected during baseflow only. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Quality (see Table 1-Surface Water Quality Parameter List). Quarterly sampling was initiated during March 1988 and will continue throughout the year; i.e., June, September, and December. Baseline analysis was performed in 2001 and will be repeated every five years there-after.

a. **Cottonwood Creek Drainage**

(1) Cottonwood Canyon Creek

- (a) SW-1
- (b) SW-2
- (c) SW-3

(2) Grimes Wash

- (a) GWR01
- (b) GWR02

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DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE  
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(c) GWR03

(3) Indian Creek

- (a) ICA
- (b) ICD
- (c) ICB

(4) Straight Canyon

- (a) T-19

**b. Huntington Creek Drainage**

(1) Deer Creek

- (a) DCR01
- (b) DCR04
- (c) DCR06

(2) Huntington Creek

- (a) HCC01
- (b) HCC02
- (c) HCC04

(3) Meetinghouse Canyon - South Fork:

- (a) MCH01

(5) Rilda Canyon

- (a) RCF1
- (b) RCF3
- (c) RCW4

(6) Mill Fork Canyon

- (a) MFA01
- (b) MFB02

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(c) MFU03

**Reclamation Monitoring - Surface Water Hydrology:** Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Quality (see Table 1-Surface Water Quality Parameter List). Sampling will be conducted on a quarterly basis until bond release. Baseline analysis will be performed on the 5<sup>th</sup> and 9<sup>th</sup> years following reclamation. In no case will baseline sampling time frame exceed 5 years converting from operational to reclamation monitoring.

**2. Groundwater Hydrology**

- a. East/Trail Mountain Springs: Water samples will be collected and analyzed during the months of July and October. Rilda Canyon Springs (NEWUSSD: Meters 2 & 3; when functioning) and T-18 (Oliphant Mine Discharge) will be monitored for quarterly for quality. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table 2-Ground Water Quality Parameter List).
- b. In-Mine: Two water samples will be collected and analyzed per mine quarterly. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table 2-Ground Water Quality Parameter List).
- c. Wells: TM-1B will be sampled quarterly. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table 2-Ground Water Quality Parameter List).
- d. Waste Rock Wells: One water sample will be collected and analyzed per location quarterly. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table 2-Ground Water Quality Parameter List).

Baseline analysis was performed in 2001 and will be repeated every five years thereafter.

**Reclamation Monitoring - Groundwater Hydrology:**

- a. East/Trail Mountain Springs: Water samples will be collected and analyzed during the months of July and October. Rilda Canyon Springs

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(NEWUSSD: Meters 2 & 3; when functioning) will be monitored quarterly for quality. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table 2-Ground Water Quality Parameter List). East/Trail Mountain Springs (including Rilda Springs and T-18 [Oliphant Mine Discharge]) monitoring will be conducted until permit area reduction approval or unless otherwise approved by the Division.

- b. In-Mine: Two water samples will be collected and analyzed per mine quarterly until the mine is sealed or the sites become inaccessible. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table 2-Ground Water Quality Parameter List).
- c. Wells: Well TM-1B will be sealed during final reclamation. Quarterly sampling will continue until sealing. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table 2-Ground Water Quality Parameter List).
- d. Waste Rock Wells: Waste rock wells will be sealed during final reclamation. One water sample will be collected and analyzed per location quarterly until well sealing. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table 2-Ground Water Quality Parameter List).
- e. Post Reclamation Monitoring: PacifiCorp commits to conduct annual surveys to identify new discharge locations within and below sealed portals. If discharge occurs, one water sample will be collected and analyzed per location quarterly. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table 2-Ground Water Quality Parameter List). Baseline analysis will be performed on the 5<sup>th</sup> and 9<sup>th</sup> year.

**3. UPDES Monitoring Sites**

- a. Deer Creek Mine
- b. Wilberg/Cottonwood Mines
- c. Trail Mountain Mine

UPDES sites will be monitored as specified in the individual permits.

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***III. ANNUAL REPORTS***

All data collected regarding the hydrology of East/Trail Mountain will be summarized by the applicant in an annual Hydrologic Monitoring Report. Copies of the report will be submitted to the Utah State Division of Oil, Gas and Mining. In addition, any raw data collected will be submitted to the Utah State Division of Oil, Gas and Mining on a quarterly basis.