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

ENERGY WEST
MINING COMPANY
A SUBSIDIARY OF PACIFICORP

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,

Kenneth S. Fleck
Ken Fleck
Geology and Environmental Affairs Manager

cc: (File)

Cover3_2012

Print Form | Submit by Email | Reset Form

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	Deer Creek Mine
Permit Number	C/015/0018	Permit expiration Date	2016-02-07
Operator Name	Energy West Mining Company	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	☐ Required ☒ Not Required	
Refuse Piles	☒ Required ☐ Not Required	Refer to Attachment A
Impoundments	☒ Required ☐ Not Required	Refer to Attachment A
Other:		

OPERATOR COMMENTS

Refuse and impoundment reports are submitted quarterly to the Division of Oil, Gas and Mining.

REVIEWER COMMENTS ☐ Met Requirements ☐ Did Not meet Requirements

COMMITMENTS AND CONDITIONS

The Permittee is responsible for ensuring annual technical commitments in the Mining and Reclamation Plan and conditions accepted with the permit are completed throughout the year. The Division has identified these commitments below and has provided space for you to report what you have done during the past year for each commitment. If additional written response is required, it should be filed as an attachment to this report.

Title: RAPTORS
Objective: To document the location and activity of nests that could be affected by mining.
Frequency: annually
Status: Ongoing
Reports: Submit annually in annual report.
Citation: MRP, Section 322, Subsection Terrestrial Species.

Operator Comments

Data and map included in confidential file.

Reviewer Comments ☐ Met Requirements ☐ Did Not Meet Requirements

Title: SUBSIDENCE MONITORING REPORT
Objective: To Determine the effects of subsidence
Frequency: Annually
Status: Ongoing
Reports: Submit in annual report
Citation: MRP, Volume 3, Appendix X

Operator Comments

Refer to Subsidence Report.

Reviewer Comments ☐ Met Requirements ☐ Did Not Meet Requirements

Title: ROOF, FLOOR, AND MID-SEAM MATERIAL IN ACTIVE SECTIONS TO BE SAMPLED ANNUALLY.
Objective: Transport and dispose of waste rock in a controlled manner.
Frequency: Annually in active sections
Status: Ongoing during mining **THIS WAS NOT SUBMITTED IN 2011 ANNUAL REPORT. OVERDUE**
Reports: Annual report
Citation: MRP, Part 3, Estimated Waste Rock Volumes, R645-301-536, page 75

Operator Comments

The 2011 Roof, Rib and Floor sample analysis was inadvertently excluded from the initial Annual Report submittal. The Division sent a deficiency list to Energy West on June 28, 2012 (Task ID #4802). Energy West complied with the deficiency and submitted the analysis on July 18, 2012.

Reviewer Comments ☐ Met Requirements ☐ Did Not Meet Requirements

Title: WASTE ROCK SITE OPERATIONAL SAMPLING
Objective: Monitor chemical quality of waste at waste rock site.
Frequency: Grab samples upon completion of each two foot lift. Parameters as described.
Status: Ongoing during mining. **No analysis was found in the 2011 annual report. Please include analysis or explanation of when analysis will be preformed.**
Reports: Annual Report
Citation: MRP, Volume 10, Chapter 7, page 7-4 to 7-5
Operator Comments

No grab samples were collected in 2011. GRAMS SAMPLES FOR 2012?

Reviewer Comments ☐ Met Requirements ☐ Did Not Meet Requirements

Title: DEMONSTRATION OF SELECTED OVERBURDEN AS BEST AVAILABLE MATERIAL IN THE PERMIT AREA FOR USE AS SUBSTITUTE TOPSOIL.

Objective: Monitor chemical quality of identified substitute topsoil to show reduction in sodicity.

Frequency: Sampling will occur once within each permit term until such time as the soils are found acceptable for substitute topsoil use. The last sample, collected in 2010, did not show suitability. The current permit term is 2011-2016.

Status: To be conducted once in current permit term (2011-Feb 2016).

Reports: Annual Report

Citation: MRP, Volume 2, Part 4, section R645-301-233, page 2-3

Operator Comments

No sampling or analysis was conducted in 2012.

Reviewer Comments ☐ Met Requirements ☐ Did Not Meet Requirements

FUTURE COMMITMENTS AND CONDITIONS

The following commitments are not required for the current annual report year, but will be required by the permittee in the future as indicated by the "status" field. These commitments are included for information only, and do not currently require action. If you feel that the commitment is no longer relevant or needs to be revised, please contact the Division.

Title: WILDLIFE
Objective: Adhere to wildlife exclusionary periods.
Frequency: Ongoing
Status: Ongoing during Rilda portal reclamation
Reports: Not required
Citation: MRP, Section 322, page 10; Section 330, page 16 #14; Section 342, page 32, #7

Title: SUBSOIL TESTING
Objective: Regraded subsoil will be sampled on 500 ft intervals to a depth of four feet (three or four samples for the 2,000 linear feet in the facilities area). The samples will be analyzed on site for pH and EC. Problem areas will be further sampled and sent to a laboratory of analysis.
Frequency: At final regrading
Status: Ongoing at reclamation
Reports: Laboratory analysis to be provided to the Division
Citation: MRP, Volume 11, Section R645-301-231.300

Title: TOPSOIL HANDLING TESTING PLAN
Objective: Three composite samples will be taken from the facilities area and sediment pond. Samples will be analyzed for parameters to be compared with baseline information and to determine the need for amendments, including fertilizer.
Frequency: Final Reclamation
Status: Ongoing
Reports: Analysis to be provided to the Division
Citation: MRP, Volume 11, Section R645-301-242

Title: WASTE ROCK SITE RECLAMATION SAMPLING
Objective: Monitor chemical quality of upper four feet of final waste reclaimed surface at waste rock site.
Frequency: Grab samples within four feet of final elevation at a rate of two samples per acre per lift. Parameters as described.
Status: At final reclamation of waste rock cell.
Reports: Annual report
Citation: MRP, Volume 10, Chapter 7, page 7-5

Title: SOIL SAMPLING ON FINAL GRADED SURFACE
Objective: Monitor chemical quality of reclaimed substitute topsoil.
Frequency: Grab samples for pH and SAR as described.
Status: At final reclamation of mine facilities
Reports: Annual Report
Citation: MRP, Volume 2, Part 4, section 645-301-233.

Title: MACROINVERTEBRATE MONITORING
Objective: Monitor the macroinvertebrates in Rilda Creek
Frequency: Spring/fall two years prior to and spring/fall one year immediately following start of construction. Spring every three years during operations and reclamation.
Status: Construction complete in fall 2008. Spring and Fall 2009 surveys complete. Spring 2012 is the anticipated date for the first of the three-year monitoring surveys.
Reports: Annual Report
Citation: MRP, Section 330, page 26.

Title: FISH SURVEYS
Objective: Monitor fish in Rilda Creek as part of annual surveys.
Frequency: Spring/fall two years prior to and spring/fall one year immediately following start of construction. Spring every three years during operations and reclamation.
Status: Construction complete in Fall 2008. Spring and Fall 2009 surveys complete. Spring 2012 is the anticipated date for the first of the three-year surveys.
Reports: Annual Report
Citation: MRP, Section 330, page 26

OPERATOR COMMENTS (OPTIONAL)

Fish and Macroinvertebrate Surveys. Data was collected in 2011 and reported in 2012. This 2012 report can be reviewed in Attachment D.

REVIEWER COMMENTS

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:

10N section roof, rib and floor samples were collected and analyzed. Results are found in Attachment D.

Reviewer Comments

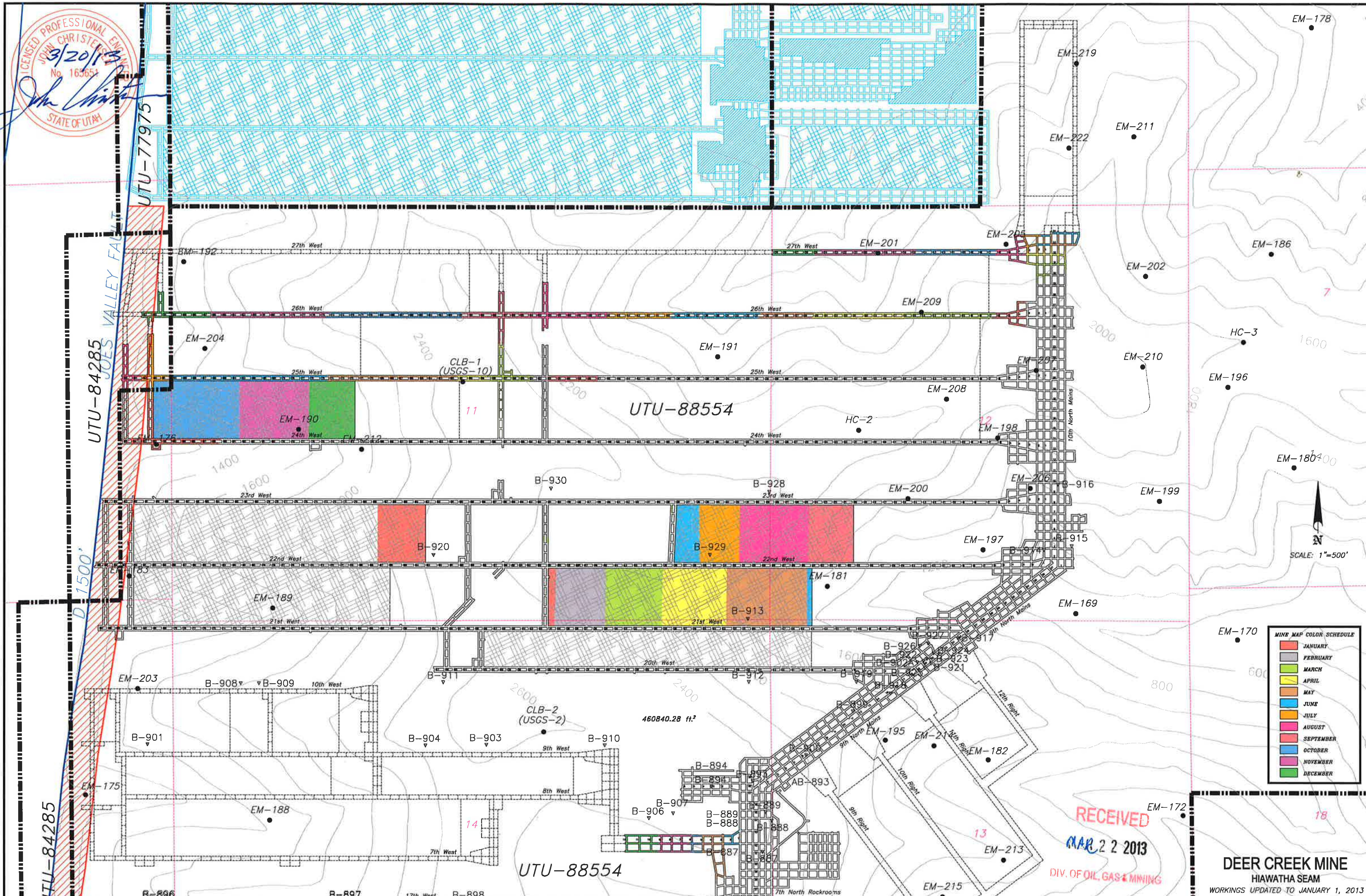
MAPS

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
Annual subsidence map		☐	☐	☐	☒
Mine Map		☐	☐	☐	☒
		☐	☐	☐	☐
		☐	☐	☐	☐
		☐	☐	☐	☐

Reviewer Comments ☐ Met Requirements ☐ Did Not Meet Requirements

Annual Subsidence Map, refer to Subsidence Report
Mine Map, refer to Attachment C


DEER CREEK MINE
HIAWATHA SEAM
WORKINGS UPDATED TO JANUARY 1, 2013
MINE MAP COLOR SCHEDULE
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
SCALE: 1"=500'
N
UTU-88554
UTU-84285
UTU-77975
JOES VALLEY FAULT
D 1500'
27th West
26th West
25th West
24th West
23rd West
22nd West
21st West
20th West
10th West
9th West
8th West
7th West
17th West
10th North Mains
9th North Mains
7th North Rockrooms
12th Right
11th Right
10th Right
9th Right
CLB-1 (USGS-10)
CLB-2 (USGS-2)
460840.28 ft.²
LICENSED PROFESSIONAL ENGINEER
JOHN CHRISTENSEN
No. 165651
STATE OF UTAH
3/20/13
RECEIVED
MAR 2 2 2013
DIV. OF OIL, GAS & MINING

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

1st 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.	**Pile Name**	Cottonwood Waste Rock Site
	Pile 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? 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 outslopes 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.

LICENSED PROFESSIONAL ENGINEER MARK A. REYNOLDS 5049079-2202 STATE OF UTAH

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

Signature: [signature] **Date:** 5-1-12

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**	March 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	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		

Field Evaluation

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

All construction was done according to the permitted, professional engineered design specifications.

2. Placement of underdrains and protective filter systems.

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.

3. Installation of final surface drainage systems.

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.

4. Placement and compaction of fill materials.

The site is leveled as they reach capacity. Trash and extraneous material are removed from the piles shortly after they are placed.

5. Final grading and revegetation of fill.

See No. 3.
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.

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 yd3 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: 5-1-12

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

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF 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 (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)		2012 1st Quarter Inspection **Attachments to Report?** X **No** **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^3 original site 90,000 yd3 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: Mark Reynolds, Sr. Construction Engineer

(Full Name and Title)

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

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

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

Waste Rock Site Quarterly Reports

Energy West Mining Company

2nd 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.	**Pile Name**	Cottonwood Waste Rock Site
	Pile 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**	

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 outslopes 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

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

I hereby certify that; I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself 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: [signature] **Date:** 6-27-12

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**	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? X No Yes	

Field Evaluation

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

All construction was done according to the permitted, professional engineered design specifications.

2.Placement of underdrains and protective filter systems.

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.

3.Installation of final surface drainage systems.

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.

4.Placement and compaction of fill materials.

The site is leveled as they reach capacity. Trash and extraneous material are removed from the piles shortly after they are placed.

5.Final grading and revegetation of fill.

See No. 3.
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.

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE		Page 1 of 2

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 yd3 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

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE			
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 I.D.	**Pile Name**	ELK CANYON/ORIGINAL SITE	
	Pile Number		
	MSHA ID Number	1211-UT-09-00121-01	
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	

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^3 original site 90,000 yd3 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.

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: [signature] **Date:** 6-27-12

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

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

Waste Rock Site Quarterly Reports

Energy West Mining Company

3rd Quarter – 2012

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE

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.	**Pile Name**	Cottonwood Waste Rock Site	
	Pile 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 outslopes 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.

LICENSED PROFESSIONAL ENGINEER MARK A. REYNOLDS 5049079-2202 STATE OF UTAH

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

Signature: [signature] **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	**Pile Name**	Waste Rock Disposal Site	
	Pile 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? X No Yes	

Field Evaluation

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

All construction was done according to the permitted, professional engineered design specifications.

2.Placement of underdrains and protective filter systems.

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.

3.Installation of final surface drainage systems.

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.

4.Placement and compaction of fill materials.

The site is leveled as they reach capacity. Trash and extraneous material are removed from the piles shortly after they are placed.

5.Final grading and revegetation of fill.

See No. 3.
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.

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 yd3 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: [signature] 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 Pile or Refuse Pile I.D.	**Pile Name**	ELK CANYON/ORIGINAL SITE	
	Pile Number		
	MSHA ID Number	1211-UT-09-00121-01	
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 3rd Quarter Inspection		
	Attachments to Report? X No 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^3 original site 90,000 yd3 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.

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

LICENSED PROFESSIONAL ENGINEER MARK A. REYNOLDS 5049079-2202 STATE OF UTAH

Waste Rock Site Quarterly Reports

Energy West Mining Company

4th 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 Pile or Refuse Pile I.D.	**Pile Name**	Cottonwood Waste Rock Site	
	Pile 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	

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 outslopes 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

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

I hereby certify that; I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself 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:** 12-20-12

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**	Dec. 20, 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	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? x No Yes	

Field Evaluation

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

All construction was done according to the permitted, professional engineered design specifications.

2.Placement of underdrains and protective filter systems.

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.

3.Installation of final surface drainage systems.

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.

4.Placement and compaction of fill materials.

The site is leveled as they reach capacity. Trash and extraneous material are removed from the piles shortly after they are placed.

5.Final grading and revegetation of fill.

See No. 3.
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.

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 yd3 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

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

I hereby certify that; I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself 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: [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**	

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^3 original site 90,000 yd3 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.

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:** 12-20-12

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

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

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

1st 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	

IMPOUNDMENT INSPECTION

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

	North Pond	**South Pond**	**Waste Rock Pond**
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.

	North Pond	**South Pond**	**Waste Rock Pond**
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

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT

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.

	North Pond	South Pond	Waste Rock Pond
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.

	North Pond	South Pond	Waste Rock Pond
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

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

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

Signature: Richard Cullum **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.**

	Mine Site Pond	Waste Rock Pond
.onditions, 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.

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

Principle and emergency spillway elevations.

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

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT		

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.

	Mine Site Pond	**Waste Rock Pond**
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.

	Mine Site Pond	**Waste Rock Pond**
Sediment Volume	A.F. (see Note)	None
Remaining Sediment	.0 A.F.	0.59 A.F.
ater impounded	8.6 A.F.	

Changes, Comments, etc.

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

Qualification Statement

MARK. A. REYNOLDS
5049079-2202
LICENSED PROFESSIONAL ENGINEER
STATE OF UTAH

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

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.

POND:

60% Design
Storage Capacity ------ .076 A.F.
100% Sediment
Capacity -------------- .126 A.F.

Principle and emergency spillway elevations.

POND

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.

	POND
Water Elevation	small amount of water from melted snow
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	0.05 A.F.

Changes, Comments, etc. The construction of the pond was completed in early 4th 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.

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

Signature: Mark Reynolds Date: 5-1-12

Signature: Richard Cullum Date: 5/2/12

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
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 1st 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

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

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 Quarterly Reports

Energy West Mining Company

2nd Quarter – 2012

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IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			Page 1 of 2
Permit Number	C/015/0019	Report Date	June 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	June 18, 2012
Inspected By	Rick Cullum/ Mark Reynolds
	2nd 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 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.

	North Pond	South Pond	Waste Rock Pond
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.

	North Pond	South Pond	Waste Rock Pond
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.

	North Pond	South Pond	Waste Rock Pond
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.

	North Pond	South Pond	Waste Rock Pond
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

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

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 Cullen **Date:** 6/29/12

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			Page 1 of 2
Permit Number	C/015/0018	**Report Date**	July 6, 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	6/18/12 **Waste Rock Pond** 6/18/12		
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.

	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.

	Mine Site Pond:	Waste Rock Pond:
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.

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

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT		

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.

	Mine Site Pond	**Waste Rock Pond**
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.

	Mine Site Pond	**Waste Rock Pond**
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 3rd 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.

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

Signature: [signature] **Date:** 7-6-12

Signature: Richard Cullen **Date:** 7/10/12

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
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.

POND:

60% Design
Storage Capacity ------ .076 A.F.
100% Sediment
Capacity -------------- .126 A.F.

Principle and emergency spillway elevations.

POND

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.

	POND
Water Elevation	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 4th 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.

PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

Signature: [signature] Date: 6-27-12

Signature: Richard Cullum Date: 6/29/12

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			Page 1 of 1
Permit Number	C/015/0009	**Report Date**	June 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 2nd Quarter 2012 Inspection

Inspection Date	June 18, 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	Dry
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	0.00
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

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

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 Quarterly Reports

Energy West Mining Company

3rd Quarter – 2012

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
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
	3rd 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 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.

Pond	North Pond	South Pond	Waste Rock
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.

	North Pond	South Pond	Waste Rock Pond
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.

	North Pond	South Pond	Waste Rock Pond
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.

	North Pond	South Pond	Waste Rock Pond
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

LICENSED PROFESSIONAL ENGINEER
MARK. A. REYNOLDS
5049079-2202
STATE OF UTAH

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**	**Mine Site Pond:**	**Waste Rock Pond:**
	Impoundment Number		
	UPDES Permit Number	UT-0023604-001	
	MSHA ID Number	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.

	Mine Site Pond	**Waste Rock Pond**
onditions, 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.

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

Principle and emergency spillway elevations.

	Mine Site Pond	**Waste Rock Pond**
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 outslopes of embankments, etc.

	Mine Site Pond	Waste Rock Pond
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.

	Mine Site Pond	Waste Rock Pond
Sediment Volume	2.32 A.F. @ 7214.53	None
Remaining Sediment	0.8 A.F.	0.59 A.F.
ater 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 1st part of the 4th 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 Cullen Date: 10/2/12

Signature: Mark Reynolds Date: 9-27-12

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

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.

POND

Conditions, Comments Etc. 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.

POND:

60% Design Storage Capacity ------ .076 A.F.

100% Sediment Capacity -------------- .126 A.F.

Principle and emergency spillway elevations.

POND

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.

	POND
Water Elevation	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 4th 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.

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

Signature: [signature] **Date:** 10-2-12

Signature: [signature] **Date:** 9-27-12

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			Page 1 of X/ 1
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 outslopes 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

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

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

4th Quarter – 2012

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			Page 1 of 2
Permit Number	C/015/0019	**Report Date**	Dec. 20, 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	Dec. 7, 2012
Inspected By	Rick Cullum/ Mark Reynolds
	4th 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 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.

	North Pond	South Pond	Waste Rock Pond
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.

	North Pond	South Pond	Waste Rock Pond
Principal Spillway Elevation	7354.83	7325.33	6766.3
Emergency Spillway Elevation	7363.33	7334.2	6770.0

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT		

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.

	North Pond	South Pond	Waste Rock Pond
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.

	North Pond	South Pond	Waste Rock Pond
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

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LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

Signature: [signature] **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**	**Mine Site Pond:**	**Waste Rock Pond:**
	Impoundment Number		
	UPDES Permit Number	UT-0023604-001	
	MSHA ID Number	N/A	N/A

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

	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.

	Mine Site Pond:	**Waste Rock Pond:**
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.

	Mine Site Pond	**Waste Rock Pond**
Principle Spillway Elevation (F.A.S.L.):	7218.64	6318.0
Emergency Spillway Elevation	7232.03	6318.0

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT		Page 2 of 2

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.

	Mine Site Pond	Waste Rock Pond
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.

	Mine Site Pond	Waste Rock Pond
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 1st part of the 4th quarter.

Qualification Statement

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

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

Signature: _________________ **Date:** 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.

POND

Conditions, Comments Etc. 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.

POND:

60% Design
Storage Capacity ------ .076 A.F.
100% Sediment
Capacity -------------- .126 A.F.

Principle and emergency spillway elevations.

POND

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.

	POND
Water Elevation	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 4th quarter 2008. The pond is functioning as designed.

Qualification Statement

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

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

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

Signature: ____________ **Date:** ____________

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			Page 1 of 1
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 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	7181.04
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.

Qualification Statement

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

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

Signature: [signature] Date: 12-20-12

Signature: __________ Date: __________

10 North Roof, Rib, and Floor Sampling Reports

2012

Energy West Mining Company

Inter-Mountain Labs
Your Environmental Monitoring Partner
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Date: 1/17/2013

CLIENT: Energy West Mining Co
Project: Energy West #2
Lab Order: S1212163

CASE NARRATIVE

Report ID: S1212163001

Samples 10N Roof, Floor, and Rib were received on December 10, 2012.

Samples were analyzed using the methods outlined in the following references:

U.S.E.P.A. 600/2-78-054 "Field and Laboratory Methods Applicable to Overburden and Mining Soils", 1978
American Society of Agronomy, Number 9, Part 2, 1982
USDA Handbook 60 "Diagnosis and Improvement of Saline and Alkali Soils", 1969
Wyoming Department of Environmental Quality, Land Quality Division, Guideline No. 1, 1984
New Mexico Overburden and Soils Inventory and Handling Guideline, March 1987
State of Utah, Division of Oil, Gas, and Mining: Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining, April 1988
Montana Department of State Lands, Reclamation Division: Soil, Overburden, and Regraded Spoil Guidelines, December 1994
State of Nevada Modified Sobek Procedure
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition

All Quality Control parameters met the acceptance criteria defined by EPA and Inter-Mountain Laboratories except as cated in this case narrative.

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

Inter-Mountain Labs
Your Environmental Monitoring Partner
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Soil Analysis Report

Energy West Mining Co
P.O. Box 310
Huntington, UT 84528

Report ID: S1212163001

Project: Energy West #2
Date Received: 12/10/2012

Date Reported: 1/17/2013
Work Order: S1212163

Lab ID	Sample ID	pH	Saturation	Electrical Conductivity	Field Capacity	Wilt Point	PE Calcium	PE Magnesium	PE Sodium	SAR
		s.u.	%	dS/m	%	%	meq/L	meq/L	meq/L	
S1212163-002	10N Roof	8.2	37.5	0.75	10.0	3.2	3.52	3.44	1.11	0.60
S1212163-003	Rib	8.5	111	0.16	3.9	2.4	0.88	0.28	0.39	0.51
S1212163-004	Floor	8.6	38.6	0.17	5.1	1.9	0.86	0.35	0.42	0.54

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential

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

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

1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Soil Analysis Report

Energy West Mining Co
P.O. Box 310
Huntington, UT 84528

Report ID: S1212163001

Project: Energy West #2
Date Received: 12/10/2012

Date Reported: 1/17/2013
Work Order: S1212163

Lab ID	Sample ID	Sand %	Silt %	Clay %	Texture	Coarse Fragment %	Boron ppm	Selenium ppm
S1212163-002	10N Roof	86.0	7.0	7.0	Loamy Sand	100	0.17	0.06
S1212163-003	Rib	92.0	3.0	5.0	Sand	100	0.32	<0.02
S1212163-004	Floor	92.0	7.0	1.0	Sand	100	<0.05	<0.02

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential

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

Reviewed by: Karen A Secor

Karen Secor, Soil Lab Supervisor

Inter-Mountain Labs
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Soil Analysis Report

Energy West Mining Co
P.O. Box 310
Huntington, UT 84528

Report ID: S1212163001

Project: Energy West #2
Date Received: 12/10/2012

Date Reported: 1/17/2013
Work Order: S1212163

Lab ID	Sample ID	Total Sulfur %	T.S. AB t/1000t	Neutral. Potential t/1000t	T.S. ABP t/1000t	Sulfate Sulfur %	Pyritic Sulfur %	Organic Sulfur %	PyriticS AB t/1000t	PyriticS ABP t/1000t
S1212163-002	10N Roof	0.15	4.62	117	112					
S1212163-003	Rib	0.60	18.7	5.16	-13.6	0.09	0.12	0.39	3.75	1.41
S1212163-004	Floor	0.07	2.23	0.07	-2.16	<0.01	0.07	<0.01	2.19	-2.12

These results apply only to the samples tested.

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

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

Inter-Mountain Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
Energy West Mining Co	DC-Mine
Sampler: (Signature) Denni Coakley	**Chain of Custody Tape No.**

Sample No./ Identification	Date	Time	Lab Number	Matrix	No. of Containers	ANALYSES / PARAMETERS				Remarks
10N XC-34	12/3/12	1200	S1212163		3					
↳ Roof	"	"			1	See Attached				
Rib	"	"			1	analysis sheet				
Floor	"	"			1					

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	**Date**	**Time**	**Received by: (Signature)**	**Date**	**Time**
Relinquished by: (Signature)	**Date**	**Time**	**Received by laboratory: (Signature)**	**Date**	**Time**
			Kane Ases	12/10/12	

Inter-Mountain Laboratories, Inc.

35103

- ☒ 1633 Terra Avenue, Sheridan, Wyoming 82801, Telephone (307) 672-8945
- ☐ 1701 Phillips Circle, Gillette, Wyoming 82718, Telephone (307) 682-8945
- ☐ 2506 West Main Street, Farmington, NM 87401, Telephone (505) 326-4737
- ☐ 1160 Research Dr., Bozeman, Montana 59715, Telephone (406) 586-8450
- ☐ 11183 SH 30, College Station, TX 77845, Telephone (409) 776-8945
- ☐ 3304 Longmire Drive, College Station, TX 77845, Telephone (409) 774-4999

WorkOrde	LabID	SampleID	Sampled	Begin Dep	End Depth	pH s.u.	Saturation %	Electrical Conductivi dS/m	Field Capacity %	Wilt Point %	PE Calcium meq/L	PE Magnesiur meq/L	PE Sodium meq/L	SAR	Sand %	Silt %	Clay %	Texture	Boron ppm	Nitrate (as N) ppm	Selenium ppm	TKN %	Total Carbon %	TOC %	Total Sulfur %	T.S. AB t/1000t	Neutral. Potential t/1000t	T.S. ABP t/1000t	Sulfate Sulfur %	Pyritic Sulfur %	Organic Sulfur %	PyriticS AB t/1000t	PyriticS ABP t/1000t
S1201100	S1201100-	DC0111 C	12/12/11	0	0	8.4	34.3	0.37	14.2	4.8	1.11	1.38	1.13	1.01	72.0	18.0	10.0	Sandy Loe	0.39	0.4	<0.02	0.21	9.5	8.5	0.14	4.40	84.0	79.6					
S1201100	S1201100-	DC0211 C	12/12/11	0	0	8.1	72.7	0.24	14.5	3.9	0.80	0.62	0.88	1.05	95.0	5.0	<0.1	Sand	0.20	0.1	<0.02	1.32	80.2	80.2	0.84	26.3	4.89	-21.4	0.12	0.18	0.53	5.73	-0.84
S1201100	S1201100	DC0311 C	12/12/11	0	0	8.3	33.2	0.27	17.5	2.8	0.83	0.69	0.93	1.06	97.0	3.0	<0.1	Sand	0.12	0.2	<0.02	0.14	1.8	1.6	0.03	0.88	12.6	11.7					

Inter-Mountain Labs
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Soil Analysis Report

Energy West Mining Co
P.O. Box 310
Huntington, UT 84528

Report ID: S1201100001

Project: Energy West Table #6
Date Received: 1/10/2012

Date Reported: 1/31/2012
Work Order: S1201100

Lab ID	Sample ID	pH	Saturation	Electrical Conductivity	Field Capacity	Wilt Point	PE Calcium	PE Magnesium	PE Sodium	SAR
		s.u.	%	dS/m	%	%	meq/L	meq/L	meq/L	
S1201100-001	DC0111 Composite Roof	8.4	34.3	0.37	14.2	4.8	1.11	1.38	1.13	1.01
S1201100-002	DC0211 Composite Rib	8.1	72.7	0.24	14.5	3.9	0.80	0.62	0.88	1.05
S1201100-003	DC0311 Composite Floor	8.3	33.2	0.27	17.5	2.8	0.83	0.69	0.93	1.06

These results apply only to the samples tested.

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

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

Inter-Mountain Labs
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Soil Analysis Report

Energy West Mining Co
P.O. Box 310
Huntington, UT 84528

Report ID: S1201100001

Project: Energy West Table #6
Date Received: 1/10/2012

Date Reported: 1/31/2012
Work Order: S1201100

Lab ID	Sample ID	Sand %	Silt %	Clay %	Texture	Boron ppm	Nitrate (as N) ppm	Selenium ppm	TKN %	Total Carbon %	TOC %
S1201100-001	DC0111 Composite Roof	72.0	18.0	10.0	Sandy Loam	0.39	0.4	<0.02	0.21	9.5	8.5
S1201100-002	DC0211 Composite Rib	95.0	5.0	<0.1	Sand	0.20	0.1	<0.02	1.32	80.2	80.2
S1201100-003	DC0311 Composite Floor	97.0	3.0	<0.1	Sand	0.12	0.2	<0.02	0.14	1.8	1.6

These results apply only to the samples tested.

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

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

Inter-Mountain Labs
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Soil Analysis Report

Energy West Mining Co
P.O. Box 310
Huntington, UT 84528

Report ID: S1201100001

Project: Energy West Table #6
Date Received: 1/10/2012

Date Reported: 1/31/2012
Work Order: S1201100

Lab ID	Sample ID	Total Sulfur %	T.S. AB t/1000t	Neutral. Potential t/1000t	T.S. ABP t/1000t	Sulfate Sulfur %	Pyritic Sulfur %	Organic Sulfur %	PyriticS AB t/1000t	PyriticS ABP t/1000t
S1201100-001	DC0111 Composite Roof	0.14	4.40	84.0	79.6					
S1201100-002	DC0211 Composite Rib	0.84	26.3	4.89	-21.4	0.12	0.18	0.53	5.73	-0.84
S1201100-003	DC0311 Composite Floor	0.03	0.88	12.6	11.7					

These results apply only to the samples tested.

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

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

P.O. DBN 7128

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CHAIN OF CUSTODY RECORD

Client/Project Name: Energy West Mining Co

Project Location: Deer Creek Mine

Sampler: (Signature)

Chain of Custody Tape No.

ANALYSES / PARAMETERS

Sample No./ Identification	Date	Time	Lab Number	Matrix	No. of Containers					Remarks
DC0111	12/12/11	1000	S1201100-001	Composit Roof	1	See Attached				
DC0211	"	"	002	" Rib	1					
DC0311	"	"	003	" Floor	1					

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Dennis Oakley	1/6/12	1000	[signature]	1/10/12	0930
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by laboratory: (Signature)	Date	Time

Inter-Mountain Laboratories, Inc.

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- [ ] 1701 Phillips Circle, Gillette, Wyoming 82718, Telephone (307) 682-8945
- [ ] 2506 West Main Street, Farmington, NM 87401, Telephone (505) 326-4737
- [ ] 1160 Research Dr., Bozeman, Montana 59715, Telephone (406) 586-8450
- [ ] 11183 SH 30, College Station, TX 77845, Telephone (409) 776-8945
- [ ] 3304 Longmire Drive, College Station, TX 77845, Telephone (409) 774-4999

35103

Inter-Mountain Labs
1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

Soil Analysis Report
Energy West Mining Co
P.O. Box 310
Huntington, UT 84528

Report ID: S1201100001

Project: Energy West Table #6
Date Received: 1/10/2012

Date Reported: 1/31/2012
Work Order: S1201100

Lab ID	Sample ID	pH	Saturation	Electrical Conductivity	Field Capacity	Wilt Point	PE Calcium	PE Magnesium	PE Sodium	SAR
		s.u.	%	dS/m	%	%	meq/L	meq/L	meq/L	
S1201100-001	DC0111 Composite Roof	8.4	34.3	0.37	14.2	4.8	1.11	1.38	1.13	1.01
S1201100-002	DC0211 Composite Rib	8.1	72.7	0.24	14.5	3.9	0.80	0.62	0.88	1.05
S1201100-003	DC0311 Composite Floor	8.3	33.2	0.27	17.5	2.8	0.83	0.69	0.93	1.06

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
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Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

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1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Soil Analysis Report

Energy West Mining Co
P.O. Box 310
Huntington, UT 84528

Report ID: S1201100001

Project: Energy West Table #6
Date Received: 1/10/2012

Date Reported: 1/31/2012
Work Order: S1201100

Lab ID	Sample ID	Sand	Silt	Clay	Texture	Boron	Nitrate (as N)	Selenium	TKN	Total Carbon	TOC
		%	%	%		ppm	ppm	ppm	%	%	%
S1201100-001	DC0111 Composite Roof	72.0	18.0	10.0	Sandy Loam	0.39	0.4	<0.02	0.21	9.5	8.5
S1201100-002	DC0211 Composite Rib	95.0	5.0	<0.1	Sand	0.20	0.1	<0.02	1.32	80.2	80.2
S1201100-003	DC0311 Composite Floor	97.0	3.0	<0.1	Sand	0.12	0.2	<0.02	0.14	1.8	1.6

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential

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

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

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

P.O. DBN 7128

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CHAIN OF CUSTODY RECORD

Client/Project Name: Energy West Mining Co

Project Location: Deer Creek Mine

ANALYSES / PARAMETERS

Sampler: (Signature)

Chain of Custody Tape No.

Sample No./ Identification	Date	Time	Lab Number	Matrix	No. of Containers					Remarks
DC0111	12/12/11	1000	S1201100-001	Composit Roof	1					
DC0211	"	"	002	" Rib	1	See Attached				
DC0311	"	"	003	" Floor	1					

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Dennis Oakley	1/6/12	1000	Karen Secor	1/10/12	0930
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by laboratory: (Signature)	Date	Time

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35103

MACROINVERTEBRATES AND FISH MONITORING AT RILDA CREEK, EMERY COUNTY, UTAH.

(2004-2011).

Prepared for:

Energy West Mining Company
P.O. Box 310
Huntington, Utah 84528

Prepared by:

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March 27, 2012

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APPENDIX

MACROINVERTEBRATES AND FISH MONITORING AT RILDA CREEK, EMERY COUNTY, UTAH (2004-2011).

1. INTRODUCTION

In 2006, Energy West Mining Company developed a new portal facility in Rilda Canyon for their Deer Creek mine in Emery County, Utah. This development was intended to provide closer access to the existing mining area, reduce travel time for miners, improve personnel safety, and provide an additional air intake to meet Mine Safety and Health Administration (MSHA) requirements.

Given that the construction of this facility could potentially disturb aquatic biota, the main objective of this monitoring study is to assess potential effects of the new mine portal development on fish and the aquatic invertebrate community in Rilda Creek. This study addresses differences between control and experimental sites, between seasons (spring and fall), and years (pre- and post-construction). To address this objective, the Utah Division of Wildlife Resources (UDWR) Southeast Region and Socio-Ecological Concepts, LLC (S.E.C) conducted pre- and post-disturbance surveys of macroinvertebrate and fish communities in Rilda Creek. The aquatic invertebrate surveys are intended to monitor changes quantitatively while fish surveys are intended to qualitatively assess potential changes on fish species. Pre-disturbance surveys took place during spring and fall of 2004 and 2005; construction of surface facilities began in April of 2006. Post-disturbance surveys were conducted in spring and fall of 2006, 2007 and 2008. A single spring survey was conducted in 2011.

This report includes a description of the study area, the methodology used, and results and discussion of fish and invertebrate surveys that have been completed to date by both the UDWR and S.E.C (2004-2011). The results and discussion section of this report addresses differences across sites, seasons, and years (pre- and post-construction).

2. METHODS

2.1 STUDY AREA

Rilda Creek is a small first-order stream tributary to Huntington Creek. This stream is located in the San Rafael River Drainage (Hydrologic Unit #14060009) within the Manti La-Sal National Forest. Historically, mining has been a major management activity in this area. The current Forest Plan identifies this area as appropriate for mineral development.

Three sampling sites were selected during a preliminary assessment at Rilda Canyon (Walker 2004). Site 1 is located near the confluence with Huntington Creek, Sites 2 and 3 are located approximately 1.4 miles (2.3 Km) and 2.7 miles (4.3 Km), respectively, above the mouth of Rilda Creek (Figure 1). Elevation ranges from 6,942 feet (2,116 m) at Site 1 to 7,881 feet (2,402 m) at Site 3. Site 3 (Test Site) was located upstream from the area potentially impacted by the new surface development and was used as a control for the spring sampling surveys. The collection of invertebrate samples was possible at these sites during the spring surveys. However, Site 3 did not present flow during fall surveys. An alternative sampling site was selected (Site 4) and the third sample was collected in an area adjacent to the federally restricted zone for culinary water use (Figure 1). This alternative site was used to compare pre- and post-construction conditions but was not used as a control site because it is located downstream of the construction area.

This report encompasses pre- and post-construction sampling efforts completed to date with an emphasis on the 2011 spring survey. Spring pre-disturbance surveys were conducted on May 28, 2004 and June 16, 2005. Fall pre-disturbance surveys were conducted on October 22, 2004 and October 19, 2005. Spring post-disturbance surveys were completed on June 22, 2006, May 21, 2007, June 23, 2008, and June 10, 2011. Fall post-disturbance surveys were completed on October 21, 2006, October 12, 2007, and October 8, 2008; a fall monitoring survey was not conducted in 2011. The same standard procedures for the collection and processing of samples were used for all surveys. A summary of sampling events conducted to date is shown in Table 1.

2.2 MACROINVERTEBRATE SAMPLING

Quantitative aquatic invertebrate samples were collected using a 500 um Surber sampler (surface area=0.09 m^2). Two samples were collected at the first four fast-water habitat units encountered. All samples were combined at each site (i.e., eight samples per site). Sampling locations were not randomly selected due to the small size of the sampling units and low flow conditions during fall surveys. The location of the habitat units sampled is shown in Table 2. Samples were processed in the field following the protocol recommended by the National Aquatic Monitoring Center (NAMC). The material collected in each sample was preserved using 10 percent buffered formalin. Sample processing was completed at the NAMC. Selected habitat data was recorded at each sampling site (e.g., water temperature, pH, conductivity). The NAMC also calculated a number of metrics (e.g., abundance, richness, and diversity) based on taxa found in each sampling station. A description of these metrics can be found in Appendix I. This report compiles metrics calculated for all fish and aquatic invertebrate surveys conducted along Rilda Creek from 2004 to 2011.

2.3 FISH SURVEY

As described by Walker (2005), specific sampling sites were not assigned for fish sampling. A single pass electrofishing survey was conducted from the mouth of Rilda Creek to an area approximately 3.5 km upstream. A single backpack electrofisher (Smith-Roth LR-24) was used (electrofisher settings: 30Hz, 150 volts, 400-watt power limit). Stream conditions (i.e., flow and clarity) were typically adequate for effective electro-fishing sampling. Fish collected were identified, enumerated, and classified according to their size as young of the year (YOY), juveniles, or adults. Fish were allowed to recover in buckets filled with stream water and subsequently released. Electrofishing surveys were conducted prior to aquatic invertebrate sample collection.

2.4 DATA ANALYSIS

Summaries of the metrics calculated for quantitative invertebrate samples collected in Rilda Creek were presented in tabular and/or graphic form. The comparison between sites, seasons, and pre-/post-construction years was based on these tabular and graphic presentations of the data.

Metrics from sites 1, 2, and 3 collected in spring sampling events were used to compare test and control sites. The seasonal comparison was based on metrics calculated for sites 1 and 2. This seasonal comparison did not include data from Site 3 because this site was desiccated during fall sampling events. Due to the observed differences in invertebrate abundance and diversity between seasons, data from spring and fall sampling events were treated independently to assess differences across years (i.e., pre- and post-construction). Data from sites 1, 2, and 3 were used to compare spring sampling events across years, while data from sites 1, 2, and 4 were used to compare fall sampling events. Table 1 shows sampling events completed to date and the surveys used to compare sites, seasons, and years.

3. RESULTS AND DISCUSSION

3.1 MACROINVERTEBRATE SURVEY

3.1.1 TEST AND CONTROL SITE COMPARISON

A compilation of the metrics calculated for test and controls sites during spring sampling events is shown in Table 3. As noted in S.E.C (2009), the total and EPT invertebrate abundance tends to decrease from the lowermost site (i.e., Site 1) to the uppermost site (i.e., Site 3; Figure 2a and 2b). Although this pattern appeared to be consistent for both pre-and post-construction sampling events, average total and EPT taxa abundance was higher in post-construction samples from Sites 1, 2, and 3. Higher total and EPT abundances at the middle and lower sampling sites (i.e., test sites) suggests that there is more invertebrate habitat available in the lower stream reaches. Breidinger (2007), stated that the lower EPT abundance at the uppermost site may be caused by higher water velocities at this site. It is also possible that reduced base flows limit invertebrate habitat and the recruitment of invertebrates at this site. Site 3 also appeared to have more fine sediment than the downstream sites which can also pose limitations for aquatic invertebrates.

A trend in species diversity (based on Shannon diversity index) and total taxa richness was not observed across sites. However, the average Shannon index at Sites 1and 3 appeared to be lower for post-construction samples than for pre-construction samples (Figure 2c). Average total taxa richness was also lower for post-construction samples at Site 1; post-construction total taxa richness at Site 2 and Site 3are within the ranges observed pre-construction (Figure 2d). Overall, the lack of noticeable differences in invertebrate diversity and taxa richness across sites indicated that water quality conditions are similar between control and test sites.

The Hilsenhoff Biotic Index (HBI), which summarizes the overall pollution tolerances of the taxa collected, suggested that slight enrichment is prevalent at all sites (Figure 2e). This index has been used to detect nutrient enrichment, high sediment loads, low dissolved oxygen, and thermal impacts. A consistent pattern of increasing or decreasing HBI values across sites was not observed but it was noted that average index values were slightly higher for post-construction samples than for pre-construction samples.

The predominant taxa across sites trough 2008 were Baetidae and Heptageniidae, which are both members of the Ephemeroptera order generally considered sensitive to pollution. In 2011, Orthocladiinae was the dominant taxa at Sites 1 and 2, and Tanyponidae was the dominant taxa at Site 3 (Table 3). Both of these taxa are members of the Chironomidae family which is typically considered tolerant to pollution. It is possible that the apparent shift in community composition from 2008 to 2011 was due to habitat changes caused by drastically higher stream flows and sediments loads observed in spring 2011. Consistent with previous surveys (S.E.C 2009), results from recent surveys show that average intolerant taxa abundance is higher at Sites 1 and 2 than at Site 3 (Figure 2f). Average intolerant taxa abundance was higher in post-construction samples from all sites.

Overall, the low Hilsenhoff biotic index (HBI) values (i.e., typically below 4), suggested that pollution levels in Rilda Creek were low across all test and control sites. The macroinvertebrate assessment also indicated that stream condition during spring surveys appear to increase slightly from upstream to downstream sites. The observed increase in invertebrate abundance, coupled with slightly lower species diversity, taxa richness, and the increasing dominance of the community by a single taxa at most sites, suggest that lower water quality conditions occurred during post-construction sampling events. However, given that the control site (Site 3) is located upstream of the disturbed area where construction activities took place, it cannot be concluded that construction activities have lead to the observed changes in the aquatic invertebrate community. Differences in the aquatic invertebrate community during pre- and post-construction sampling events are explored and discussed further below under the year to year comparison.

3.1.2 SEASONAL COMPARISON

This seasonal comparison section encompasses surveys spring and fall surveys conducted through 2008 and is presented here as reported in S.E.C (2009). Survey data from spring and fall of 2007 and 2008 support earlier findings of considerable seasonal differences in the aquatic invertebrate fauna in Rilda Creek (Cirrus 2007). Seasonal differences are observed in metrics calculated for spring and fall surveys conducted from 2004 to 2008. These seasonal differences are consistent across sites and years. A seasonal comparison of summary statistics for the metrics calculated is shown in Table 4. These seasonal differences also became apparent when comparing metrics across years (see Figures 3, 4, and 5).

Consistent with earlier reports, total and EPT abundance in samples collected during fall surveys were typically several orders of magnitude higher than in those collected during spring. Total abundance in spring surveys was typically below 250 invertebrates/m^2, while in fall surveys abundance exceeded 950 invertebrates/m^2. Similar differences were observed in EPT abundance across seasons. Further, the total taxa richness and the number of families are consistently higher in fall than in spring. From 5 to 9 more families were typically observed in fall surveys than in spring surveys. The extent of change between spring and fall measured by these metrics remains consistent across years (Table 4).

Although a consistent pattern of increasing or decreasing diversity across seasons was not observed, the number of families found in fall samples was higher than in samples collected in spring (Table 4; Figure 5c and 5d). As noted in Cirrus (2006), the distribution of taxa within the invertebrate community, as measured by the evenness index, typically decreased in the fall as the abundance of individual taxa increased. Taxa within the Ephemeroptera order (e.g., Baetidae and Heptageniidae) were the dominant taxa during both seasons but their abundance was substantially higher in the fall than in spring. The availability of more suitable invertebrate habitat could explain the increase in the number of families, total richness, EPT richness, and the increase in both tolerant and intolerant taxa abundance during fall.

It is likely that observed seasonal differences in the aquatic invertebrate community is related to natural disturbances to the stream ecosystem. In general, variation in flow (floods to desiccation) is the major cause of natural disturbance in streams and leads to large, often temporary reductions in insect abundance and diversity (Thorp and Covish 2001). The observed cycles of increased and decreased abundance and richness across seasons in Rilda Creek may reflect natural history strategies of aquatic invertebrates that are adapted to large variations in stream flow conditions.

Substantial differences in organic enrichment across seasons were not observed. The Hilsenhoff biotic index (HBI) was typically between 2 and 4, indicating that Rilda Creek could be considered slightly enriched. The number of tolerant taxa in fall surveys indicated that while there may be more habitat available during this time of the year, water quality conditions likely decrease.

As Cirrus (2006) pointed out, the observed differences in invertebrate community composition between spring and fall may not be linked to differences in water quality but rather to stream flow and habitat conditions. Invertebrate community differences observed across sites may be associated with seasonal changes in flow. These changes in flow conditions could also be associated with the differences in invertebrate communities observed across seasons. High spring runoff flows may function as discrete events that disrupt aquatic invertebrate populations leading to the observed seasonal oscillations in invertebrate abundance and richness. As flow conditions decrease and stabilize through summer and fall, some invertebrate taxa may re-colonize the stream while the abundance of other taxa (e.g., Baetidae) increases.

3.1.3 YEAR-TO-YEAR COMPARISON

Bi-annual surveys conducted from 2004 to 2008 and spring surveys conducted through 2011 suggested that although noticeable changes in the aquatic invertebrate community were not observed post-construction, there are some differences in metrics based on pre- and post-construction aquatic invertebrate samples that should be noted. Summary statistics for annual spring and fall surveys are shown in Table 5 and Table 6, respectively. Graphic presentations of these metrics are shown in Figures 3, 4, and 5. As noted above, given the differences in the aquatic invertebrate community across seasons, differences across years were assessed separately for spring and fall surveys. Since a fall survey was not conducted in 2011, the year-to-year comparison based in fall survey data presented in this report is consistent with S.E.C (2009).

Although total invertebrate abundance in spring surveys was substantially higher in 2006 than in pre-construction surveys, subsequent sampling during this season indicated that total abundance post-construction was within the pre-construction ranges observed (Figure 3a). Conversely, mean total abundance in fall samples were lower in 2007 and 2008 than in pre-construction surveys (Figure 3b). Similar differences were also observed in EPT abundance for both spring and fall surveys (Figures 3c and 3d). EPT abundance in spring 2011 was the lowest recorded to date but it is likely that this decrease can be related to habitat changes caused by drastically higher spring run-off flows observed this year. A decline in average total taxa richness occurred from spring 2006 to spring 2011 but the ranges observed are within those recorded pre-construction. Overall, significant changes between pre- and post-construction total taxa richness were not observed (Figure 3e and 3f).

In terms of species diversity, pre- and post-construction differences in the taxa evenness index were not observed in spring (Figure 4a) or fall samples (Figure 4b). However, as noted above under the Test and Control site comparison, the percentage of dominant taxa was typically higher in post-construction than in pre-construction samples. The cause of this increase in dominance by a single taxa is not known given that it was observed both on test and control sites (Table 3).
Further, considerable annual differences in diversity metrics were not observed (Figure 4c and 4d). Average Shannon index values appeared lower in post-construction spring samples, particularly in 2008, but overall their range is not drastically different than Shannon Index ranges based on pre-construction samples (Figure 4c).

Substantial differences were not observed in the mean abundance of intolerant taxa, number of families, and Hilsenhoff HBI across pre- and post-construction surveys (Figure 5). Overall, differences in the aquatic invertebrate community that could reveal a decline in water quality resulting from construction activities in Rilda Canyon were not evident. In addition, although there was variability in the composition of the aquatic invertebrate community across years, the lack of noticeable changes in the proportions of functional feeding groups across pre- and post-construction surveys also suggested that comparable conditions of invertebrate habitat and water quality occurred before and after construction (Figure 6). As noted previously, some of the changes in dominant taxa and invertebrate community composition observed in 2011 may be related to differences in habitat conditions associated to above average stream flows experienced this year.

Overall, results of spring and fall surveys conducted to date suggest that the aquatic invertebrate community has not changed drastically following construction activities in Rilda Canyon and suggests that water quality conditions have remained stable after the completion of the construction project. Observed differences cannot be associated to construction activities given that they occurred at all sites, including the control site located upstream of the construction area.

3.2 FISH SURVEY

A summary of the qualitative fish surveys conducted to date is shown in Table 7. As noted in previous reports, the only two fish species that have been observed along Rilda Creek are brown trout (*Salmo trutta*) and cutthroat trout (*Oncorhynchus clarki*). Fish sampling efforts in fall of 2008 resulted in the capture of 50 cutthroat trout and 2 brown trout. The qualitative survey conducted in fall of 2008 suggests that cutthroat trout continues to be the dominant species. Most of the cutthroat trout observed over 100 mm in total length; 14 were less than 100 mm, and a total of 8 young of the year were observed. The presence of these young fish suggests that natural reproduction continues to occur along low to middle reaches of Rilda Creek. This also suggests that water quality and fish habitat conditions have not declined substantially since construction activities began. The observed variability in numbers of fish captured could be the result of variations in sampling effort and/or due to natural variability annual fish recruitment. Overall, and as noted in previous reports, no fish were observed above the concrete structure located downstream of the road crossing in Rilda Canyon during the 2008 fall surveys (Figure 1).

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Walker, A.W. 2005. Surveys conducted to determine pre-disturbance conditions prior to surface facility development in Rilda Canyon during 2004-2005. Utah Department of Natural Resources, Division of Wildlife Resources. Salt Lake City, UT. 24pp.

Table 1. Summary of sampling events and locations in Rilda Creek, Emery County, UT. (2004-2011).

Site	Pre-disturbance				Post-disturbance						
	2004		2005		2006		2007		2008		2011
	28-May	22-Oct	16-Jun	19-Oct	22-Jun	21-Oct	21-May	12-Oct	23-Jun	8-Oct	10-Jun
Site 1	X [a, b, c]	X [b, c]	X [a, b, c]	X [b, c]	X [a, b, c]	X [b, c]	X [a, b, c]	X [b, c]	X [a, b, c]	X [b, c]	X [a, b, c]
Site 2	X [a, b, c]	X [b, c]	X [a, b, c]	X [b, c]	X [a, b, c]	X [b, c]	X [a, b, c]	X [b, c]	X [a, b, c]	X [b, c]	X [a, b, c]
Site 3	X [a, c]		X [a, c]		X [a, c]		X [a, c]		X [a, c]		X [a, c]
Site 4[d]		X [c]		X [c]		X [c]		X [c]		X [c]	

[a] Data used to assess differences between control and test sites.

[b] Data used to assess differences between seasons (i.e., spring and fall).

[c] Data used to assess differences between years (i.e., pre-disturbance: 2004- 2005, and post-disturbance: 2006-2011).

[d] Site 4 was selected as an additional sampling site for the fall surveys given that no flow conditions were present at Site 3 during this time.

Table 2. UTM coordinates for macroinvertebrate sampling locations in Rilda Creek, Emery County, UT.

Site	Samples	UTM X[a]	UTM Y[a]
1	1a, 1b	489769	4362610
	1c,1d	489771	4362548
	1e,1f	489764	4362562
	1g, 1h	489727	4362522
2	2a,2b	487709	4361324
	2c,2d	487637	4361290
	2e,2f	487520	4361329
	2g,2h	487467	4361330
3	3a,3b	485904	4361789
	3c,3d	485856	4361774
	3f,3g	485818	4361876
	3g,3h	485818	4361876
4[b]	4a,4b	487093	4361288
	4c,4d	487122	4361293
	4f,4g	487113	4361280
	4g,4h	487096	4361279

[a] NAD 27

[b] Site 4 was selected as an additional sampling site for the fall surveys given that no flow conditions were present at Site 3 during this time.

Table 3. Summary of macroinvertebrate surveys conducted in spring at Rilda Creek, Emery County, Utah (2004-2011)

Site	Site 1-Test						Site 2- Test						Site 3-Control					
Date	May 04	Jun 05	Jun 06	May 07	Jun 08	Jun 11	May 04	Jun 05	Jun 06	May 07	Jun 08	Jun 11	May 04	Jun 05	Jun 06	May 07	Jun 08	Jun 11
Total abundance [a]	118	48	245	116	177	19	99	26	208	199	71	38	73	28	160	8	142	228
EPT abundance [a]	78	38	234	101	159	0	67	17	202	141	58	4	43	20	113	4	125	0
Total taxa richness	14	12	10	12	10	7	13	8	13	17	10	10	11	10	14	4	9	10
Number of families [b]	9	7	8	9	8	6	10	6	12	12	7	6	8	5	10	4	8	6
Shannon diversity	1.97	2.112	1.37	1.597	1.425	1.67	1.96	1.835	1.722	2.249	1.65	1.94	1.68	2.016	1.736	1.242	0.96	1.5
Simpson diversity	0.19	0.136	0.328	0.336	0.304	NA	0.19	0.17	0.259	0.135	0.302	NA	0.28	0.144	0.247	0.239	0.582	NA
Evenness	0.68	0.871	0.698	0.501	0.724	0.86	0.71	0.929	0.624	0.755	0.55	0.84	0.596	0.911	0.65	NA	0.448	0.65
Hilsenhoff HBI [c]	2.72	3.06	3.55	3.88	3.66	5.07	2.45	2.74	3.26	2.5	2.81	4.36	3.35	2.1	4.21	2.67	3.57	4.65
Intolerant taxa abundance	3	5	36	12	24	0	17	5	54	54	19	1	1	3	7	4	5	0
Tolerant taxa abundance	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Dominant family [d]	BAE 30%	HEP 23%	HEP 44%	EPH 50%	BAE 40%	ORT 58%	BAE 34%	BAE 35%	BAE 45%	HEP 21%	BAE 54%	ORT 61%	BAE 48%	BAE 32%	BAE 41%	BAE 50%	BAE 76%	TAN 72%

[a] Total and EPT invertebrate abundance for quantitative samples is given as the estimated number of individuals per square meter
[b] Numbers in parenthesis are the number of families observed in qualitative samples
[c] Hilsenhoff Biotic Index (HBI) values of 0-2 are considered clean, 2-4 slightly enriched, 4-7 enriched, and 7-10 polluted
[d] Percent dominance of the dominant taxa. Baetidae (BAE), Heptageniidae (HEP), Ephemerellidae (EPH), Orthocladiinae (ORT), Tanyponidae (TAN).

Table 4. Summary statistics for macroinvertebrate surveys at Rilda Creek, Emery County, Utah: Seasonal comparison (2004-2008) [a].

Year	2004		2005		2006		2007		2008	
Season	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Total abundance (number/m2)										
Mean	109	1700	37	2607	227	2965	158	1118	124	991
SD	13	179	16	1036	26	332	59	765	75	759
EPT abundance (number/m2)										
Mean	67	1243	28	2347	218	2628	121	1014	109	878
SD	1	263	15	1042	23	205	28	671	71	682
Total taxa richness										
Mean	14	32	10	26	12	29	15	24	10	24
SD	1	3	3	2	2	1	4	6	0	5
Number of families										
Mean	10	18	7	16	10	16	11	16	8	17
SD	1	2	1	2	2	1	2	4	1	4
Shannon diversity										
Mean	1.97	2.06	1.97	1.3	1.55	1.86	1.92	1.59	1.54	1.6
SD	0.01	0.04	0.2	0	0.25	0.06	0.46	0.15	0.16	0.54
Simpson diversity										
Mean	0.19	0.24	0.15	0.52	0.29	0.31	0.24	0.36	0.3	0.36
SD	0	0.02	0.02	0.07	0.05	0.01	0.14	0.11	0	0.13
Evenness										
Mean	0.7	0.49	0.9	0.35	0.66	0.4	0.63	0.48	0.64	0.5
SD	0.02	0.04	0.04	0.07	0.05	0	0.18	0.15	0.12	0.14
Hilsenhoff HBI[b]										
Mean	2.59	4	2.9	3.82	3.41	3.38	3.19	3.48	3.24	3
SD	0.19	0.5	0.23	0.23	0.21	0.23	0.98	0.37	0.6	0
Intolerant taxa abundance (number/m2)										
Mean	10	260	5	240	45	732	33	188	22	235
SD	10	227	0	228	13	247	30	28	4	207
Tolerant taxa abundance (number/m2)										
Mean	0	2	0	1.5	0	34	0	22	0	2
SD	0	2.8	0	2.1	0	17	0	30	0	3

[a] Based on spring and fall data collected from 2004 to 2008 (Sites 1 and 2). A monitoring survey was not conducted in the fall of 2011.

[b] Hilsenhoff Biotic Index (HBI) values of 0-2 are considered clean, 2-4 slightly enriched, 4-7 enriched, and 7-10 polluted.

Table 5. Summary statistics for spring macroinvertebrate surveys (2004-2011) [a]

Year	Mean Values (Spring surveys)										
	Total Abundance	EPT Abundance	Total Richness	EPT Richness	Abundance of Intolerant Taxa	Abundance of Tolerant Taxa	No. of Families	Shannon Diversity	Simpson Diversity	Evenness	Hilsenhoff HBI
2004 Avg	97	59	13	7	7	0	9	1.87	0.22	0.66	2.84
SE	15.97	9.60	1.08	2.04	6.16	0	0.71	0.12	0.04	0.04	0.33
2005 Avg	34	25	10	6	4	0	6	1.99	0.15	0.90	2.63
SE	8.60	8.03	1.41	1.08	0.82	0	0.71	0.10	0.01	0.02	0.35
2006 Avg	204	183	12	7	32	0	10	1.61	0.28	0.66	3.67
SE	30.14	44.33	1.47	0.41	16.77	0	1.41	0.15	0.03	0.03	0.34
2007 Avg	104	73	11	5	29	0	8	1.75	0.19	0.76	2.59
SE	95.50	68.50	4.64	4.00	25.00	0	4.00	0.50	0.05	0.13	0.09
2008 Avg	177	159	10	4	24	0	8	1.43	0.30	0.72	3.66
SE	38.19	36.34	0.41	0.71	6.96	0	0.41	0.25	0.11	0.10	0.33
2011 Avg	95	1.33	9	NA	0.33	1	6	1.70	NA	0.78	4.69
SE	81.72	1.63	1.22	NA	0.41	1.22	0	0.16	NA	0.08	0.25

[a] Based on data from Sites 1, 2 and 3.

Table 6. Summary statistics for fall macroinvertebrate surveys (2004-2011) [a]

Year	Mean Values (Fall surveys)										
	Total Abundance	EPT Abundance	Total Richness	EPT Richness	Abundance of Intolerant Taxa	Abundance of Tolerant Taxa	No. of Families	Shannon Diversity	Simpson Diversity	Evenness	Hilsenhoff HBI
2004 Avg	2076	1588	33	17	740	2.67	17	2.02	0.26	0.44	3.45
SE	470	443	2.16	1.63	600	1.63	1.22	0.04	0.03	0.05	0.71
2005 Avg	2725	2316	25	14	312	2.33	15	1.47	0.45	0.39	3.85
SE	538	522	1.08	0.82	145	1.47	1.08	0.21	0.1	0.06	0.12
2006 Avg	2292	1977	29	16	613	27	16	2.08	0.26	0.45	3.19
SE	841	804	0.82	0.41	190	12	1.08	0.26	0.07	0.06	0.26
2007Avg	1181	988	28	13	185	20	17	1.8	0.32	0.45	3.37
SE	390	337	6.01	1.22	14	15	2.68	0.27	0.08	0.08	0.23
2008 Avg	1116	967	26	11	275	3	17	1.75	0.31	0.54	0.39
SE	409	358	3.63	2.16	115	2.16	2.04	0.34	0.09	0.08	0.10
2011	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

[a] Based on data from Sites 1, 2 and 4. NS: Not Sampled

Table 7. Summary of fish surveys in Rilda Creek, Emery County, Utah (2004-2011).

Date	Species	Number observed	Comments
4-Jun-04	Cutthroat trout	20	UDWR survey. Larger fish (100-250 mm) captured in lower reaches. YOY (<100mm) captured throughout the section. No fish observed above road crossing.
	Brown trout	1	
22-Oct-04	Cutthroat trout	56	Cirrus Survey. Larger fish (40: 100-250 mm) captured mainly in lower and middle reaches of the sections surveyed. 26 fish less than 100 mm (including 9 YOY) were captured throughout the section. No fish observed above the road crossing.
	Brown trout	1	
16-Jun-05	Cutthroat trout	1	UDWR survey. No fish observed due to high flow conditions.
	Brown trout	0	
19-Oct-05	Cutthroat trout	37	Cirrus survey. Larger fish (15: 100-250 mm) captured mainly in lower and middle reaches of the sections surveyed. 22 fish less than 100 mm (including 16 YOY) were captured throughout the section. No fish observed above the concrete structure.
	Brown trout	0	
14-Jun-06	Cutthroat trout	10	UDWR survey. Seven fish with lengths from 100 to 250 mm and 3 fish with less than 100 mm were captured. Three fish were longer than 200mm. All fish were captured below the concrete structure.
	Brown trout	0	
20-Oct-06	Cutthroat trout	27	Cirrus survey. Larger fish (12: 100-250 mm) captured mainly in lower and middle reaches of the sections surveyed. 15 fish less than 100 mm (including 7 YOY) were captured throughout the section. No fish observed above the concrete structure.
	Brown trout	0	
22-May-07	Cutthroat trout	6	UDWR survey. Six cutthroat trout and one brown trout Salmo trutta were captured during electrofishing surveys. All fish measured over 100mm and four exceeded 200mm. No young of year were captured during this sampling.
	Brown trout	1	
13-Oct-07	Cutthroat trout	88	S.E.C. survey. Larger fish (22: 100-250) were captured in lower to middle reaches of the section surveyed. 13 fish with total length less than 100mm were captured throughout the section surveyed. 53 YOY were also captured throughout this section. No fish were observed above the concrete structure.
	Brown trout	7	S.E.C. survey. 5 brown trout with total length less than 100mm and 2 with length greater than 250mm were observed in lower to middle reaches of the section surveyed. No fish were observed above the concrete structure.
23-Jun-08	Cutthroat trout	0	UDWR Survey.
	Brown trout	1	UDWR survey. One fish with 132 mm in total length. This fish was captured below the concrete structure.
8-Oct-08	Cutthroat trout	50	S.E.C. survey. Larger fish (33: 100-250mm) were observed in lower to middle reaches of the section surveyed. 14 fish with total length less than 100mm were captured throughout the section surveyed. 3 YOY were also captured throughout this section, and 5 YOY were observed. No fish were observed above the concrete structure.
	Brown trout	2	S.E.C. survey. 2 brown trout with total length greater than 250mm were observed in lower to middle reaches of the section surveyed. No fish were observed above the concrete structure.
10- Jun-11	Cutthroat trout	7	S.E.C. survey. All fish were captured in the lower reaches of the stream section surveyed. Only cutthroat trout were observed. Lengths ranged from 42 mm TL to 152 mm TL. Four fish had total lengths less than 100mm including one YOY. Three fish had total length greater than 100mm. No fish were observed above the concrete structure.
	Brown trout	0	S.E.C. survey. No brown trout observed.

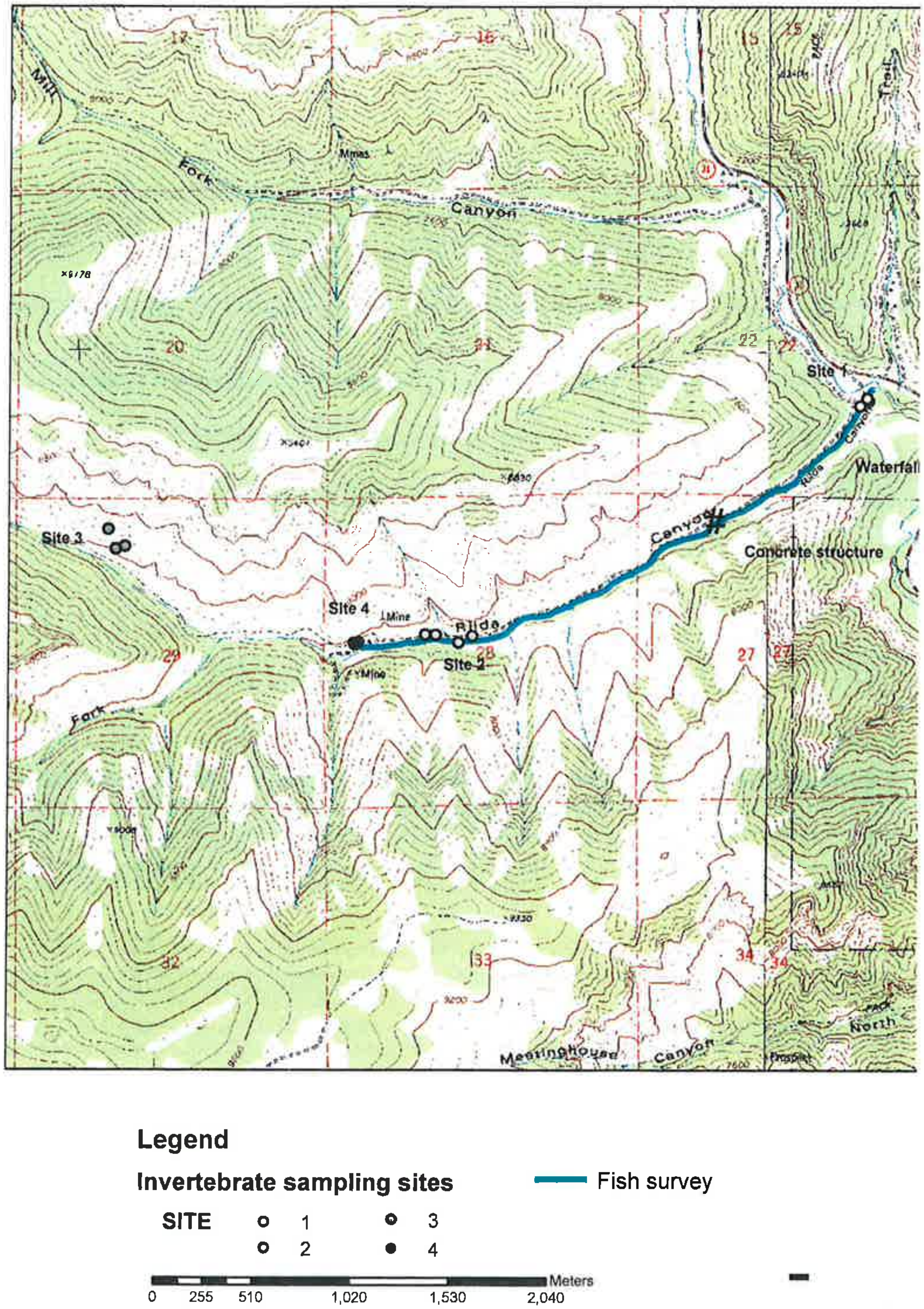


Figure 1. Map of Rilda Creek Canyon, Emery County, Utah. Location of macroinvertebrate sampling sites and fish survey sampling section.

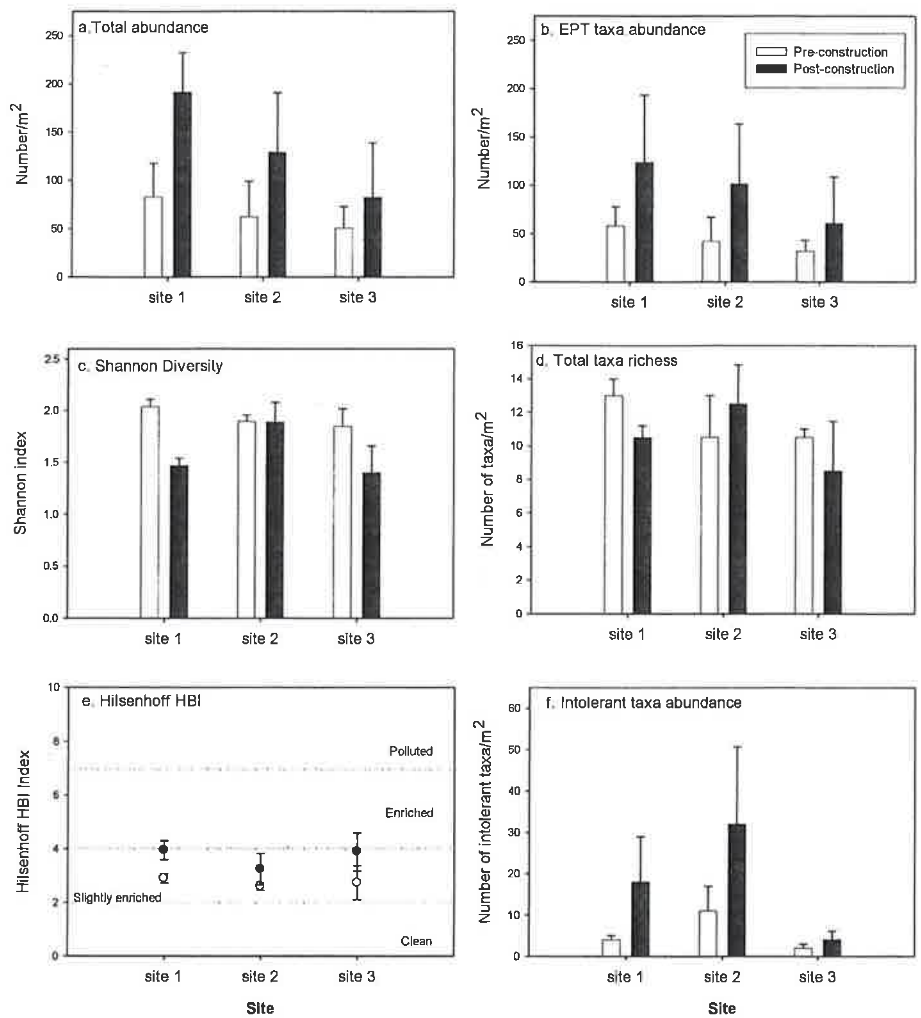


Figure 2. Total abundance (a), EPT taxa abundance (b), Shannon diversity (c), and Total taxa richness (d), Hilsenhoff HBI (e), and Intolerant taxa abundance (f) for spring macroinvertebrate surveys at Rilda Creek, Emery County, Utah, conducted during pre- (white) and post- (black) construction (2004-2011). Bars or circles represent the mean. Lines show standard errors.

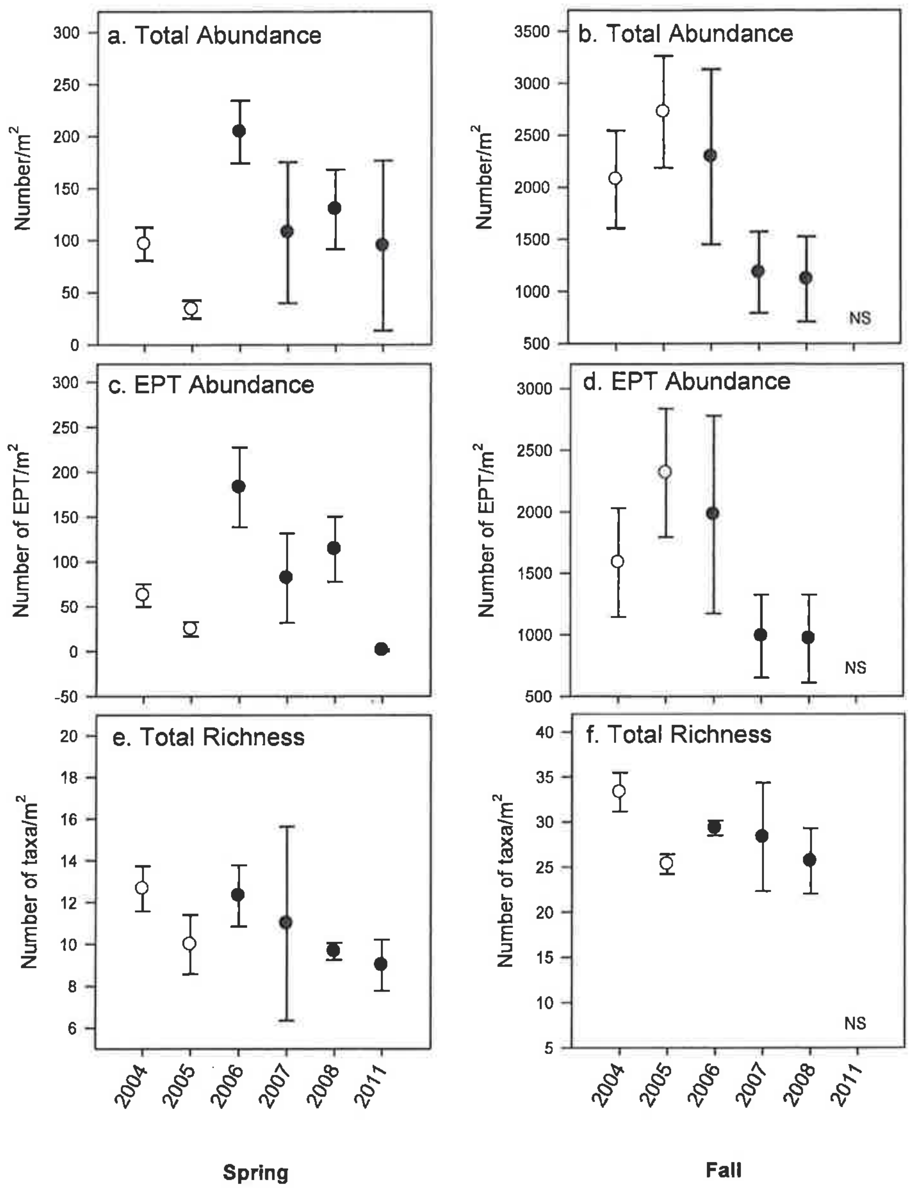


Figure 3. Total abundance (a,b), EPT abundance (c,d), and Total richness (e,f), for spring (left figures) and fall (right figures) macroinvertebrate surveys at Rilda Creek, Emery County, Utah, conducted during pre- (white circles) and post- (black circles) construction (2004-2011). Circles represent the mean. Lines show standard errors.

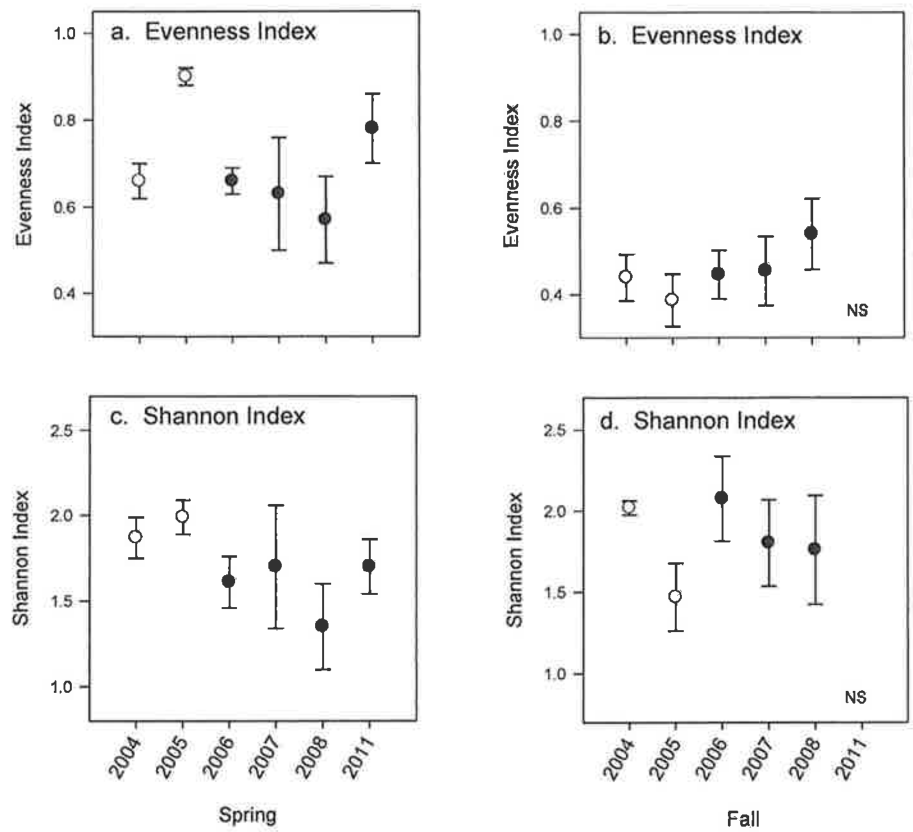


Figure 4. Evenness (a,b) and Shannon diversity (c,d), indexes for spring (left figures) and fall (right figures) macroinvertebrate surveys at Rilda Creek, Emery County, Utah, conducted during pre- (white circles) and post- (black circles) disturbance conditions (2004-2011). Circles represent the mean. Lines show standard errors.

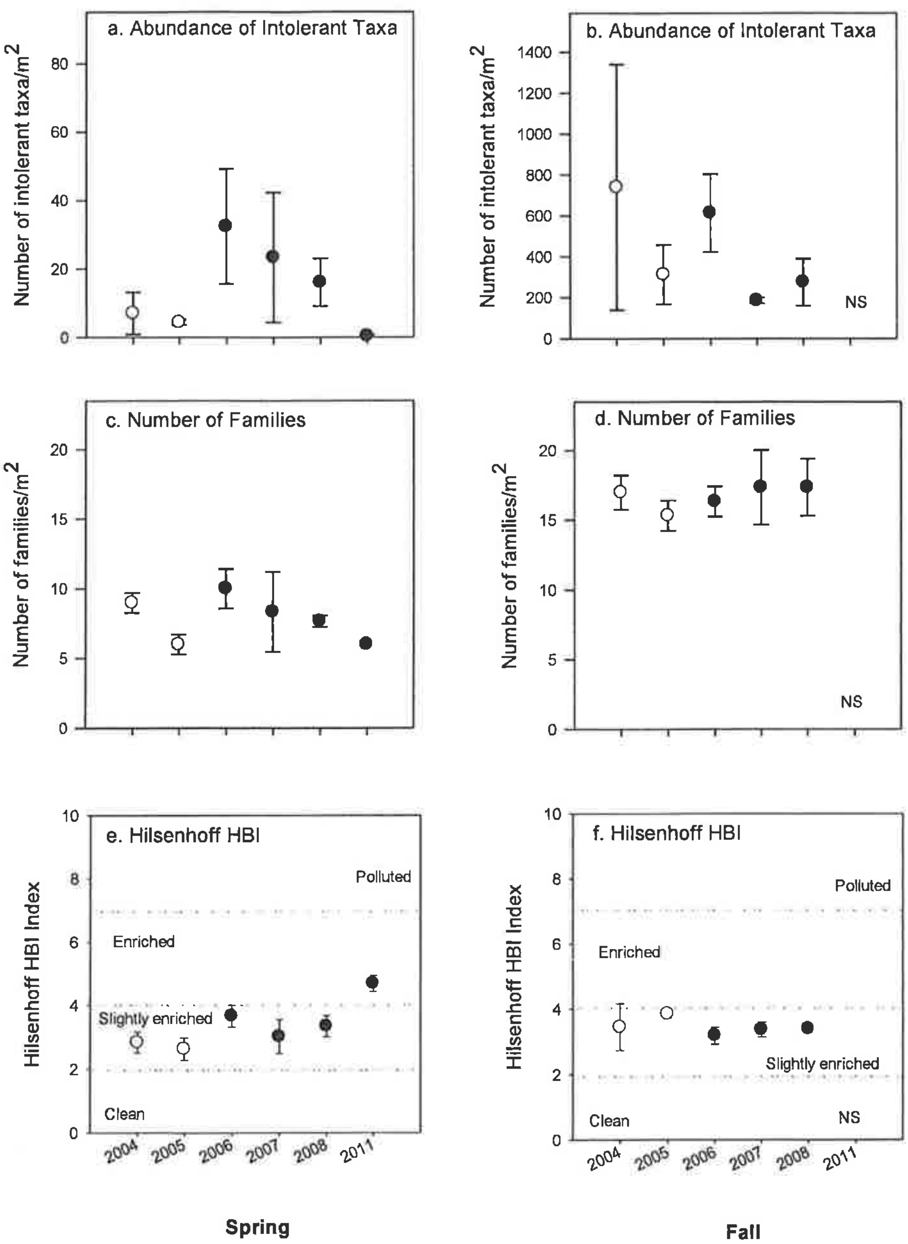
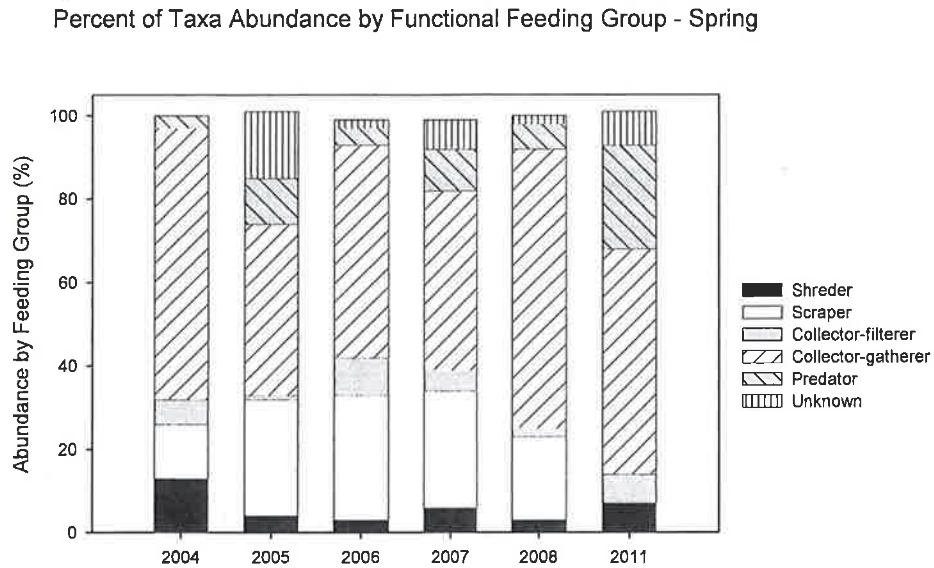


Figure 5. Abundance of intolerant taxa (a,b), number of families (c,d), and Hilsenhoff HBI (e,f) in Rilda Creek for spring (left figures) and fall (right figures) macroinvertebrate surveys at Rilda Creek, Emery County, Utah, conducted during pre- (white circles) and post- (black circles) disturbance conditions (2004-2011). Circles represent the mean. Lines show standard errors.



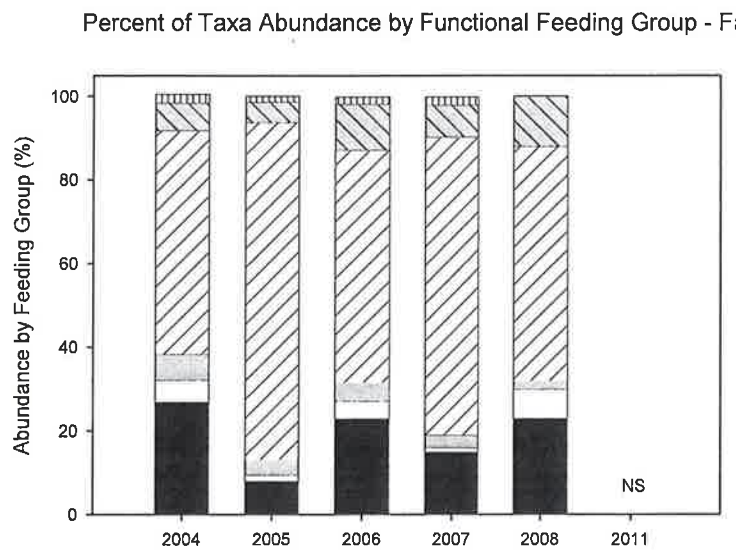


Figure 6. Spring and fall macroinvertebrate taxa abundance by functional feeding group in Rilda Creek (2004-2011).

APPENDIX I

Taxa Lists for Individual Samples

Aquatic Invertebrate Report For Samples Collected By Socio-Ecological Concepts LLC - Logan, UT

Report prepared for:
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Report prepared by:
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Methods

Field sampling

Samples were collected on June 10, 2011 (Table 2). Aquatic invertebrates were collected quantitavely from targeted riffle habitats with a Surber Net

Laboratory methods

General procedures for processing invertebrate samples were similar to those recommended by the United States Geological Survey (Cuffney et al. 1993) and are described in greater detail and rationalized in Vinson and Hawkins (1996). Samples were sub-sampled if the sample appeared to contain more than 600 organisms. Sub-samples were obtained by pouring the sample into an appropriate diameter 500 micron sieve, floating this material by placing the sieve within an enamel pan partially filled with water and leveling the material within the sieve. The sieve was then removed from the water pan and the material within the sieve was divided into two equal parts. One half of the sieve was then randomly chosen to be processed and the other half set aside. The sieve was then placed back in the enamel pan and the material in the sieve again leveled and split in half. This process was repeated until approximately 600 organisms remained in one-half of the sieve. This material was placed into a Petri dish and all organisms were removed under a dissecting microscope at 10-30 power. Additional sub-samples were taken until at least 600 organisms were removed, All organisms within a sub-sample were removed, and separated into taxonomic Orders. When the sorting of the sub-samples was completed, the entire sample was spread throughout a large white enamel pan and searched for 10 minutes to remove any taxa that might not have been picked up during the initial sample sorting process. The objective of this "big/rare" search was to provide a more complete taxa list by finding rarer taxa that may have been excluded during the sub-sampling process. These rarer bugs were placed into a separate vial and the data entered separately from the bugs removed during the sub-sampling process. All the organisms removed during the sorting process were then identified using appropriate identification keys (see literature cited list for list of taxonomic resources used). Once the data had been entered into a computer and checked, the unsorted portion of the sample was discarded. The identified portion of the sample was placed in a 20 ml glass scintillation vial with polypropylene lids in 70% ethanol, given a catalog number, and retained. In this report, metrics were calculated using data from the sub-sampled and big/rare portions of the sample. Abundance data are presented as the estimated number of individuals per square meter for quantitative samples and the estimated number per sample for qualitative samples.

Table 2. Field comments and laboratory processing information.

Station	Sampling Date	Habitat Sampled	Sampling	Sampling Area Sqmts	% of sample processed	Number of individuals identified
RILDA-03	06/10/2011	Targeted Riffle	Surber Net	0.74	100	14
RILDA-02	06/10/2011	Targeted Riffle	Surber Net	0.74	100	28
RILDA-01	06/10/2011	Targeted Riffle	Surber Net	0.74	100	169

Data summarization

A number of metrics or ecological summaries can be calculated from an aquatic invertebrate sample. A summary and description of commonly used metrics is available in Barbour et al. (1999, http://www.epa.gov/owow/monitoring/rbp/index.html#Table%20of%20Contents) and Karr and Chu (1998). Both of these publications suggest use of the following metrics for assessing the health of aquatic invertebrate assemblages: Total taxa richness, EPT taxa richness, Ephemeroptera taxa richness, Plecoptera taxa richness, Trichoptera taxa richness, % EPT abundance, % Ephemeroptera abundance, % Chironomidae abundance, Intolerant taxa richness, % tolerant organisms, Hilsenhoff Biotic Index, % contribution of the dominant taxon, clinger taxa richness, % clinger abundance, % collector-filterer abundance, and the % scraper abundance. Assessments are best made by comparing samples to samples collected similarly at reference sites or from samples collected prior to impacts or management actions at a location. In this report, the following metrics were calculated for each sample.

Taxa richness - Richness is a component and estimate of community structure and stream health based on the number of distinct taxa. Taxa richness normally decreases with decreasing water quality. In some situations organic enrichment can cause an increase in the number of pollution tolerant taxa. Taxa richness was calculated for operational taxonomic units (OTUs) and the number of unique genera, and families. The values for operational taxonomic units may be overestimates of the true taxa richness at a site if individuals were the same taxon as those identified to lower taxonomic levels or they may be underestimates of the true taxa richness if multiple taxa were present within a larger taxonomic grouping but were not identified. All individuals within all samples were generally identified similarly, so that comparisons in operational taxonomic richness among samples within this dataset are appropriate, but comparisons to other data sets may not. Comparisons to other datasets should be made at the genera or family level.

Abundance - The abundance, density, or number of aquatic macroinvertebrates per unit area is an indicator of habitat availability and fish food abundance. Abundance may be reduced or increased depending on the type of impact or pollutant. Increased organic enrichment typically causes large increases in abundance of pollution tolerant taxa. High flows, increases in fine sediment, or the presence of toxic substances normally cause a decrease in invertebrate abundance. Invertebrate abundance is presented as the number of individuals per square meter for quantitative samples and the number of individuals collected in each sample for qualitative samples.

EPT - A summary of the taxonomic richness and abundance within the insect Orders Ephemeroptera, Plecoptera, and Trichoptera (EPT). These orders are commonly considered sensitive to pollution (Karr and Chu 1998).

Percent contribution of the dominant family or taxon - An assemblage largely dominated (>50%) by a single taxon or several taxa from the same family suggests environmental stress. Habitat conditions likely limit the number of taxa that can occur at the site.

Shannon diversity index - Ecological diversity is a measure of community structure defined by the relationship between the number of distinct taxa and their relative abundances. The Shannon diversity index was calculated for each sampling location for which there were a sufficient number of individuals and taxa collected to perform the calculations. The calculations were made following Ludwig and Reynolds (1988, equation 8.9, page 92).

Evenness - Evenness is a measure of the distribution of taxa within a community. The evenness index used in this report was calculated following Ludwig and Reynolds (1988, equation 8.15, page 94). Value ranges from 0-1 and approach zero as a single taxa becomes more dominant.

Clinger taxa - The number of clinger taxa have been found by Karr and Chu (1998) to respond negatively to human disturbance. Clinger taxa were determined using information in Merritt et al. (2008). These taxa typically cling to the tops of rocks and are thought to be reduced by sedimentation or abundant algal growths.

Long-live taxa - The number of long-lived taxa was calculated the number of taxa collected that typically have 2-3 year life cycles. Disturbances and water quality and habitat impairment typically reduces the number of long-lived taxa Karr and Chu (1998). Life-cycle length determinations were based on information in Merritt et al. (2008).

Biotic indices - Biotic indices use the indicator taxa concept. Taxa are assigned water quality tolerance values based on their tolerance to pollution. Scores are typically weighted by taxa relative abundance. In the United States the most commonly used biotic index is the Hilsenhoff Biotic Index (Hilsenhoff 1987, Hilsenhoff 1988). The USFS and BLM throughout the western United States have also frequently used the USFS Community Tolerance Quotient.

Hilsenhoff biotic index - The Hilsenhoff Biotic Index (HBI) summarizes the overall pollution tolerances of the taxa collected. This index has been used to detect nutrient enrichment, high sediment loads, low dissolved oxygen, and thermal impacts. It is best at detecting organic pollution. Families were assigned an index value from 0- taxa normally found only in high quality unpolluted water, to 10- taxa found only in severely polluted waters. Family level values were taken from Hilsenhoff (1987, 1988) and a family level HBI was calculated for each sampling location for which there were a sufficient number of individuals and taxa collected to perform the calculations. Sampling locations with HBI values of 0-2 are considered clean, 2-4 slightly enriched, 4-7 enriched, and 7-10 polluted. Rather than using mean HBI values for a sample, taxon HBI values can also be used to determine the number of pollution intolerant and tolerant taxa occurring at a site. In this report, taxa with HBI values $\leq$ 2 were considered intolerant clean water taxa and taxa with HBI values $\geq$ 8 were considered pollution tolerant taxa. The number of tolerant and intolerant taxa and the abundances of tolerant and intolerant taxa were calculated for each sampling location.

USFS community tolerant quotient - Taxa are assigned a tolerant quotient (TQ) from 2 - taxa found only in high quality unpolluted water, to 108 - taxa found in severely polluted waters. TQ values were developed by Winget and Mangum (1979). The dominance weighted community tolerance quotient (CTQd) was calculated. Values can vary from about 20 to 100, in general the lower the value the better the water quality.

Functional feeding group measures - A common classification scheme for aquatic macroinvertebrates is to categorize them by feeding acquisition mechanisms. Categories are based on food particle size and food location, e.g., suspended in the water column, deposited in sediments, leaf litter, or live prey. This classification system reflects the major source of the resource, either within the stream itself or from riparian or upland areas and the primary location, either erosional or depositional habitats. The number of taxa and individuals of the following feeding groups were calculated for each sampling location. Functional feeding group designations were from Merritt et al. (2008).

Shredders - Shredders use both living vascular hydrophytes and decomposing vascular plant tissue - coarse particulate organic matter. Shredders are sensitive to changes in riparian vegetation. Shredders can be good indicators of toxicants that adhere to organic matter.

Scrapers - Scrapers feed on periphyton - attached algae and associated material. Scraper populations increase with increasing abundance of diatoms and can decrease as filamentous algae, mosses, and vascular plants increase, often in response to increases in nitrogen and phosphorus. Scrapers decrease in relative abundance in response to sedimentation and higher levels of organic pollution or nutrient enrichment.

Collector-filterers - Collector-filterers feed on suspended fine particulate organic matter. Collector-filterers are sensitive to toxicants in the water column and to pollutants that adhere to organic matter.

Collector-gatherers - Collector-gatherers feed on deposited fine particulate organic matter. Collector-gatherers are sensitive to deposited toxicants.

Predators - Predators feed on living animal tissue. Predators typically make up about 25% of the assemblage in stream environments and 50% of the assemblage in still-water environments.

Unknown feeding group - This category includes taxa that are highly variable, parasites, and those that for which the primary feeding mode is currently unknown.

Results

Abundance data and taxa richness are reported as the estimated number of individuals per square meter for quantitative samples and the number per sample for qualitative samples. NC = Not calculated. * = unable to calculate. EPT = totals for the insect orders, Ephemeroptera, Plecoptera, Trichoptera. QL = qualitative sample.

	Sampling date	Station	Total abundance	EPT abundance	Dominant family	% contribution dominant family
	06/10/2011	RILDA-03	19	0	Chironomidae	57.89
	06/10/2011	RILDA-02	38	4	Chironomidae	60.53
	06/10/2011	RILDA-01	228	0	Chironomidae	71.93
Mean			95.0	1.3		63.45

Diversity indices

	Sampling Date	Station	Total taxa richness	Total genera richness	Total family richness	EPT taxa richness	Shannon diversity index	Evenness
	06/10/2011	RILDA-03	7	3	6	0	1.670	0.860
	06/10/2011	RILDA-02	10	4	6	2	1.940	0.840
	06/10/2011	RILDA-01	10	0	6	0	1.500	0.650
Mean			9.0	2.3	6.0	0.7	1.700	0.780

Genera richness by major taxonomic group.

	Sampling Date	Station	Coleoptera	Diptera	Ephemerotpera	Heteroptera	Megaloptera	Odonata	Plecoptera	Trichoptera	Annelida	Custacea	Mollusca
	06/10/2011	RILDA-03	1	6	0	0	0	0	0	0	0	0	0
	06/10/2011	RILDA-02	0	6	1	0	0	0	0	1	1	0	0
	06/10/2011	RILDA-01	0	8	0	0	0	0	0	0	0	0	0
Mean			0.3	6.7	0.3	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0

Total abundance by major taxonomic group.

Sampling Date	Station	Coleoptera	Diptera	Ephemerotpera	Heteroptera	Megaloptera	Odonata	Plecoptera	Trichoptera	Annelida	Custacea	Mollusca
06/10/2011	RILDA-03	1	18	0	0	0	0	0	0	0	0	0
06/10/2011	RILDA-02	0	27	3	0	0	0	0	1	5	0	0
06/10/2011	RILDA-01	0	220	0	0	0	0	0	0	0	0	0
Mean		0.3	88.3	1.0	0.0	0.0	0.0	0.0	0.3	1.7	0.0	0.0

Biotic Indices

Sampling date	Station	Hilsenhoff Biotic Index		USFS Community CTQd
		Index	Indication	
06/10/2011	RILDA-03	5.07	Some organic pollution	98
06/10/2011	RILDA-02	4.36	Possible slight organic pollution	99
06/10/2011	RILDA-01	4.65	Some organic pollution	100
Mean		4.69		99.0

Taxa richness and relative abundance values with respect to tolerance or intolerance to pollution were based on the Hilsenhoff Biotic Index (HBI). Intolerant taxa have HBI score <= 2. Tolerant taxa have a HBI score >= 8. Data are presented as estimated count per square meter for quantitative samples and total number per sample for qualitative samples.

Sampling date	Station	Intolerant taxa				Tolerant Taxa			
		Richness		Abundance		Richness		Abundance	
06/10/2011	RILDA-03	0	(0)	0	(0)	1	(14)	3	(16)
06/10/2011	RILDA-02	1	(10)	1	(3)	0	(0)	0	(0)
06/10/2011	RILDA-01	0	(0)	0	(0)	0	(0)	0	(0)
Mean		0.3	(3)	0.3	(1)	0.3	(5)	1.0	(5)

Functional feeding groups

Taxa richness by functional feeding group. The percent of the total is shown in parentheses.

Sampling date	Station	Shredders		Scrapers		Collector-filterers		Collector-gatherers		Predators		Unknown	
06/10/2011	RILDA-03	0	(0)	0	(0)	0	(0)	5	(71)	1	(14)	1	(14)
06/10/2011	RILDA-02	1	(10)	0	(0)	1	(10)	6	(60)	2	(20)	0	(0)
06/10/2011	RILDA-01	1	(10)	0	(0)	1	(10)	3	(30)	4	(40)	1	(10)
Mean		0.7	(7)	0.0	(0)	0.7	(7)	4.7	(54)	2.3	(25)	0.7	(8)

Invertebrate abundance by functional feed group. The percent of the total is shown in parentheses.

	Sampling date	Station	Shredders		Scrapers		Collector-filterers		Collector-gatherers		Predators		Unknown	
	06/10/2011	RILDA-03	0	(0)	0	(0)	0	(0)	16	(84)	1	(5)	1	(5)
	06/10/2011	RILDA-02	1	(3)	0	(0)	1	(3)	32	(84)	3	(8)	0	(0)
	06/10/2011	RILDA-01	3	(1)	0	(0)	1	(0)	76	(33)	109	(48)	39	(17)
Mean			1.3	(1)	0.0	(0)	0.7	(1)	41.3	(67)	37.7	(20)	13.3	(7)

The 10 metrics thought to be most responsive to human induced disturbance (Karr and Chu 1998).

Sample	Sampling Date	Station	Total taxa	Epheme-roptera taxa	Plecoptera taxa	Trichoptera taxa	Long-lived taxa	Intolerant taxa	Clinger taxa	% tolerant indi-viduals	% contribution dominant taxon	% predators
	06/10/2011	RILDA-03	7	0	0	0	1	0	0	15.79	42.11	5.26
	06/10/2011	RILDA-02	10	1	0	1	0	1	1	0.00	31.58	7.89
	06/10/2011	RILDA-01	10	0	0	0	0	0	0	0.00	39.04	47.81
Mean			9.0	0.3	0.0	0.3	0.3	0.3	0.3	5.26	37.57	20.32

Taxonomic list and counts for quantitative samples collected on June 10, 2011. Count is the total number of individuals identified and retained. Samples heading refers to the number of samples containing that taxon.

Order	Family	Subfamily/Genus/Species	Samples	Count
Phylum: Annelida				
Class: Clitellata	SubClass: Oligochaeta			
			1	4
Phylum: Arthropoda				
Class: Arachnida	SubClass: Acari			
Trombidiformes			1	5
Class: Entognatha	SubClass:			
Collembola			2	2
Class: Insecta	SubClass: Pterygota			
Coleoptera	Dytiscidae		1	1
Diptera			2	30
Diptera	Ceratopogonidae		1	8
Diptera	Chironomidae		1	6
Diptera	Chironomidae	Chironominae	3	6
Diptera	Chironomidae	Orthocladiinae	3	68
Diptera	Chironomidae	Tanypodinae	1	66
Diptera	Dolichopodidae		1	2
Diptera	Psychodidae	Pericoma	1	2
Diptera	Simuliidae		2	2
Diptera	Stratiomyidae	Euparyphus	1	1
Diptera	Tipulidae		1	2
Diptera	Tipulidae	Limoniinae Eriopterini Ormosia	1	1
Diptera	Tipulidae	Limoniinae Hexatomini Limnophila	1	1
Diptera	Tipulidae	Tipulinae Tipula	1	1
Ephemeroptera	Baetidae	Baetis	1	2
Trichoptera	Rhyacophilidae	Rhyacophila	1	1

Total: OTU Taxa: **20** Genera: **7** Families: **11** Individuals: **211**

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Taxa Lists for Individual Samples

Taxonomic list and densities of aquatic invertebrates identified and retained from a sample collected June 10, 2011 at station RILDA-03, Rilda Creek, Upper Site, Emery county, Utah. The sample was collected from targeted riffle habitat using a Surber Net. The total area sampled was 0.740 square meters. The percentage of the sample that was identified and retained was 100% of the collected sample. A total of 14 individuals were removed, identified and retained. The sample identification number is 146866. OTU=operational taxonomic unit. Notes - identification to genus or species was not supported because: I - immature organisms, D- damaged organisms, M - poor slide mount, G - gender, U - indistinct characters or distribution, R - retained in our reference collection.

Order	Family	Subfamily/Genus/Species	Life Stage	Density	Notes
Phylum: Arthropoda					
Class: Insecta		SubClass: Pterygota			
Coleoptera	Dytiscidae		larvae	1.35	I
Diptera			larvae	1.35	U
Diptera	Chironomidae	Chironominae	larvae	2.70	
Diptera	Chironomidae	Orthocladiinae	larvae	8.11	
Diptera	Psychodidae	Pericoma	larvae	2.70	
Diptera	Stratiomyidae	Euparyphus	larvae	1.35	
Diptera	Tipulidae	Limoniinae Eriopterini Ormosia	larvae	1.35	
Total: OTU Taxa: **7**		Genera: **3** Families: **6**		18.92	

Taxonomic list and densities of aquatic invertebrates identified and retained from a sample collected June 10, 2011 at station RILDA-02, Rilda Creek, Middle Site, Emery County, Utah. The sample was collected from targeted riffle habitat using a Surber Net. The total area sampled was 0.740 square meters. The percentage of the sample that was identified and retained was 100% of the collected sample. A total of 28 individuals were removed, identified and retained. The sample identification number is 146867. OTU=operational taxonomic unit. Notes - identification to genus or species was not supported because: I - immature organisms, D- damaged organisms, M - poor slide mount, G - gender, U - indistinct characters or distribution, R - retained in our reference collection.

Order	Family	Subfamily/Genus/Species	Life Stage	Density	Notes
Phylum: Annelida					
Class: Clitellata		SubClass: Oligochaeta			
			adult	5.41	
Phylum: Arthropoda					
Class: Entognatha		SubClass:			
Collembola			adult	1.35	
Class: Insecta		SubClass: Pterygota			
Diptera	Chironomidae		pupae	8.11	
Diptera	Chironomidae	Chironominae	larvae	2.70	
Diptera	Chironomidae	Orthocladiinae	larvae	12.16	
Diptera	Simuliidae		larvae	1.35	D
Diptera	Tipulidae	Limoniinae Hexatomini Limnophila	larvae	1.35	
Diptera	Tipulidae	Tipulinae Tipula	larvae	1.35	
Ephemeroptera	Baetidae	Baetis	larvae	2.70	
Trichoptera	Rhyacophilidae	Rhyacophila	larvae	1.35	I
Total: OTU Taxa: **10**		Genera: **4**	Families: **6**	37.84	

Taxonomic list and densities of aquatic invertebrates identified and retained from a sample collected June 10, 2011 at station RILDA-01, Rilda Creek, Lower Site, Emery County, Utah. The sample was collected from targeted riffle habitat using a Surber Net. The total area sampled was 0.740 square meters. The percentage of the sample that was identified and retained was 100% of the collected sample. A total of 169 individuals were removed, identified and retained. The sample identification number is 146868. OTU=operational taxonomic unit. Notes - identification to genus or species was not supported because: I - immature organisms, D- damaged organisms, M - poor slide mount, G - gender, U - indistinct characters or distribution, R - retained in our reference collection.

Order	Family	Subfamily/Genus/Species	Life Stage	Density	Notes
Phylum: Arthropoda					
Class: Arachnida		SubClass: Acari			
Trombidiformes			adult	6.76	U
Class: Entognatha		SubClass:			
Collembola			adult	1.35	
Class: Insecta		SubClass: Pterygota			
Diptera			larvae	39.19	U
Diptera	Ceratopogonidae		larvae	10.81	I
Diptera	Chironomidae	Chironominae	larvae	2.70	
Diptera	Chironomidae	Orthocladiinae	larvae	71.62	
Diptera	Chironomidae	Tanypodinae	larvae	89.19	
Diptera	Dolichopodidae		larvae	2.70	
Diptera	Simuliidae		larvae	1.35	I
Diptera	Tipulidae		larvae	2.70	U

Total:	OTU Taxa: **10**	Genera: **0**	Families: **6**	228.38

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 5th North Mains in the Blind Canyon seam where 5th 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 – 12th , 14th , 15th, 16th and 17th 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: 12th, 14th, 15th, 16th, and 17th West.

Noticeable subsidence has occurred above the combined areas of 12th through 17th 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 – 2nd, 3rd, 4th, 5th, 6th, and 7th Left Longwall Panels (Blind Canyon Seam, "District 2"), 21st, 22nd, 23rd, 25th 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 1st 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: 2nd, 3rd, 4th, 5th, 6th and 7th Left. Only a small portion of 4th 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 21st West panel was completely extracted in 2011; this is the first dual-seam mining area in the Mill Fork Lease to be mined. 21st West panel is located entirely within the gob shadow of the 5th Left Blind Canyon panel. Small but noticeable subsidence had occurred in 2011. During 2012, five longwall panel areas were mined: 22nd West Inby, 22nd West Outby, 23rd West Inby, 23rd West Outby and part of 25th 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 22nd – 23rd 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 5th, 6th, and 7th Left panels. Dual-seam longwall mining in this area began in December, 2010, with the startup of 21st West longwall panel in the Hiawatha seam. 21st West panel was probably too narrow, at 450 feet, to have contributed to the overall subsidence in this dual seam area. The addition of 22nd West Outby and 23rd 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 ±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 1st - 10th Right	7.5	7.0	93
25 Deer Cr. 8-15th 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. 2nd 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

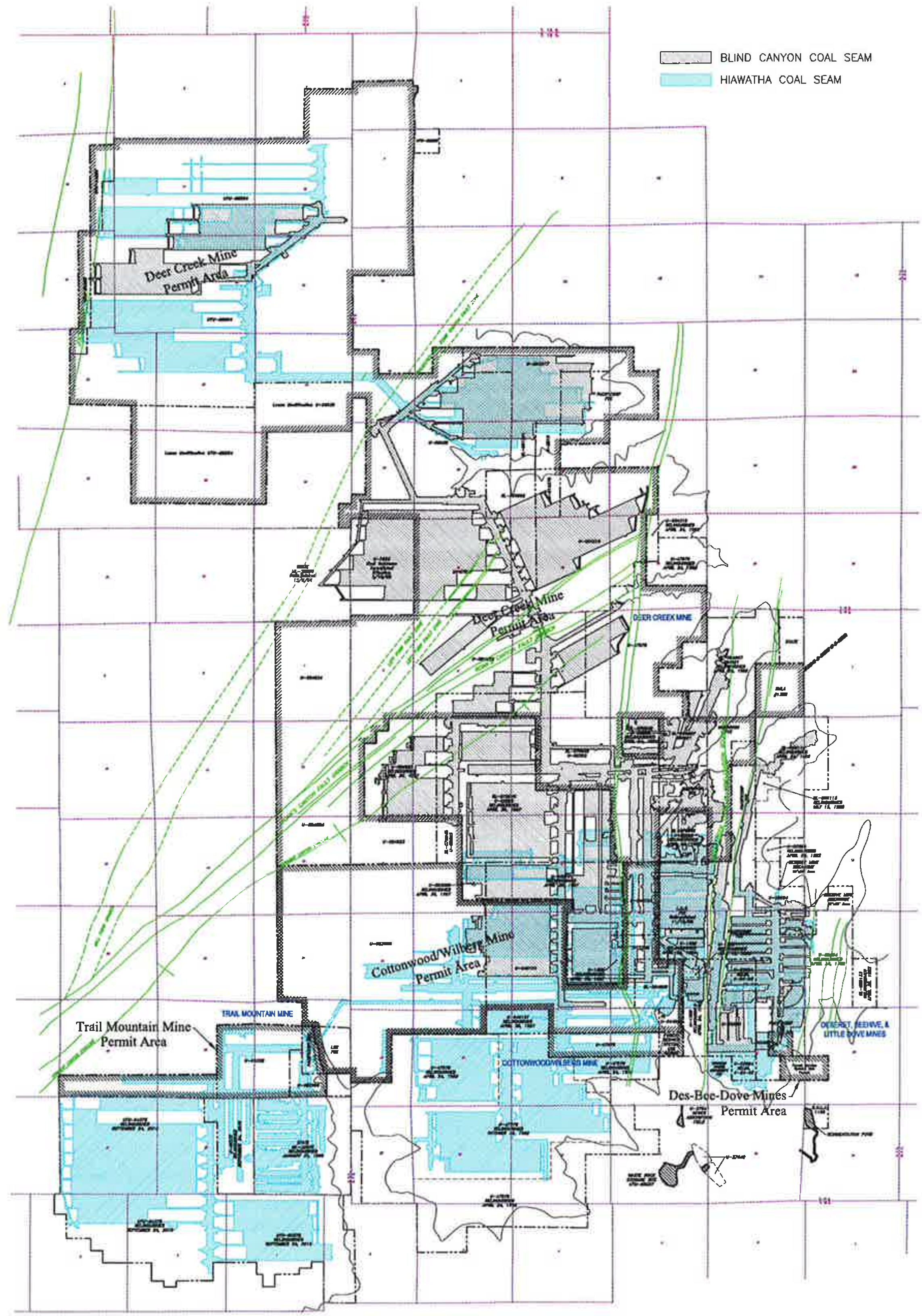
I, Kenneth S. Fleck, being a Licensed Professional Geologist in the State of Utah (#5224883-2250), with significant experience in subsidence monitoring, certify that the subsidence data contained in this document was collected under my direction, and the attached subsidence materials were prepared by 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 13th day of February 2013.

Kenneth S. Fleck

Professional Geologist

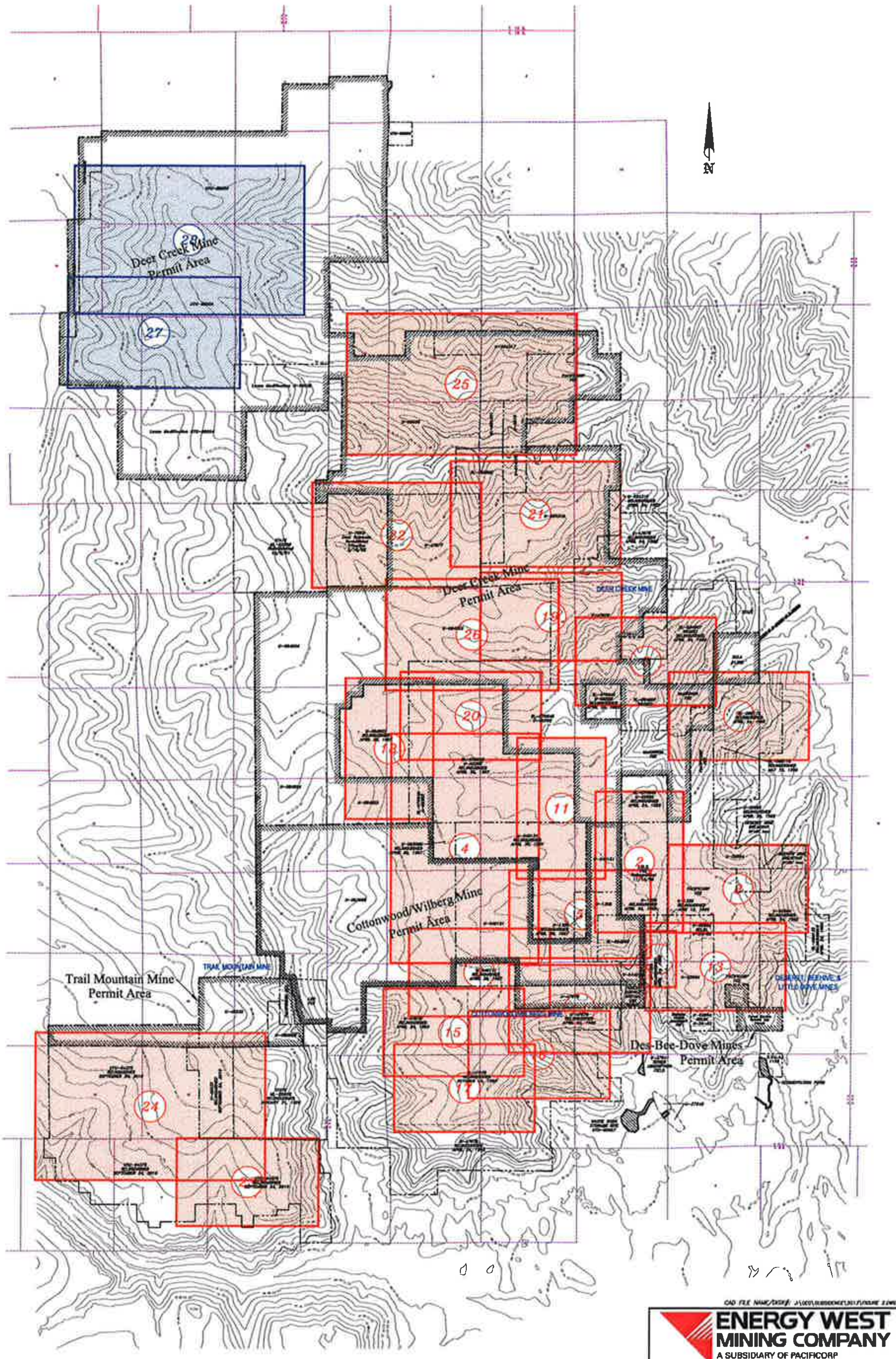
License No. 5224883-2250



ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

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

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



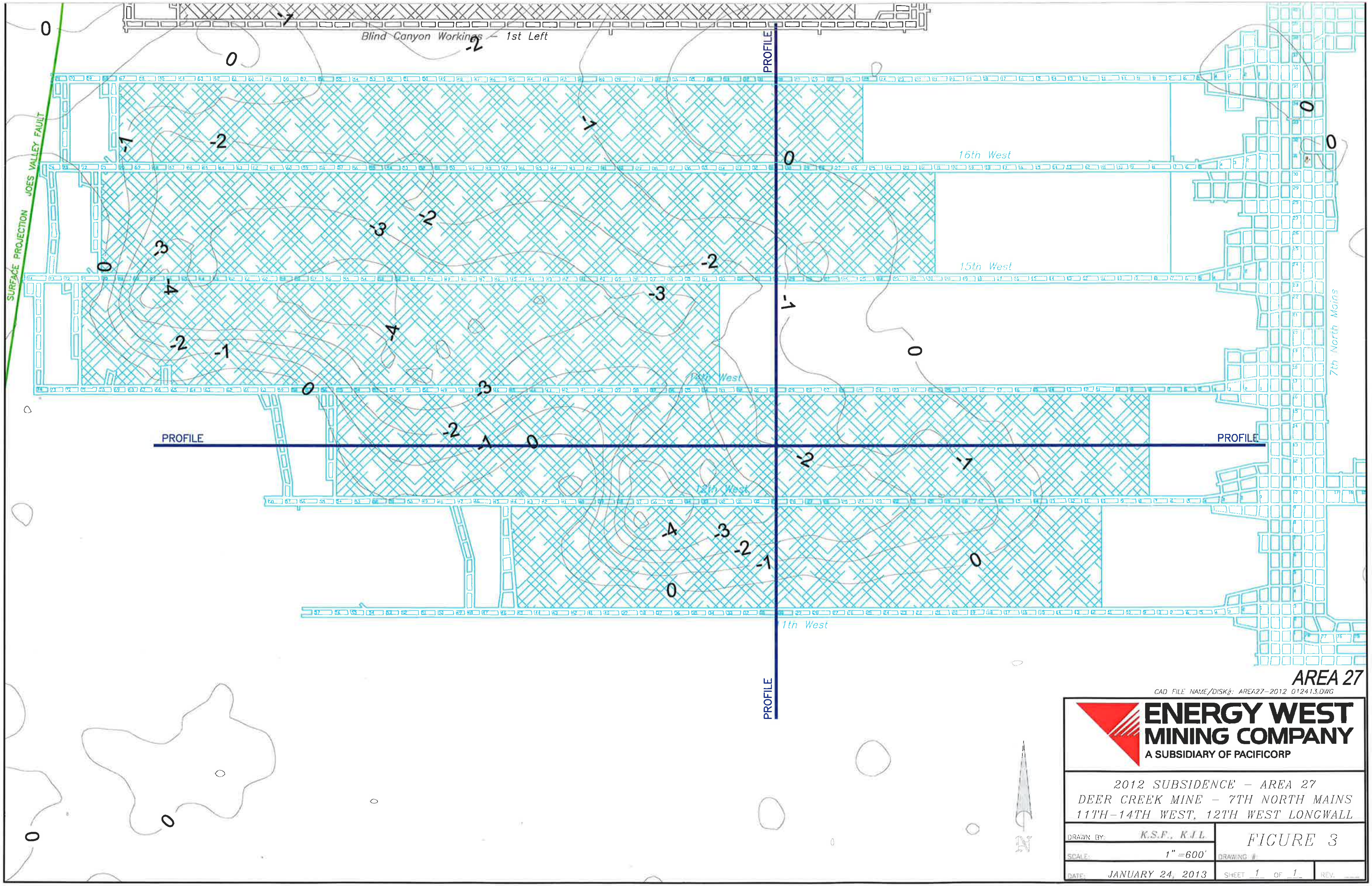
15 AREAS ELIMINATED FROM STUDY AS OF 2010

21 AREAS STUDIED FOR SUBSIDENCE NUMBERS KEYED TO TEXT

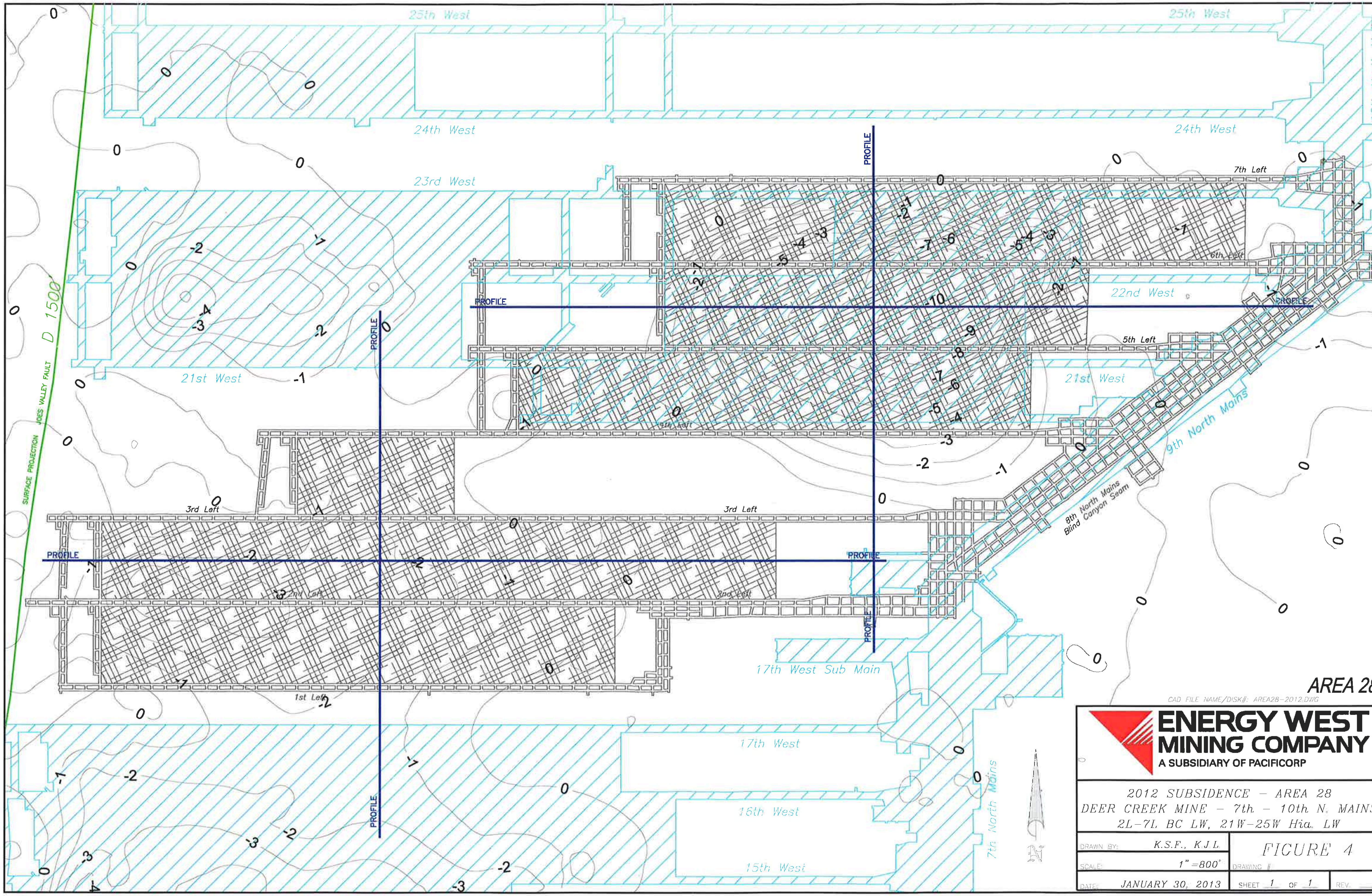
ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

2012 SUBSIDENCE MONITORING AREAS STUDIED FOR SUBSIDENCE

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



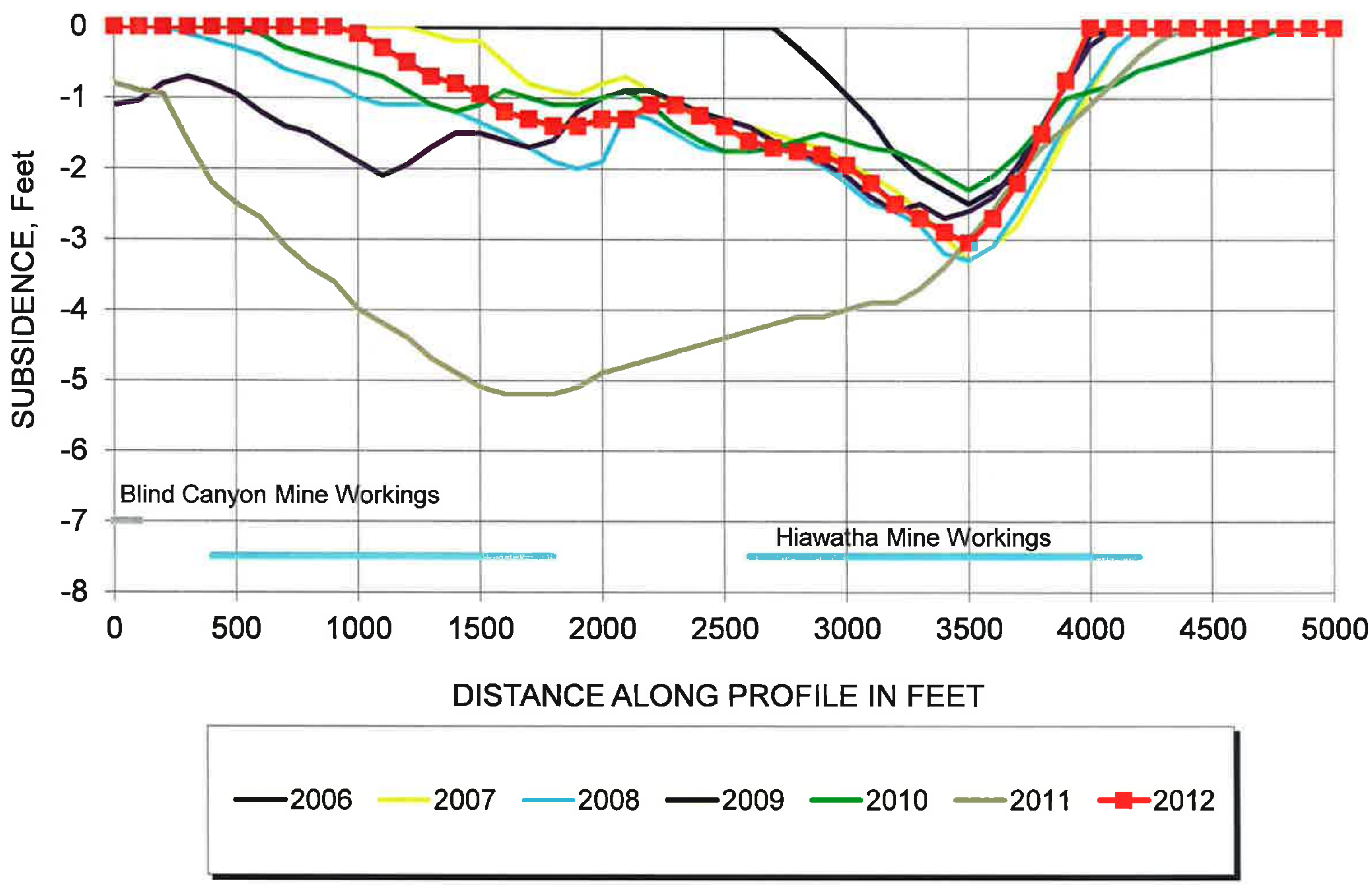
Blind Canyon Workings - 1st Left
PROFILE
16th West
15th West
14th West
12th West
11th West
7th North Mains
SURFACE PROJECTION JOES VALLEY FAULT
AREA 27
CAD FILE NAME/DISK#: AREA27-2012 012413.DWG
ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP
2012 SUBSIDENCE - AREA 27
DEER CREEK MINE - 7TH NORTH MAINS
11TH-14TH WEST, 12TH WEST LONGWALL
DRAWN BY: K.S.F., K.J.L.
SCALE: 1" =600'
DATE: JANUARY 24, 2013
FIGURE 3
DRAWING #
SHEET 1 OF 1
REV.
N



25th West
24th West
23rd West
22nd West
21st West
17th West Sub Main
17th West
16th West
15th West
7th Left
6th Left
5th Left
4th Left
3rd Left
2nd Left
1st Left
10th North Mains
9th North Mains
8th North Mains Blind Canyon Seam
7th North Mains
PROFILE
SURFACE PROJECTION JOES VALLEY FAULT
D 1500'
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.
SCALE: 1" = 800'
DATE: JANUARY 30, 2013
FIGURE 4
DRAWING #
SHEET 1 OF 1
REV.

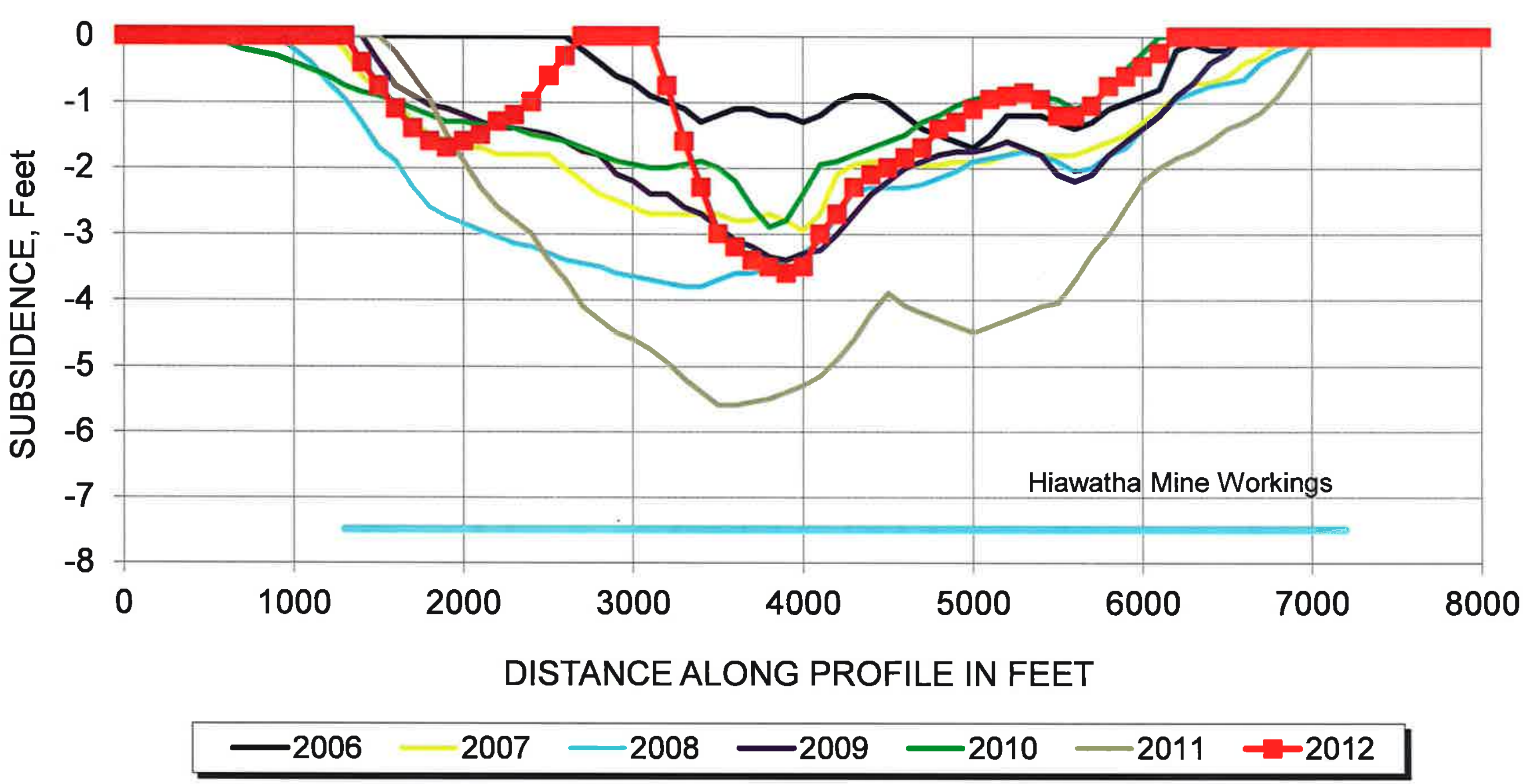
Energy West 2012 Subsidence Report
Area 27 Subsidence Profile (Mill Fork Area)
North-South

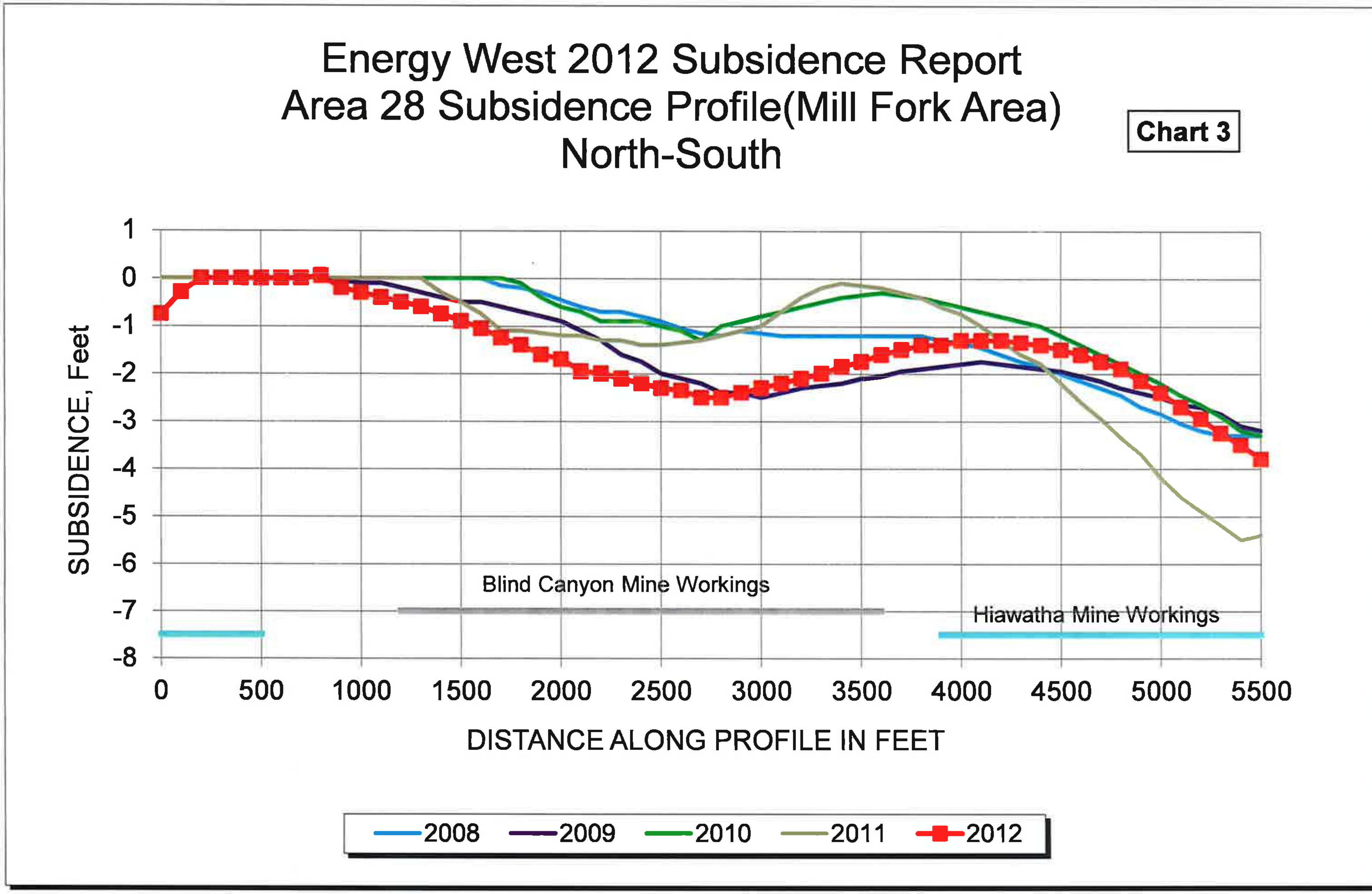
Chart 1

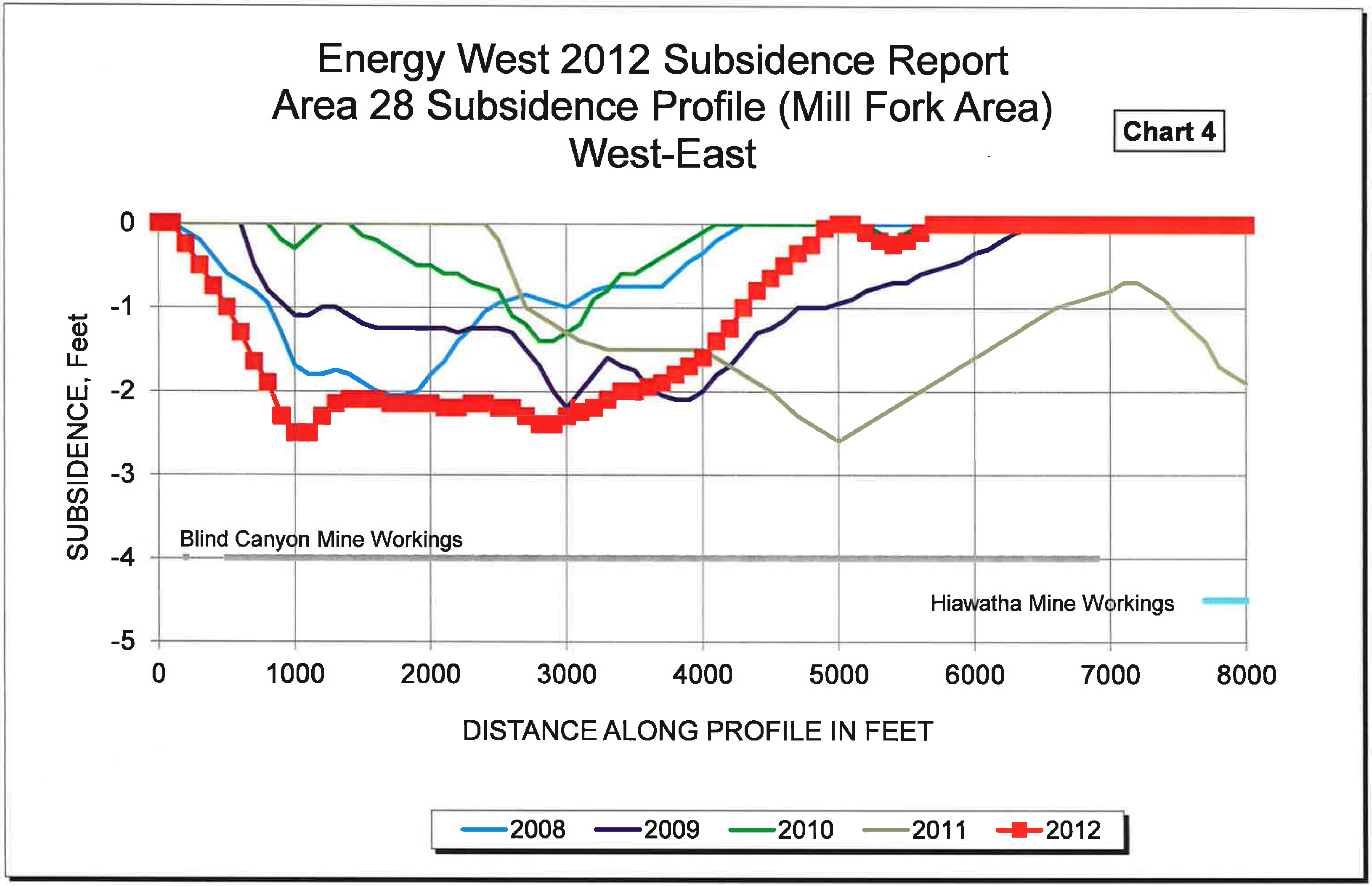


Energy West 2012 Subsidence Report
Area 27 Subsidence Profile (Mill Fork Area)
West-East

Chart 2

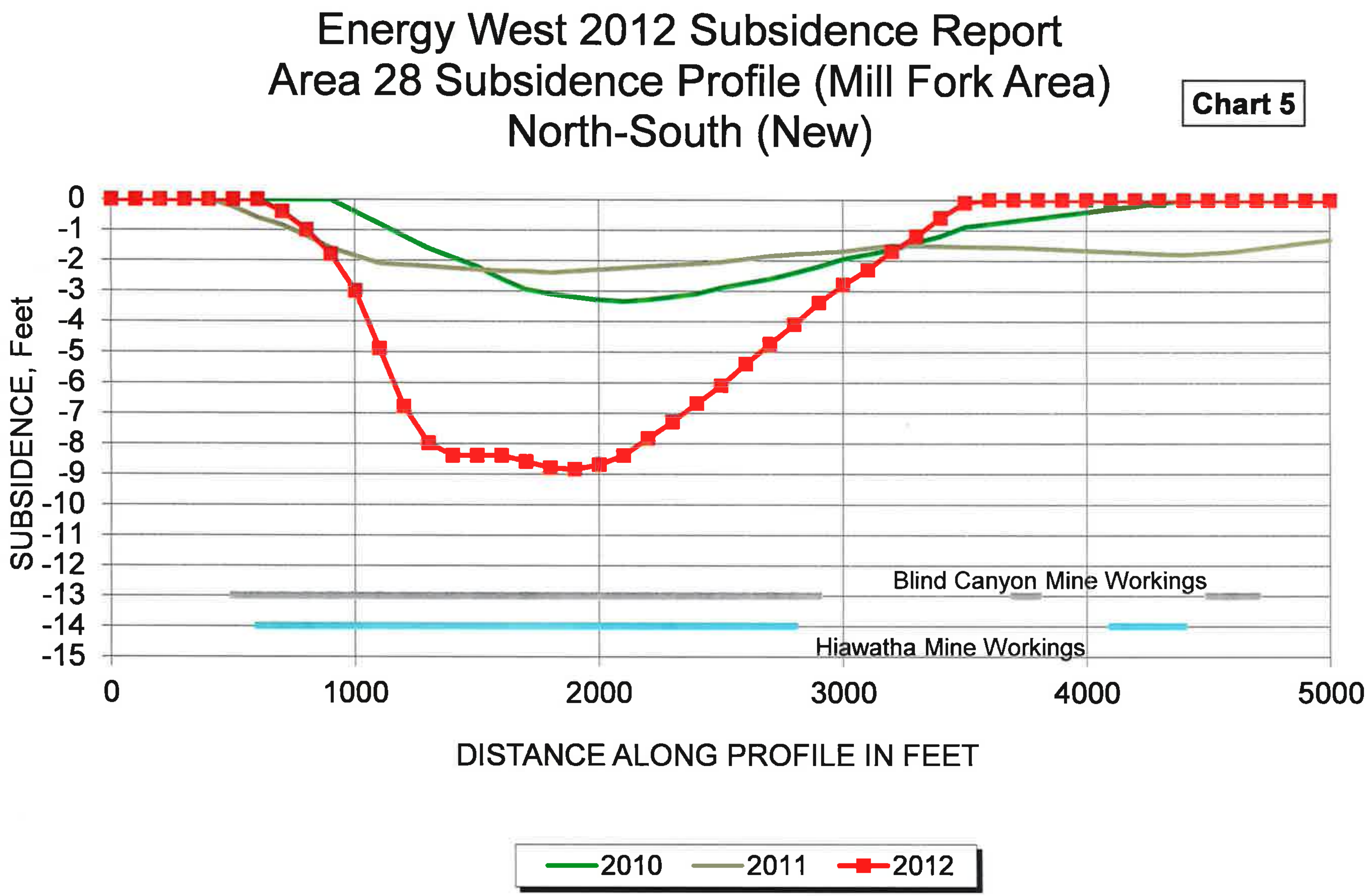


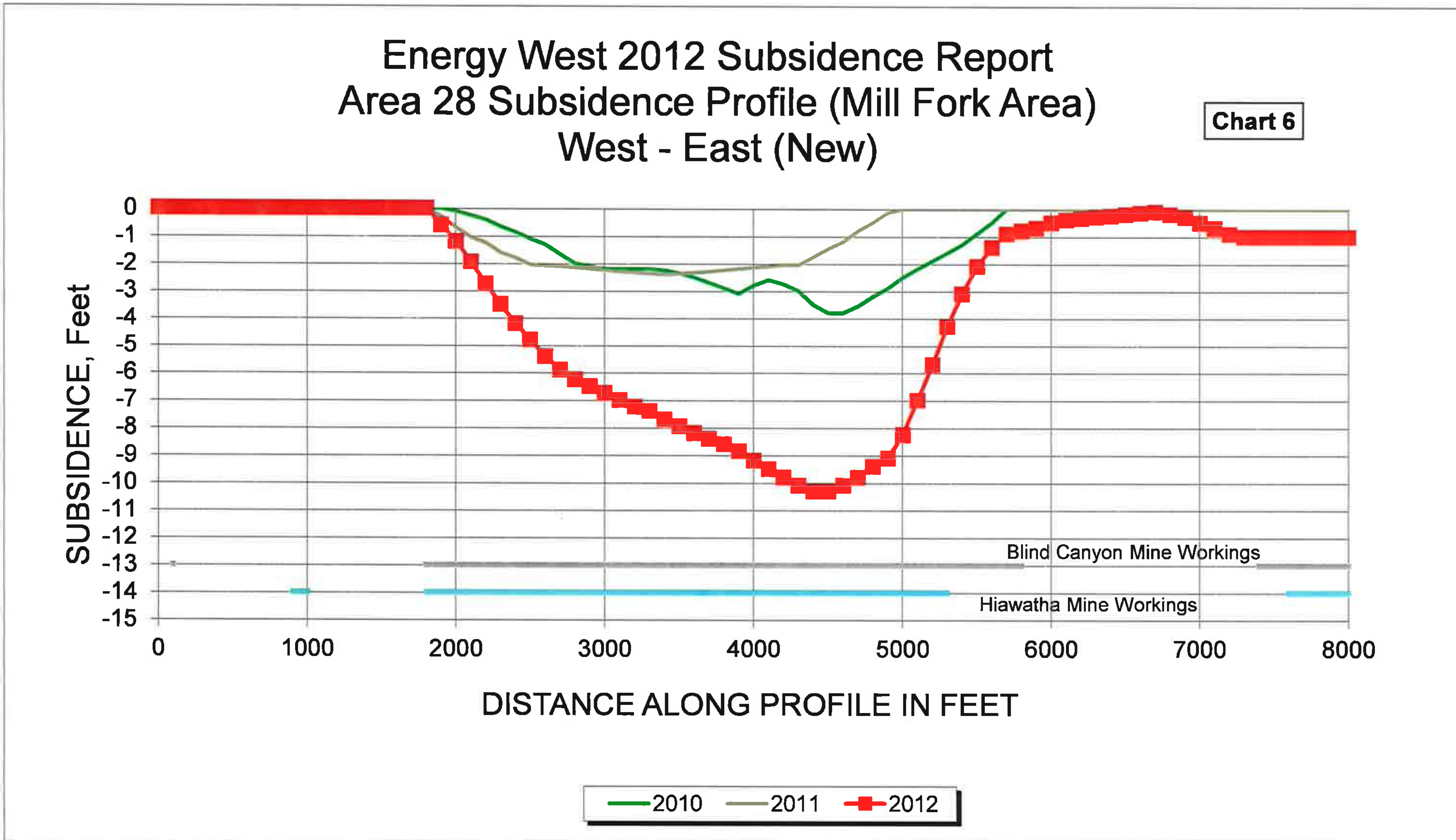

Energy West 2012 Subsidence Report
Area 28 Subsidence Profile(Mill Fork Area)
North-South
Chart 3
SUBSIDENCE, Feet
1
0
-1
-2
-3
-4
-5
-6
-7
-8
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
DISTANCE ALONG PROFILE IN FEET
Blind Canyon Mine Workings
Hiawatha Mine Workings
2008
2009
2010
2011
2012



Energy West 2012 Subsidence Report
Area 28 Subsidence Profile (Mill Fork Area)
West-East
Chart 4
SUBSIDENCE, Feet
0
-1
-2
-3
-4
-5
Blind Canyon Mine Workings
Hiawatha Mine Workings
0
1000
2000
3000
4000
5000
6000
7000
8000
DISTANCE ALONG PROFILE IN FEET
2008
2009
2010
2011
2012

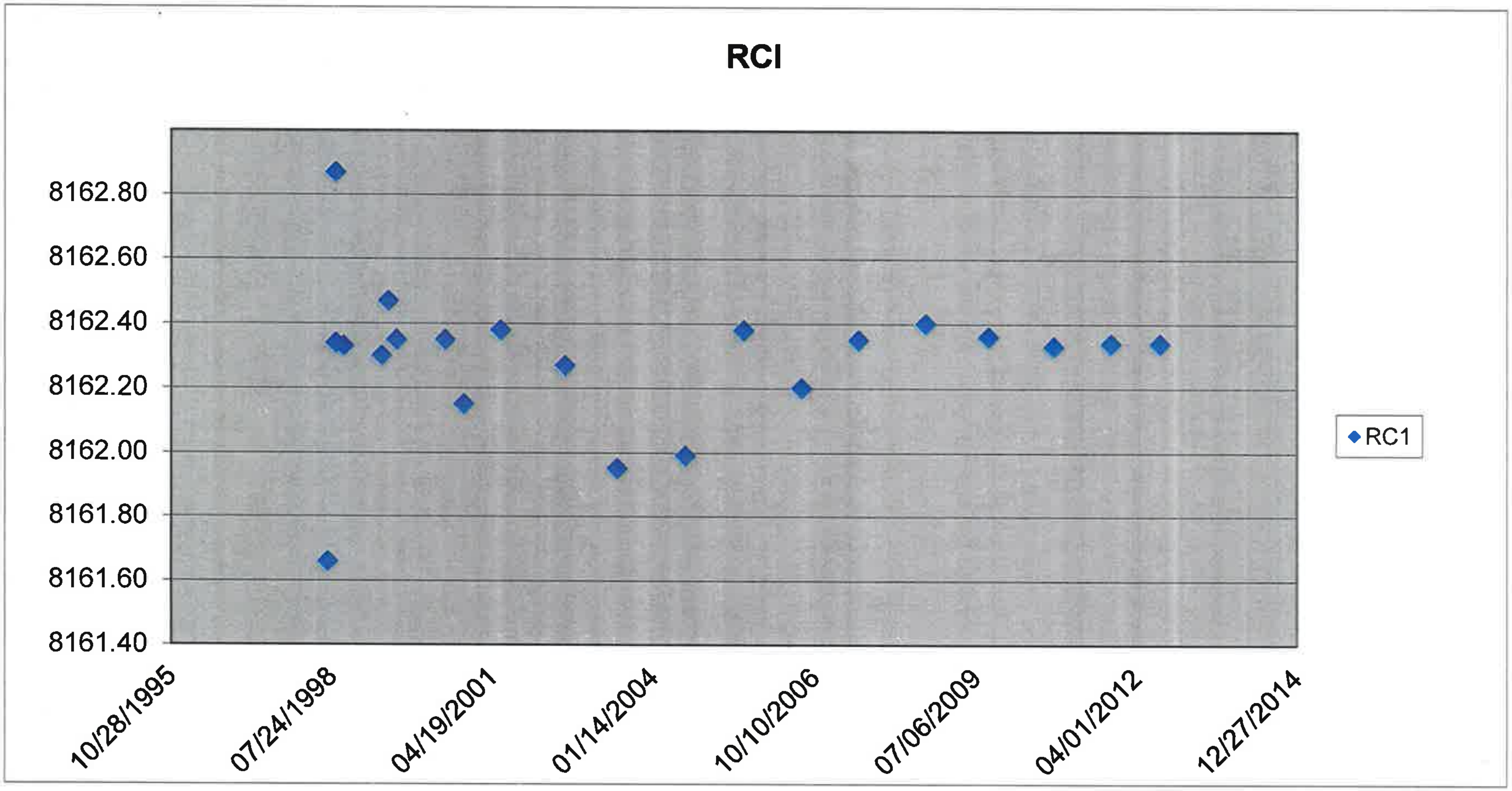
Chart 5

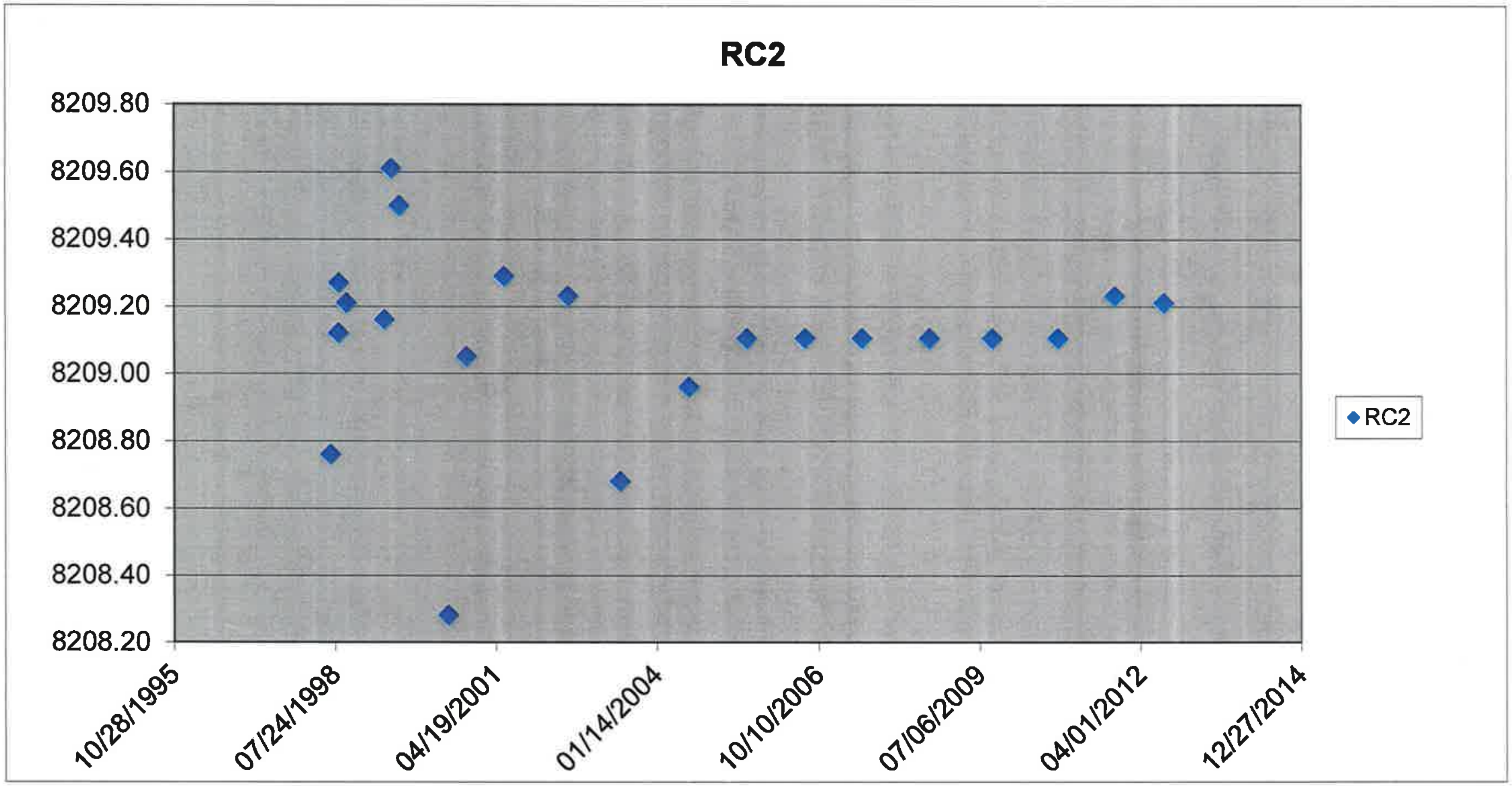

Energy West 2012 Subsidence Report
Area 28 Subsidence Profile (Mill Fork Area)
North-South (New)
SUBSIDENCE, Feet
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
-13
-14
-15
0
1000
2000
3000
4000
5000
DISTANCE ALONG PROFILE IN FEET
Blind Canyon Mine Workings
Hiawatha Mine Workings
2010
2011
2012

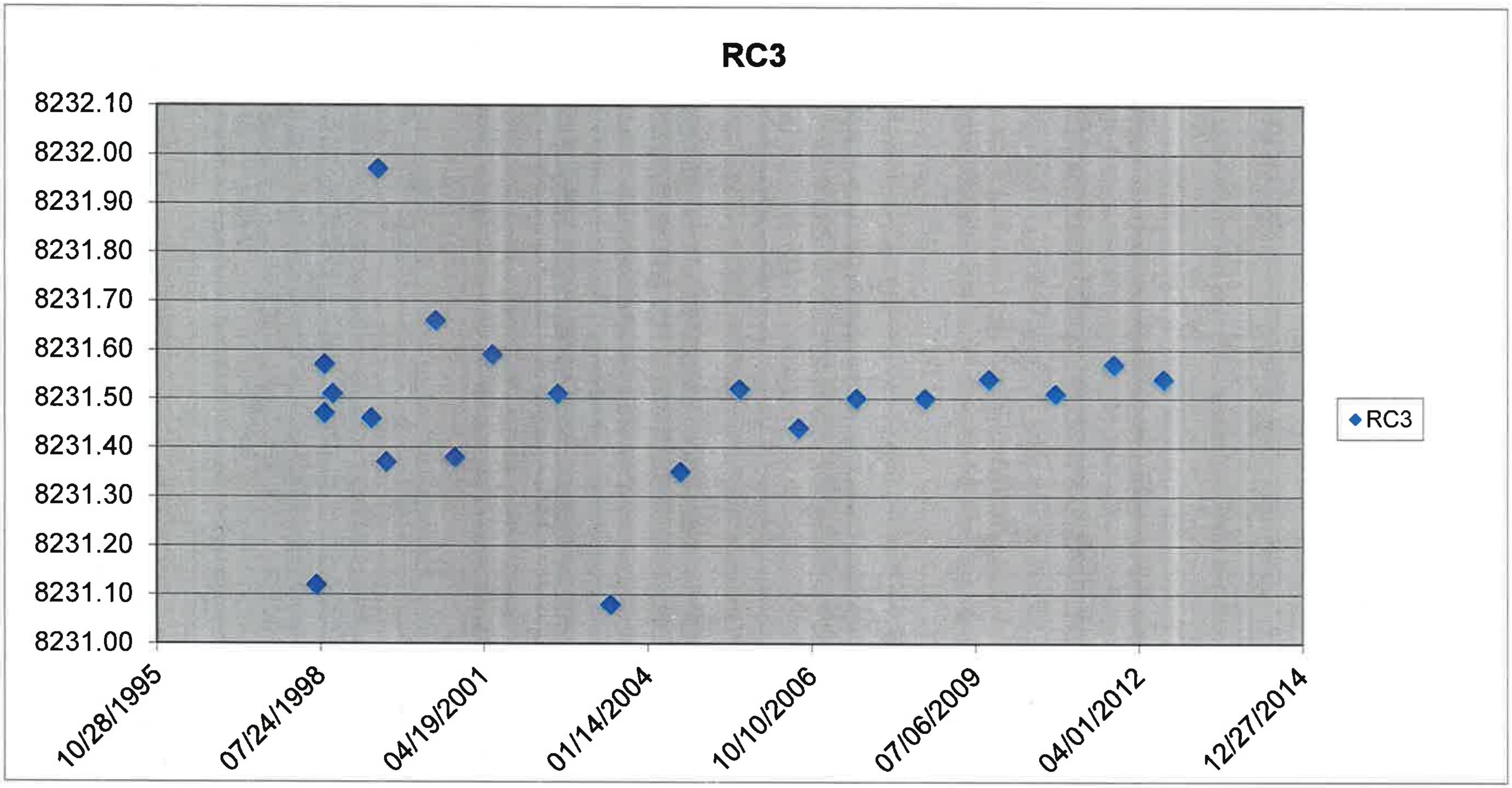

Energy West 2012 Subsidence Report
Area 28 Subsidence Profile (Mill Fork Area)
West - East (New)
Chart 6
SUBSIDENCE, Feet
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
-13
-14
-15
0
1000
2000
3000
4000
5000
6000
7000
8000
DISTANCE ALONG PROFILE IN FEET
Blind Canyon Mine Workings
Hiawatha Mine Workings
2010
2011
2012

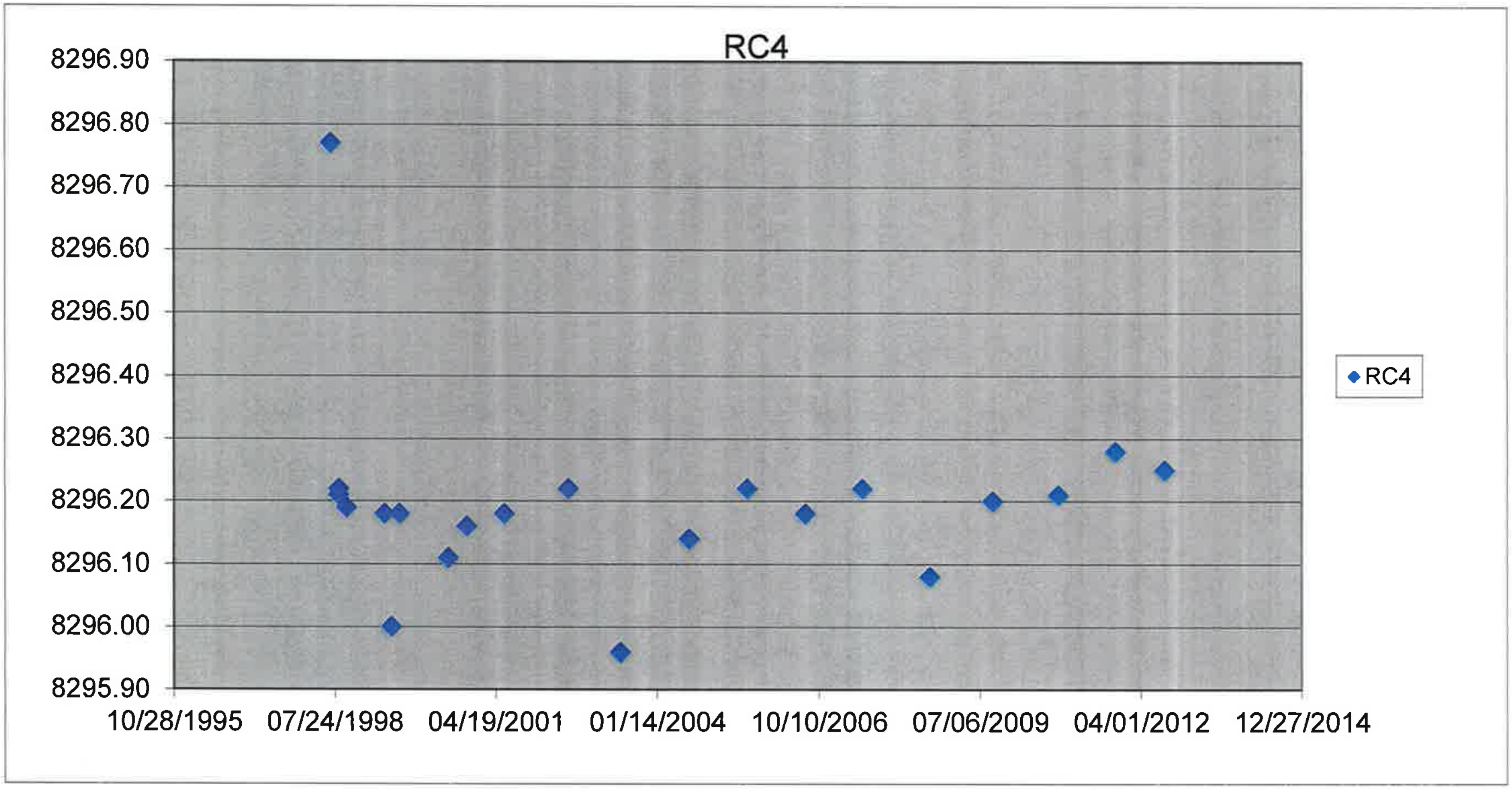
RILDA CANYON MONITORING ABOVE 5TH NORTH DRILL HOLE AREA

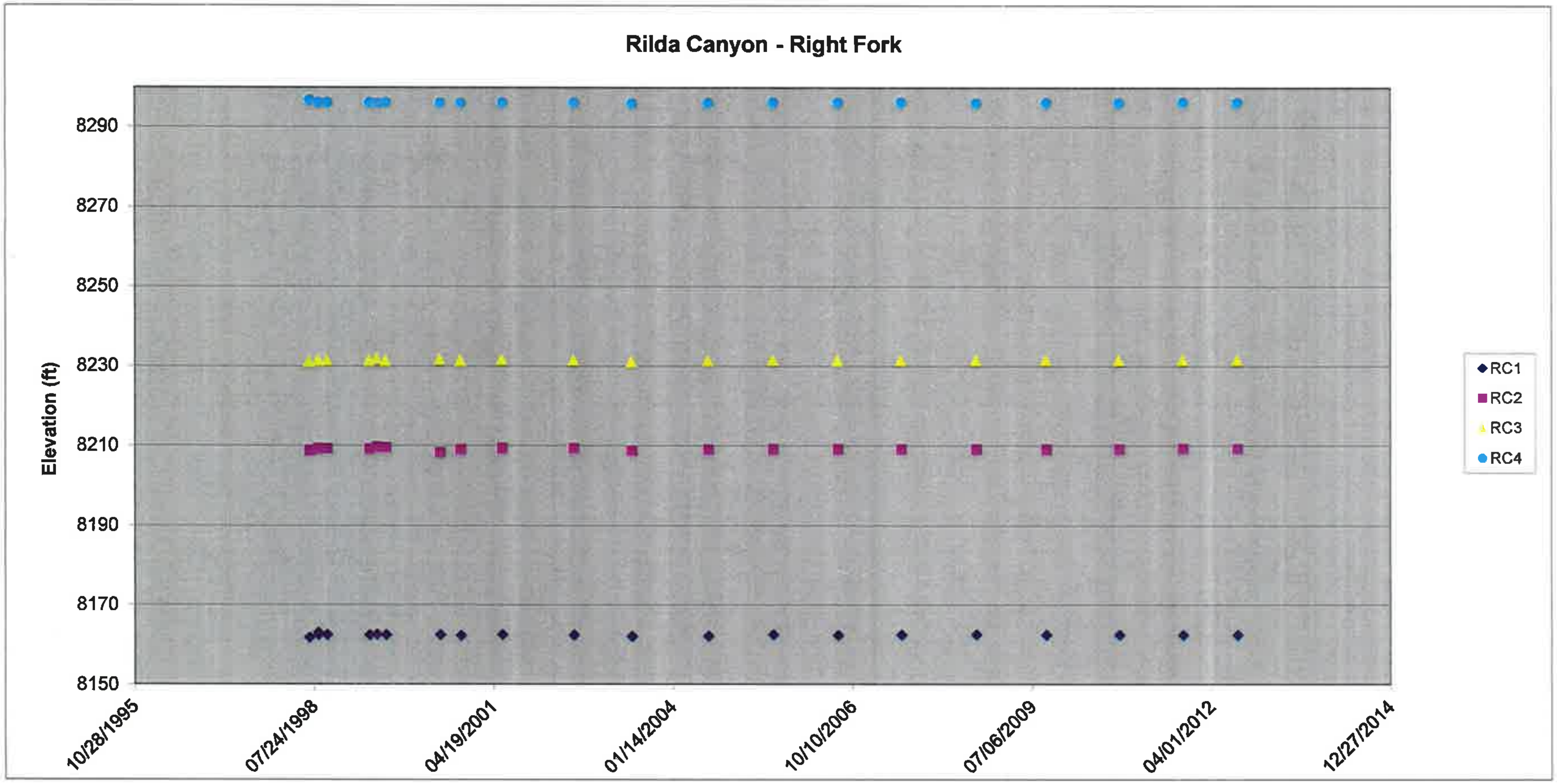
		Bottom End	RC1			RC2			RC3		Top End	RC4
DATE	N	E	ELEV.	N	E	ELEV.	N	E	ELEV.	N	E	ELEV.
06/25/1998	392182.74	2093512.40	8161.66	392322.12	2092965.04	8208.76	392421.14	2092750.95	8231.12	392536.81	2092275.45	8296.77
08/12/1998	392184.17	2093512.37	8162.87	392322.95	2092965.38	8209.12	392421.69	2092751.06	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

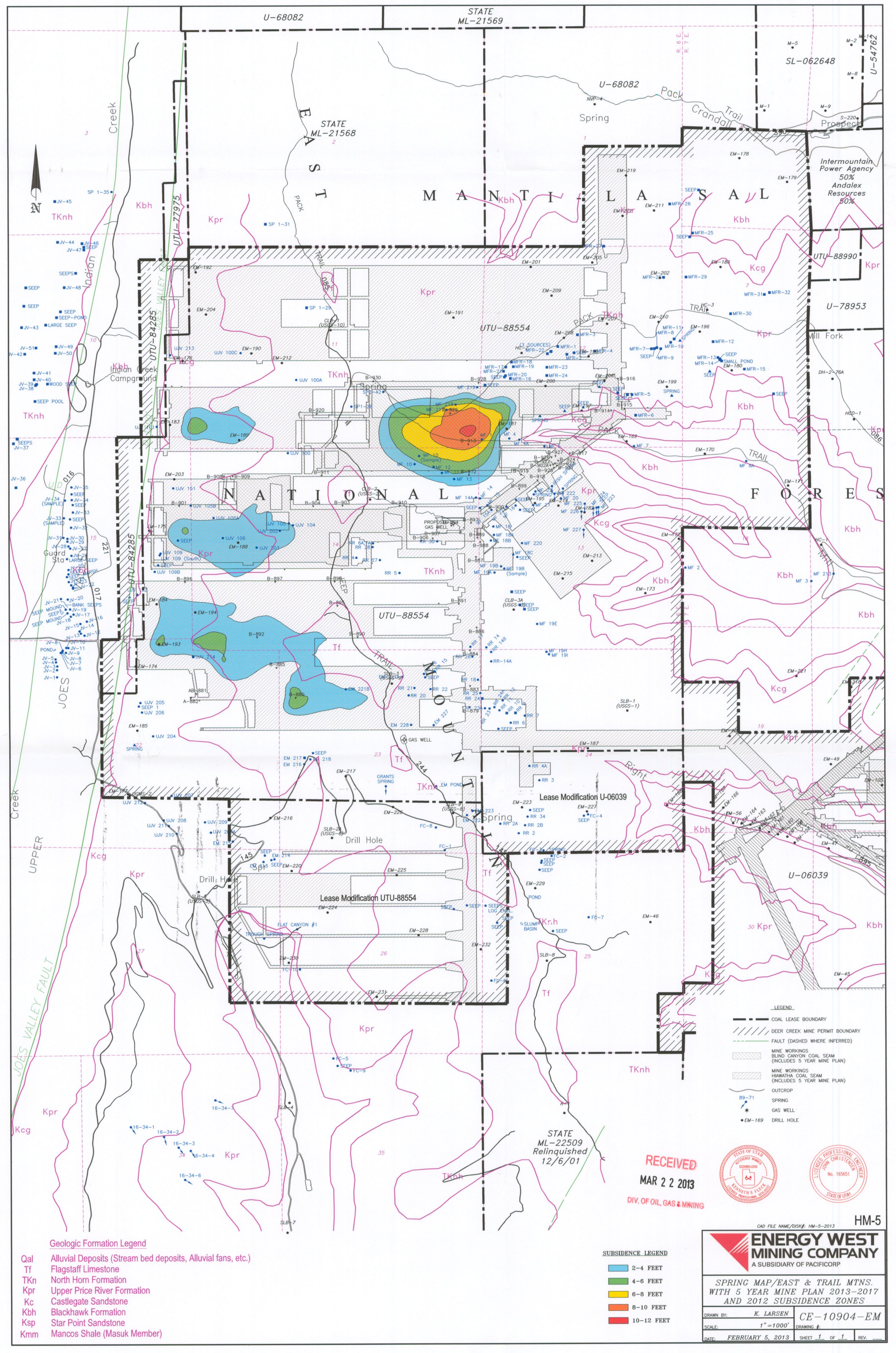

RCI
8162.80
8162.60
8162.40
8162.20
8162.00
8161.80
8161.60
8161.40
10/28/1995
07/24/1998
04/19/2001
01/14/2004
10/10/2006
07/06/2009
04/01/2012
12/27/2014
RC1


RC2
8209.80
8209.60
8209.40
8209.20
8209.00
8208.80
8208.60
8208.40
8208.20
10/28/1995
07/24/1998
04/19/2001
01/14/2004
10/10/2006
07/06/2009
04/01/2012
12/27/2014
RC2


RC3
8232.10
8232.00
8231.90
8231.80
8231.70
8231.60
8231.50
8231.40
8231.30
8231.20
8231.10
8231.00
10/28/1995
07/24/1998
04/19/2001
01/14/2004
10/10/2006
07/06/2009
04/01/2012
12/27/2014
RC3


RC4
8296.90
8296.80
8296.70
8296.60
8296.50
8296.40
8296.30
8296.20
8296.10
8296.00
8295.90
10/28/1995
07/24/1998
04/19/2001
01/14/2004
10/10/2006
07/06/2009
04/01/2012
12/27/2014
RC4


Rilda Canyon - Right Fork
Elevation (ft)
8290
8270
8250
8230
8210
8190
8170
8150
10/28/1995
07/24/1998
04/19/2001
01/14/2004
10/10/2006
07/06/2009
04/01/2012
12/27/2014
RC1
RC2
RC3
RC4



EAST MANTI LA SAL NATIONAL FOREST
TRAIL MOUNTAIN
U-68082
STATE ML-21569
STATE ML-21568
SL-062648
U-54762
UTU-88554
UTU-88990
U-78953
UTU-77975
UTU-84285
U-06039
Intermountain Power Agency 50%
Andalex Resources 50%
Lease Modification U-06039
Lease Modification UTU-88554
STATE ML-22509 Relinquished 12/6/01
Indian Creek Campground
Guard Sta
JOES VALLEY FAULT
Pack Crandall Trail
Prospect
Mill Fork
Spring
Drill Hole
GAS WELL
PROPOSED GAS WELL
GRANTS SPRING
FLAT CANYON #1
SLUMP BASIN
POND
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
SUBSIDENCE LEGEND
2-4 FEET
4-6 FEET
6-8 FEET
8-10 FEET
10-12 FEET
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)
RECEIVED
MAR 2 2 2013
DIV. OF OIL, GAS & MINING
HM-5
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
SHEET 1 OF 1


U-68082
STATE
ML-21569
SL-062648
U-54762
STATE
ML-21568
U-68082
R 6 E
R 7 E
Intermountain Power Agency 50%
Andalex Resources 50%
UTU-77975
UTU-88990
U-78953
JOES VALLEY FAULT
UTU-84285
UTU-88554
Deer Creek Mine
Permit Area
UTU-84285
UTU-88554
Lease Modification U-06039
U-06039
Lease Modification UTU-88554
JOES VALLEY FAULT
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 HIAWATHA COAL SEAM (INCLUDES 5 YEAR MINE PLAN)
OUTCROP
RECEIVED
MAR 2 2 2013
DIV. OF OIL, GAS & MINING
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
SCALE: 1"=2000'
DATE: FEBRUARY 5, 2013
SUBALL-2013
DRAWING #:
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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(Located in Map Section)

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 showd 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 2012water 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 consistant 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 AppendixK) 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)	*% of Normal*	*Precip. (inches)*	*% of Normal*	*Precip. (inches)*	*% of Normal*
2011						
October	0.39	46	3.2	267	0.86	66
November	0.19	38	0.59	98	0.59	60
December	0.78	140	0.14	22	0.53	59
2012						
January	0.47	73	0.19	23	0.75	67
February	0.56	96	0.35	50	0.95	77
March	0.00	0	0.59	83	0.65	52
April	0.08	15	0.43	67	0.44	45
May	0.00	0	0	0	0.00	0
June	0.00	0	0.01	1	0.05	9
July	1.05	136	1.72	170	2.65	329
August	0.35	33	0.51	43	1.29	102
September	0.82	92	0.79	79	0.78	60
TOTALS	4.69	58	7.73	86	9.53	76
Mean Monthly	0.39	---	0.71	---	0.79	---

NR - No Record

* Tranferred Site from Hunter Plant to Castle Dale

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

	2012		2011		2012 As
Station	***Amount***	***% of Normal***	***Amount***	***% of Normal***	***% of 2011***
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

99-00	0.00	0.00	0.12	0.41	1.19	0.50	0.03	0.76	0.40	0.28	1.00	0.39	5.08
30-Year	0.82	0.53	0.36	0.64	0.57	0.68	0.52	0.65	0.41	0.81	0.97	0.86	7.81
00-01	2.89	0.09	0.10	1.14	1.03	0.47	0.23	0.53	0.23	0.81	0.82	0.76	9.10
01-02	0.16	0.75	0.17	0.00	0.05	0.02	0.16	0.00	0.26	0.18	0.18	2.55	4.48
02-03	0.78	0.74	0.28	0.02	0.37	1.22	0.08	0.56	0.12	0.00	0.87	0.30	5.34
03-04	0.29	0.56	0.91	0.30	1.84	0.00	2.02	0.10	0.82	0.41	0.39	1.03	8.67
04-05	2.14	1.67	0.51	2.01	1.11	0.17	0.19	0.40	2.11	0.15	0.58	1.00	12.04
05-06	1.37	0.26	0.06	0.61	0.16	1.51	0.13	0.03	0.19	0.32	0.83	0.42	5.89
06-07	3.80	0.01	0.43	0.40	0.01	0.24	0.52	0.40	0.05	0.43	3.04	1.22	10.55
07-08	0.43	0.03	1.33	0.49	0.93	0.00	0.11	0.50	0.35	0.03	0.29	0.68	5.17
08-09	0.36	0.22	0.91	0.07	0.37	0	0.59	0.7	0.69	0.07	0.21	0.6	4.79
09-10	0.32	0.00	1.53	1.46	0.8	0.65	0.1	0.17	0.46	0.13	0.3	0.1	6.02
40-Year	0.93	0.50	0.43	0.65	0.59	0.62	0.49	0.57	0.44	0.67	0.92	0.86	7.66
10-11	2.09	0.29	1.79		0.65	0.25	0.36	1.56	0.81	1.73	0.62	0.66	10.81
11-12	0.39	0.19	0.78	0.47	0.56	0.00	0.08	0.00	0.00	1.05	0.35	0.82	4.69
*Average**	0.95	0.50	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	---	---	---	---	---	0.08	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	0.28	0.16	0.77	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	
01-02	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
02-03	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
03-04	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
04-05	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	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	0.25	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	1.23	3.21	1.08	1.93	0.49	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
10-Year	1.89	2.03	2.62	2.40	2.21	2.11	1.54	1.67	0.68	1.07	0.95	1.05	20.23
80-81	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
81-82	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
82-83	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
83-84	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
84-85	2.92	2.63	3.24	1.54	1.09	3.54	1.95	1.19	0.89	3.04	0.03	4.35	26.41
85-86	4.40	6.62	1.99	1.81	8.54	2.48	3.79	1.62	0.26	1.01	1.68	2.73	36.93
86-87	1.86	1.98	0.55	2.14	2.07	2.47	1.03	2.93	0.79	2.12	1.22	0.49	19.65
87-88	1.39	1.68	3.50	3.06	0.72	3.32	2.14	1.60	0.86	1.04	2.23	1.16	22.70
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	0.62	1.87	20.40
20-Year	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
90-91	1.32	0.90	1.64	1.49	1.64	4.24	3.06	2.60	0.57	1.04	1.39	2.70	22.56
91-92	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
92-93	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
93-94	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
94-95	2.40	4.26	1.60	3.25	1.90	3.84	3.94	5.07	2.04	1.00	2.53	1.95	33.78
95-96	1.54	1.38	3.54	5.84	3.25	3.23	1.75	1.73	0.90	1.09	0.45	2.20	26.90
96-97	1.43	2.35	3.90	4.00	1.31	0.77	1.97	2.03	1.03	0.64	1.98	4.45	25.86
97-98	2.30	1.88	2.00	3.65	3.60	2.86	1.80	1.82	2.30	2.01	1.86	1.68	27.76
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
30-Year	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
00-01	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
01-02	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
02-03	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
03-04	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
04-05	4.35	2.59	2.05	3.94	2.53	2.01	1.41	1.90	1.26	0.65	1.23	1.40	25.32
05-06	1.53	2.26	3.92	2.92	1.70	5.59	4.72	0.50	0.95	0.90	1.03	1.88	27.90
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**	-	-	-	-	-	-	-	-	-	-	-	-	-
49-Year	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
*10-11**	-	-	-	-	-	-	-	-	-	-	-	-	-
*11-12**	-	-	-	-	-	-	-	-	-	-	-	-	-
Average**	2.09	2.28	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 500 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	
2011	*Average Temperature**	*Departure From Normal*	*Average Temperature**	*Departure From Normal*	*Average Temperature**	*Departure From Normal*
October	50.6	2.2	49.2	0.0	45.1	3.7
November	39.2	3.7	34.3	-0.7	29.9	0.4
December	24.3	0.0	28.0	-0.2	21.9	-0.4
2012						
January	27.8	7.0	30.5	2.0	26.4	2.5
February	32.3	4.4	29.5	0.1	20.8	-4.0
March	43.6	5.2	42.8	2.6	37.1	5.7
April	50.6	4.1	48.8	2.9	45.3	7.3
May	58.7	3.2	58.9	3.1	50.9	3.7
June	69.4	4.9	71.3	4.0	63.9	6.2
July	72.8	1.9	71.1	0.1	63.9	-1.2
August	71.8	3.2	71.4	0.7	62.6	-0.6
September	63.1	3.2	63.0	0.4	59.4	5.3
AVERAGE	38.0	3.6	49.9	1.2	43.9	2.4

* Temperatures reported in degrees Fahrenheit.
** Tranferred Site from Hunter Plant to Castle Dale in 2008

TABLE 8: COMPARISON OF 2011 AND 2012 TEMPERATURES*

	2011		2012		2012
Station	*Average Temperature*	*Departure From Normal*	*Average Temperature*	*Departure From Normal*	*Departure From 2011*
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
Average Departure From Normal		0.3		2.4	

* Temperatures reported in degrees Fahrenheit.

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

	*Huntington Creek Below Electric Lake**	*Huntington Creek At Plant**
Total Yearly Flow (Acre Feet)	12,150	7,967
Mean Discharge in Cubic Feet Per Second (CFS)	16.7	48
Maximum Discharge (CFS)	60.6	132
Date of Maximum Discharge	24-Jun-12	18-May-12
Minimum Discharge (CFS)	3.9	10.8
Date of Minimum Discharge	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	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20120313	0	191	61.34	21	13	509		252	0.26	0	24.08	0.009	0	8.47	1.76	12.33	43	24	279
20120612	0	163	50.92	0	6	371		189	0.27	0	15.04	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	8.57	1.54	7.01	26	111	241
20121204	0	197	60.7	25	15	577		281	0.12	0	31.33	0.031	0	8.42	2.18	15.47	72	6	326
No. of Analysis	4	4	4	4	4	4	0	4	4	4	4	4	4	4	4	4	4	4	4
2011 **																			
MIN	0	143	48.03	0	5	327	0	167	0.08	0	11.35	0	0	8.48	0.76	4.92	12	8	183
MAX	0	251	73.08	10	16	602	0	320	1.19	0	33.5	0.013	0	8.61	2.04	13.39	61	85	329
MEAN	0	183	58.18	2.5	9.75	434.5	0	229.75	0.39	0	20.51	0.005	0	8.54	1.31	8.50	32.5	28.5	243
2010 **																			
MIN	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
MEAN	0	182	57	12	11	469		233	0	0	22	0	0	9	2	10	41	41	264
2010 **																			
MIN	0	163	51	0	6	371		189	0.12		15.04	0.00		8.42	0.93	5	21	6	210
MAX	0	197	61	25	15	577		281	1.03		31.33	0.03		8.58	2.18	15	72	111	326
MEAN	0	182	57	12	11	469		233	0.42		22.05	0.01		8.51	1.60	10	41	41	264
2009 **																			
MIN	0	154	47	0	5	358	8	189	0		14	0		8	1	4	19	5	219
MAX	0	218	65	7	16	563	9	289	0		31	0		9	2	13	59	13	341
MEAN	0	184	56	3	10	454	9	235	0		23	0		9	1	9	40	10	278
2008 **																			
MIN		144	52.7	0.0	4.0	361	7.80	185	0.12		12.94	0.01		8.34	0.78	3.89	15.0	0.0	229
MAX		216	65.8	15.0	20.0	630	15.10	306	1.05		34.36	0.07		8.60	2.08	15.49	83.0	11.0	399
MEAN		181	58.5	7.7	11.0	498	10.73	243	0.39		23.53	0.03		8.51	1.52	9.11	45.8	5.7	296
2007 **																			
MIN		152	49	8	5	401	10.89	188	0.13		16	0.01		8.23	0.70	4	18	13	193
MAX		207	61	8	12	599	13.12	260	0.30		27	0.03		8.51	1.68	11	54	19	301
MEAN		181	56	8	9	486	11.80	226	0.23		21	0.02		8.40	1.39	7	36	15	250
2006 **																			
MIN		157	47		5	387	11.61	177	0.12		14	0.00		7.99	0.75	4	19	8	209
MAX		233	73		20	701	14.32	324	8.77		35	0.02		8.43	1.93	18	85	969	467
MEAN		198	61		11	531	13.17	252	2.34		24	0.01		8.19	1.32	10	47	251	306
2005 **																			
MIN		161	49		3	362	9.42	178	0.08		14	0.01		8.28	0.69	3	15	14	204
MAX		221	65		21	641	12.43	291	0.49		31	0.05		8.45	2.36	18	66	38	366
MEAN		193	58		10	484	10.87	232	0.27		21	0.02		8.34	1.46	10	38	28	280
2004 **																			
MIN		154	44	6	5	332	5.27	173	0.12		15	0.01		8.41	0.84	5	17	13	153
MAX		245	59	6	15	485	14.66	245	0.28		24	0.09		8.63	1.74	13	45	37	287
MEAN		196	53	6	9	425	10.27	215	0.22		20	0.05		8.48	1.25	8	33	23	237
2003 **																			
MIN		193	46	5	6	222	4.73	206	0.11		19	0.01		8.25	1.16	7	27	6	200
MAX		237	58	5	14	525	7.01	250	0.70		26	0.03		8.56	1.96	13	51	17	321
MEAN		216	53	5	9	395	6.20	221	0.29		22	0.02		8.42	1.54	10	37	11	250
2002 **																			
MIN		195	45	8	5	358	10.65	178	0.20		16			8.40	1	7	20	17	153
MAX		232	52	8	11	461	13.62	216	2.10		21			8.58	1	10	38	143	276
MEAN		217	49	8	8	413	11.86	199	0.83		19			8.46	1	9	30	63	230
2001 **																			
MIN	126	170	43	5	5	348	8.20	153	0.10		11			8.43	1	5	14	7	196
MAX	400	265	58	5	15	574	8.20	248	0.50		25			8.61	2	15	45	37	290
MEAN	218	220	50	5	10	459	8.20	201	0.30		19			8.52	2	9	30	21	243
2000 **																			
MIN		176	41	6	3	304	5.40	148	0.20		11			8.28	1	2	10	10	168
MAX		254	57	6	18	490	12.00	233	0.20		22			8.53	1	13	36	27	285
HISTORICAL 1990-2011																			
MIN	0.0	126	32.7	0.0	1.0	210	3.8	118	0.01	0.00	9.00	0.00	0.0	7.10	0.01	1.00	2.0	0.00	134
MAX	25.0	400	102.6	38.0	45.0	701	15.1	392	13.30	0.25	44.70	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	8.7	221.49	0.48	0.07	19.54	0.05	2.0	8.40	1.34	8.09	32.0	31.35	240
No. of Analysis		119	119	80	118	129	120	119	108	69	119	83	65	129	101	119	119	121	129

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

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

TABLE 12: HUNTINGT(REEK WATER QUALITY *

HCC02 - @ POWER PLANT (BELOW DEER CREEK CONFLUENCE)

2012** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20120313	0	205	62	11	23	571		268	0	0	27	0	0	9	2	20	51	47	323
20120614	0	171	54	0	7	388		203	0	0	17	0	0	9	1	8	24	19	226
20120910	0	183	55	0	9	427		214	1	0	19	0	0	9	2	9	30	119	257
20121204	0	209	58	31	29	711		303	0	0	39	0	0	8	4	37	96	0	399
No. of Analysis	4	4	4	4	4	4	0	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	11.9	0.0	0.0	8.5	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	37.6	0.0	0.0	8.6	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	22.3	0.0	0.0	8.5	1.7	11.9	41.0	33.0	####
2010**																			
MIN	0	150	47	0	4	326	8.70	170	0.09		12	0.00		8.48	0.80	4	14	6	194
MAX	0	221	59	21	36	687	10.90	291	1.62		35	0.00		8.62	3.54	36	85	134	414
MEAN	0	185	53	5	17	496.5	9.65	226	0.52		23	0.00		8.55	2.11	18	48	45	293
2009**																			
MIN	0	155	47	0	7	370	8	194	0		15	0		8	1	6	22	10	229
MAX	0	227	64	9	33	686	9	306	0		35	0		9	3	28	78	17	422
MEAN	0	189	56	2	17	516	8	246	0		26	0		9	2	16	53	14	319
2008**																			
MIN									0.12			0.00			0.92				
MAX		227	64	9	33	686	9.20	306	4.00		35			8.61	4.00	28	78	17	422
MEAN		144	43	4	15	393.875	7.42	187.4375	1.14		20	1.00		7.39	2.50	13	39	11	243
2007**																			
MIN		158	48	10	5	412	10.15	185	0.14		16	0.01		8.27	1	4	19	8	192
MAX		215	61	10	22	681	14.04	270	0.24		29	0.03		8.56	2	19	66	15	330
MEAN		187	55	10	12	514.75	11.83	228.5	0.19		22	0.02		8.41	2	10	40	11	261
2006**																			
MIN		157	47		6	400	11.50	179	0.10		15	0.00		8.07	1	5	20	8	215
MAX		235	73		76	899	14.31	332	11.93		36	0.01		8.48	2	51	86	1420	498
MEAN		200	61		27	596.5	13.31	258.25	3.10		25	0.01		8.31	1	20	48	363	318
2005**																			
MIN		164	48	5	4	372	9.49	182	0.08		15	0.01		8.34	1	5	17	8	223
MAX		220	63	5	32	674	14.78	284	0.38		31	0.05		8.48	2	29	73	37	389
MEAN		194	56	5	14	498	11.79	229.75	0.23		22	0.02		8.40	2	14	41	26	289
2004**																			
MIN		153	45	6	6	336	5.61	177	0.15		16			8.29	1	5	18	12	166
MAX		226	58	6	51	609	14.61	248	0.57		25			8.59	2	32	47	41	368
MEAN		192	53	6	20	463.5	10.25	217.25	0.34		20			8.42	1	15	35	26	265
2003**																			
MIN		221	47	5	7	422	4.70	212	0.11		19			8.16	1	8	28	7	213
MAX		251	56	7	19	634	6.96	250	0.78		26			8.57	2	16	53	50	318
MEAN		234	53	6	13	511.25	6.22	226.5	0.31		23			8.44	2	12	39	21	258
2002**																			
MIN		198	44	5	6	369	10.08	180	0.20		17			8.42	1	8	22	16	172
MAX		248	53	6	16	569	13.84	227	1.60		23			8.58	2	14	43	128	300
MEAN		226	49	6	11	457.25	11.88	204.75	0.75		20			8.48	1	11	33	79	251
2001**																			
MIN		172	44	8	6	364	8.20	159	0.10		12	0.05		8.30	2	6	16	9	200
MAX		284	59	8	32	642	8.20	259	0.60		27	0.05		8.65	2	23	52	33	338
MEAN		226	50	8	19	507	8.20	207.75	0.37		20	0.05		8.50	2	14	35	21	268
2000**																			
MIN		175	41	5	5	316	5.90	148	0.10		11			8.27	1	3	14	15	169
MAX		279	60	5	34	587	11.90	261	0.20		27			8.52	2	22	65	27	339
MEAN		226	50	5	17	456	10.03	206.5	0.17		20			8.36	2	12	36	21	257
HISTORICAL 1990-2011																			
MIN	0	148	32	0	1	210	3.8	129	0.01	0	8	0	0	7.14	0.01	1	4	0	161
MAX	33	310	91.7	37	76	899	15	448	11.93	0.21	39.9	1	5.1	8.98	5	51.2	150	1420	498
MEAN	4.5	217.2	57.9	4.5	15.3	452.1	8.6	233.6	0.5	0.1	21.2	0.1	1.9	8.4	1.7	11.2	40.4	36.6	####
No. of Analysis	66	114	114	81	113	124	119	114	106	65	114	77	62	124	95	114	114	118	124

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

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

TABLE 13: HUNTINGTON CREEK WATER QUALITY *

HCC04 - @ RESEARCH FARM

2012** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20120313	0	208	63	8	22	573		269	0	0	27	0.01	0	8.53	2.04	20	55	28	315
20120614	0	172	53	0	8	392		200	0	0	17	0.00	0	8.57	1.21	8	26	16	229
20120910	0	181	56	0	11	446		220	1	0	19	0.05	0	8.62	1.75	9	32	136	251
20121204	0	212	61	26	36	745		321	0	0	41	0.02	0	8.45	4.01	39	108	0	409
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
2011**																			
MIN	0.0	150.0	49.6	0.0	6.0	335.0	0.0	174.0	0.1	0.0	12.1	0.0	0.0	8.4	0.8	5.6	14.0	7.0	198.0
MAX	0.0	257.0	74.1	0.0	27.0	685.0	0.0	339.0	1.2	0.0	37.5	0.0	0.0	8.6	2.6	24.1	83.0	98.0	415.0
MEAN	0.0	192.3	59.0	0.0	15.8	482.5	#DIV/0!	241.0	0.5	0.0	22.8	0.0	0.0	8.5	1.6	13.4	43.8	42.5	284.5
2010**																			
MIN		172	48	0	4	327	8.70	167	0.08	0.00	12	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	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	8.54	2.00	18	51	48	297
2009**																			
MIN		149	47	0	7	376	8	197	0	0	16	0	0	8	1	6	23	5	234
MAX		226	67	13	45	737	9	325	0	0	38	0	0	9	3	34	95	21	450
MEAN		187	57	7	24	556	9	258	0	0	28	0	0	9	2	21	61	13	341
2008**																			
MIN									0.00			0.00			0.92				
MAX		226	67		45	737	9.20	325	4.00		38	4.00		8.60	4.00	34	95	21	450
MEAN		142	44		20	418.1875	7.47	195.875	1.10		21	1.00		7.38	2.48	16	46	11	257
2007**																			
MIN		161	49		7	428	10.18	189	0.15		16	0.01		8.31	1	6	23	8	208
MAX		212	62		25	700	13.79	279	0.26		31	0.03		8.59	3	22	73	38	370
MEAN		187	56.5		15.0	536.25	11.99	235.75	0.20		22.99	0.02		8.44	1.60	12.36	45.8	19.0	283.3
2006**																			
MIN		159	48		8	420	11.58	184	0.12		16	0.01		8.02	1	7	25	6	215
MAX		235	78		104	1036	14.59	366	16.43		42	0.01		8.50	3	70	109	1370	589
MEAN		199	63		38	663	13.52	274	4.46		28	0.01		8.33	2	27	61	358	351
2005**																			
MIN		163	48		4	378	9.07	186	0.10		15	0.00		8.06	1	5	19	38	225
MAX		215	68		48	784	12.69	312	0.42		35	0.05		8.47	2	34	97	57	459
MEAN		191	59		21	545	10.34	244	0.26		24	0.02		8.32	1	16	53	45	323
2004**																			
MIN		153	45	6	7	360	5.46	179	0.11		16	0.02		8.41	1	7	22	15	205
MAX		248	60	7	54	640	14.64	262	0.46		27	0.03		8.61	2	33	65	40	384
MEAN		198	55	7	23	493	10.25	226	0.25		22	0.02		8.49	1	16	44	24	287
2003**																			
MIN		211	49	5	11	444	4.65	218	0.11	0.01	20	0.01		8.34	1	10	34	7	282
MAX		251	61	6	38	658	7.07	282	0.84	0.01	32	0.03		8.57	2	26	79	56	377
MEAN		233	56	6	24	530	6.28	244	0.34	0.01	26	0.02		8.49	2	18	56	25	307
2002**																			
MIN		196	44	6	8	397	10.24	184	0.20		18			8.41	1	10	25	17	197
MAX		240	57	8	27	722	13.60	254	1.60		27			8.59	2	21	70	103	343
MEAN		224	51	7	18	524	11.89	220	0.63		23			8.50	1	15	47	55	289
2001**																			
MIN		181	46	5	8	382	8.30	168	0.10		13			8.36	2	8	20	8	197
MAX		294	67	5	51	727	8.30	303	0.30		33			8.59	2	35	87	29	432
MEAN		232	54	5	27	556	8.30	227	0.20		23			8.46	2	20	50	18	298
2000**																			
MIN		175	42	8	7	328	6.50	4	0.20		12			8.35	2	3	17	10	187
MAX		268	61	8	32	640	11.80	268	0.20		29			8.45	2	23	74	31	371
MEAN		225	52	8	20	484	9.80	173	0.20		21			8.38	2	13	45	21	276
HISTORICAL 1991-2011																			
MIN	0.0	96	35.3	0.0	2.0	220	4.2	145	0.00	0.00	9.90	0.000	0.0	7.35	0.01	2.00	9.0	0.00	170
MAX	25.0	326	108.1	44.0	104.0	1036	14.7	397	16.43	0.37	42.00	0.30	5.0	8.94	10.70	69.70	170.0	1370.00	589
MEAN	4.1	219	59.4	5.0	19.6	486.3	8.5	244.0	0.57	0.08	23.09	0.05	1.9	8.42	1.76	14.47	53.9	38.08	293.9
No. of Analysis	77	125	125	89	125	142	138	124	113	75	125	85	66	143	107	125	125	136	143

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

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

TABLE 14: DEER CREEK SURFACE WATER QUALITY *

DCR01 - ABOVE THE 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 SAMPLES DURING 2012																	
No. of Analysis	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2011**																		
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
2010**	NO SAMPLES DURING 2010																	
2009**	NO SAMPLES DURING 2009																	
2008**																		
MIN	0	205	39.54	18	4	529	207	0	0	26.31	0	na	8.71	0.96	32.66	34		268
MAX	0	205	39.54	18	4	529	207	0	0	26.31	0	na	8.71	0.96	32.66	34		268
MEAN	0	205	39.54	18	4	529	207	0	0	26.31	0	na	8.71	0.96	32.66	34		268
2007**	NO SAMPLES DURING 2007																	
MIN																		
MAX																		
MEAN																		
2006**																		
MIN		238	43		6	538	223	0.06		28			8.39	1	30	35	15	279
MAX		283	49		8	720	259	0.06		33			8.59	1	47	68	15	406
MEAN		261	46		7	629	241	0.06		31			8.49	1	39	52	15	343
2005**																		
MIN		258	49	5	5	567	268	0.23		31	0		8.18	1	30	37	27	328
MAX		278	56	5	7	702	268	0.23		35	0		8.46	1	61	63	27	403
MEAN		268	53	5	6	635	268	0.23		33	0		8.32	1	45	50	27	366
2004**																		
MIN		244	43		4	505	213			26				1	33	34	11	314
MAX		244	43		4	505	213			26				1	33	34	11	314
MEAN		244	43		4	505	213			26				1	33	34	11	314
2003**	NO FLOW DURING 2003																	
2002**	NO FLOW DURING 2002																	
2001**																		
MIN		317	41	8	5	620	222	0.20		26			8.30		31	41	35	307
MAX		321	46	8	7	662	226	0.20		30			8.72		45	63	35	366
MEAN		319	44	8	6	641	224	0.20		28			8.51		38	52	35	337
2000**																		
MIN		307	39		4	547	218			28			8.45		42	46	6	329
MAX		325	41		6	615	233			33			8.48		48	74	6	378
MEAN		316	40		5	581	226			31			8.47		45	60	6	354
HISTORICAL 1978-2011																		
MIN	137.0	397	107.2	24.0	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	205	2.2	0.0	3.5	360	193.00	0.00	0.0	19.30	0.00	0.00	7.0	0.01	13.4	10	0	231
MEAN	10.1	302	53.3	6.2	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	47	35	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 then 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	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20120313	0	264	58	5	117	1075	353	0	0	50	0	0	8	6	90	108	0	606
20120612	0	252	48	0	40	852	323	0	0	49	0	0	9	7	60	139	0	499
20120910	0	230	49	14	33	802	318	0	0	48	0	0	9	6	48	130	0	481
20121204	0	240	52	47	46	888	327	0	0	48	0	0	9	8	67	126	0	494
No. of Analysis	4	4	4	4	4	4	0	4	4	4	4	4	4	4	4	4	4	4
2011**																		
MIN	0	244	51	0	30	805	323	0	0	42	0	0	8	5	48	105	0	459
MAX	0	263	63	24	104	1127	386	0	0	56	0	0	9	8	101	199	25	712
MEAN	0	255	59	6	57	913	354	0	0	50	0	0	9	6	64	145	15.5	548.25
2010**																		
MIN		251	49.1	0.0	40	894	315	0	0	44	0	0	9	8	62	151	0	555
MAX		277	58.6	33.0	103	1169	367	0	0	54	0	0	9	10	110	175	11	686
MEAN		266	54.9	10.8	62	1000	338	0	0	49	0	0	9	9	81	164	4	610
2009**																		
MIN		245	51	0	38	860	326	0	0	48	0	0	8	5	57	115	0	510
MAX		368	70	12	107	1142	413	0	0	62	0	0	9	9	91	211	22	707
MEAN		285	60	3	63	982	379	0	0	56	0	0	8	7	68	157	12	598
2008**		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
MIN		229	50	0	45	827	325	0	0	49	0	0	8	5	50	93	0	466
MAX		267	63	26	149	1279	387	0	0	56	0	0	9	7	109	151	7	744
MEAN		247	56	12	90	1027	350	0	0	51	0	0	9	6	74	123	4	588
2007**																		
MIN		243	54		30	871	332	0		46	0			5	39	74	71	431
MAX		276	66		79	988	371	1		50	0			7	64	126	71	540
MEAN		265	62		51	951	353	1		48	0			6	47	96	71	486
2006**																		
MIN		235	49		65	937	281	0		39	0			2	62	71	5	510
MAX		289	75		409	2255	406	0		57	0			6	275	113	25	1172
MEAN		267	60		179	1344	350	0		48	0			4	127	96	12	703
2005**																		
MIN		246	43		45	720	278	0		37	0			2	46	59	32	429
MAX		267	65		209	1472	375	0		51	0			6	136	109	56	791
MEAN		257	53		89	969	315	0		45	0			4	70	85	44	543
2004**																		
MIN		247	48	6	62	799	307	0			0			4	49	85	102	445
MAX		343	63	7	431	1876	351	4			0			6	254	101	216	1042
MEAN		278	54	7	196	1196	326	1			0			5	122	92	159	662
2003**																		
MIN	10	256	52.8	6	94	435	340	0.03		48			8.46	5.01	69	102	12	511
MAX	10	371	57.8	17	136	969	358	0.12		52			8.63	5.63	91	110	12	602
MEAN	10	316	55.8	10	109	780	348	0.07		51			8.57	5.35	77	106	12	563
2002**																		
MIN		266	41.0		49	735	279	0.20		43			8.50	5.00	48	87	6	400
MAX		338	53.0		93	932	322	0.20		46			8.66	5.00	68	112	6	559
MEAN		303	49.0		73	860	306	0.20		45			8.56	5.00	59	98	6	501
2001**																		
MIN		298	47.0		39	777	261	0.10		35			8.40	2.00	36	77	6	452
MAX		327	68.0		177	1364	396	0.10		55			8.65	5.00	137	136	9	779
MEAN		309	55.0		101	1015	320	0.10		44			8.50	4.00	80	108	8	565
2000**																		
MIN		286	51.0		59	858	309	0.10		44			8.19	5.00	50	99	5	494
MAX		332	65.0		77	945	389	0.70		55			8.41	6.00	57	161	63	551
MEAN		313	56.3	6	68	889	341	0.40		49			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	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	0.27	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	0.03	1.22	8.29	5.08	82.06	162.13	183.15	625.74
No. of Analysis	70	116	116	88	118	163	116	137	63	116	110	70	163	116	116	118	144	163

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

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

TABLE 16: MEETINGHOUSE CANYON WATER QUALITY *

MHC01 - LEFT 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
	NO FLOW DURING 2012																	
No. of Analysis	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
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
2010**	NO FLOW DURING 2010																	
2009**	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																	
2002**	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	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 then 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	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	207	63	0	5	427	235	4	0	19	0	0	8	1	6	16	1804	258
MAX	0	219	63	0	5	482	259	4	0	27	0	0	8	1	8	32	1804	259
MEAN	0	213	61	0	4	455	247	2	0	23	0	0	8	1	7	24	902	259
2010**																		
MIN	0	191	54.75	0	2	393	206.00	4	0.00	16.90	0	0.00	8.53	0.86	6	15	409	221
MAX	0	191	54.75	0	2	393	206.00	4	0.00	16.90	0	0.00	8.53	0.86	6	15	409	221
MEAN	0	191	54.75	0	2	393	206.00	4	0.00	16.90	0	0.00	8.53	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	8.49	0.98	6	23	0	261
MAX	0	209	62.60	9	2	453	251.00	0	0.00	23.11	0	0.00	8.49	0.98	6	23	0	261
MEAN	0	209	62.60	9	2	453	251.00	0	0.00	23.11	0	0.00	8.49	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	8.50	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	8.50	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	8.50	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
MAX		222	54.20		2	436	224	0.11		21.60			8.35	1	4.67	22		227
MEAN		222	54.20		2	436	224	0.11		21.60			8.35	1	4.67	22		227
2003**																		
MIN		251	61.40	7	3	455	241	0.10		21.40			8.38	1	4.79	23		272
MAX		251	61.40	7	3	455	241	0.10		21.40			8.38	1	4.79	23		272
MEAN		251	61.40	7	3	455	241	0.10		21.40			8.38	1	4.79	23		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	8.33	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	8.50	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	8.40	0.8	4.53	19.4	37.333	251
No. of Analysis	3	7	7	5	7	7	7	7	3	7	4	3	7	7	7	7	5	7

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

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

TABLE 18: MILL FORK CANYON WATER QUALITY *

MFA1 - ABOVE 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	206	54.73	0	2	427	231	0	0	18.49	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	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	8.46	0.86	6.785	24	713	254.5
2010**																		
MIN	0	191	54.76	0	2	387	206	3.29	0	16.82	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	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	8.56	0.85	5.89	15	379	226
2009**																		
MIN	0.0	206	61.23	10	2	443	246.00	0	0.00	23	0	0.00	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	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	8.61	0.96	6	23	8	264
2008**																		
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
2007**																		
MIN	No Flow During 2007																	
MAX																		
MEAN																		
2006**																		
MIN		220	63		3	463	251	0.08		23			8.47	1	4.84	20	12	265
MAX		220	63		3	463	251	0.08		23			8.47	1	4.84	20	12	265
MEAN		220	63		3	463	251	0.08		23			8.47	1	4.84	20	12	265
2005**																		
MIN		190	62	17	2	429	239	0.54		21	0		8.51	1	4.51	17	43	245
MAX		190	62	17	2	429	239	0.54		21	0		8.51	1	4.51	17	43	245
MEAN		190	62	17	2	429	239	0.54		21	0		8.51	1	4.51	17	43	245
2004**																		
MIN		215	54		2	436	223			22			8.54	1	4.77	23	5	219
MAX		215	54		2	436	223			22			8.54	1	4.77	23	5	219
MEAN		215	54		2	436	223			22			8.54	1	4.77	23	5	219
2003**																		
MIN		275	61	6	3	451	243	0.07		22			8.45	1	4.60	23	4	262
MAX		275	61	6	3	451	243	0.07		22			8.45	1	4.60	23	4	262
MEAN		275	61	6	3	451	243	0.07		22			8.45	1	4.60	23	4	262
2002**	NO FLOW DURING 2002																	
2001**	NO FLOW DURING 2001																	
2000**	NO FLOW DURING 2000																	
HISTORICAL 1986-2011																		
MIN	0.0	153	32.0	5.0	2.0	180	208	0.06	0.0	13.0	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	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	8.2	1.66	9.7	61.6	44.5	334.9
No. of Analysis	3	26	27	7	26	27	27	21	5	27	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 then laboratory minimum detection limit.

TABLE 19: MILL FORK CANYON WATER QUALITY *

MFB2 - 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		203	55	0	2	414	219	0	0	20	0	0	9	1	7	22	0	258
MAX		272	64	22	9	732	399	4	0	58	0	0	9	3	15	104	416	432
MEAN		238	60	11	6	573	309	2	0	39	0	0	9	2	11	63	208	345
2009**																		
MIN		267	59	0	6	628	347	0	0	43	0	0	9	2	12	70	0	357
MAX		269	67	0	10	759	408	0	0	63	0	0	9	3	15	117	18	473
MEAN		268	63	0	8	694	378	0	0	53	0	0	9	2	13	94	9	415
2008**																		
MIN		283	67	0	10	810	441			66	0		8	3	16	132	0	504
MAX		293	75	18	11	918	474			70	0		9	3	17	148	0	546
MEAN		288	71	9	11	864	458			68	0		8	3	17	140	0	525
2007**																		
MIN		315	70		11	956	438			64	0.003		8.13	2.32	17.40	124	7	561
MAX		351	82		14	1040	519			77	0.003		8.33	3.60	20.40	177	7	579
MEAN		336	77		12	984	487			71	0.003		8.23	2.94	19.23	154	7	571
2006**																		
MIN		251	66		5	564	296	0		32	0.002		8.41	1.29	7.06	39	17	324
MAX		332	77		12	924	447	0		62	0.002		8.43	2.58	16.98	132	17	497
MEAN		292	71		9	744	372	0		47	0.002		8.42	1.94	12.02	86	17	411
2005**																		
MIN		200	56	16	3	461	258	1		23	0.018		8.46	0.97	5.12	22	54	280
MAX		274	66	22	9	730	350	1		51	0.018		8.48	2.33	12.90	77	54	415
MEAN		237	61	19	6	596	304	1		37	0.018		8.47	1.65	9.01	50	54	348
2004**																		
MIN		279	58	10	10	654	327	0		44	0.027		8.49	1.88	10.60	67		338
MAX		297	59	10	12	684	357	0		51	0.027		8.52	2.52	13.90	93		415
MEAN		288	59	10	11	669	342	0		47	0.027		8.51	2.20	12.25	80		377
2003**																		
MIN		354	71	9	14	715	375			48			8.41	2.20	12.20	86		415
MAX		354	71	9	14	715	375			48			8.41	2.20	12.20	86		415
MEAN		354	71	9	14	715	375			48			8.41	2.20	12.20	86		415
2002**	NO FLOW DURING 2002																	
2001**																		
MIN		318	52	7	11	746	330			45			8.46	2	12	76	5	382
MAX		338	58	8	14	763	340			51			8.59	3	14	106	5	433
MEAN		328	55	8	13	755	335			48			8.53	3	13	91	5	408
2000**	NO FLOW DURING 2000																	
HISTORICAL 1986-2011																		
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: Database input restricted to values greater then laboratory minimum detection limit.

TABLE 20: RILDA CANYON SURFACE WATER QUALITY *

RCF1 - RILDA CANYON FLUME - 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
20120612	0	209	56	0	1	438	226	0	0	21	0	0	8	1	7	18	26	229
20120910	0	213	56	0	2	447	242	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	2
2011**																		
MIN	0	196	53	0	1	408	222	0	0	18	0	0	9	1	4	10	17	226
MAX	0	209	60	0	1	431	224	4	0	22	0	0	9	1	8	22	347	231
MEAN	0	203	56	0	1	420	223	2	0	20	0	0	9	1	6	16	182	228.5
2010**																		
MIN		201	58	0	1	399	218	1	0	18	0	0	9	1	5	10	133	226
MAX		201	58	0	1	399	218	1	0	18	0	0	9	1	5	10	133	226
MEAN		201	58	0	1	399	218	1	0	18	0	0	9	1	5	10	133	226
2009**																		
MIN		202	53	9	3	446	237	0	0	25	0	0	9	1	9	25	0	264
MAX		202	53	9	3	446	237	0	0	25	0	0	9	1	9	25	0	264
MEAN		202	53	9	3	446	237	0	0	25	0	0	9	1	9	25	0	264
2008**																		
MIN		198	52	0	2	446	228	0		0	0		0	1	1	9		0
MAX		202	53	9	3	453	228	237		24	25		9	9	9	24		252
MEAN		200	53	5	3	450	228	119		12	13		4	5	5	16		126
2007**																		
MIN		186	51		2	484	217	0.05		21.6	0.000		8.05	0.74	7.36	19		242
MAX		199	53		3	513	240	0.05		26.0	0.000		8.32	1.24	8.93	27		263
MEAN		193	52.4		2.5	498.5	228.5	0.05		23.8	0.000		8.19	0.99	8.15	23.0		252.5
2006**																		
MIN		207	56		3	434	228	0.25		19.7	0		8.46	0.86	5.00	15	16	240
MAX		213	59		3	488	231	0.25		22.1	0		8.49	1.01	8.06	23	16	259
MEAN		210	58		3	461	230	0.25		20.9	0		8.48	0.94	6.53	19	16	250
2005**																		
MIN		199	56		2	420	236	0.31		19.1	0		8.30	0.80	4.86	13	73	268
MAX		208	65		3	485	240	0.31		23.5	0		8.61	1.14	8.74	22	73	280
MEAN		204	60		3	453	238	0.31		21.3	0		8.46	0.97	6.80	18	73	274
2004**																		
MIN		195	46		2	394	193	0.06		18.7	0		8.44	0.77	5.36	16	6	145
MAX		204	51		3	433	220	0.06		22.9	0		8.60	1.02	8.02	25	6	233
MEAN		200	48		3	414	207	0.06		20.8	0		8.52	0.90	6.69	21	6	189
2003**																		
MIN	5	224	49	5	2	416	218	0.04		20.4			8.56	0.74	5.92	16	5	215
MAX	5	245	56	8	2	421	223	0.56		23.3			8.58	1.21	8.40	24	5	248
MEAN	5	235	52	7	2	419	221	0.30		21.9			8.57	0.98	7.16	20	5	232
2002**																		
MIN		269	50		2	430	215			22.0			8.62		9.00	22		229
MAX		269	50		2	430	215			22.0			8.62		9.00	22		229
MEAN		269	50		2	430	215			22.0			8.62		9.00	22		229
2001**																		
MIN		244	46	6	2	468	205	0.10		19.0			8.55		5.00	15	17	242
MAX		261	58	6	2	508	223	0.10		22.0			8.62		9.00	26	17	273
MEAN		253	52	6	2	488	214	0.10		20.5			8.59		7.00	21	17	258
2000**																		
MIN		252	53		2	420	223			22.0			8		6.00	20	13	266
MAX		252	53		2	420	223			22.0			8		6.00	20	13	266
MEAN		252	53		2	420	223			22.0			8		6.00	20	13	266
HISTORICAL 1989-2011																		
MIN	0.0	177	46.0	0.0	1.0	300	193.00	0.0	0.0	17.54	0.00	0.00	7.8	0.0	3.78	1	0	145
MAX	10.0	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	2.5	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	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: Database input restricted to values greater then laboratory minimum detection limit.

TABLE 21: RILDA CANYON SURFACE WATER QUALITY *

RCF3 - RILDA CANYON FLUME - ABOVE NEWUA SPRINGS

2012** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20120313	0.0	350.0	101.0	0.0	10.0	921.0	7.5	495.0	0.1	0.0	59.1	0.0	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	576.0		297.0	0.2	0.0	31.5	0.0	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	882.0		465.0	0.2	0.0	55.7	0.0	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	747.0		393.0	0.2	0.0	47.2	0.0	0.0	8.1	2.1	17.4	93.0	7.0	433.0
No. of Analysis	4	4	4	4	4	4	1	4	4	4	4	4	4	4	4	4	4	4	4
2011**																			
MIN	0	212	59.9	0	2.0	423	8.70	228	0.16	0.00	19.14	0.00	0.00	7.95	0.80	4.79	13.0	0.0	258
MAX	5	351	97.0	0	11.0	899	8.70	481	14.79	0.00	58.07	0.03	0.00	8.54	2.82	24.63	152.0	1786.0	573
MEAN	1	287	79.9	0	7.0	702	8.70	373	3.86	0.00	42.22	0.02	0.00	8.19	1.97	16.74	95.0	448.0	436
2010**																			
MIN					2.0	411	6.10	221	0.29		18.45	0.00		7.87	0.81	5.10	13.0	0.0	233
MAX					11.0	922	10.20	510	1.37		62.65	0.04		8.56	3.10	26.36	157.0	100.0	592
MEAN					7.3	765	8.80	419.75	0.65		48.58	0.02		8.14	2.42	19.78	111.3	34.0	488
2009**																			
MIN	0	217	62		2	462	8	251	0		23	0		8	1	7	26	6	288
MAX	15	374	108		10	1005	9	545	1		67	0		8	3	30	183	90	678
MEAN	9	330	91		8	840	8	448	1		53	0		8	3	22	130	31	550
2008**																			
MIN	0	179	61		2	470	9	242	1		22	0		8	1	5	18	8	247
MAX	20	378	115		10	1072	16	577	1		70	0		9	4	29	213	12	742
MEAN	10	322	97		8	911	12	471	1		55	0		8	3	23	147	10	571
2007**																			
MIN		285	77.6		6.0	834	10.09	378	0.20		44.70	0.02		7.54	1.86	15.60	90.0	5.0	438
MAX		400	132.0		12.0	1304	12.48	614	1.17		69.10	0.09		8.04	3.51	30.06	255.0	6.0	746
MEAN		370	111.2		10.2	1128.2	11.26	536.2	0.50		62.75	0.05		7.79	3.14	26.11	196.0	5.5	653
2006**																			
MIN		220	62		3.0	487	10.3	252	0.16		23.8	0		7.78	0.98	6.4	25	6	278
MAX		376	112		12.0	1073	12.5	563	0.30		69.0	0		8.18	3.32	26.8	185	18	626
MEAN		328	94		8.8	906	11.7	454	0.25		53.3	0		7.97	2.57	20.9	135	10	517
2005**																			
MIN		206	61	13.0	2.0	437	9.1	239	0.15		21.2	0		7.94	0.94	5.8	19	109	273
MAX		353	95	13.0	11.0	974	14.2	467	2.16		56.0	0		8.53	3.16	27.4	155	109	586
MEAN		310	83	13.0	7.8	805	11.6	392	0.68		44.8	0		8.13	2.32	19.9	111	109	486
2004**																			
MIN	8	217	53		3.0	450	6.0	225	0.17		22.6	0		7.92	0.94	7.1	29	19	217
MAX	15	448	102		12.0	948	13.3	505	0.27		60.7	0		8.31	2.82	27.3	176	19	613
MEAN	12	341	85		8.0	791	10.1	408	0.21		47.5	0		8.08	2.29	20.8	128	19	478
2003**																			
MIN	7	280	62		3.0	505	5.1	263	0.12		21.8			7.73	1.02	8.9	36	11	319
MAX	16	458	100		12.0	948	6.5	497	0.27		58.2			8.26	2.90	27.4	176	11	605
MEAN	12	406	89		8.5	823	6.0	430	0.20		40.9			8.05	2.40	22.3	133	11	512
2002**																			
MIN		423	90		8.0	885	9.2	447	0.10		54.0		2	8.02	2.00	25	151	8	563
MAX		433	94		9.0	936	12.8	474	0.30		58.0		4	8.12	3.00	27	172	8	624
MEAN		429	92		8.8	912	10.7	460	0.18		56.0		3	8.07	2.75	26	163	8	584
2001**																			
MIN		287	55		3.4	564		244	0.10		26.0			7.97	1.00	10	43	5	302
MAX		431	92		8.5	908		456	1.30		55.0			8.19	3.00	23	159	16	569
MEAN		380	78		6.7	792		377	0.53		44.0			8.10	2.33	18	116	11	474
2000**																			
MIN	38.0	281	56		3.0	500	9.9	251	0.10		27.0			7.88	2.00	8	44	5	199
MAX	38.0	418	87		8.0	882	10.8	431	0.10		52.0			8.17	3.00	24	140	14	570
MEAN	38.0	367	76		6.0	740	10.4	370	0.10		43.7			8.07	2.50	18	106	8	436
HISTORICAL 1989-2011																			
MIN	0.0	179	52.7	0.0	2.0	380	4.4	221	0.02	0.00	18.5	0.000	0.0	7.50	0.01	4.8	7.0	0.0	199
MAX	38.0	500	132.0	30.0	50.0	1304	15.5	748	14.79	0.41	70.2	0.20	5.0	8.83	5.00	30.1	255.0	1786.0	746
MEAN	8.3	356	85.5	4.2	9.1	750.7	8.6	407.3	0.65	0.07	45.6	0.04	1.7	8.08	2.26	17.3	106.4	62.2	463
No. of Analysis	43	79	79	38	79	80	73	79	79	33	79	51	35	80	76	79	79	55	79

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

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

TABLE 22: RILDA CANYON SURFACE WATER QUALITY *

RCW4 - RILDA CANYON FLUME - NEAR HIGHWAY 31

2012** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20120313	0	356	141	0	29	1512		865	0	0	125	0	0	8	5	34	485	0	1112
20120612	0	301	102	0	22	1143		615	0	0	88	0	0	8	4	26	338	6	763
20120910	0	341	124	0	28	1376		767	0	0	111	0	0	8	5	31	423	0	994
20121204	20	314	114	26	17	1285		706	0	0	102	0	0	8	5	32	327	0	927
No. of Analysis	4	4	4	4	4	4	1	4	4	4	4	4	4	4	4	4	4	4	4
2011**																			
MIN	0	215	60.8	0	3.0	457	9.20	239	0.00	0.00	21.31	0.00	0.00	8.37	0.92	5.81	26.0	0.0	266
MAX	0	362	142.2	0	32.0	1498	9.20	882	18.51	0.00	128.02	0.00	0.00	8.49	5.16	34.54	517.0	2084.0	1145
MEAN	0	295	105.5	0	18.8	1078	9.20	605	4.64	0.00	83.12	0.00	0.00	8.42	3.48	23.75	304.3	523.5	776
2010**																			
MIN		224	65.3		3.0	528	6.70	277	0.00		27.78	0.00		8.29	1.24	7.57	58.0	0.0	315
MAX		367	140.5		19.0	1551	10.50	925	1.29		139.37	0.00		8.50	5.03	33.43	552.0	102.0	1233
MEAN		322	115.7		14.5	1220	9.15	707	0.39		101.48	0.00		8.36	3.98	25.67	383.8	28.0	915
2009**																			
MIN		243	77.1		5.0	679	8.40	367	0.00		42.44	0.00		8.15	1.69	11.59	118.0	0.0	450
MAX		361	161.5		17.0	1683	9.20	1015	0.36		148.57	0.00		8.46	5.51	35.14	643.0	21.0	1393
MEAN		320	125.3		13.5	1331	8.80	778	0.09		112.93	0.00		8.32	4.23	27.27	444.0	5.3	1048
2008**																			
MIN		222	72		3	601	9	313	0		32	0		8	1	8	72	0	336
MAX		356	175		20	1890	14	1137	1		170	0		9	6	38	764	92	1532
MEAN		307	139		13	1447	11	852	0		122	0		8	5	28	503	23	1095
2007**																			
MIN		296	115.0		12.0	1392	10.12	678	0.07		94.80	0.00		7.98	2.99	24.10	349.0	5.0	868
MAX		373	172.0		25.0	2050	13.47	1060	0.07		155.00	0.00		8.37	5.25	37.10	698.0	5.0	1429
MEAN		339	153.4		18.8	1810.2	11.35	947.2	0.07		136.95	0.00		8.15	4.51	33.70	606.4	5.0	1292.6
2006**																			
MIN		242	70.2		5.0	592	10.41	313	0.35		33.40	0.00		8.20	1.45	9.65	61.0	26.0	351
MAX		337	114.0		16.0	1272	13.50	659	0.35		90.80	0.00		8.41	3.78	28.40	309.0	26.0	825
MEAN		305	96.1		12.0	1038	11.96	529	0.35		70.00	0.00		8.31	2.95	21.57	222.3	26.0	663.33
2005**																			
MIN		222	65.5		3.0	421	9.38	270	2.96		25.90	0.06		8.28	1.02	7.44	35.0	188.0	302
MAX		339	99.7		15.0	1129	15.87	550	2.96		73.00	0.06		8.55	3.13	27.50	239.0	188.0	729
MEAN		298	83.2		11.0	846	12.25	442	2.96		56.80	0.06		8.38	2.40	20.48	164.7	188.0	564.67
2004**																			
MIN	10	252	60.9		5.0	585	4.46	297	0.65		35.10	0.02	3.0	8.27	1.53	11.80	75.0	35.0	348
MAX	10	421	90.0		16.0	979	10.57	529	0.65		73.90	0.02	3.0	8.45	3.19	27.20	210.0	35.0	666
MEAN	10	325	74.3		10.3	796	8.19	415	0.65		55.77	0.02	3.0	8.33	2.45	20.47	147.3	35.0	511
2003**																			
MIN	22	326	73.9	10	8.0	662	5.38	361	0.07		42.80	0.01		8.23	1.84	15.60	102.0	5.0	451
MAX	22	448	94.3	10	17.0	1058	6.66	538	0.54		73.50	0.01		8.54	3.34	27.50	255.0	24.0	701
MEAN	22	394	84.4	10	13.8	906	6.22	476	0.24		64.28	0.01		8.38	2.85	24.23	194.5	14.5	584.25
2002**																			
MIN		389	81.0		17.0	970	9.17	495			67.00			8.23	3.00	26.00	179.0		616
MAX		421	87.0		19.0	1058	12.92	505			71.00			8.40	3.00	30.00	230.0		717
MEAN		398	84.8		18.5	995	10.70	501			69.75			8.30	3.00	28.25	207.8		652.5
2001**																			
MIN		311	62.0		8.4	724	8.20	307	0.20		37.00			8.23	2.00	15.00	97.0	17.0	386
MAX		426	85.0		19.0	1046	8.20	476	0.20		64.00			8.47	3.00	27.00	190.0	17.0	603
MEAN		385	76.3		14.8	907	8.20	419	0.20		55.50			8.34	2.75	23.00	156.8	17.0	536.5
2000**																			
MIN		325	63.0		6.0	630	6.20	318	0.10		39.00			8.19	2.00	14.00	83.0	5.0	376
MAX		420	76.0		16.0	907	14.00	415	0.10		59.00			8.32	3.00	26.00	157.0	7.0	572
MEAN		382	69.3		12.0	802	10.50	387	0.10		52.00			8.24	2.50	22.25	130.0	6.0	492
HISTORICAL 1989-2011																			
MIN	0.0	209	59.0	0.0	2.0	400	3.9	239	0.00	0.00	21.31	0.000	0.0	7.27	0.01	5.81	15.0	0.0	260
MAX	40.0	461	175.1	51.0	700.0	2050	15.9	1137	18.51	0.28	170.07	0.20	5.0	8.86	10.00	52.00	764.0	2084.0	1532
MEAN	5.5	355	91.6	5.3	23.3	926.2	8.7	509.6	0.87	0.05	68.16	0.03	1.5	8.30	3.03	22.17	211.0	84.0	628.6
No. of Analysis	33	74	74	38	74	75	69	74	42	27	74	30	32	75	72	74	74	46	74

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

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

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

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
20120316	6	383	90	0	17	911		486	0	0	63	0	0	8	2	31	143	0
20120612	0	389	93	0	18	1016		515	0	0	69	0	0	8	2	32	160	11
No. of Analysis	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		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		400	100		20	1109	0	580		0	80		0	8	2	37	216	29
MAX		400	100		20	1109	0	580		0	80		0	8	2	37	216	29
MEAN		400	100		20	1109		580		0	80		0	8	2	37	216	29
2007**																		
MIN		355	85		16	924	457	0		60	0		8	2	27	131	35	560
MAX		389	88		20	1026	513	0		71	0		8	2	34	149	35	630
MEAN		372	86		18	975	485	0		66	0		8	2	30	140	35	595
2006**																		
MIN		245	60		6	583	284	0		32	0		8	1	10	35	7	318
MAX		335	81		13	858	425	0		54	0		8	1	22	96	28	452
MEAN		302	72		10	755	369	0		46	0		8	1	17	71	14	405
2005**																		
MIN		237	60		5	535	281	0		31	0		8	1	11	37	9	336
MAX		372	83		14	968	456	0		60	0		8	2	25	125	17	565
MEAN		305	72		10	752	369	0		46	0		8	1	18	81	13	451
2004**																		
MIN		331	86		14	858	443			56			8	2	23	165	5	575
MAX		331	86		14	858	443			56			8	2	23	165	5	575
MEAN		331	86		14	858	443			56			8	2	23	165	5	575
2003**																		
MIN		442	95		20	1015	541	0		74	0		8	2	34	206	7	657
MAX		442	95		20	1015	541	0		74	0		8	2	34	206	7	657
MEAN		442	95		20	1015	541	0		74	0		8	2	34	206	7	657
2002**	NO FLOW DURING 2002																	
2001**																		
MIN		289	43		8	521	239	0		32			8.10	3.0	12.0	38	25	304
MAX		299	49		9	531	262	0		34			8.24	3.0	13.0	43	29	319
MEAN		294	46		9	526	251	0		33			8.17	3.0	12.5	41	27	312
2000**																		
MIN		289	43		8	521	239	0		32			8.10	3.0	12.0	38	25	304
MAX		299	49		9	531	262	0		34			8.24	3.0	13.0	43	29	319
MEAN		294	46		9	526	251	0		33			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 Analysis	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 then laboratory minimum detection limit.

TABLE 24: COTTONWOOD CANYON CREEK WATER QUALITY *

SW-2

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
20120316	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 Analysis	4	4	4	4	4	4	4	0	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	1099	577	0	0	79	0	0	8	7	44	242	12	782
MEAN	2	318	88	1	18	1032	519	0	0	73	0	0	8	6	39	231	7	690
2008**																		
MIN	0	288	70	0	15	915	462	0		70	0		8	4	33	178	0	526
MAX	0	360	96	0	26	1162	549	0		75	0		8	7	43	244	10	718
MEAN	0	315	85	0	19	1034	507	0		71	0		8	6	37	218	3	652
2007**																		
MIN	8	287	78	5	14	995	464	0		65	0		8	4	34	170	16	597
MAX	8	326	92	26	22	1156	515	0		71	0		8	7	41	257	16	716
MEAN	8	305	87	16	17	1068	500	0		68	0		8	6	37	231	16	680
2006**																		
MIN		244	57		8	597	289	0		35	0		8	1	12	45	5	331
MAX		327	86		23	1057	503	0		70	0		8	4	34	183	35	628
MEAN		298	75		17	905	432	0		59	0		8	3	28	138	20	520
2005**																		
MIN		233	58	9	7	558	282	0		34	0		8	1	12	46	5	333
MAX		331	92	9	42	1283	546	0		77	0		9	6	46	250	38	768
MEAN		303	75	9	22	971	446	0		63	0		8	4	32	174	18	593
2004**																		
MIN		287	73	8	16	908	448	1		60	0		8	4	33	214	10	602
MAX		345	87	8	45	1097	510	1		71	0		8	7	49	289	49	692
MEAN		310	81	8	28	1001	472	1		66	0		8	6	41	243	30	659
2003**																		
MIN		356	78.0	6	16	993	479			69			8.26	5	39	238	6	630
MAX		391	91.2	7	25	1079	535			77			8.49	7	46	274	6	738
MEAN		372	85.1	7	22	1035	510			72			8.41	6	42	258	6	696
2002**																		
MIN		361	76.0	5	19	1021	474			68			8.25	6	43	249	15	702
MAX		398	87.0	8	28	1096	505			70			8.42	8	46	273	15	758
MEAN		375	80.0	7	24	1064	484			69			8.36	7	45	259	15	730
2001**																		
MIN		288	19.0	5	13	563	113	0.10		16			8.36	1	25	57	6	335
MAX		627	46.0	20	92	1251	271	0.50		38			8.62	5	268	103	29	786
MEAN		489	31.5	12	39	1037	192	0.30		28			8.50	4	172	87	14	642
2000**																		
MIN		288	19.0	5	13	563	113	0.10		16			8.36	1	25	57	6	335
MAX		627	46.0	20	92	1251	271	0.50		38			8.62	5	268	103	29	786
MEAN		489	31.5	12	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	563.08
No. of Analysis	54	119	119	48	119	80	86	99	34	119	75	61	114	118	118	119	99	119

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

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

TABLE 25: COTTONWOOD CANYON CREEK WATER QUALITY *

SW-3

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
20120316	7	432	112	0	220	1945	667	0	0	94	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	3	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		1	1	1	0.08		1	0.016		1.00	1.00	1	1	0	1
MAX	10	466	124		303	2300	784	1.00		115	1.000		8.21	4.46	220	395	1	1498
MEAN	7	311	83		202	1534	523	0.39		77	0.344		5.81	3.31	147	264	0	999
2007**																		
MIN	6	352	110		330	2380	748	0		115	0		8	5	220	382	9	1515
MAX	6	375	117		336	2390	778	0		118	0		8	6	228	401	9	1544
MEAN	6	364	113		333	2385	763	0		117	0		8	5	224	392	9	1530
2006**																		
MIN		246	58		33	738	312	0		41	0		8	2	27	69	37	409
MAX		346	105		215	1914	668	0		99	0		8	4	140	279	37	1120
MEAN		296	81		124	1326	490	0		70	0		8	3	83	174	37	765
2005**																		
MIN		228	57	10	10	566	301	0		39	0		9	1	15	51	14	332
MAX		433	153	10	447	3070	913	0		129	0		9	5	221	444	23	1835
MEAN		331	105	10	229	1818	607	0		84	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	18	31	1230	99	0.30		15.0			8.52	4.00	233	112	12	774
MAX		602	32	48	607	2800	216	0.30		33.0			9.00	5.00	531	147	18	1563
MEAN		552	23	30	181	1652	159	0.30		24.8			8.75	4.50	325	130	15	988
2000**																		
MIN		485	15	18	31	1230	99	0.30		15.0			8.52	4.00	233	112	12	774
MAX		602	32	48	607	2800	216	0.30		33.0			9.00	5.00	531	147	18	1563
MEAN		552	23	30	181	1652	159	0.30		24.8			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	0.000	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

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

** Data: Database input restricted to values greater then 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
	NO SAMPLES COLLECTED DURING 2012 -NO FLOW																	
2011**	NO SAMPLES COLLECTED DURING 2011 -NO FLOW																	
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**	NO SAMPLES COLLECTED DURING 2007 -NO FLOW																	
2006**	NO SAMPLES COLLECTED DURING 2006 -NO FLOW																	
2005**	NO SAMPLES COLLECTED DURING 2005 -NO FLOW																	
2004**	NO SAMPLES COLLECTED DURING 2004 -NO FLOW																	
2003**	NO SAMPLES COLLECTED DURING 2003 -NO FLOW																	
2002**	NO SAMPLES COLLECTED DURING 2002 -NO FLOW																	
2001**	NO SAMPLES COLLECTED DURING 2001 -NO FLOW																	
2000**	NO SAMPLES COLLECTED DURING 2000 -NO FLOW																	
HISTORICAL 1979-2011																		
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 Analysis	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 then laboratory minimum detection limit.

TABLE 27: GRIMES WASH WATER QUALITY *

GWR02 - LEFT 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
	NO SAMPLES COLLECTED DURING 2012 -NO FLOW																	
No. of Analysi	0	0	0	0	0	0	2	2	0	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		11	810	359			53			8.3	1.1	40	129		527
MAX		297	56.2		11	810	359			53			8.3	1.1	40	129		527
MEAN		297	56.2		11	810	359			53			8.3	1.1	40	129		527
2006**																		
MIN		263	51	16	9	732	305	1		43	0		8.4	1.2	34	82	9	391
MAX		303	71	16	9	838	369	1		47	0		8.5	1.4	39	112	25	497
MEAN		283	61	16	9	785	337	1		45	0		8.4	1.3	37	97	17	444
2005**																		
MIN		286	55	9	9	803	330	0		47	0		8.5	1.4	38	101	5	450
MAX		304	69	25	9	818	380	0		50	0		8.6	1.8	40	117	53	491
MEAN		295	62	17	9	811	355	0		49	0		8.5	1.6	39	109	29	471
2004**	No flow during 2004																	
2003**	No flow during 2003																	
2002**	No flow during 2002																	
2001**																		
MIN		329	44.0	7.0	8.0	806	303	0.10		44.00			8.40	1.00	35.00	109.2	10.0	451
MAX		370	72.0	7.0	9.8	917	361	0.10		47.00			8.66	1.00	42.00	122.0	10.0	460
MEAN		350	58.0	7.0	8.9	861.5	332	0.10		45.50			8.53	1.00	38.50	115.6	10.0	455.5
2000**																		
MIN		296	40.0		10.0	691	302			49.00			8.48	2.00	42.00	136.0	17.0	423
MAX		296	40.0		10.0	691	302			49.00			8.48	2.00	42.00	·136.0	17.0	423
MEAN		296	40.0		10.0	691	302			49.00			8.48	2.00	42.00	136.0	17.0	423
HISTORICAL 1979-2011																		
MIN	1.0	188	2.3	1.0	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	482	88.9	26.0	156.0	917	460	2.52	0.22	68.50	0.15	3.5	8.85	3.00	42.00	212.0	1428.0	570
MEAN	4.2	312	51.5	6.4	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	31	24	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 then laboratory minimum detection limit.

TABLE 28: GRIMES WASH WATER QUALITY *

GWR03 - 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
20120315	5	190	76	0	104	973	364	2	0	42	0	0	8	8	63	187	110	599
No. of Analysis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2011**																		
MIN	0	265	57	0	58	941	384	0	0	59	0	0	8	2	65	146	9	566
MAX	0	292	86	0	70	1126	499	0	0	69	0	0	8	2	69	214	22	726
MEAN	0	279	72	0	64	1034	442	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	139	0	0	8	8	262	578	0	1863
MAX	7	293	144	0	475	2810	931	0	0	139	0	0	8	8	262	578	0	1863
MEAN	7	293	144	0	475	2810	931	0	0	139	0	0	8	8	262	578	0	1863
2008**																		
MIN		335	158		397	2740	1004	0.17		148.2	0.007		8.18	8.06	236	561	22	1873
MAX		335	158		397	2740	1004	0.17		148.2	0.007		8.18	8.06	236	561	22	1873
MEAN		335	158		397	2740	1004	0.17		148.2	0.007		8.18	8.06	236	561	22	1873
2007**																		
MIN		275	80		204	1689	564	0.08		88	0.00		8.11	4.08	143	300	6	1082
MAX		340	157		517	3210	1049	0.09		161	0.01		8.50	8.66	294	622	6	2071
MEAN		311	131		397	2653	863	0.09		130	0.01		8.28	6.78	231	486	6	1685
2006**																		
MIN		277	64	15	29	900	363	0.07		48	0.00		8.40	1.66	45	122	10	512
MAX		282	66	15	73	1081	388	0.50		56	0.00		8.47	2.14	70	142	16	619
MEAN		280	65	15	51	991	376	0.29		52	0.00		8.44	1.90	57	132	13	565.5
2005**																		
MIN		257	70	7	35	856	373	0.07		48	0.00		8.34	2.09	48	134	11	581
MAX		308	145	16	360	2760	799	0.74		106	0.02		8.50	5.77	215	427	56	1620
MEAN		282	97	12	165	1622	537	0.50		71	0.01		8.44	3.57	116	244	34	974.3
2004**																		
MIN		311	122		183	1657	674	0.09	1.18	90	0.00		7.68	5.74	118	434	7	1159
MAX		394	192		539	3020	1048	2.62	1.18	144	0.04		8.21	7.73	252	653	134	2006
MEAN		349	167		433	2629	945	0.94	1.18	129	0.02		8.04	7.19	213	582	49	1758
2003**																		
MIN	10	356	133	7	182	1781	756	0.03	0.02	101	0.01	2	8.01	6.41	113	460		1242
MAX	12	447	163	7	294	2290	909	0.62	0.02	124	0.02	2	8.43	7.08	165	549		1579
MEAN	11	395	145	7	221	2006	842	0.19	0.02	116	0.01	2	8.26	6.75	136	517		1421
2002**																		
MIN		318	146		296	2250	859			118			7.84	7.00	171	538		1584
MAX		438	166		708	3650	1065			158			8.49	9.00	397	783		2449
MEAN		390	155		433	2737	930			132			8.07	7.67	248	631		1894
2001**																		
MIN		346	80		60	1169	418	0.80		53			7.87	2.00	59	172	6	601
MAX		423	143		651	3640	843	0.80		118			8.43	6.00	429	551	37	1985
MEAN		372	108		239	2151	623	0.80		86			8.24	4.50	194	361	22	1272
2000**																		
MIN		298	105		223	1895	563	0.50		73			8.15	5.00	150	392	10	1347
MAX		323	132		3226	9960	696	1.00		101			8.22	6.00	1870	464	70	5862
MEAN		311	116		1030	4136	650	0.75		88			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	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	160.8	0.90	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	83.5	0.06	2.70	8.08	5.8	202.5	356.3	156.3202	1088.7
No. of Analysis	61	96	96	55	98	136	96	123	57	96	102	57	140	95	96	99	118	138

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

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

Table 29

EAST MOUNTAIN SPRINGS DISCHARGE

2012

Spring	Date Sampled	Flow (GPM)	Temp. C	Date Sampled	Flow (GPM)	Temp. C	Seasonal Net Change %
79-40	07/17/2012	0.0		10/03/2012	Dry		
80-41	07/17/2012	seep		10/03/2012	Dry		
80-42							
80-43	07/16/2012	0.0		10/03/2012	Dry		
80-44	07/17/2012	seep		10/03/2012	Dry		
80-45							
80-46	07/16/2012	0.0		10/03/2012	Dry		
80-47	07/17/2012	1.0	7.5	10/03/2012	1.1	7.5	4.81
80-48	07/18/2012	0.7	13.1	10/01/2012	0.3	14.1	-65.75
80-49							
80-50	07/20/2012	0.4	11.4	10/09/2012	seep		
82-51	07/17/2012	0.0		10/01/2012	Dry		
82-52	07/17/2012	0.0		10/02/2012	seep		
84-53							
84-54							
84-55							
84-56	07/16/2012	0.4	8.0	10/03/2012	0.2	7.9	-53.66
85-57							
86-58							
86-59							
89-60	07/17/2012	0.2	13.6	10/02/2012	0.1	11.8	-26.32
89-61	07/05/2012	developed		10/01/2012	0.5	5.8	Found drain
89-62							
89-63							
89-64							
89-65	07/18/2012	0.6	8.3	10/01/2012	0.5	9.3	-12.90
89-66	07/18/2012	0.0		10/01/2012	Dry		
89-67	07/18/2012	4.3	8.5	10/01/2012	2.4	6.8	-44.71
89-68	07/18/2012	0.4	13.1	10/01/2012	seep		
89-69							
89-70							
89-71							
91-72	07/17/2012	2.7	19.2	10/04/2012	3.3	14.1	21.61
91-73	07/17/2012	Dry		10/04/2012	Dry		

Spring | Date Sampled | Flow (GPM) | Temp. C | Date Sampled | Flow (GPM) | Temp. C | Seasonal Net Change %

TOTAL FLOW FOR JULY	**44.7**	**15.8**	
(W\OUT 80-50, 91-72 & 73)		**Net Change - Average**	-39.38
		Net Change - By Volume	-64.62

TOTAL FOR JULY 2011 =338 GPM
JULY 2011 86.78% HIGHER THAN JULY 2012

Table 29
EAST MOUNTAIN SPRINGS DISCHARGE
2012

Spring	Date Sampled	Flow (GPM)	Temp. C	Date Sampled	Flow (GPM)	Temp. C	Seasonal Net Change %

MILL FORK
2012

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
TOTAL FLOW FOR JULY		**463.9**			**381.3**		
				Net Change - Average			7.41
				Net Change - By Volume			-17.80

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 Var[illegible]ns (GPM)

SOUTHERN AREA

July Flow Data

Spring	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
Burnt 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	599.3	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	Developed	Developed	Developed	20.0
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	3.9	9	0.67
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	20.0	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	0.1	1.2	2.0	2.0	2.6	1.2	2.1	1.5	1.2	5.14	0.87
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	31	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	0.2	dry	dry	dry	dry	dry	dry	Dry	Damp	Dry	Dry	Dry	Dry	Dry	Dry
79-24	9.3	6.1	5.0	4.3	damp	0.8	dry	dry	dry	dry	damp	dry	0.1	dry	dry	1.0	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	dry	damp	damp	10.0	dry	10.0	0.8	5.0	7.9	2.7	1.4	4.3	0.1	dry	dry	5.6	6.0	0.01	1.00	Dry	Dry	9.2	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	0.6	seep	1.0	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	1.75	0.55
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	0.5	13.9	3.7	4.5	37.5	2.5
79-35	15.0	10.5	10.5	7.8	6.3	2.7	dry	1.9	4.3	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
79-40	15.0	8.3	5.6	4.7	2.0	5.4	dry	dry	dry	dry	4.0	dry	2.0	0.5	1.4	2.0	1.7	dry	1.3	dry	dry	dry	1.0	1.2	Dry	Dry	Dry	Dry	2	0
80-41	10.9	15.0	5.8	4.1	2.5	3.9	dry	dry	dry	dry	4.0	dry	2.4	0.5	4.5	5.4	3.7	1.3	4.8	dry	dry	1.4	5.4	6.0	Seep	Seep	Damp	Seep	5.39	0
80-43	24.0	20.0	6.6	3.1	0.4	1.8	dry	dry	dry	dry	2.7	dry	1.5	damp	damp	0.5	0.1	dry	dry	dry	dry	dry	Seep	Seep	Dry	Damp	Dry	Dry	0.6	0
80-44	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	damp	Damp	Damp	Damp	Damp	Damp	Damp	0.92	seep
80-46	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	seep	2.9	4.0	Dry	Dry	Dry	Dry	1.95	0
80-47	20.0	15.0	12.5	12.2	7.4	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	1.04
82-51	10.0	5.9	3.8	2.6	damp	damp	dry	dry	0.1	damp	3.2	damp	3.0	0.5	2.0	2.1	0.7	0.1	1.3	dry	0.1	seep	1.0	1.0	Dry	1.3	Dry	Dry	1.95	0
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	12.0	3.4	8.0	1.8	1.0	1.0	16.0	17.8	2.9	1.6	Seep	Dry	12.05	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	0.01	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

xx No measurement - utilized yearly comparison.

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

MILL FORK AREA

Spring	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
EM-216												0.3	0					0	0.5	0	Seep	Dry	Dry	1.8	0.0	Damp	Damp	Damp	1.3	seep
EMPOND											3	6	0.5					0.8	2.3	1.3	3.3	3.5	6.7	4.3	2.3	4.0	4.0	1.3	9.6	1.6
GRANTS SPRING																				0.4	1.32	1.6	2.3	2.3	1.0	1.8	1.3	1.5	2.8	0.8
LITTLE BEAR*	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-9																		1.5	1.8	0.8	1.6	1.4	1.7	2.2	1.2	1.6	3.0	1.3	2.0	0.1
JV-34																		3.6	47.2	0	4.3	9.5	37.0	80.0	8.6	42.8	17.3	9.3	48.0	seep
MF-7											20	10						9.2	30	13.3	21.1	23.7	42.0	30.0	19.4	34.7	33.3	33.3	63.8	24.0
MF-10											0.5	0.25	10					6.8	27.3	14.3	60	35.3	40.0	54.0	19.2	46.2	33.4	18.8	54.5	9.8
MF-19B												0.25	0.5					0.4	0	1.3	1.3	1.9	2.3	1.4	0.5	1.9	1.2	1.2	2.4	seep
MF-213																		17.6	26.1	20.1	27	33.0	68.0	55.0	29.3	58.30	46.2	46.2	66.7	27.3
MF-219																		2.1	5.6	2.4	2.7	3.1	5.0	2.3	4.0	2.0	5.3	10.5	13.0	0.2
MFR-10																			151	4.9	11.81	11.6	12.9	19.4	10.4	29.1	11.3	23.1	42.9	10.3
MFR-30																			26.6	0	0.75	1.0	1.2	2.3	0.1	2.3	1.2	1.6	2.9	0.0
RR-5												2	0					0	1.6	1.1	8.66	8.7	15.0	13.8	3.0	15.4	4.0	9.0	33.8	seep
RR-15												20	10					8	13.9	12	24	26.0	10.6	37.0	17.1	32.4	21.1	39.2	54.2	16.7
RR-23A													5					10	15	11	26.6	42.0	34.0	32.0	30.0	8.7	31.6	49.6	42.8	19.4
SPI-26																		4.4	4.3	5.8	18.6	14.0	26.7	23.5	9.0	28.6	2.8	16.2	54.5	6.2
SPI-29																			0.5	0.4	1.6	1.7	1.0	0.8	0.3	1.0	0.7	0.9	2.8	seep
UJV-101											0	0	0.3					0.8	3.9	0	1.1	1.5	1.6	0.8	0.7	1.3	1.3	1.7	2.4	0.8
UJV-206											0	0.5	0					2.1	2.6	1.5	1.1	2.4	6.0	7.9	3.2	3.40	2.5	1.6	3.5	0.8
Totals											442.5	257.3	444.3					462.3	733.2	330.6	500.8	606.9	664.0	766.8	508.4	693.5	587.5	563.3	883.0	463.6

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

Table 31b

Mode of Occurrence – East Mountain Springs – Mill Fork Area

Occurrences

Stratigraphic Location	Flow along permeable strata (fluvial channels) underlain by impermeable mudstone which intersects he land surface
Alluvium **Joes Valley Alluvium** **JV-1 through JV-35**	JV-9, JV-34
Flagstaff Limestone	EM-221A
North Horn Formation	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
Upper Price River Formation	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
Castle Gate Sandstone	MFR-6, UJV-101, UJV-208, UJV-210, UJV-211, UJV-212, UJV-213
Blackhawk Formation	MF-2, MF-3, MF-7, MF-8A, MF-213, MFR-2
Star Point Sandstone	Little Bear Spring

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 he 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	Sheba Springs, 79-1	
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		Elk Springs, 79-10, 79-18, 79-19, 79-20, 84-54, 89-61, 89-70	
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	Blackhawk Formation 80-50, 84-57, 91-73 Price River Formation Bear Canyon Fault Zone 82-51		Price River 80-49, Blackhawk 91-72	Flagstaff Limestone 79-4, 79-5, Pine Springs Trough Price River Formation 79-24, 79-33, 79-40, 80-41, 80-44, 80-45, 82-52, Jerk Water, 89-60 (Alpine)

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	-3.6	7.2	-0.5
APR	-2.2	0.1	4.4	-2.0
MAY	4.1	2.8	8.9	1.6
JUN	-3.9	-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	[illegible]
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

	EAST MOUNTAIN DEPARTURE FROM NORMAL	*ELECTRIC LAKE DEPARTURE FROM NORMAL*	*CASTLE DALE DEPARTURE FROM NORMAL*	*HUNTINGTON PLANT DEPARTURE FROM NORMAL*
JUN	3.7	-3.5	0.2	
2006				
JAN	5.6	-7.2	2.3	3.9
FEB	2.3	-14.1	2.2	0.0
MAR	2.3	-3.4	0.3	-4.1
APR	7.3	3.0	6.5	2.6
MAY	11.2	6.0	12.1	3.7
JUN	4.3	5.2	9.8	2.2
2007				
JAN	8.0	9.4	1.1	1.3
FEB	6.9	-0.1	7.1	5.9
MAR	14.4	6.6	4.8	11.2
APR	5.6	5.3	2.4	2.8
MAY	7.1	3.3	1.7	2.0
JUN	9.9	4.2	2.6	4.4
2008				
JAN	5.1	NA	-2.9	-3.1
FEB	-6.6	NA	-2.6	-2.0
MAR	5.8	NA	-0.9	-2.5
APR	-3.4	NA	-1.7	-3.0
MAY	-5.1	NA	-1.4	-3.6
JUN	-4.2	-1.1	0.3	-0.5
2009				
JAN	9.6	NA	3.5	-3.1
FEB	3.4	NA	6.2	-0.6
MAR	-6.5	NA	2.3	0.9
APR	-3.4	NA	1.5	-1.2
MAY	6.8	NA	3.2	3.4
JUN	-2.7	NA	-0.4	-5.1
2010				
JAN	2.6	NA	-3.2	-6.3
FEB	2.0	NA	-6.2	-1.4
MAR	5.1	NA	-1.0	0.5
APR	6.5	NA	2.1	-0.4
MAY	2.6	NA	-1.9	2.1
JUN	8.9	NA	3.5	-2.2
2011				
JAN	0.1	NA	3.1	-0.7
FEB	-4.3	NA	1.8	-3.5
MAR	8.5	NA	1.0	-0.8
APR	4.3	NA	-1.8	-2.7
MAY	-0.2	NA	-4.4	-7.0
JUN	-2.7	NA	-1.6	1.0
2012				
JAN	2.5	NA	7.0	2.0
FEB	-4.0	NA	4.4	0.1
MAR	5.7	NA	5.2	2.6
APR	7.3	NA	4.1	2.9
MAY	3.7	NA	3.2	3.1
JUN	6.2	NA	4.9	4.0

YEAR	*EAST MOUNTAIN*	*ELECTRIC LAKE*	*HUNTER PLANT*	*HUNTINGTON PLANT*	*TOTAL*
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	5.0	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	***CASTLE DALE***	4.6	6.0
2008	-1.4		-1.5	-2.5	-1.8
2009	1.2	NA	2.7	-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 RECESSION STUDY
YEAR 2012

SPRING		JUL	AUG	SEP	OCT
79-10	Flow (GPM)	3.2	2.4	2.0	1.7
	Temp. (C)	8.3	10.1	9.3	8.1
SHEBA	Flow (GPM)	0.7	Seep	Dry	Dry
SPRINGS	Temp. (C)	9.5			
ELK	Flow (GPM)	Developed and no longer applicable to recession study			
SPRING*	Temp. (C)				
79-35	Flow (GPM)	.78.	0.7	0.8	0.7
	Temp. (C)	7.3	8.2	8.3	10.4
79-26	Flow (GPM)	Dry	Dry	Dry	Dry
	Temp. (C)				
79-29	Flow (GPM)	0.5	0.5	0.8	0.8
	Temp. (C)	8.1	9.1	6.2	6.2
84-56	Flow (GPM)	0.4	0.2	Dry	Dry
	Temp. (C)	8.0	10.0		
80-44	Flow (GPM)	seep	Seep	Dry	Dry
	Temp. (C)				
80-46	Flow (GPM)	Dry	Dry	Dry	Dry
	Temp. (C)				
BURNT	Flow (GPM)	3.5	3.2	4.1	3.1
TREE	Temp. (C)	8.3	8.6	8.6	8.8
79-23	Flow (GPM)	Dry	Dry	Dry	Dry
	Temp. (C)				
82-52	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	no	320.46	no
Calcium	58.72	52.66	62.32	59.52	83.76	87.93	72.01	68.59	79.64	flow	54.45	flow
Carbonate	1.34	0	1.37	0.00	1.14	0.00	1.73	0.00	1.00	during	4.65	during
Chloride	5.41	3.5	4.43	2.50	4.48	1.00	4.84	3.00	11.27	2012	6.44	2012
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	
Mangenese	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
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	345.12	no	409.85	no	342.41	269.50
Calcium	44.43	38.26	80.22	71.01	97.58	flow	61.43	flow	74.40	flow	61.35	55.98
Carbonate	1.38	0.00	1.20	0.00	0.67	during	1.64	during	1.61	during	1.59	0.00
Chloride	18.36	19.50	3.86	1.50	10.87	2012	4.55	2012	10.07	2012	9.61	6.50
Cond.(umhos/cm)	560.05	597.50	457.45	462.00	867.18		549.61		682.67		553.51	574.00
Hardness	254.21	240.50	265.08	253.00	385.75		280.68		330.90		291.22	268.00
Iron	0.32	0.03	0.34	0.06	0.00		0.08		0.18		0.53	0.00
Magnesium	35.44	35.20	16.21	18.36	41.55		29.05		35.93		32.89	31.095
Mangenese	0.94	0	0.04	0	0.01		0.03		0.04		0.05	0
pH(units)	7.73	7.935	7.82	8.015	7.86		7.41		7.66		7.48	7.55
Potassium	2.09	1.285	0.90	0.265	3.59		0.79		1.48		1.41	0.905
Sodium	32.91	35.32	4.31	3.035	36.18		9.91		29.16		16.96	20.46
Sulfate	37.69	33.5	15.33	4.5	136.05		16.31		44.29		28.05	30.5
TDS	325.80	321	267.40	269	533.91		309.58		400.42		322.79	307

* Quality parameters reported as mg/l unless otherwise noted

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

Mill Fork Area

PARAMETER	EM POND Historical	EM POND 2012	EMS JV34 Historical	EMS JV34 2012	EMS JV9 Historical	EMS JV9 2012	EMS MF 7 Historical	EMS MF 7 2012	EMS MF10 Historical	EMS MF10 2012	EMS MF19B Historical	EMS MF19B 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	4.80	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		1.36	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 Historical	EMS MF213 2012	EMS MF219 Historical	EMS MF219 2012	EMS MFR-10 Historical	EMS MFR-10 2012	EMS MFR-30 Historical	EMS MFR-30 2012	EMS RR-15 Historical	EMS RR-15 2012	EMS RR-23A Historical	EMS RR-23A 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	1.00	0	0.00	0	0.60	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	0.22	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	5.57	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 Historical	EMS RR-5 2012	EMS SP1-26 Historical	EMS SP1-26 2012	EMS SP1-29 Historical	EMS SP1-29 2012	EMS UJV101 Historical	EMS UJV101 2012	EMS UJV206 Historical	EMS UJV206 2012	GRANTS Historical	GRANTS 2012	LITTLE BEAR Historical	LITTLE BEAR 2012
Elevation	10,160		10,340		10,360		8,960		9,200		10,280		7,540	
Geologic Formation	TKn		TKn		TKn		Kcg		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	527.64	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	1.33		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	8.59		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	20	75	120	215
09/18/1990	15.1	78.9	91	186
11/07/1990	13.3	37.5*	20	71
11/14/1990	14.5	67.4	9.3	91
11-19-90**	13.6	57.7	6.3	79
1991	10.9	56.5	4.7	72
991	10.9	107	136	253.9
.991	12.5	95	160	267.5
../1991	9.3	95	160	264.3
09 10/1991	9.2	105	140	251.2
10/21/1991	7.5	85	55	147.5
11/20/1991	8	80	16.2	104.2
04 07 1992	8	46	7.7	61.7
05 15 1992	7.5	110	140	257.5
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	35	75	116
10 30/1992	5.5	45	2.6	53.1
05 13/1993	6	25	13	44
06/11/1993	8.6	90	150	248.6
07/29/1993	6	110	170	286
08/27 1993	4	96	170	270
09/21 1993	2	60	110	172
10/22/1993	3	30	55	88
05 24 1994	4.6	65	75	144.6
06/16/1994	5	100	160	265
07 18 1994	5.5	100	130	235.5
08 24 1994	2	70	80	152
09/13/1994	3.7	30	20	53.7
10/23 1994	2	30	1.5	33.5
12 14/1995	2	38	***	40
06/22 1995	8	over capacity	***	
07 21 1995	2	over capacity	***	
08 24 1995	4	over capacity		
0_ 15/1995	2.3	150	***	152.3
10 31 1995			NEWUA conducting maintenance	
11/30/1995	3.3	75	***	78.3
04/03/1996	8	100	***	108
05/17 1996	5	175	***	180
06/11 1996	5.5	175.0'	***	180
07 23 1996	5.5	200.0'	***	205
08 21/1996	4.5	150.0'	***	154.5
09 18/1996	4.5	150.0'	***	154.5
10 23/1996	3.8	80	***	83.8
11/14/1996	4	80	***	84
12/12/1996	4	100	***	104

1996 problems: valve seating affected flow measurements

	METER 2	METER 3	TOTAL	NEWUA METER
04 28/1997	5.2	150	+ 150 ****	94.0 *****
05 29 1997	6	150	+ 150 ****	230
06 25 1997	6	150	+ 150 ****	300
07 17 1997	6	150	+ 150 ****	270
08 26 1997	5.5	150	+ 150 ****	270
09 15/1997	3.5	150	+ 150 ****	270
10/13 1997	5	150	+ 150 ****	180
11 18 1997	3.9	100	+100.0 ****	160
12 04 1997	4	100	+100.0 ****	150

	METER 2	METER 3	TOTAL	NEWUA METER
04/14/1998	6.7	100		120
05/27 1998	7.5	158		145
06/05 1998	10.3	+100.0 ****		280
07 06/1998	7.5	+100.0 ****		300
08/10/1998	7.1	+100.0 ****		300
09/14 1998	6.0	+100.0 ****		240
10/05 1998	6.0	+100.0 ****		200
1998	6.7	172		180
.998	5.0	93		150

	METER 2	METER 3	TOTAL	NEWUA METER
01 12 1999	5.0	120	125+	150
02/02/1999	6.3	90	96+	120
03/02 1999	6.6	80	87+	110
04 15 1999	5.0	65	70+	120
05 11/1999	5.5	100	106+	150
06 15/1999	6.6	150	157+	240
07 20 1999	6.9	170	177+	250
08 13/1999	6.7	200	207+	270
09 16/1999	6.0	200	206+	225
10 05/1999	4.0	200	204	200
11 17 1999	3.2	100	103	130
12/09 1999	2.5	80	83	110
01/12/2000	2.2	60	62.2+	110
02/03 2000	3.4	53	56.4+	120
03/09/2000	++	++	++	120
04 03 2000	++	++	++	150
05/05/2000	3	86	89+	210
06 12/2000	3	160	163+	270
07 06/2000	2.1	170	172.1+	340
08 09 2000	1.6	200	201.6*	280
09/12 2000	1.2	120	121.2*	160
10/10/2000	1.7	50	51.7*	130
11 28 2000	1.4	65	66.4*	100
12 05 2000	1.07	61	62.1*	100
01/05 2001	1.02	62.5	63.52*	100
02 05/2001	Inaccessible			90
03/13 2001	Inaccessible			60
04/23 2001	1.5	52	53.5	60
05/21/2001	1.9	140	141.9	150
06/29/2001	1.6	214	215.6	210
07 03/2001	1.2	200	201.2	210
08 14 2001	1.1	180	181.1	220
09 1_ 2001	1	162	163	180
10 17 2001	1.5	150	151.5	120
11/27 2001	1.6	100	101.6	100
12/13 2001	Iced/Frozen	40	40*	70
01 1_ 2002	1.5	45	47	60
02/11/2002	1.4	50	51	60
03/26/2002	0.5	33	34	60
04 11/2002	0.6	46	47	50
05/08 2002	0.5	40	41	55
06 25 2002	1.0	166	167	120
07 22 2002	0.7	170	171	210
08 16 2002	0.7	150	151	150
09 14/2002	0.5	60	61	90
10 16/2002	0.4	55	55	60
11/12/2002	0.4	51	51	60
12 13 2002	1.8	46	48	60
01 17 2003	1.6	46	48	60
02 26 2003	1.6	33	35	60
03 12/2003	1.5	40	42	50
04 21/2003	1.3	50	51	60
05/22/2003	3.7	150	154	70
06 26/2003	3	222	225	205
07 10/2003	2.8	190	193	225
2003	2.2	190	192	220
2003	0.4	130	130	130.4
.003	1	75	76	76
2003	0.8	70	71	70.8
12 09/2003	0.6	38	39	38.8
01 27 2004				
02 27/2004				
03 15/2004	0.4	35.2	35	*****
04/26/2004	0.5	100	101	45
05 25 2004	0.4	136	136	120
06/29 2004	*****	120	120	*****

TABLE 35: 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
10/15/2004	*****	30	30	50
11/10/2004	*****	*****	*****	83
[illegible]04	*****	*****	*****	73
[illegible]05	*****	*****	68	68
[illegible]2005	*****	*****	65	65
03/11/2005	*****	*****	62	62
04/19/2005	*****	*****	85	85
05/10/2005	*****	*****	100	100
06/09/2005	*****	*****	250	250
07/06/2005	*****	*****	240	240
08/23/2005	*****	*****	233	233
09/22/2005	*****	*****	*****	*****
10/24/2005	*****	115	150	150
11/30/2005	*****	112	158	158
01/05/2006	*****	75	72	72
01/20/2006	*****	*Inaccessible*	72	72
02/23/2006	*****	*Inaccessible*	72	72
03/14/2006	*****	*Inaccessible*	83	83
04/25/2006	*****	100	102	102
05/25/2006	*****	200	160	160
06/20/2006	*****	200	230	230
07/26/2006	*****	230	240	240
08/29/2006	*****	210	233	233
09/27/2006	*****	150	*****	*****
10/20/2006	*****	103	150	150
11/17/2006	*****	100	158	158
12/07/2006	*****	107	125	125
01/10/2007	*****	*100*	140	140
02/20/2007	*****	*94*	130	130
03/26/2007	*****	*60*	125	125
04/17/2007	*****	70	115	115
05/10/2007	*****	95	250	250
06/20/2007	*****	190	270	270
07/17/2007	*****	170	++++	
08/20/2007	*****	162	++++	
09/10/2007	*****	127	++++	
10/26/2007	*****	60	130	130
11/14/2007	*****	*60*	115	115
12/05/2007	*****	20.8	95	95
01/15/2008	*****	*Inaccessible*	65	65
02/20/2008	*****	*Inaccessible*	65	65
03/24/2008	*****	*Inaccessible*	65	65
04/22/2008	*****	100	75	75
05/28/2008	*****	10	210	210
06/17/2008	*****	11	240	240
07/07/2008	*****	10	260	260
08/19/2008	*****	10	250	250
09/23/2008	*****	107	230	230
10/22/2008	*****	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
03/26/2009	*****	37	61	61
04/16/2009	*****	27	65	65
05/07/2009	*****	44	65	65
06/18/2009	*****	183	235	235
07/10/2009	*****	150	240	240
08/20/2009	*****	167	240	240
09/09/2009	*****	130	125	125
[illegible]2009	*****	50	110	110
[illegible]09	*****	33	100	100
[illegible]9	*****	*****	120	120
01/[illegible]/2010	*****	*****	90	90
02/17/2010	*****	*****	80	80
03/1?/2010	*****	*****	80	80
04/26/2010	*****	*****	85	85
05/20/2010	*****	*****	150	150
06/08/2010	*****	*****	210	210
07/09/2010	*****	180	210	210
08/12/2010	*****	192	420	420
09/09/2010	*****	130	300	300
10/27/2010	*****	26	210	210
11/12/2010	*****	45	165	165
12/07/2010	*****	40	160	160
01/13/2011	*****	Inaccessible	148	148
02/07/2011	*****	Inaccessible	150	150
03/23/2011	*****	Inaccessible	150	150
04/11/2011	*****	56	160	160
05/26/2011	*****	188	355	355
06/15/2011	*****	200	200	200
07/22/2011	*****	167	233	233
08/22/2011	*****	214	250	250
09/06/2011	*****	200	235	235
10/18/2011	*****	160	225	225
11/09/2011	*****	81	150	150
12/05/2011	*****	68	210	210
01/10/2012	*****	48	97	97
02/07/2012	*****	40	95	95
03/13/2012	*****	38	97	97
04/10/2012	*****	53	0	0
05/10/2012	*****	200	0	0
06/19/2012	*****	130	170	170
07/03/2012	*****	30	210.6	210.6
08/15/2012	*****	87	180.6	180.6
09/10/2012	*****	Line Const.	161	161
10/22/2012	*****	Line Const.	0	0
11/06/2012	*****	Line Const.	0	0
12/04/2012	*****	Line Const.	0	0

* Flow not stabilized.
** Data collected during pump test.
*** Diverted through Meter 3.
**** Over capacity
***** Meter Valve problems
+ Meter 3 - Valve would not seat
++ [illegible] Accessible
+ [illegible]ter Not Working - Used Total of Meter 2 & 3
[illegible]placement

TABLE 36
NEWUA - RILDA CANYON SPRINGS
AVERAGE WATER QUALITY*

PARAMETER **	METER 2		METER 3		METER 4	
	Historical	2012	Historical	2012	Historical	
						Combined with Meter 3 in 1995
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	
Mangenese - Total	0.05		0.01	0	-	
Mangenese -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	

* Quality parameters reported as mg/l unless otherwise noted

** Data: Database input restricted to values greater then 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 %
T-6	Flow (GPM)	0.0	0.0	0.0	0.0	
18-2-1	Temp. (C)					
T-8	Flow (GPM)	0.0	0.0	0.0	0.0	
17-21-1	Temp. (C)					
T-9	Flow (GPM)	3.3	3.6	2.7	3.1	-6.06
17-22-1	Temp. (C)	11.0	9.0	8.0	8.0	
T-10	Flow (GPM)	0.0	0.0	0.0	0.0	
17-26-4	Temp. (C)					
T-14	Flow (GPM)	0.0	0.0	0.0	0.0	
17-25-1	Temp. (C)					
T-14A	Flow (GPM)	0.0	0.0	0.0	0.0	
17-26-5	Temp. (C)					
T-15	Flow (GPM)	0.0	0.0	0.0	0.0	
17-35-1	Temp. (C)					
T-16	Flow (GPM)	0.0	0.0	0.0	0.0	
17-35-2	Temp. (C)					
TM-23*	Flow (GPM)	0.0	0.0	0.0	0.0	
	Temp. (C)					

JULY TOTAL	**3.3**	**OCTOBER TOTAL**	**3.10**
		Net Change - Average	**-6.06**
TOTAL FOR JULY 2011 =	21.08	**Net Change - By Volume**	**-6.06**

FLOW FOR JULY 2011 WAS 84.35% GREATER THAN JULY 2012

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

JULY FLOW DATA

Spring	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	Dry	Dry	Dry	Dry	Dry	Dry	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	Dry	Dry	Dry	Dry	Dry	Dry	Dry	57.8****	84.4****
TOTAL	67.5	5.1	1.5	1.95	2.67	51.3	6.3	29.4	14.4	15.6	99.6	105.3

Spring	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
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
TOTAL	47.2	11.9	3.6	5.2	6.8	36.76	46.6	Dry	13.0	5.8

Spring	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
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	*****	*****							
TOTAL	2.8	21.68	3.3							

* August measurement
** September measurement
*** First year monitored by PacifiCorp
**** 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 Historical	18-2-1 2012	17-21-1 Historical	17-21-1 2012	17-22-1 Historical	17-22-1 2012	17-26-4 Historical	17-26-4 2012	17-25-1 Historical	17-25-1 2012	17-26-5 ** Historical	17-26-5 ** 2012
Elevation	8395		9320		9210		8880		8155		9080	
Geologic Formation	TKn		TKn		TKn		TKn		Kcg		TKn	
Bicarbonate	393.49	No	387.53	No	308.33	238.0	398.07	No	545.79	No	404	No
Calcium	61.84	Flow	52.94	Flow	46.28	46.0	60.54	Flow	89.63	Flow	78.6	Flow
Carbonate	1.16	During	1.18	During	2.39	0.0	8.33	During	3.50	During	<.5	During
Chloride	45.37	2012	30.70	2012	9.75	8.0	26.93	2012	31.55	2012	20.8	2012
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	50.40		59.30		59.75	
Mangenese	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		142.8	
TDS	585.78		393.96		292.54	268.0	426.34		723.00		515	

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

TRAIL MOUNTAIN SPRINGS
CROSS REFERENCE

ARCO'S	ENERGY WEST
T-6	18-2-1
T-8	17-21-1
T-9	17-22-1
T-10	17-26-4
T-14	17-25-1
T-14A	17-26-5
T-15	17-35-1
T-16	17-35-2
TM-23	17-14-4

* 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
TW-10														
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
2012***														
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
2011***														
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
HISTORICAL 1988-2011														
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
MN-ME**														
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
2012***														
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
2011***														
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
HISTORICAL 1991-2011														
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 intiated during 1991.

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

TABLE 41: DEER CREEK MINE - DISCHARGE WATER QUALITY*

	2012**				Historical - (1976-2011)			
Parameters	*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	*No oil and grease sheen noted during sampling*				0.1	48.8	3.21	238
pH (units)	7.34	7.60	7.44	12	6.52	8.51	7.49	432
Sulfate	73	182.00	113.30	12	13	518	172.57	438
TDS	415	643.00	505.80	12	289	1111	572.71	450
TSS	0	16.00	2.70	12	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														
No. of Analysis														
HISTORICAL 1983-2001														
MIN	403	116.0	0.1	6.0	1000	725	0.01	5.40	0.01	6.50	0.30	5.80	250.0	664
MAX	676	330.0	5.0	160.0	2600	1022	0.30	134.40	0.20	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	0.05	7.23	4.22	22.56	412.0	1050
TMA XC-32	Mine Sealed May 2001 - In-Mine Monitoring Discontinued													
2011**														
MIN														
MAX														
MEAN														
No. of Analysis														
HISTORICAL 1983-2001														
MIN	379	114	1	7	1171	581	0.10	72	0.10	7.03	6	33	256	816
MAX	467	133	5	17	1352	688	0.70	90	0.20	8.20	10	44	491	993
MEAN	441.0	119.0	3.5	12.3	1259.0	609.0	0.2	75.7	0.1	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 then laboratory minimum detection limit.

TABLE 43 : WILBERG/COTTONWOOD - DISCHARGE WATER QUALITY

* GRIMES WASH

	2012				Historical - (1976-2001)			
	Min	Max	Mean	No. of Analysis	Min	Max	Mean	No. of Analysis
pH	No Discharge During 2012				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	No. of Analysis	Min	Max	Mean	No. of Analysis
pH	Not part of monitoring program				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	No. of Analysis	Min	Max	Mean	No. of Analysis
Acidity	0	0		0	6	6	6	1
Chloride	0	15	12.42	12	6	41	16.69	128
Conductivity (umhos	1094	1118	1103.92	12	1062	1436	1158.40	128
Iron - Total	0	0.31	0.08	12	0	0.4	0.01	54
Oil & Grease	No Visual Oil & Grease Noted in 2012							0
pH (units)	7.31	7.41	7.35	12	6.2	8.08	7.38	127
Sulfate	172	230	216.58	12	215	322	257.98	128
TDS	685	734	716.50	12	696	803	754.50	128
TSS	0	13	1.50	12	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	MAGNESIUM	MANGANESE	PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
UG-3	Mine Sealed April 2001 - In-Mine Monitoring Discontinued													
2012**														
MIN														
MAX														
MEAN														
No. of Analysis														
HISTORICAL 1985 - 2001														
MIN	260	26.0	0.1	2	380	151	0.03	19.6	0.03	7.41	2.1	33.0	15.0	252
MAX	344	49.3	25.0	16	696	222	0.20	29.0	0.20	8.48	5.0	61.0	130.0	424
MEAN	305	34.2	7.3	8.80	542	189	0.15	25.3	0.10	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 then laboratory minimum detection limit.

TABLE 45 : TRAIL MOUNTAIN - DISCHARGE WATER QUALITY

@ COTTONWOOD CANYON PORTALS

	2012				Historical			
	Min	Max	Mean	No. of Analysis	Min	Max	Mean	No. of Analysis
pH	Mine Sealed April 2001 - No Discharge				7.8	8.53	8.26	67
Acidity					12	58	35	2
Bicarb. Alkalinity					341	922	753	48
Chloride					10	410	36.5	49
Conductivity					1116	1655	1464	55
Iron					0.3	2.3	0.55	71
Oil & Grease					2	2	2	2
Sulfate					50	292	152	48
TDS					671	1072	936	70
TSS					5	42	109	36

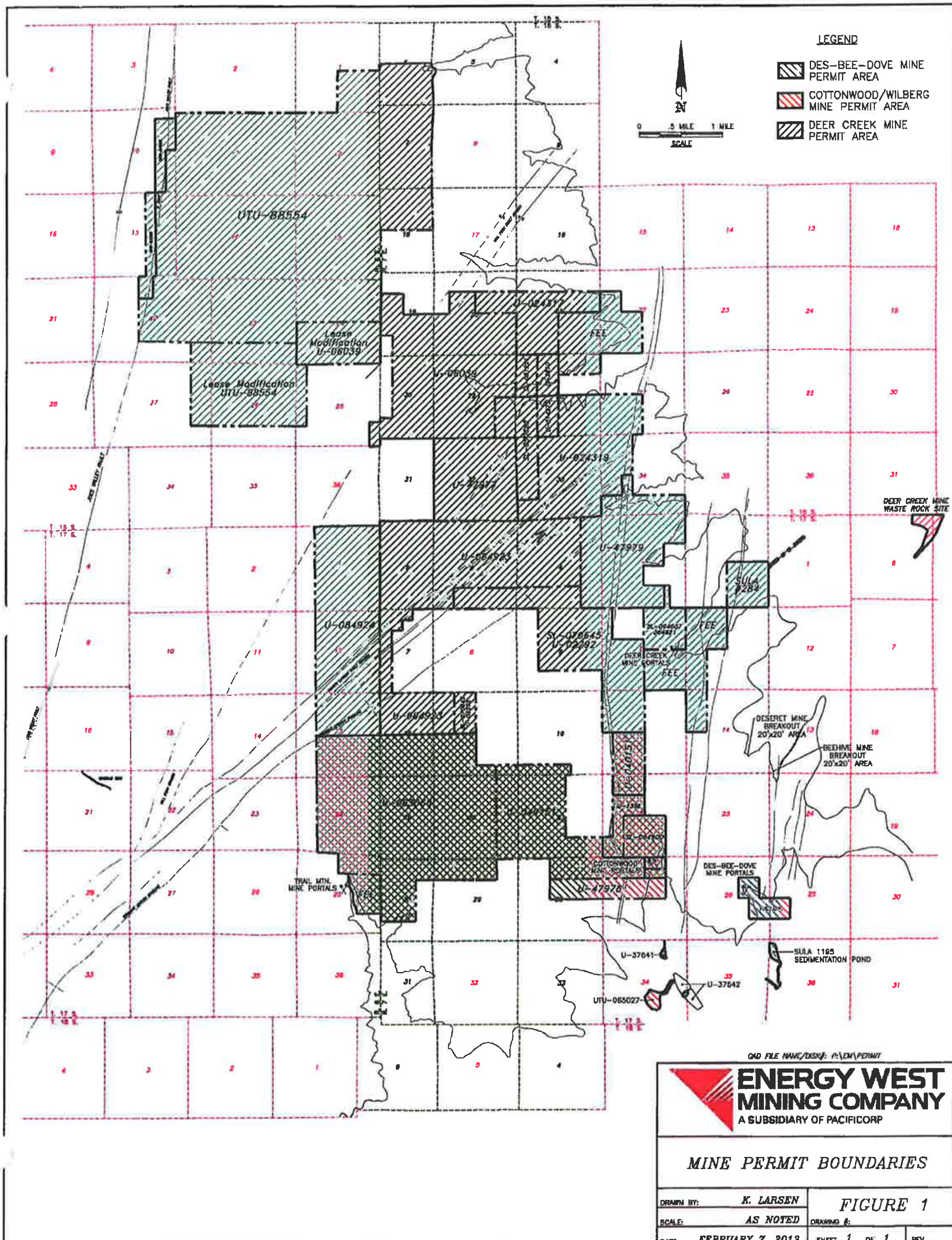
OLIPHANT PORTALS

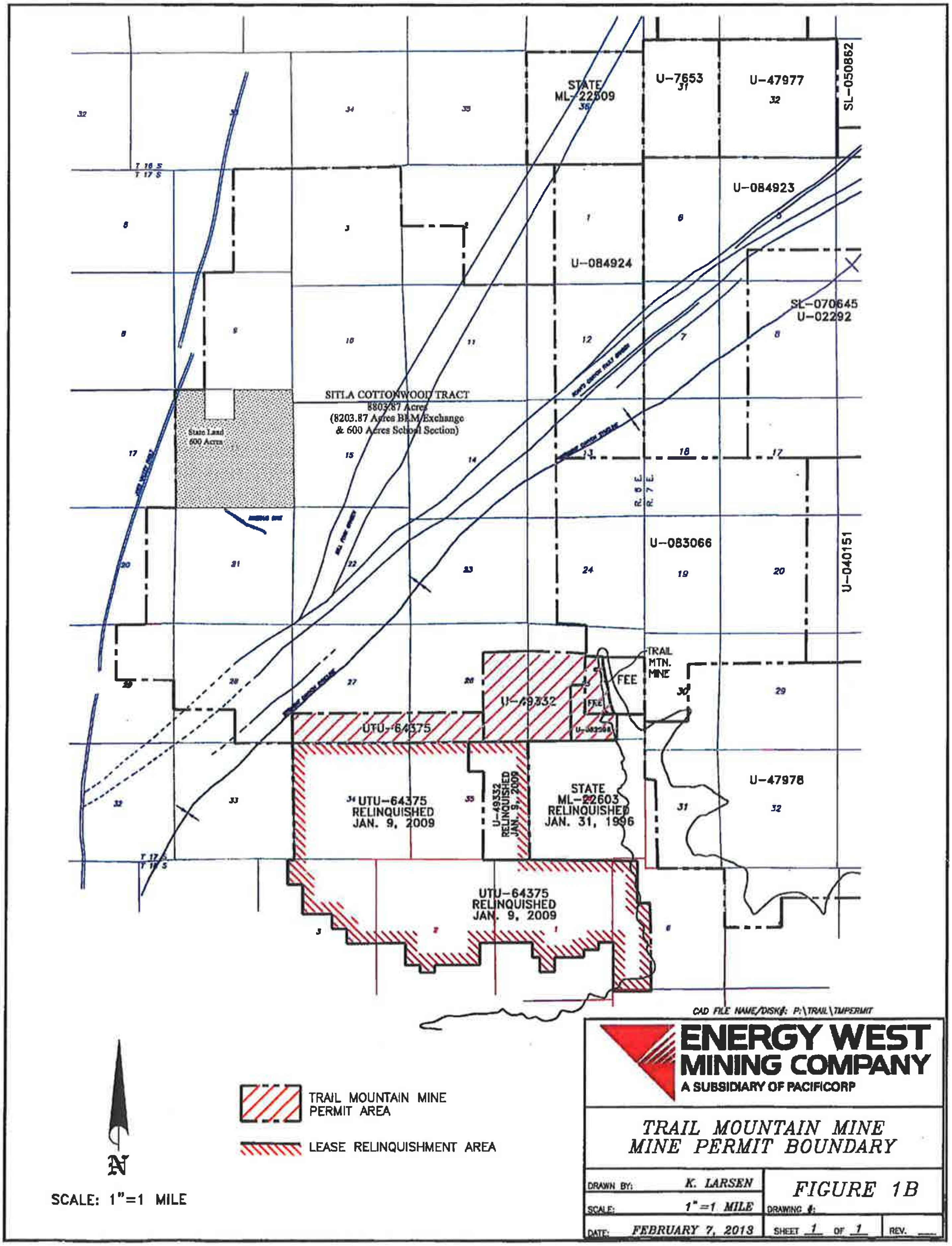
	2012				Historical			
	Min	Max	Mean	No. of Analysis	Min	Max	Mean	No. of Analysis
	No Flow for 2012 - Damp				7.54	8.91	8.1	45
Acidity					1	19	7.73	15
Bicarb. Alkalinity					214	327	282	45
Chloride					4	21	8.3	45
Conductivity					482	925	663	42
Iron					0.01	0.7	0.16	23
Oil & Grease					0.4	5	4.4	8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

TABLE 46: WELLS - WATER QUALITY *

2012* SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON DISSOLVED	MAGNESIUM	MANGANESE	PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
DEER CREEK - DCWR-1														
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
2012**														
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
HISTORICAL 1989-2011:														
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
WILBERG/COTTONWOOD - CWRW-1														
20120319	543	388.83	0	2354	16360	3787	0	683.8	0	7.42	36.35	3223.37	6741	14240
20120613	530	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
HISTORICAL 1989-2011:														
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	1135	26	4020	120,000	8327	37.77	1717	2.480	8.33	122.0	8,812	24,000	30,440
MEAN	408	380	1.7	2324	21,172	3851	1.36	699	0.209	7.56	35.8	3,834	8,298	15,759
TRAIL MOUNTAIN TM-1B														
20120316	440	9	22	56	1053	57	0	8	0	9	2	241	17	634
20120613	453	9	0	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	0.008	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
HISTORICAL 1987-2011:														
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
N
0 .5 MILE 1 MILE
SCALE
UTU-88554
Lease Modification U-06039
Lease Modification UTU-88554
U-06039
U-024317
FEE
U-024319
U-47979
U-084923
SULA 8284
U-084924
DEER CREEK MINE PORTALS
U-47978
COTTONWOOD MINE PORTALS
TRAIL MTN. MINE PORTALS
DES-BEE-DOVE MINE PORTALS
DESERET MINE BREAKOUT 20'x20' AREA
BEEHIVE MINE BREAKOUT 20'x20' AREA
DEER CREEK MINE WASTE ROCK SITE
SULA 1195 SEDIMENTATION POND
U-37641
U-37642
UTU-063027
CAD FILE NAME/DISK#: P:\EM\PERMIT
ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP
MINE PERMIT BOUNDARIES
DRAWN BY: K. LARSEN
SCALE: AS NOTED
DATE: FEBRUARY 7, 2013
FIGURE 1
DRAWING #:
SHEET 1 OF 1
REV.



STATE ML-22509
U-7653
U-47977
SL-050862
U-084923
U-084924
SL-070645
U-02292
SITLA COTTONWOOD TRACT
8803.87 Acres
(8203.87 Acres BLM Exchange & 600 Acres School Section)
State Land 600 Acres
T 16 S
T 17 S
R. 6 E.
R. 7 E.
U-083066
U-040151
TRAIL MTN. MINE
FEE
U-49332
UTU-64375
U-47978
UTU-64375 RELINQUISHED JAN. 9, 2009
U-49332 RELINQUISHED JAN. 9, 2009
STATE ML-22603 RELINQUISHED JAN. 31, 1996
T 17 S
T 18 S
CAD FILE NAME/DISK#: P:\TRAIL\TMPERMIT
ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP
TRAIL MOUNTAIN MINE PERMIT AREA
LEASE RELINQUISHMENT AREA
N
SCALE: 1"=1 MILE
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.

FIGURE 2

EAST MOUNTAIN PRECIPITATION
2012 WATER YEAR
Total Precipitation = 9.53 inches

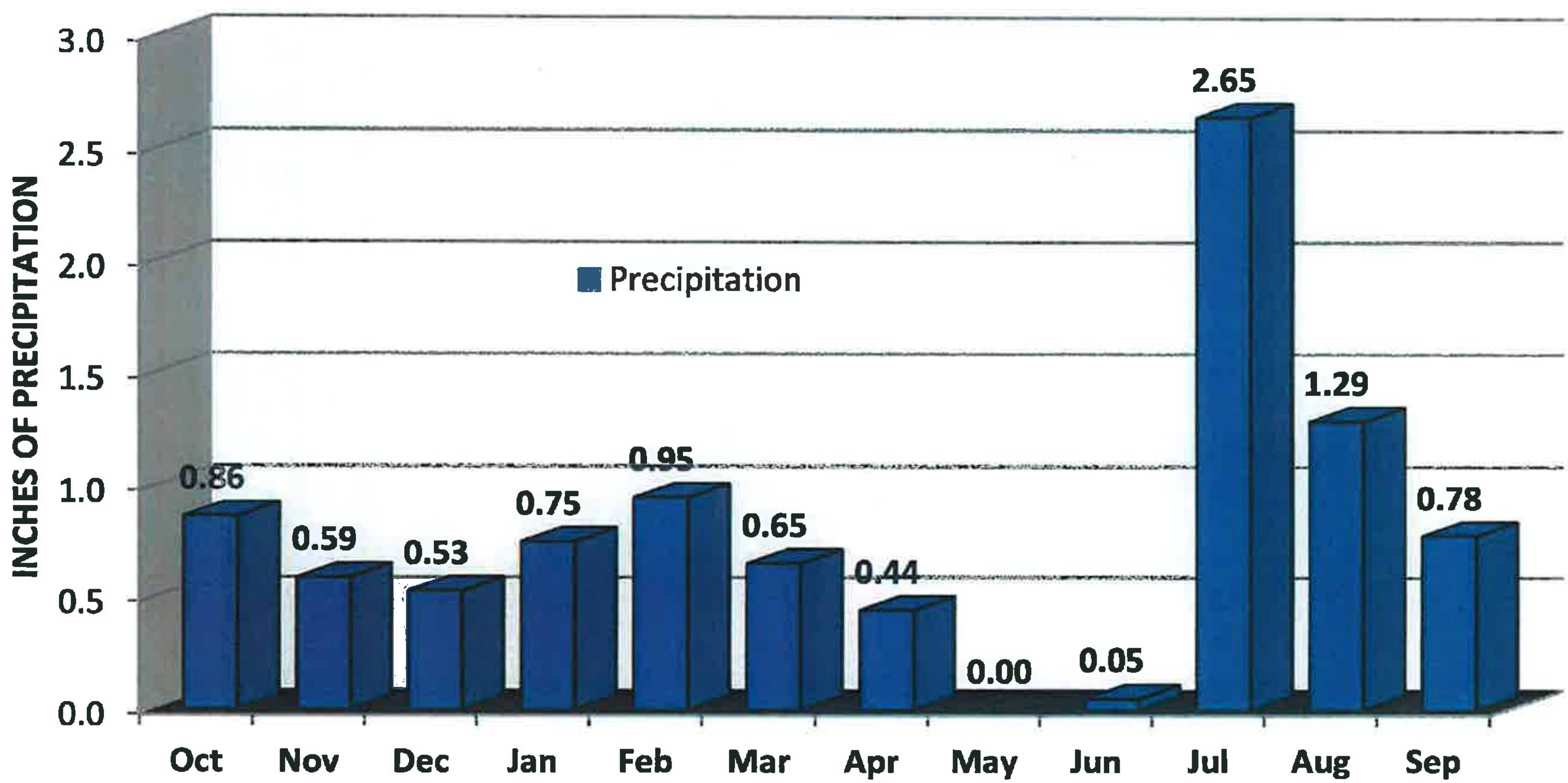


FIGURE 3a
EAST MOUNTAIN
SPRING DISCHARGE vs. PRECIPITATION vs. TEMPERARURE

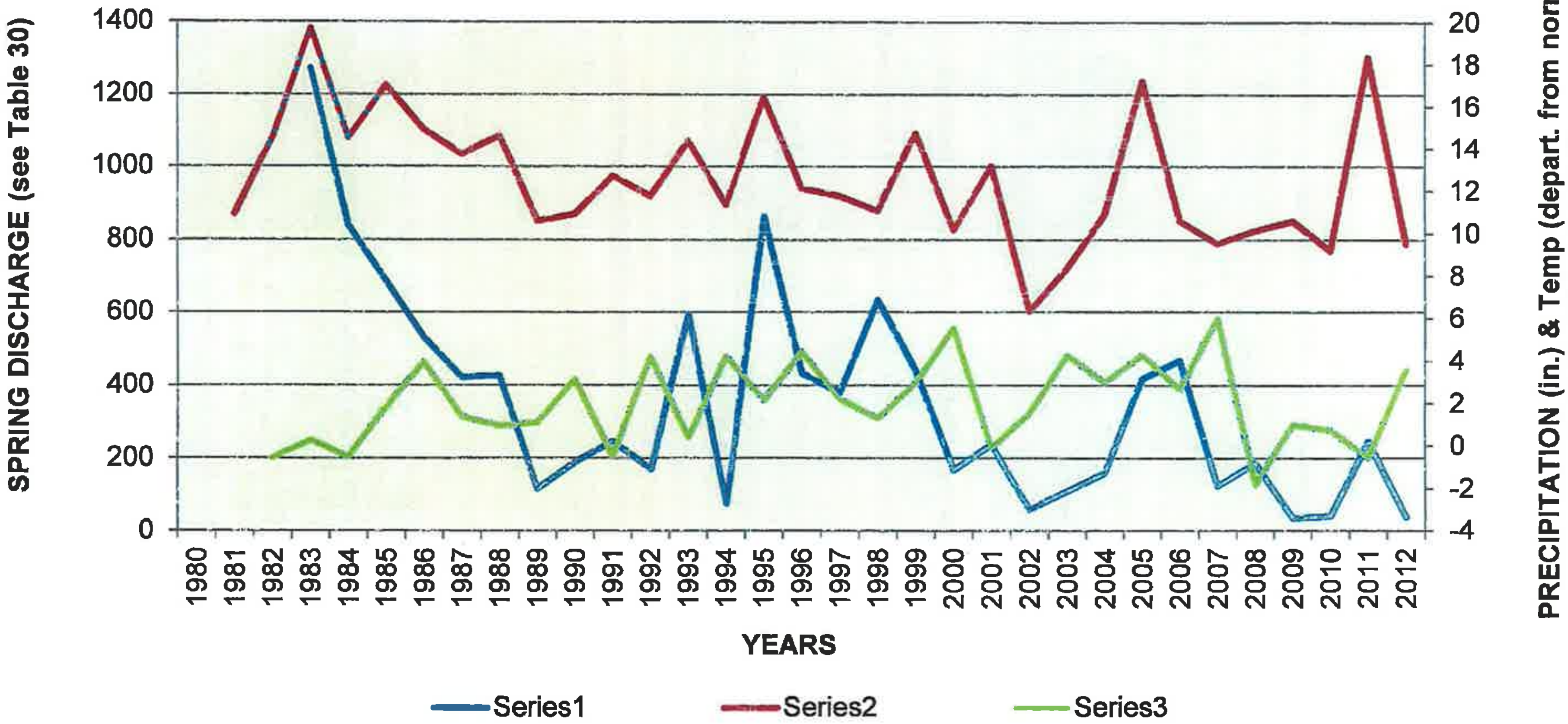


FIGURE 3b

EAST MOUNTAIN

SPRING DISCHAGE vs. PALMER DROUGHT INDEX

(Palmer Data - Averge of Region 4 & 5)

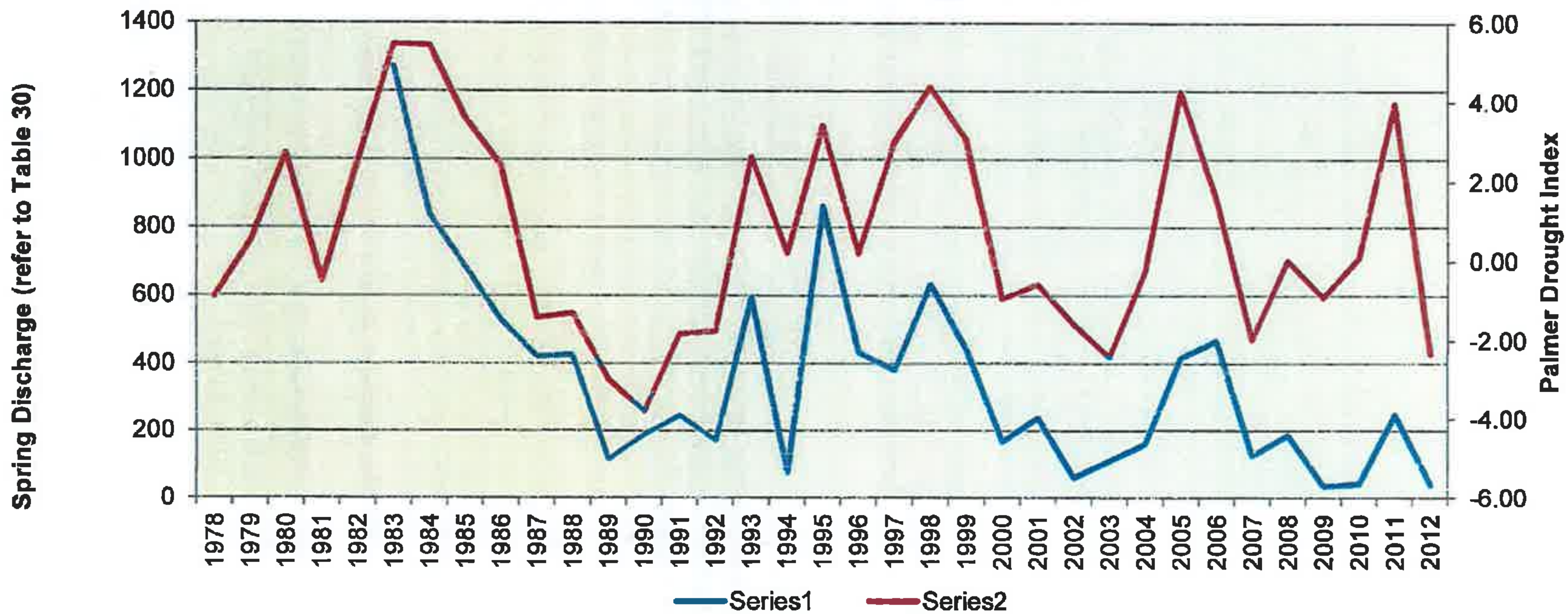


FIGURE 3c
TRAIL MOUNTAIN
SPRING DISCHAGE vs. PALMER DROUGHT INDEX
(Palmer Data - Averge of Region 4 & 5)

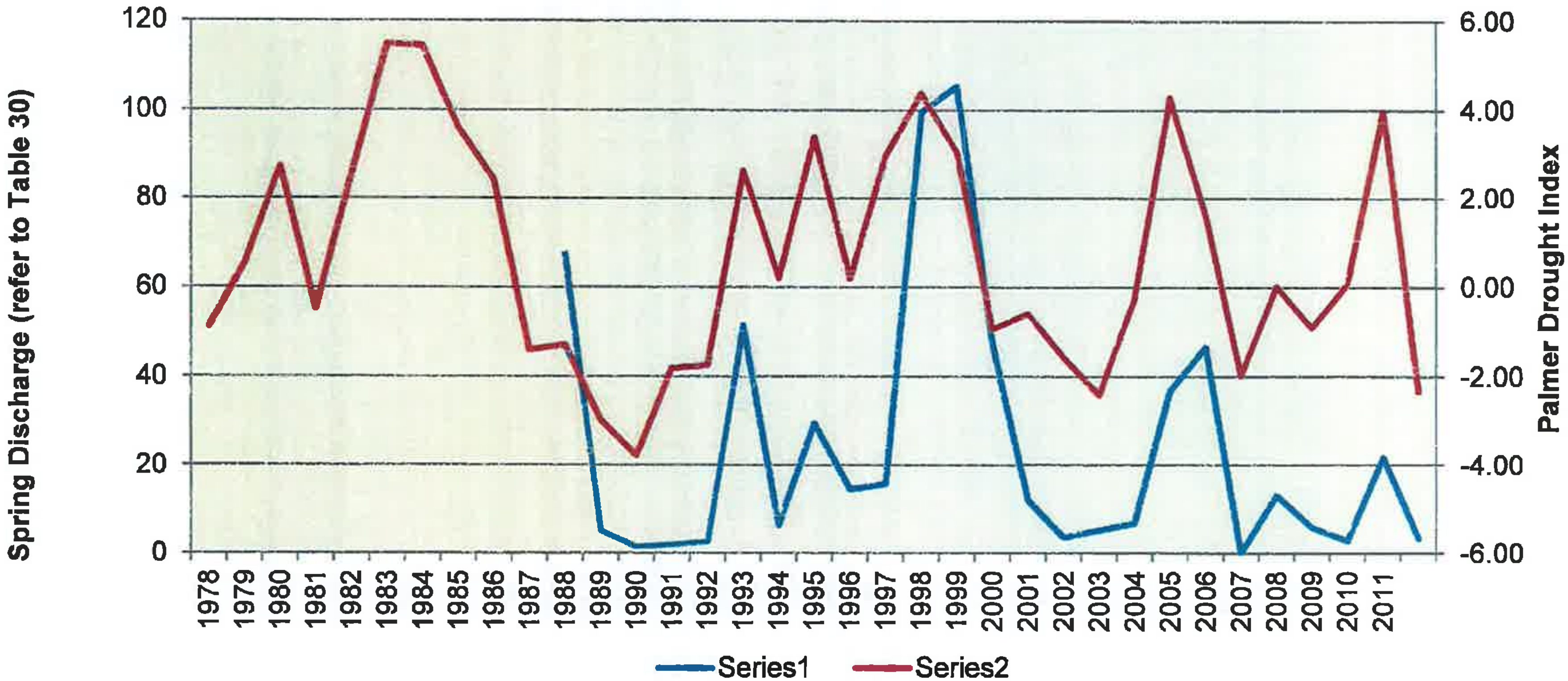
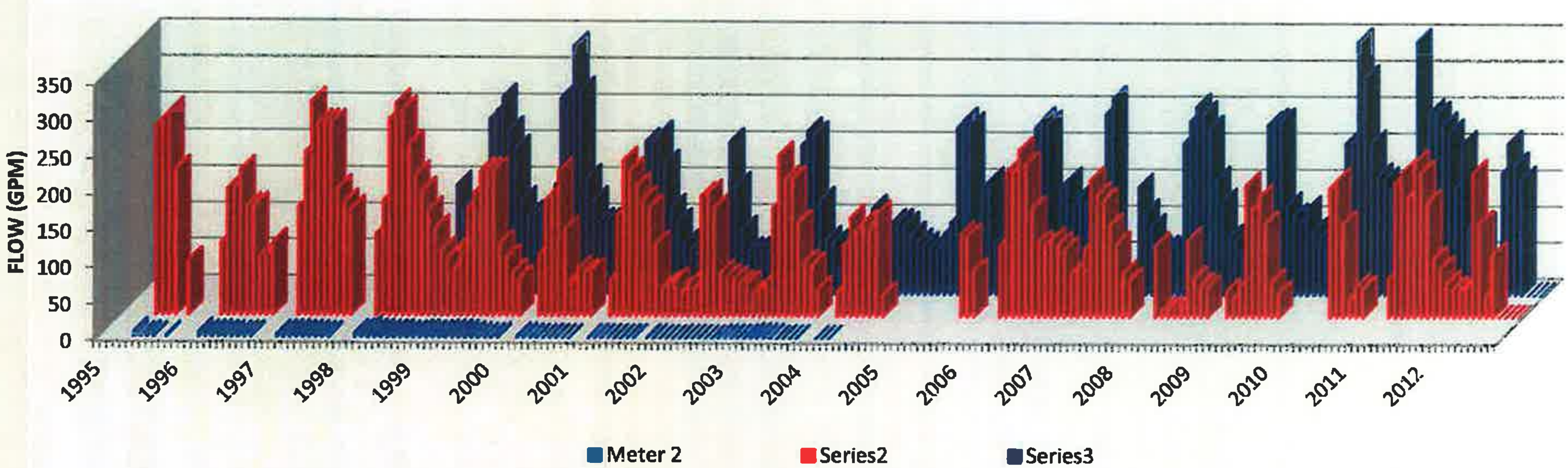


FIGURE 4a

NORTH EMERY WATER USERS SPECIAL SERVICES DISTRICT
RILDA CANYON SPRINGS



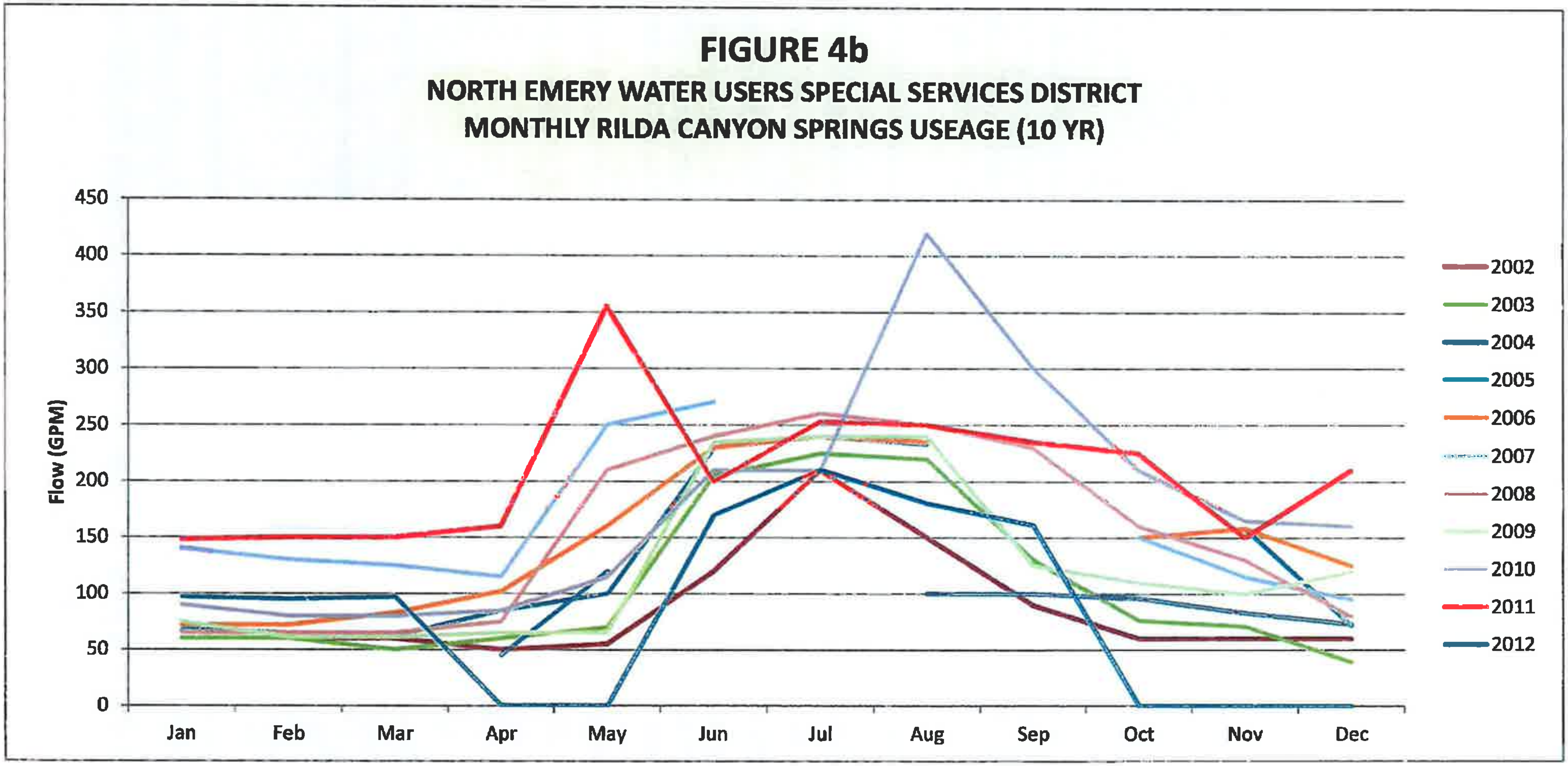


FIGURE 4b
NORTH EMERY WATER USERS SPECIAL SERVICES DISTRICT
MONTHLY RILDA CANYON SPRINGS USEAGE (10 YR)
Flow (GPM)
450
400
350
300
250
200
150
100
50
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012

FIGURE 4c

CASTLE VALLEY SPECIAL SERVICES DICTRICT
MONTHLY LITTLE BEAR SPRING USEAGE (10 YR)

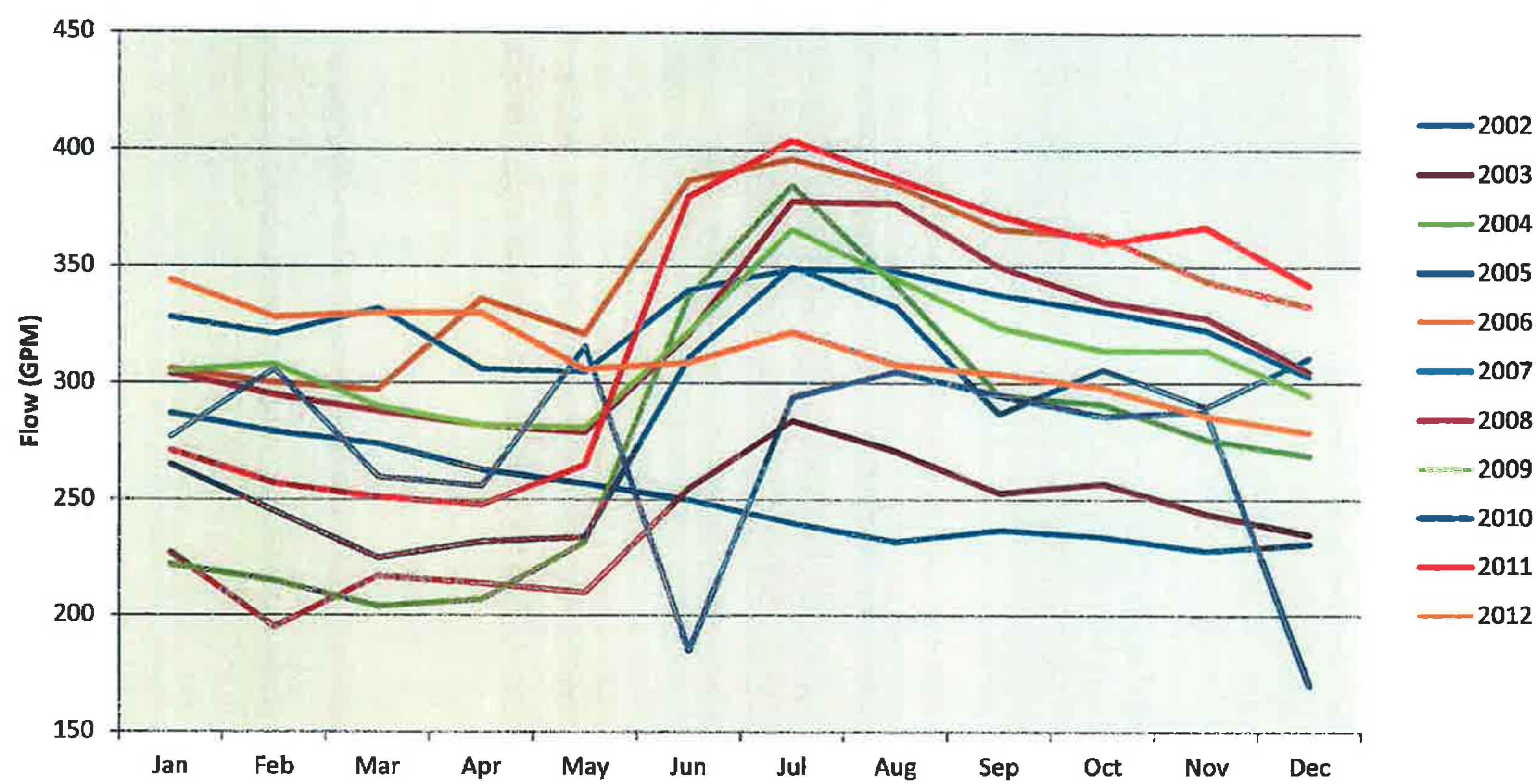
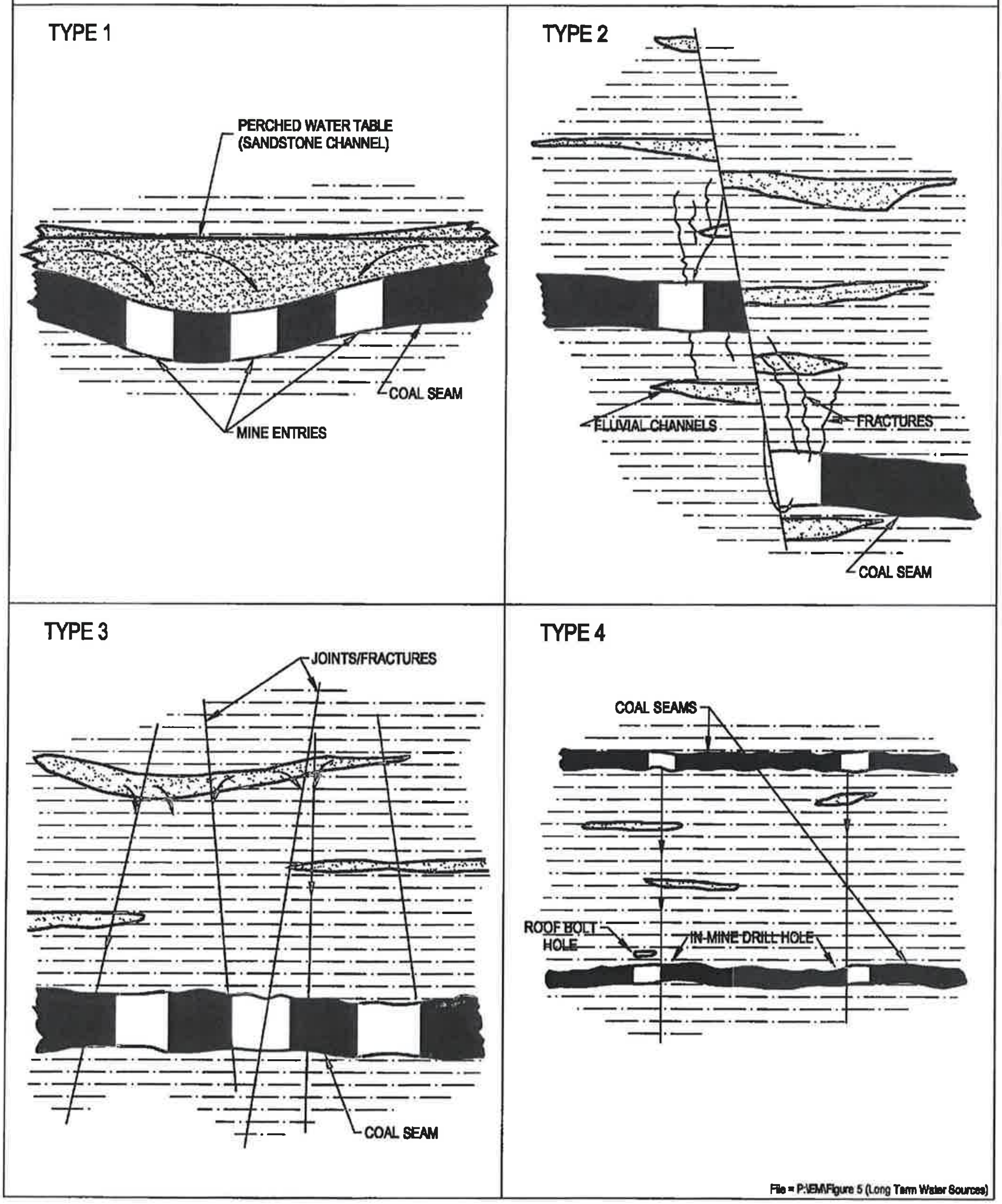


FIGURE 5
LONG TERM WATER SOURCES



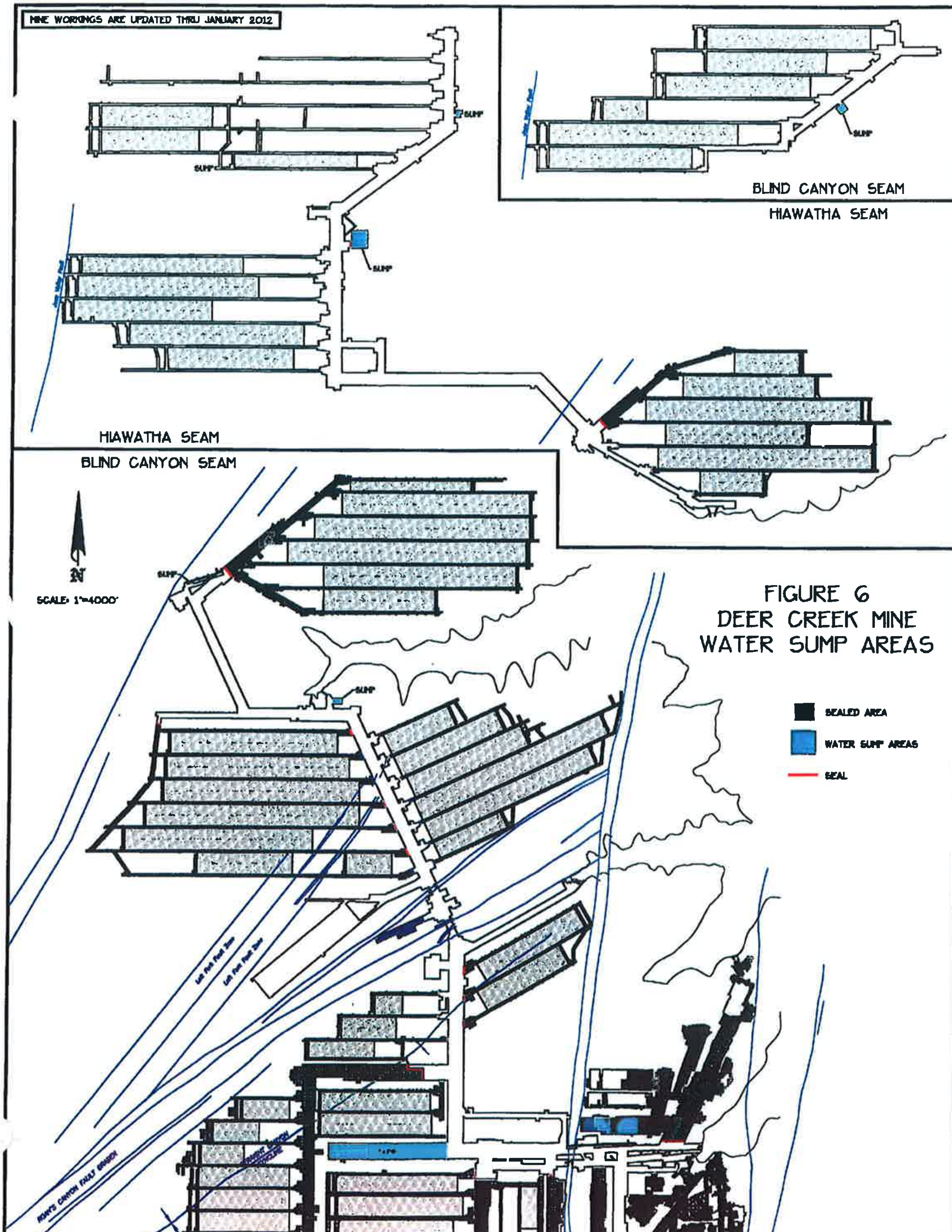


FIGURE 6
DEER CREEK MINE
WATER SUMP AREAS

FIGURE 7
DEER CREEK MINE
2012 MINE WATER DISCHARGE

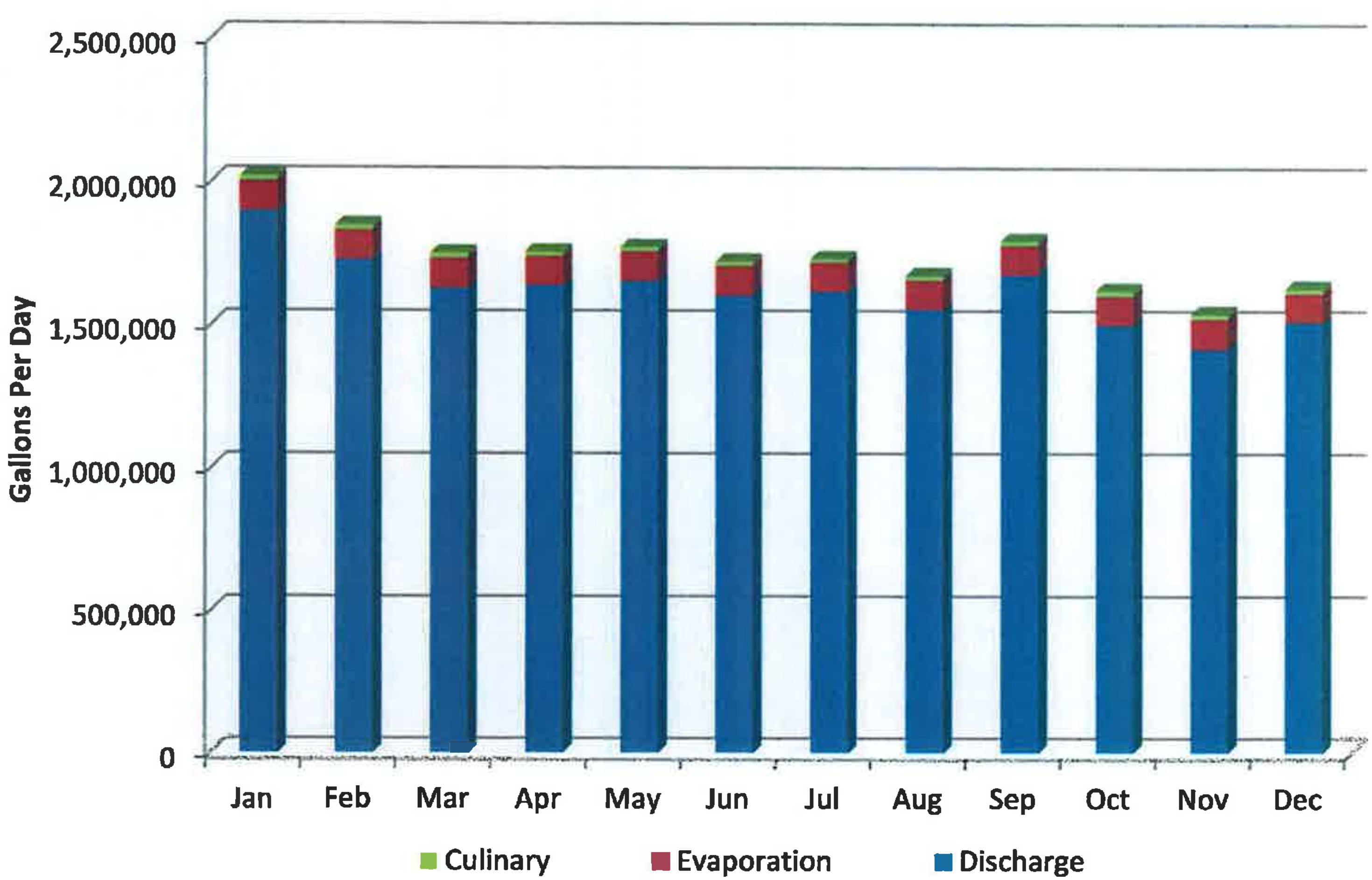
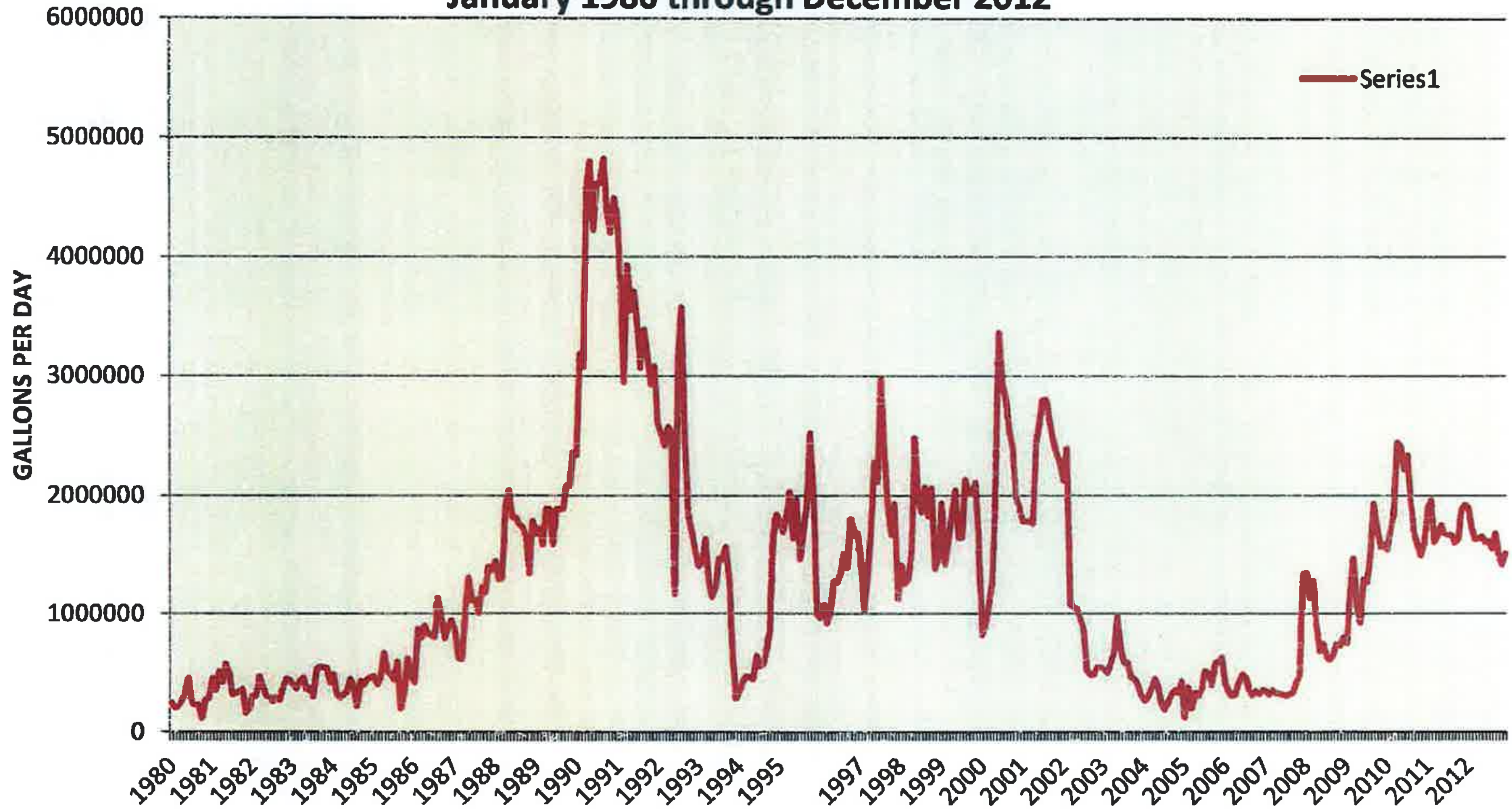


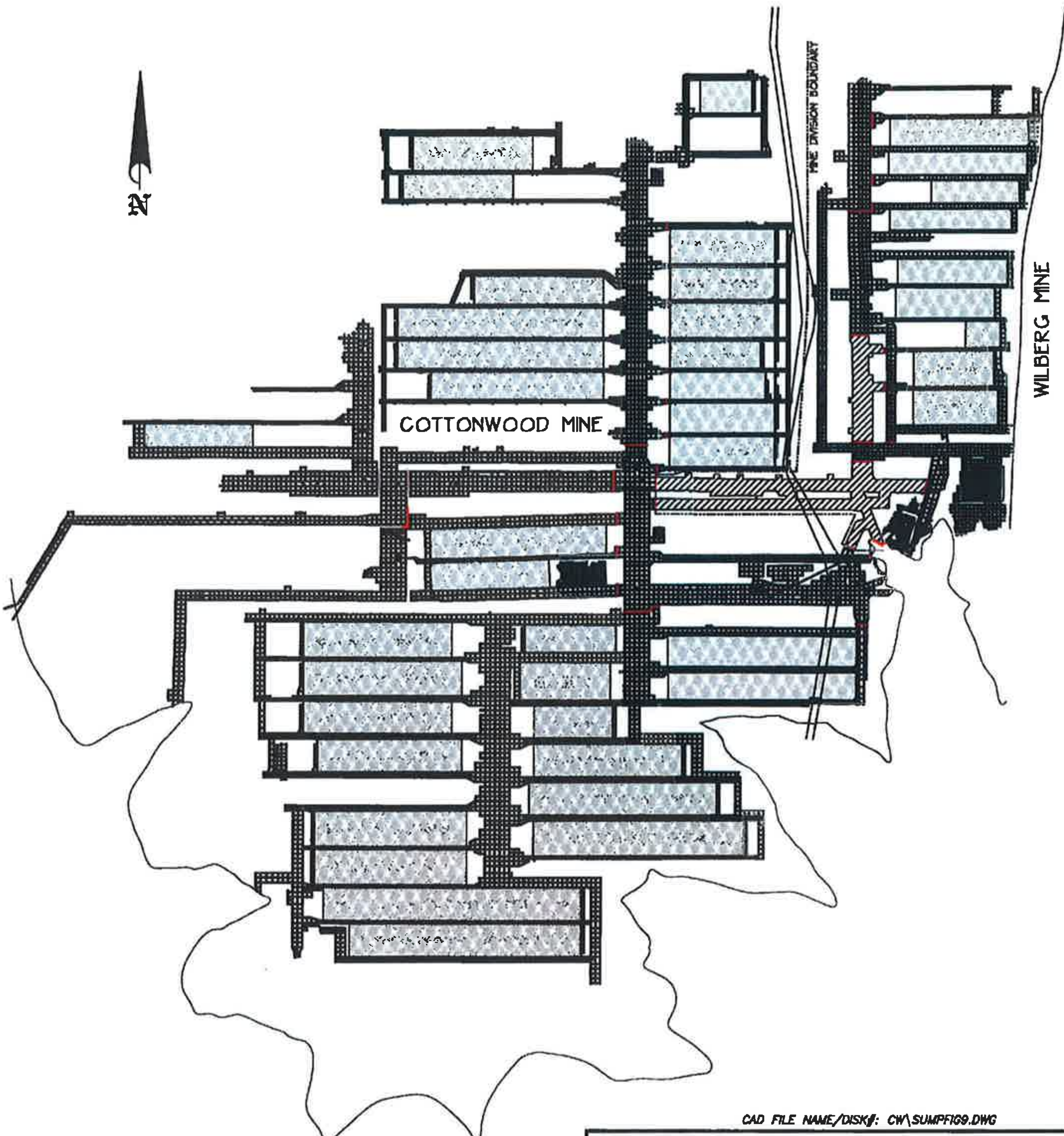
FIGURE 8

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

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

COTTONWOOD/WILBERG MINE
WATER SUMP AREAS

DRAWN BY: K. LARSEN	FIGURE 9	
SCALE: 1" =3000'	DRAWING #:	
DATE: FEBRUARY 16, 2012	SHEET 1 OF 1	REV.

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

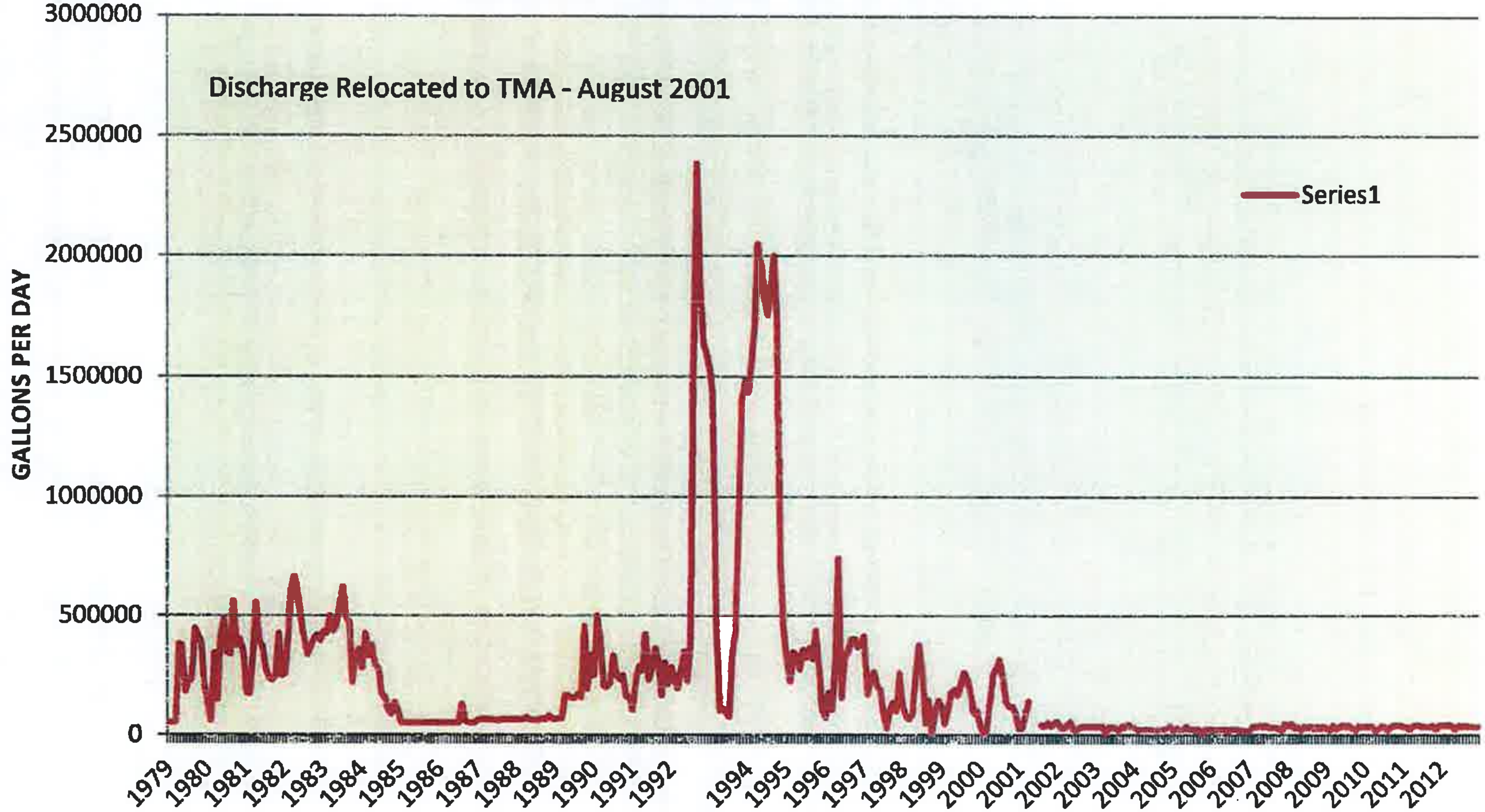
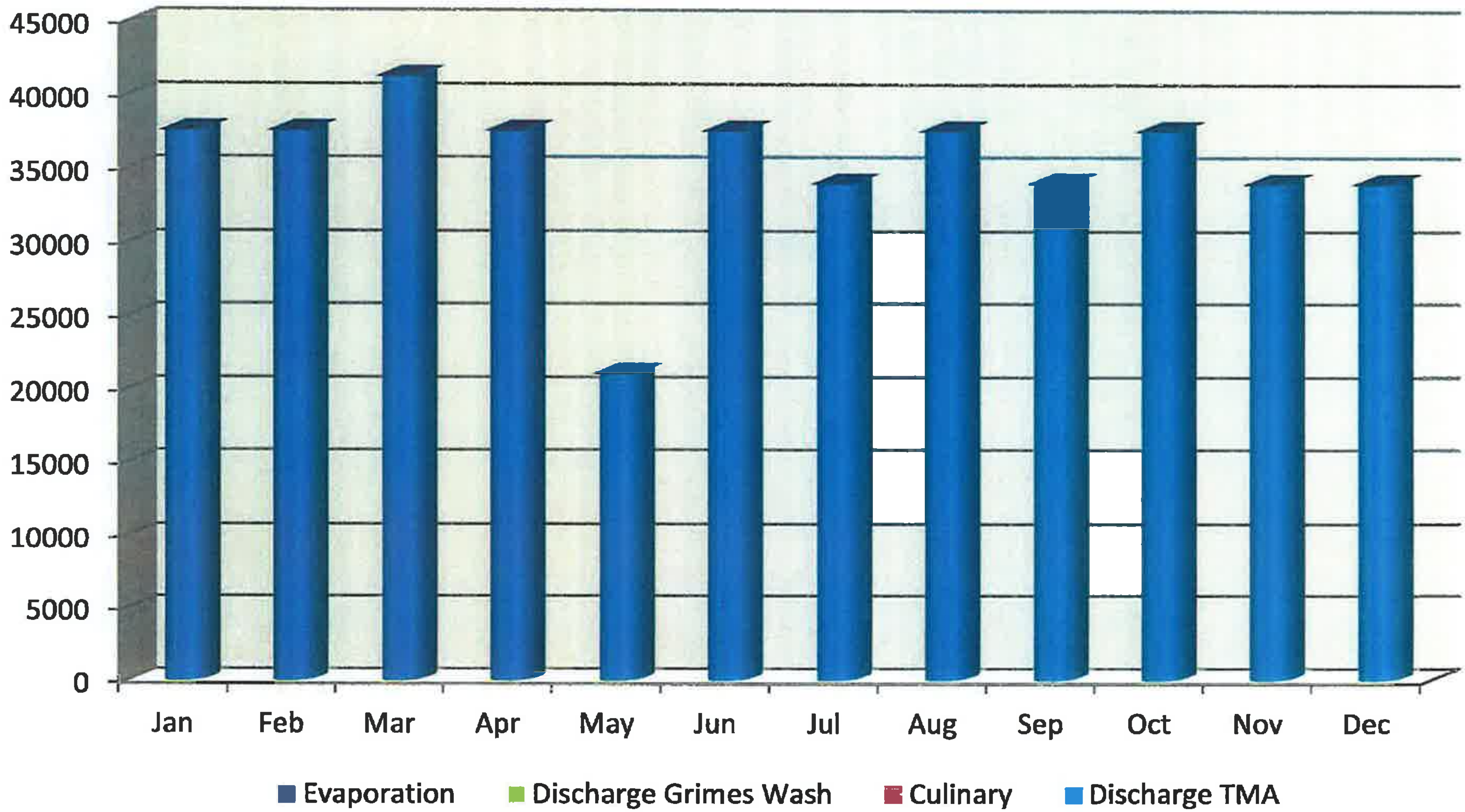


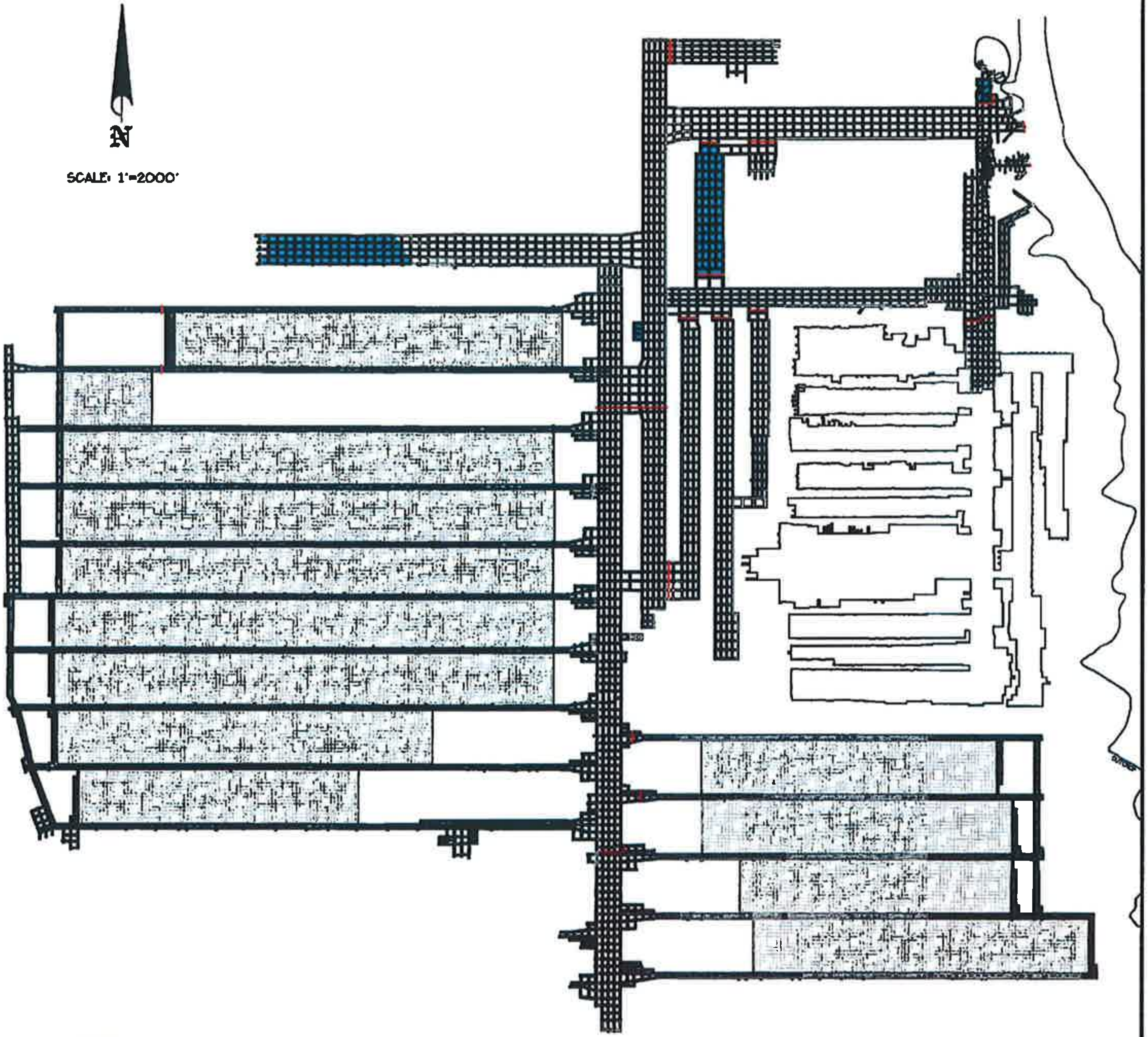
FIGURE 11

WILBERG/COTTONWOOD
2012 MINE WATER DISCHARGE



N

SCALE: 1"=2000'



SEALED AREA

WATER SUMP AREAS

SEAL

MINE SEALED APRIL 2001
WORKINGS ARE UPDATED TO APRIL 2001

CAD FILE NAME/DISK#: SUMP12.DWG

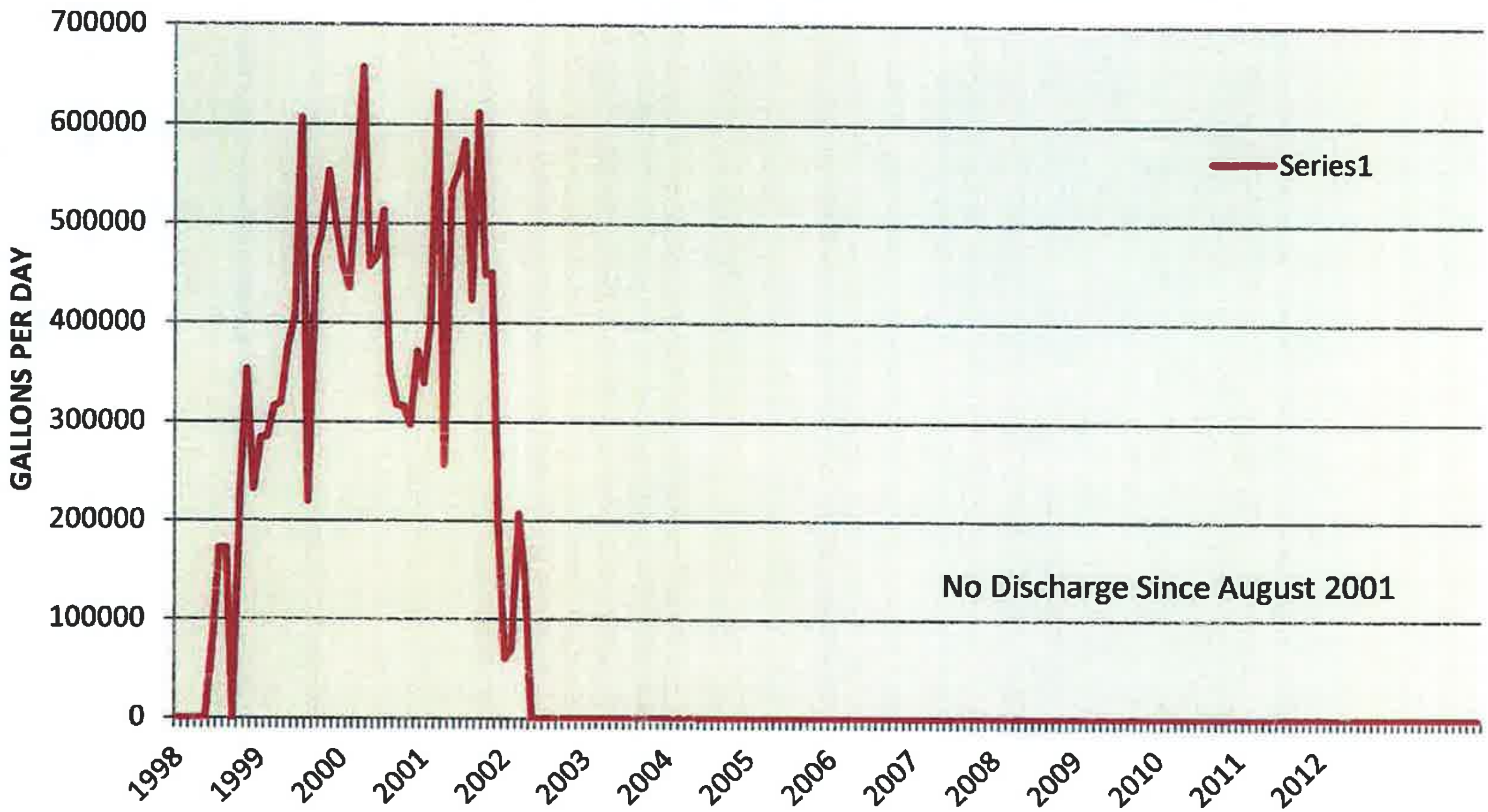
ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

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	

LEGEND

MONITORING WELL	PACIFICORP EAST/TRAIL MOUNTAIN PROPERTY BOUNDARY
DRAINAGE DIVIDE	PERMIT AREA BOUNDARY
UPDES DISCHARGE LOCATION (UT-0022896-002)	FAULT (DASHED WHERE INFERRED)
TYPICAL GROUND WATER MOVEMENT	WATER MONITORING STATION WITH FLUME
GAS WELL	WATER MONITORING STATION

STATE OF UTAH REFERENCE NUMBER 5234167-2250 CHARLES A. SEMBORSKI LICENSED PROFESSIONAL GEOLOGIST

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

HM-1

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

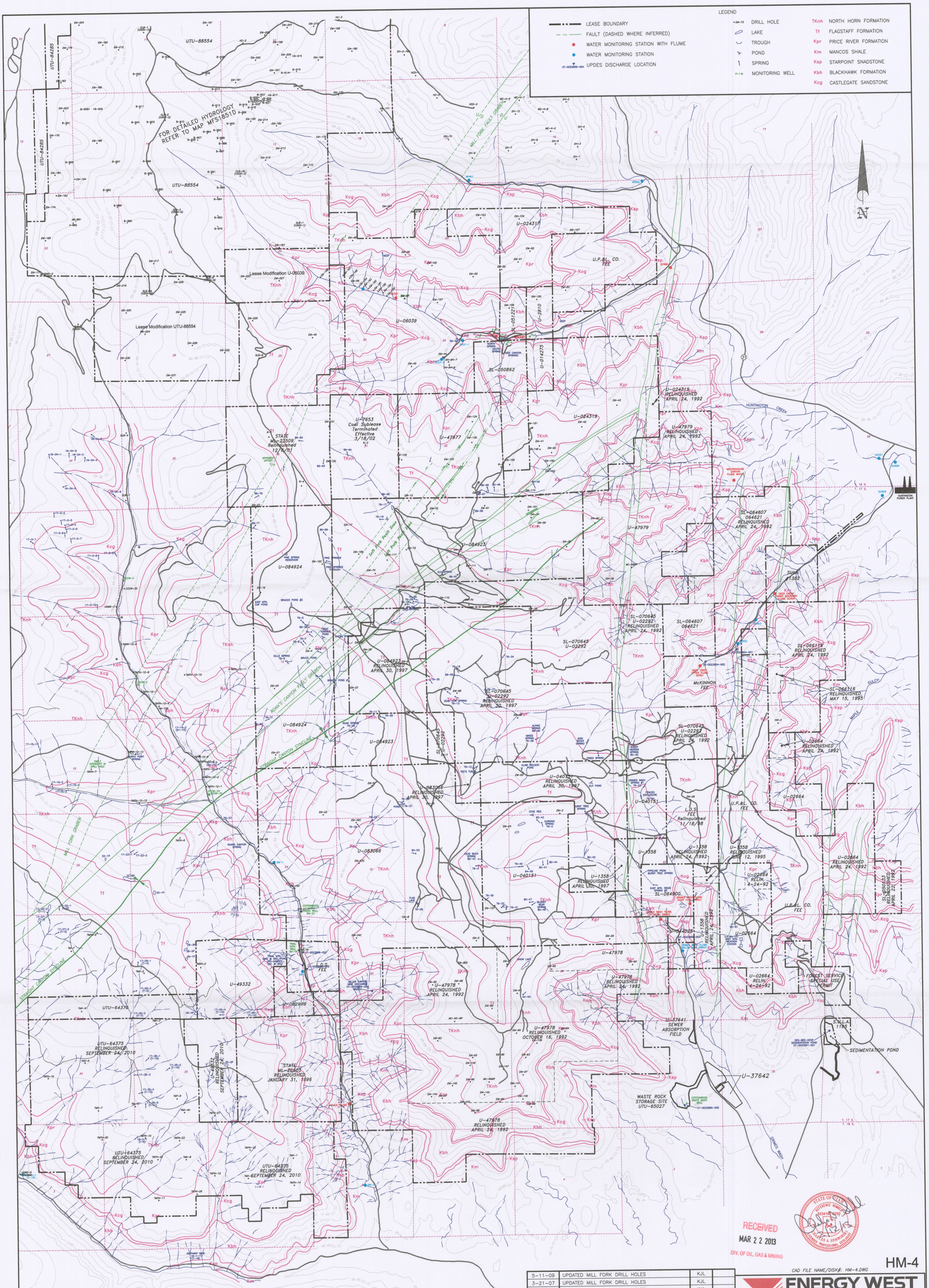
ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY HYDROLOGY DATA MAP

DRAWN BY: K. LARSEN	CE-10478-EM	
SCALE: 1" =2000'	DRAWING #:	
DATE: JANUARY 31, 2013	SHEET 1 OF 1	REV. ___


LEGEND
LEASE BOUNDARY
U-024317 LEASE NUMBERS
FAULT (DASHED WHERE INFERRED)
SANDSTONE CHANNELS
EM-182 DRILL HOLES
SECTION LINES
23 SECTION NUMBERS
N
STATE ML-21568
U-68082
SL-062648
U-54762
UTU-77975
UTU-84285
UTU-88554
UTU-88990
U-78953
U-46484
U-024317
U-06039
SL-051221
U-2810
U.P.&L. CO. FEE
Lease Modification U-06039
Lease Modification UTU-88554
PROJECTED MILL FORK CANYON FAULT ZONE
JOES VALLEY FAULT
R. 6 E.
R. 7 E.
RECEIVED
MAR 2 2 2013
DIV. OF OIL, GAS & MINING
CAD FILE NAME/DISK#: HM-2A.DWG
HM-2A
ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP
EAST MOUNTAIN PROPERTY
HIAWATHA COAL SEAM
IN-MINE WATER MONITORING LOCATIONS
DRAWN BY: K. LARSEN
SCALE: 1" =1000'
DATE: FEBRUARY 1, 2013
CE-10908-DR
SHEET 1 OF 1
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 CHK

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	



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

STATE OF UTAH
REFERENCE NUMBER 5234167-2250
CHARLES A. SEMBORSKI
LICENSED PROFESSIONAL GEOLOGIST

HM-4

DATE	REVISIONS	BY	CHK
2-7-2013	ADDED LEASE MODIFICATIONS UTU-88554 AND U-06039 ALSO ADDED 2012 DRILL HOLES	KJL	
2-17-2012	CHANGED LEASE ML-48258 TO UTU-88554 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 LEASE RELINQUISHMENT AND UPDATED DRILL HOLES	KJL	

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	

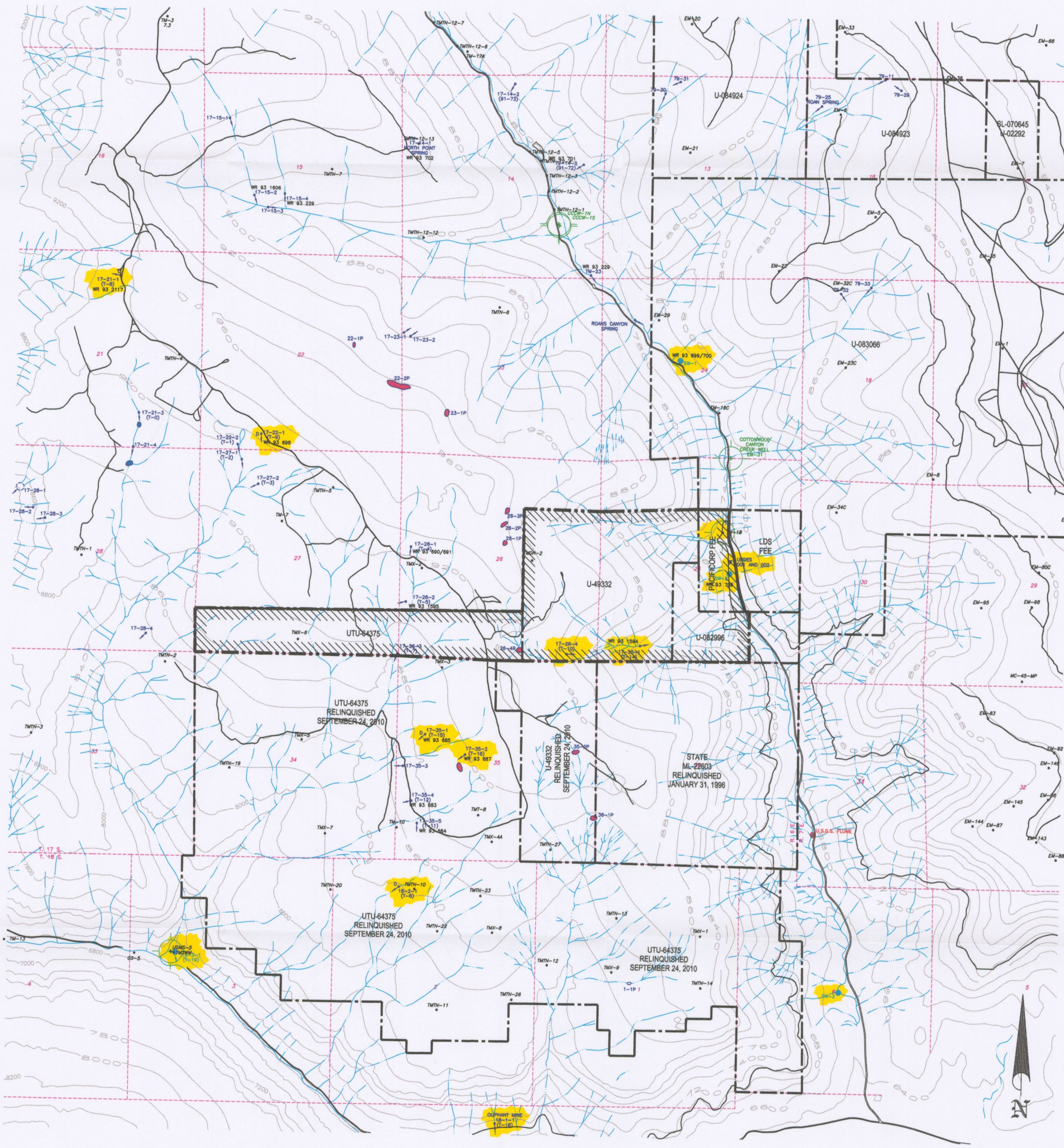
CAD FILE NAME/DISK#: HM-4.DWG

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

SPRING MAP

DRAWN BY: K. LARSEN
SCALE: 1"=2000'
DATE: FEBRUARY 7, 2013
DRAWING #: CE-10404-EM
SHEET 1 OF 1 REV. ___

CRANDALL CREEK SUB-DRAINAGE
INDIAN CREEK SUB-DRAINAGE
HUNTINGTON DRAINAGE
MILL FORK SUB-DRAINAGE
COTTONWOOD DRAINAGE
FLAT CANYON SUB-DRAINAGE
RILDA CANYON SUB-DRAINAGE
MARINUS CANYON SUB-DRAINAGE
EAST MANTI LA SAL NATIONAL FOREST
U-68082
STATE ML-21569
SL-062648
STATE ML-21568
UTU-88554
U-78953
UTU-88990
U-06039
Intermountain Power Agency 50%
Andalex Resources 50%
Lease Modification U-06039
Lease Modification UTU-88554
STATE ML-22509 Relinquished 12/6/01
JOES VALLEY FAULT
FLAT CANYON ANTICLINE
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 2 2 2013
DIV. OF OIL, GAS & MINING
STATE OF UTAH
REFERENCE NUMBER
5234167-2250
CHARLES A. SEMBORSKI
LICENSED PROFESSIONAL GEOLOGIST
SPRING LEGEND
MFB02 SURFACE WATER MONITORING LOCATION
SPRING LOCATAION (1994–1995 SURVEY)
GPS LOCATED 2000
GPS LOCATED 2001
GPS LOCATED 2002
GPS LOCATED 2010–2011
17–3–2 TRAIL MOUNTAIN SPRINGS
SPRING LOCATION (1992 SURVEY)
SPRING MONITORING LOCATION (ENERGY WEST)
93-2139 GROUND WATER RIGHTS
93-198 SURFACE WATER RIGHTS
SPRING LOCATION (1991 SURVEY)
SPRING LOCATION (1989–1990 SURVEY)
SPRING LOCATION (1987 SURVEY)
SPRING LOCATION (1985 SURVEY)
MONITORING LOCATIONS (GENWAL RESOURCES)
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)
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
SCALE: 1"=1000'
DATE: OCTOBER 18, 2012
DRAWING #: MFS1851D
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
- 17-35-1 (T-15) WR 93 685 — SPRING: TOWNSHIP-SECTION-SPRING NO. (MTN. COAL I.D.) WATER RIGHTS NO.
- WATER MONITORING STATION WITH FLUME
- WATER MONITORING STATION
- UT-0022896-004 — UPDES DISCHARGE LOCATION
- P-1 — 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
- 17-35-1 (T-15) WR 93 685 — SPRING OR WATER MONITORING LOCATION (ENERGY WEST)

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

LICENSED PROFESSIONAL ENGINEER
JOHN CHRISTENSEN
1/13/13
No. 165651
STATE OF UTAH

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	TMS1450C
SCALE: 1"=2000'	DRAWING #:
DATE: FEBRUARY 7, 2013	SHEET 1 OF 1 REV.

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
SHEET 1 OF 1
HM-5
CAD FILE NAME/DISK#: HM-5-2013
RECEIVED
MAR 2 2 2013
DIV. OF OIL, GAS & MINING
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 HIAWATHA COAL SEAM (INCLUDES 5 YEAR MINE PLAN)
OUTCROP
SPRING
GAS WELL
DRILL HOLE
EAST MANTI-LA SAL NATIONAL FOREST
Lease Modification U-06039
Mining in Lease Modifications Pending R2P2
Lease Modification UTU-88554
Mining in Lease Modifications Pending R2P2
UTU-88554
U-68082
STATE ML-21569
STATE ML-21568
SL-062648
U-54762
UTU-77975
UTU-84285
UTU-88990
U-78953
U-06039
STATE ML-22509 Relinquished 12/6/01
Intermountain Power Agency 50%
Andalex Resources 50%
JOES VALLEY FAULT
Indian Creek
Indian Creek Campground
Guard Sta
Pack Trail
Crandall
Prospect
Mill Fork
TRAIL MOUNTAIN
Drill Hole
PROPOSED GAS WELL
FLAT CANYON #1
TROUGH SPRING
GRANTS SPRING
SLUMP BASIN

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
Avg. cfs	**6.7**	**6.5**	**6.9**	**9.3**	**29.3**	**26.7**	**26.4**	**25.6**	**23.7**	**20.2**	**9.2**	**10.2**	
Total Acre-Ft	**409**	**376**	**421**	**555**	**1799**	**1588**	**1619**	**1571**	**1405**	**1237**	**545**	**624**	

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

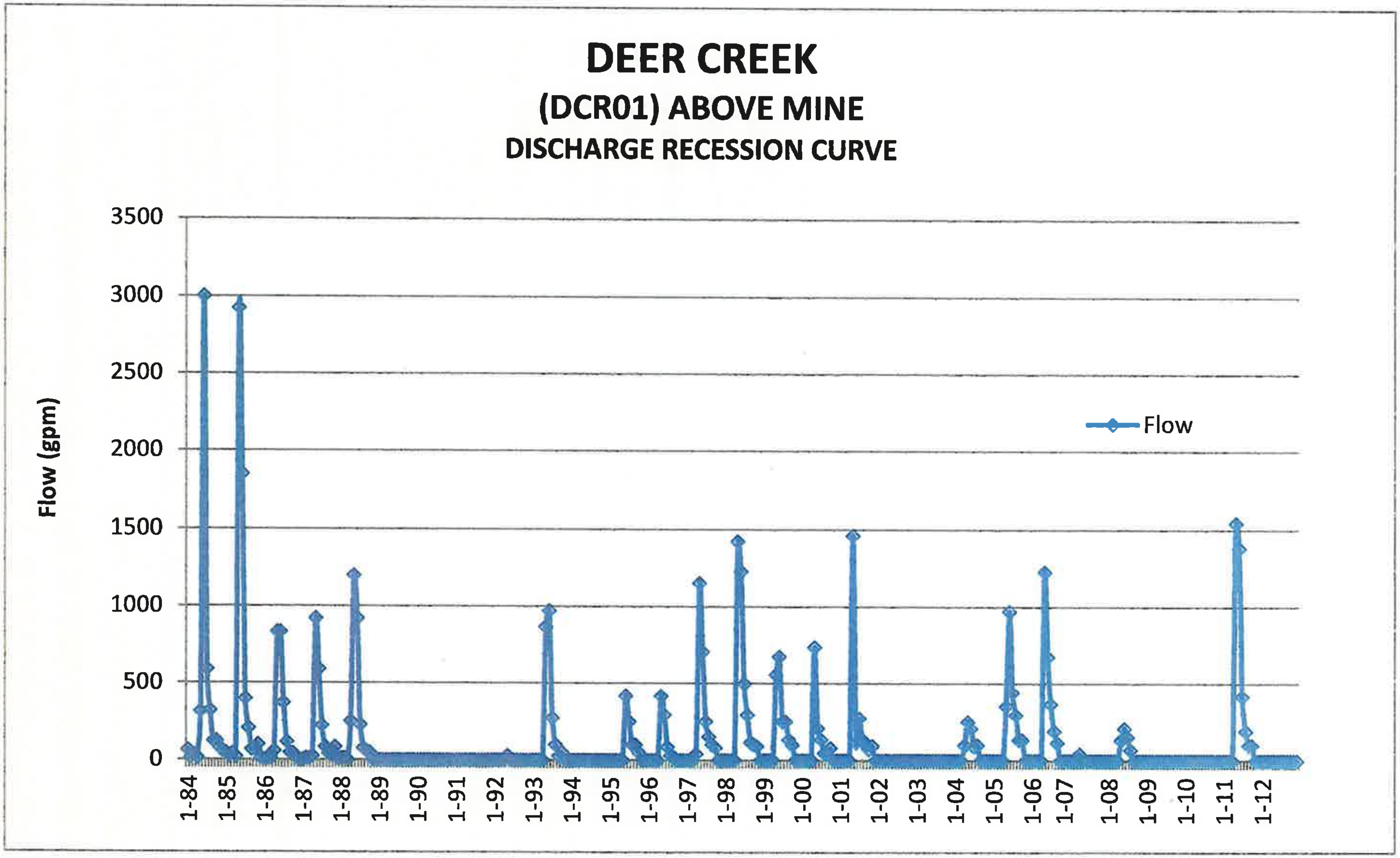
2012 -Water Flows above Huntington Power Plant (in cfs) - 2012

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			58.1	14.8	16.5	6
7	19.4	11.6	16.6	33.4	101.2	94.0	102.0		83.8	58.9	12.4	15.0	7
8	15.4	16.7	15.2	33.7	105.6	92.1	84.6		93.1	58.9	24.4	15.0	8
9	21.6	15.3	15.5	39.0	115.6	91.9	86.9		97.8	55.5	13.9	14.0	9
10	17.9	14.0	16.9	48.7	119.7	93.5	80.9		104.3	51.9	12.2	14.0	10
11	18.7	13.6	18.1	53.8	124.2	90.2	80.1		83.9	50.1	10.0	13.0	11
12	7.6	14.3	14.9	54.4	116.1	85.9	75.9		58.4	55.7	8.3	13.0	12
13	15.0	14.1	20.7	45.7	115.7	85.3	78.4		58.8	51.0	9.5	12.0	13
14	19.2	14.1	20.2	43.4	115.5	84.6	83.9		58.1	49.4	10.7	12.0	14
15	17.5	13.8	22.8	41.9	126.9	79.9	88.4		61.8	49.7	9.7	11.0	15
16	21.2	13.8	24.5	38.2	131.9	78.2	87.2		63.2	66.5	9.9	11.0	16
17	9.1	13.7	25.1	40.6	129.4	78.4	80.9		63.5	55.4	9.3	10.0	17
18	17.8	12.9	22.9	40.6	128.5	79.7	56.9		63.8	47.7	9.5	10.0	18
19	25.4	17.6	20.1	51.8	123.7	80.3	54.1		61.3	44.8	9.4	9.0	19
20	21.6	14.6	19.1	51.3	117.7	81.1	55.4		54.8	38.5	9.0	15.0	20
21	20.0	14.7	19.0	62.0	117.8	87.3	63.0		48.6	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.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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 RECESSION CURVE
Flow (gpm)
3500
3000
2500
2000
1500
1000
500
0
Flow
1-84
1-85
1-86
1-87
1-88
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
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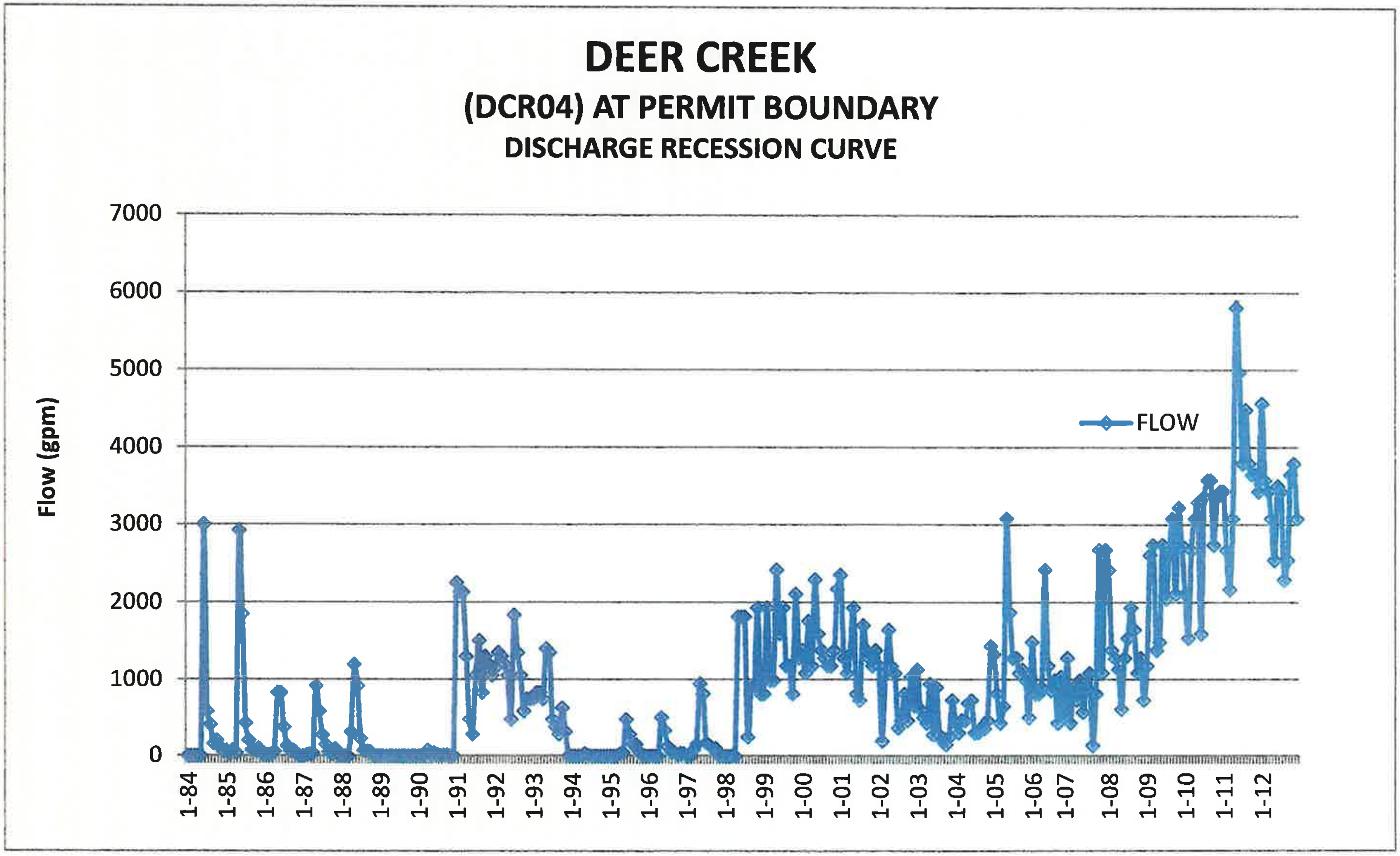
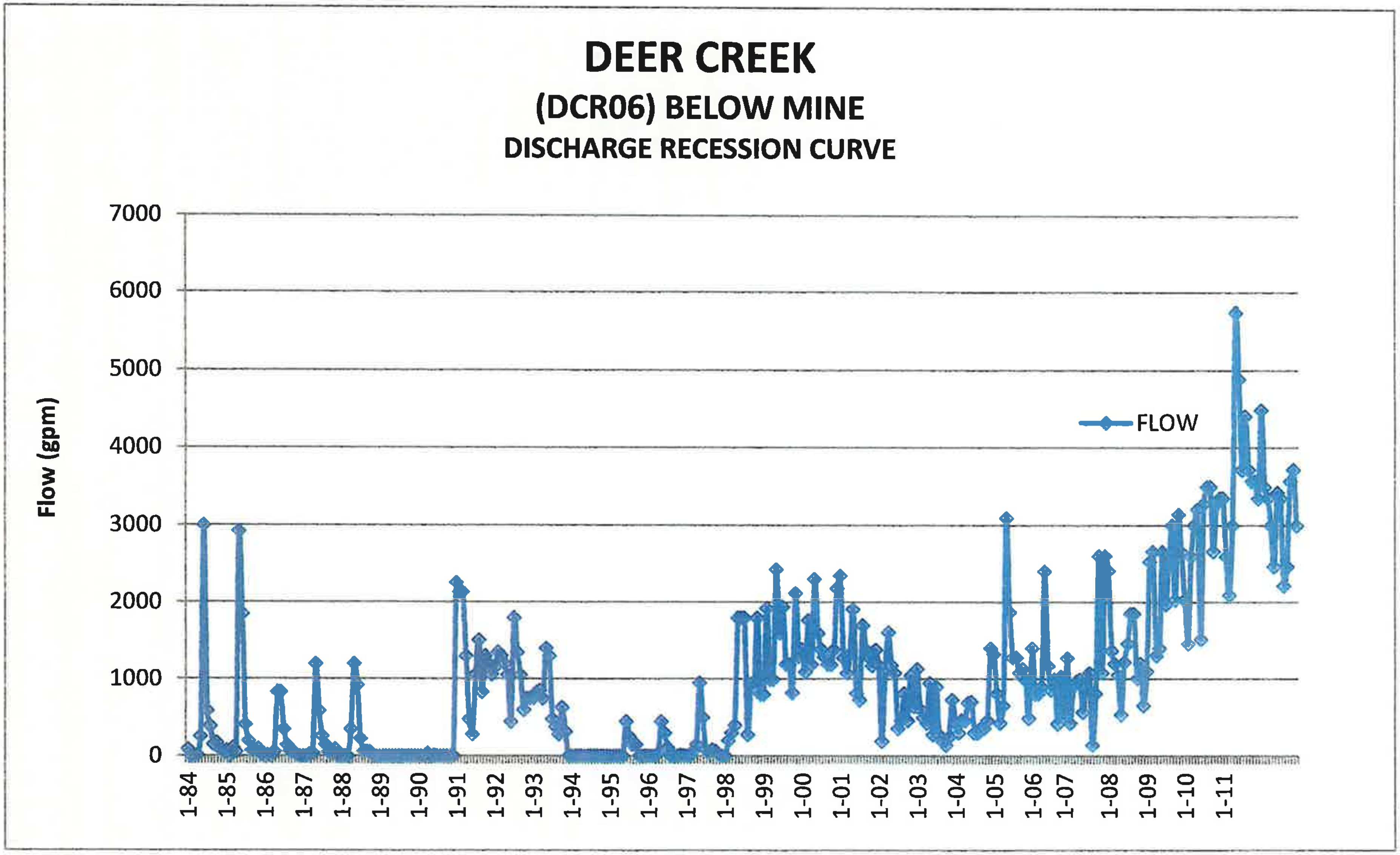
1-10
1-11
1-12


DEER CREEK
(DCR04) AT PERMIT BOUNDARY
DISCHARGE RECESSION CURVE
Flow (gpm)
7000
6000
5000
4000
3000
2000
1000
0
1-84
1-85
1-86
1-87
1-88
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
1-01
1-02
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12
FLOW


DEER CREEK
(DCR06) BELOW MINE
DISCHARGE RECESSION CURVE
Flow (gpm)
7000
6000
5000
4000
3000
2000
1000
0
FLOW
1-84
1-85
1-86
1-87
1-88
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
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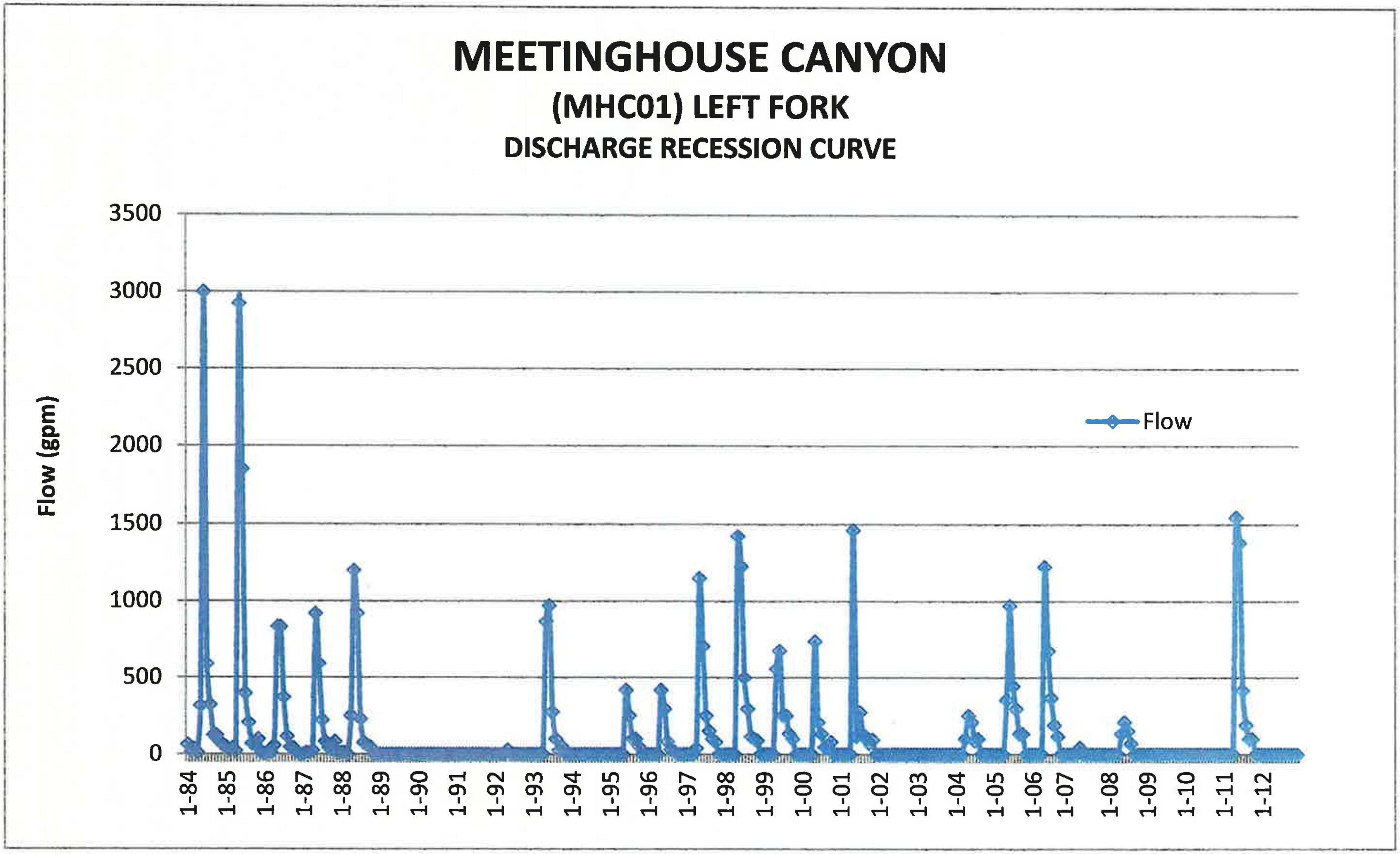
1-09
1-10
1-11


MEETINGHOUSE CANYON
(MHC01) LEFT FORK
DISCHARGE RECESSION CURVE
Flow (gpm)
3500
3000
2500
2000
1500
1000
500
0
Flow
1-84
1-85
1-86
1-87
1-88
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
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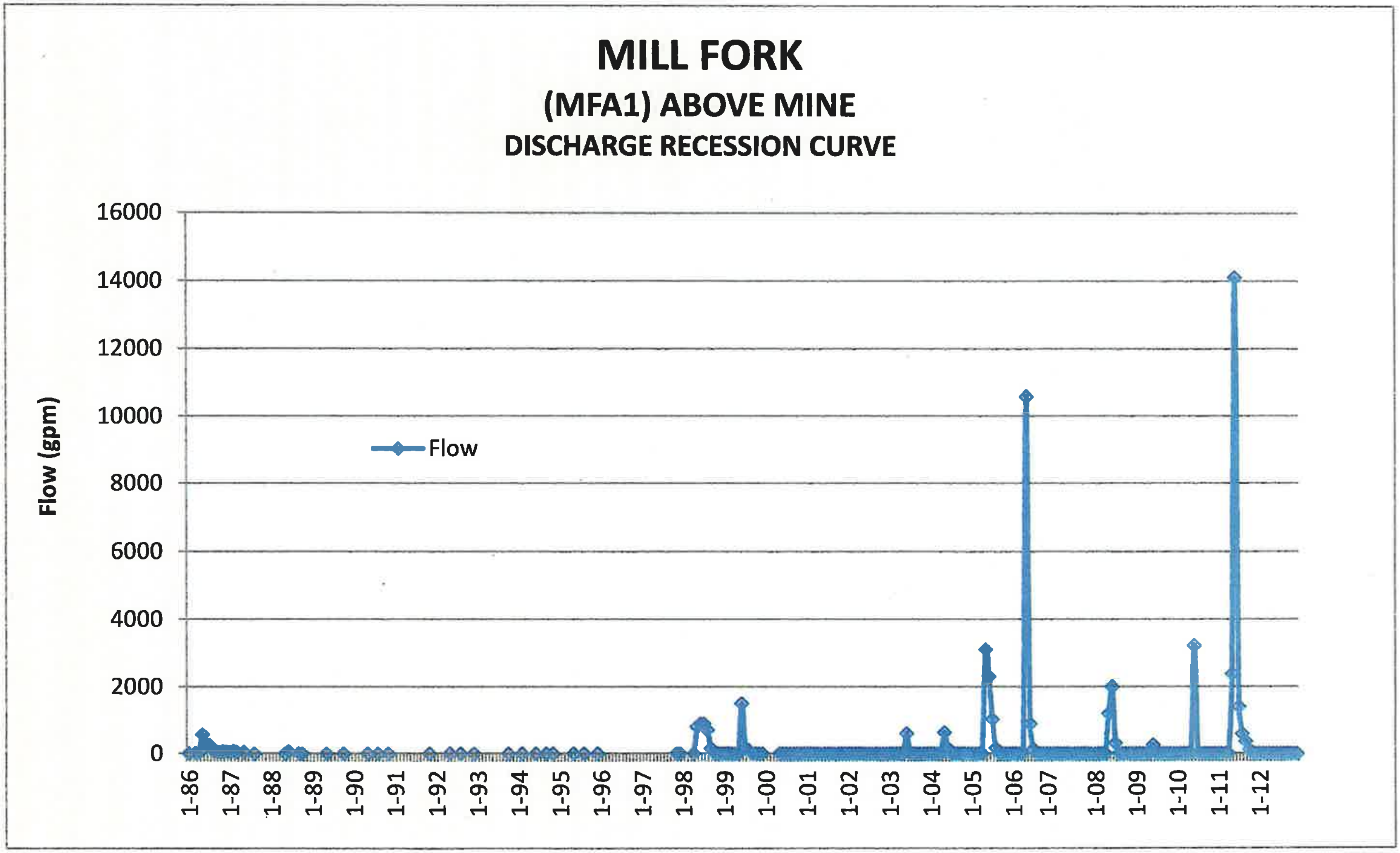
1-11
1-12


MILL FORK
(MFA1) ABOVE MINE
DISCHARGE RECESSION CURVE
Flow (gpm)
16000
14000
12000
10000
8000
6000
4000
2000
0
Flow
1-86
1-87
1-88
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
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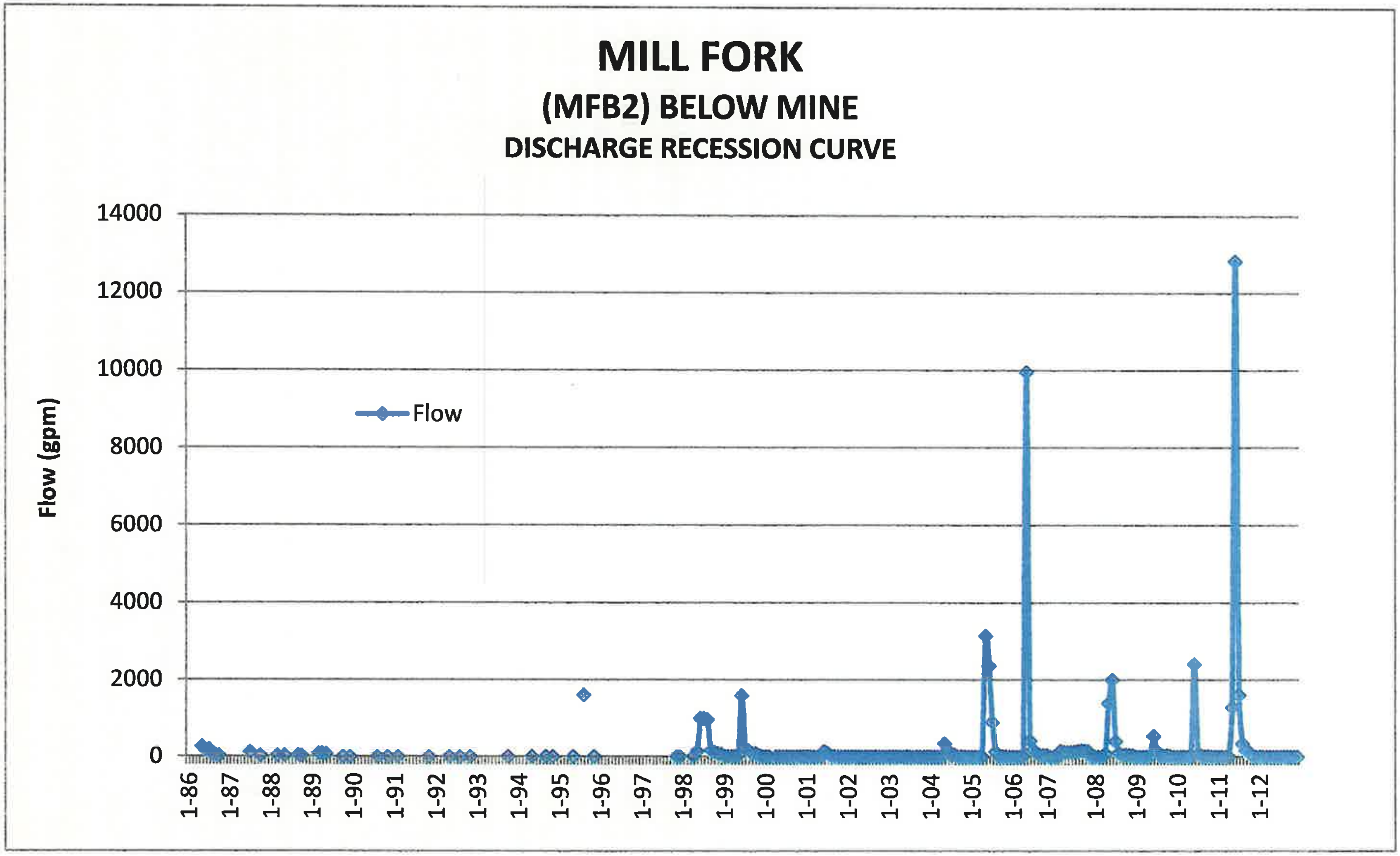
1-10
1-11
1-12


MILL FORK
(MFB2) BELOW MINE
DISCHARGE RECESSION CURVE
Flow (gpm)
14000
12000
10000
8000
6000
4000
2000
0
Flow
1-86
1-87
1-88
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
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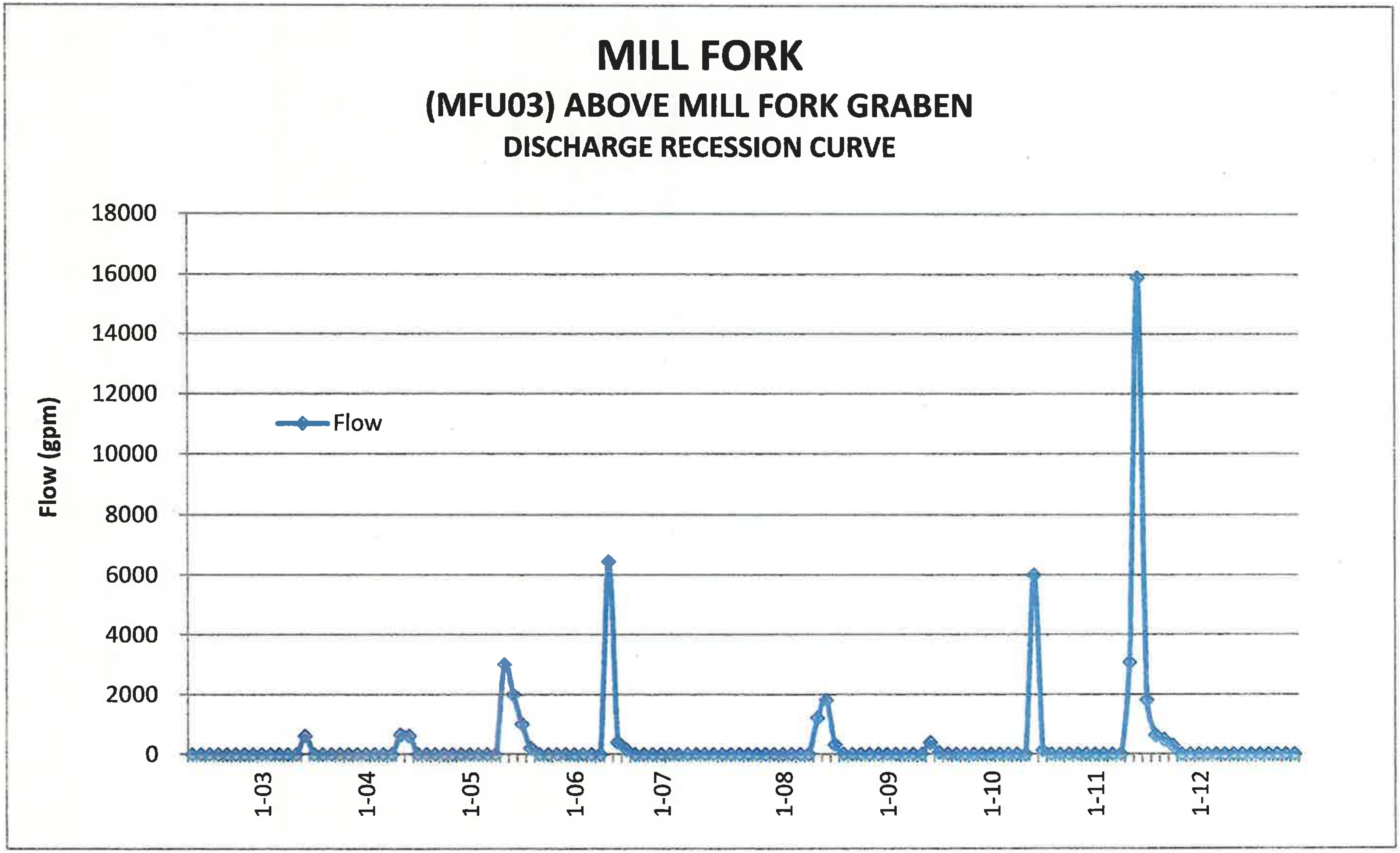
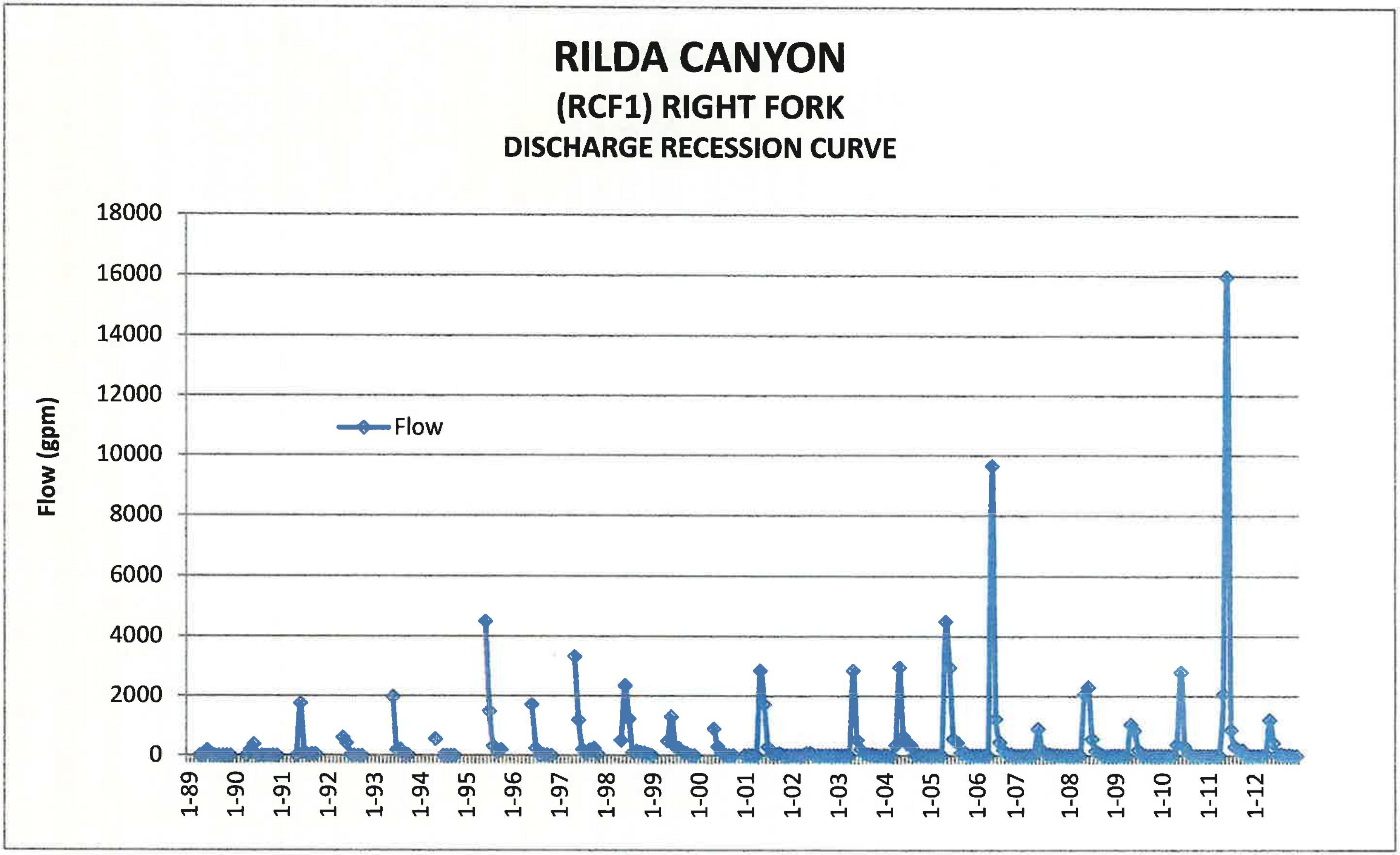
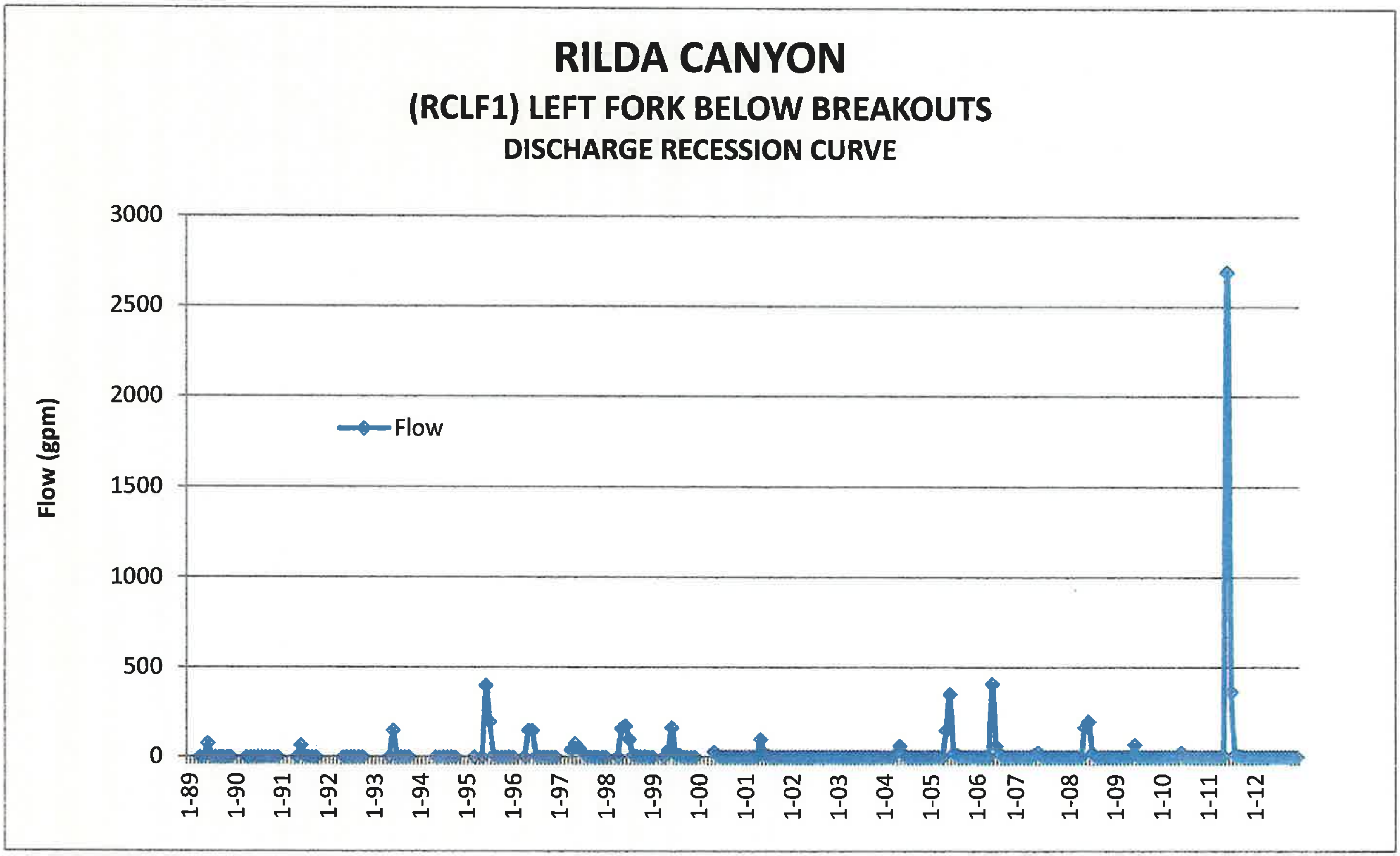
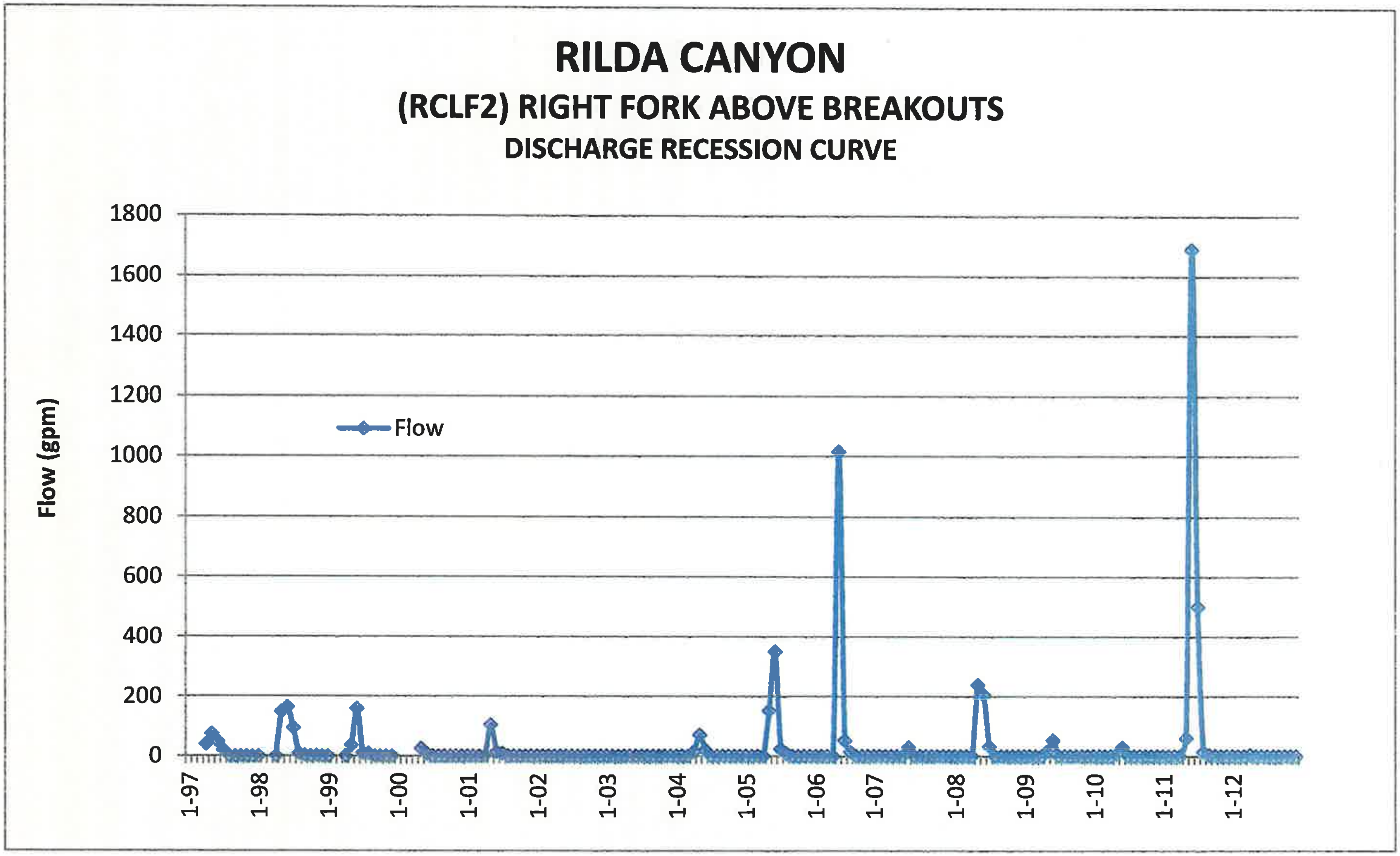
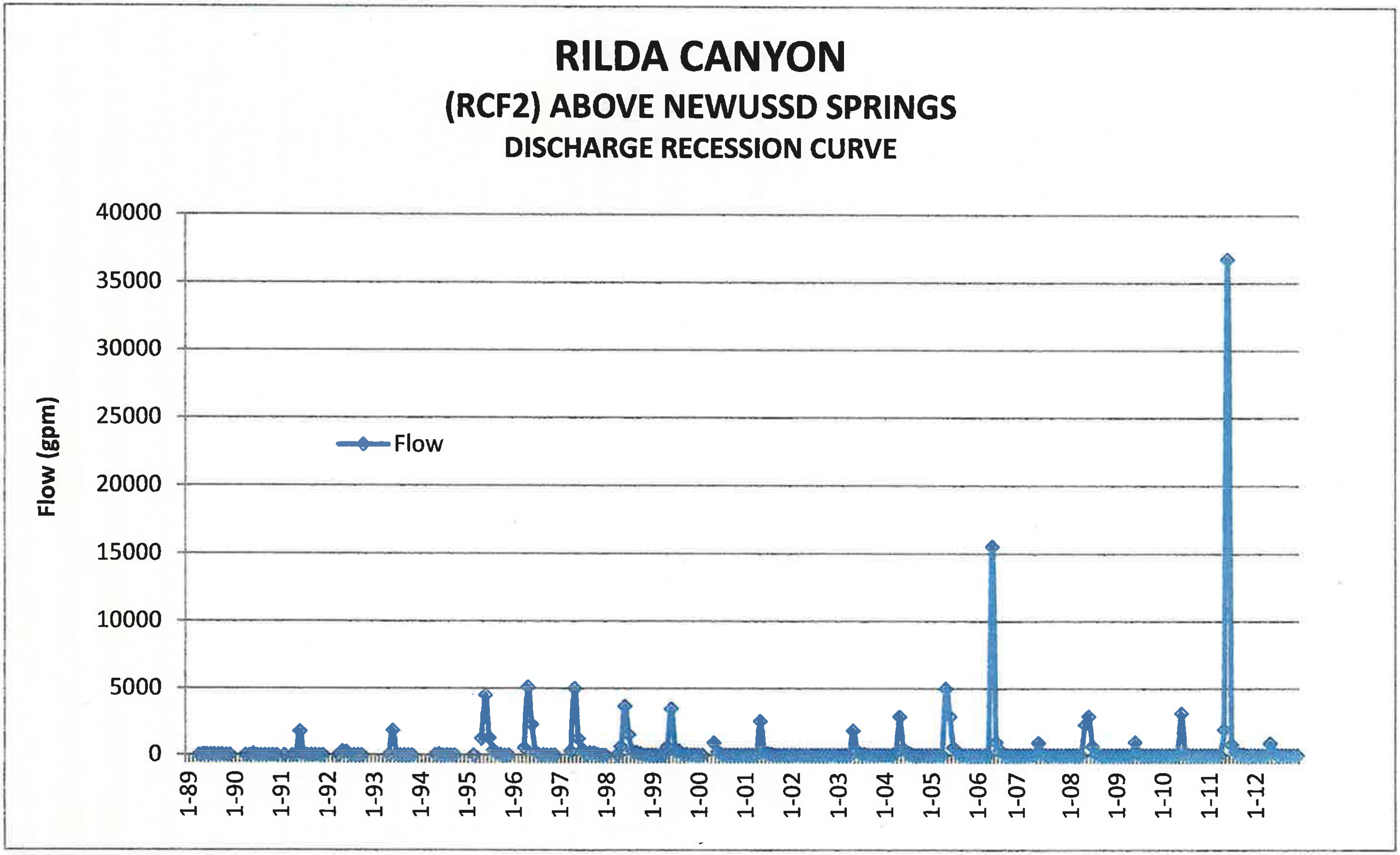
1-10
1-11
1-12

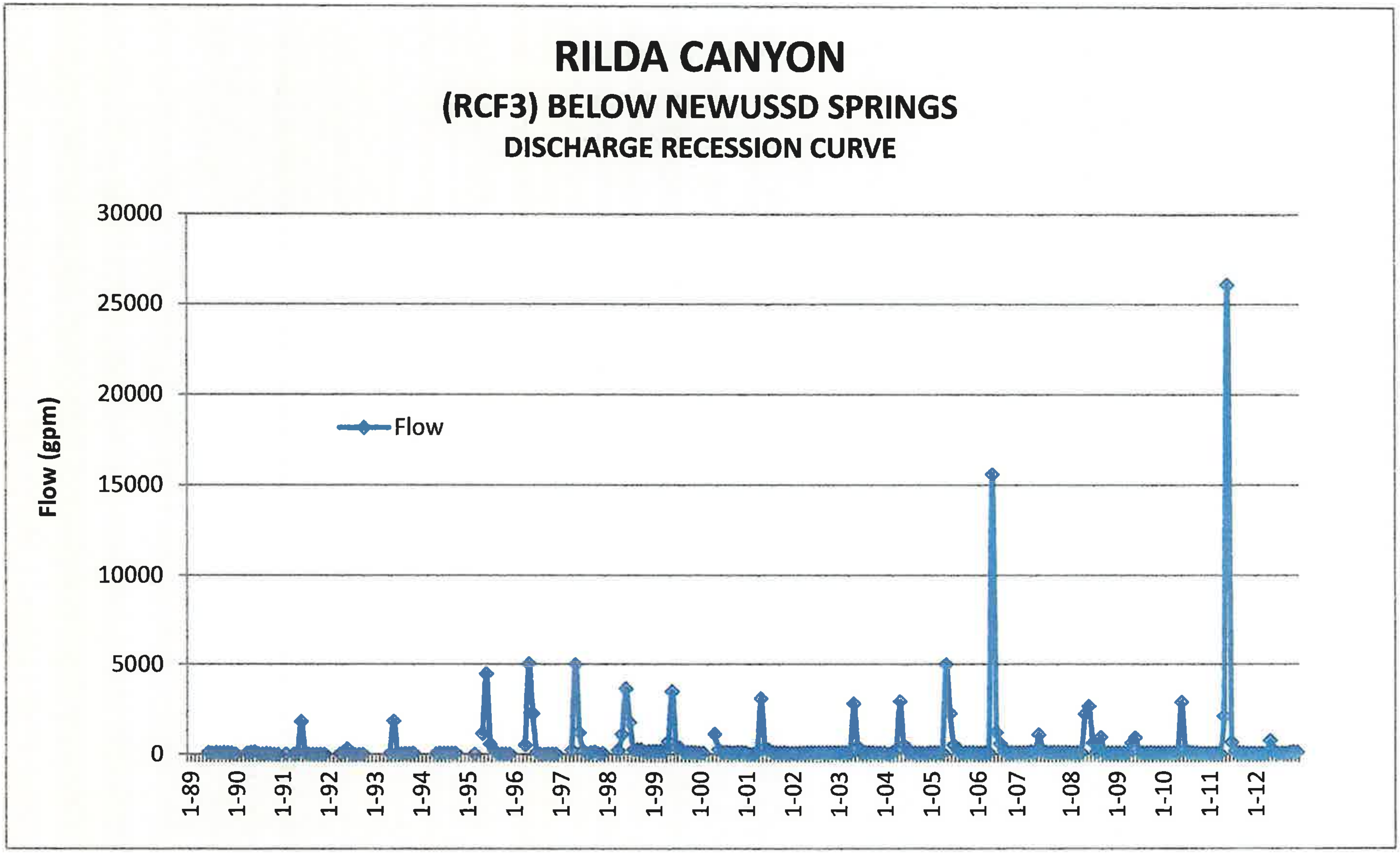

MILL FORK
(MFU03) ABOVE MILL FORK GRABEN
DISCHARGE RECESSION CURVE
Flow (gpm)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Flow
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12

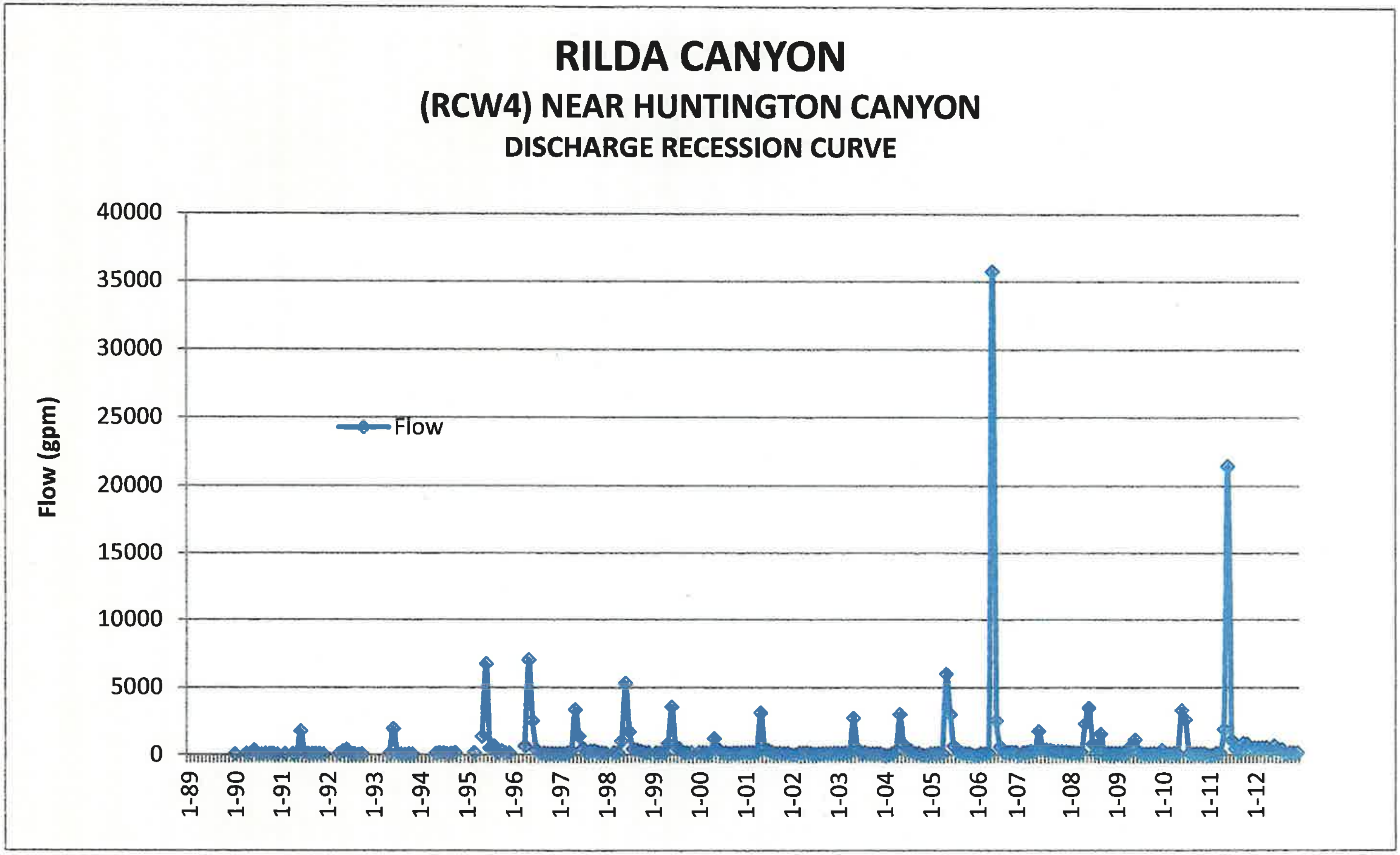

RILDA CANYON
(RCF1) RIGHT FORK
DISCHARGE RECESSION CURVE
Flow (gpm)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Flow
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
1-01
1-02
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12

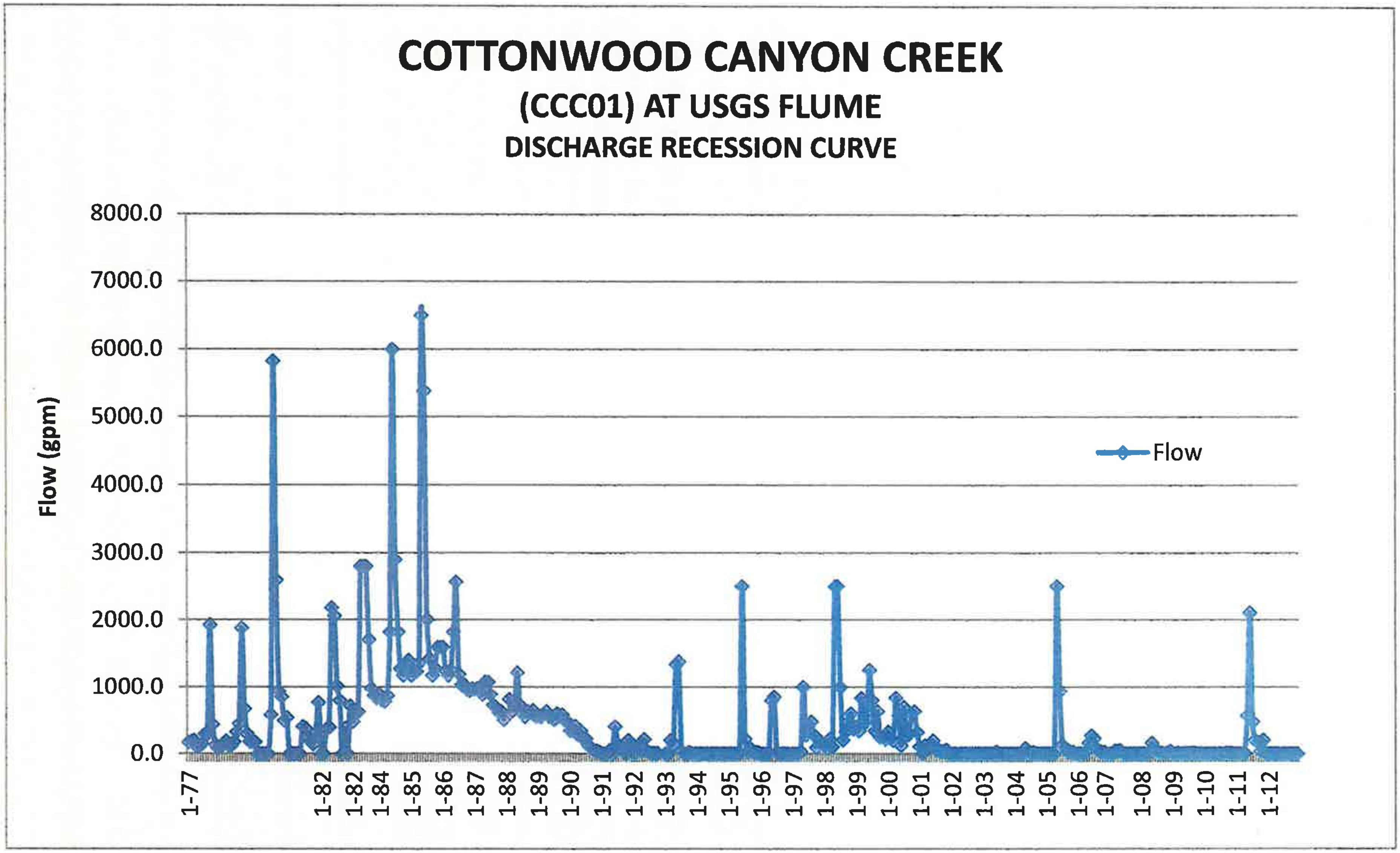

RILDA CANYON
(RCLF1) LEFT FORK BELOW BREAKOUTS
DISCHARGE RECESSION CURVE
Flow (gpm)
3000
2500
2000
1500
1000
500
0
Flow
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
1-01
1-02
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12


RILDA CANYON
(RCLF2) RIGHT FORK ABOVE BREAKOUTS
DISCHARGE RECESSION CURVE
Flow (gpm)
1800
1600
1400
1200
1000
800
600
400
200
0
Flow
1-97
1-98
1-99
1-00
1-01
1-02
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12

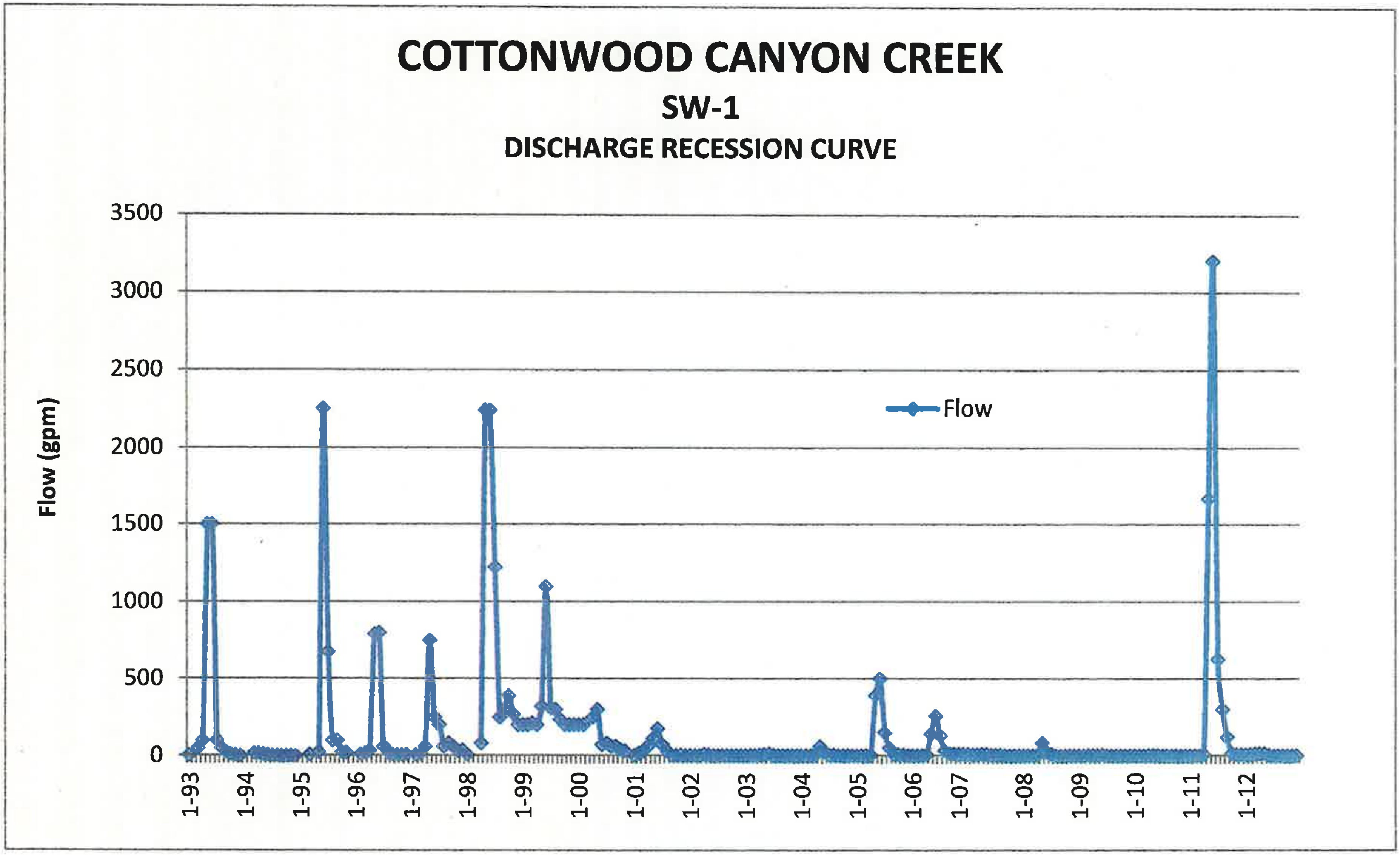

RILDA CANYON
(RCF2) ABOVE NEWUSSD SPRINGS
DISCHARGE RECESSION CURVE
Flow (gpm)
40000
35000
30000
25000
20000
15000
10000
5000
0
Flow
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
1-01
1-02
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12

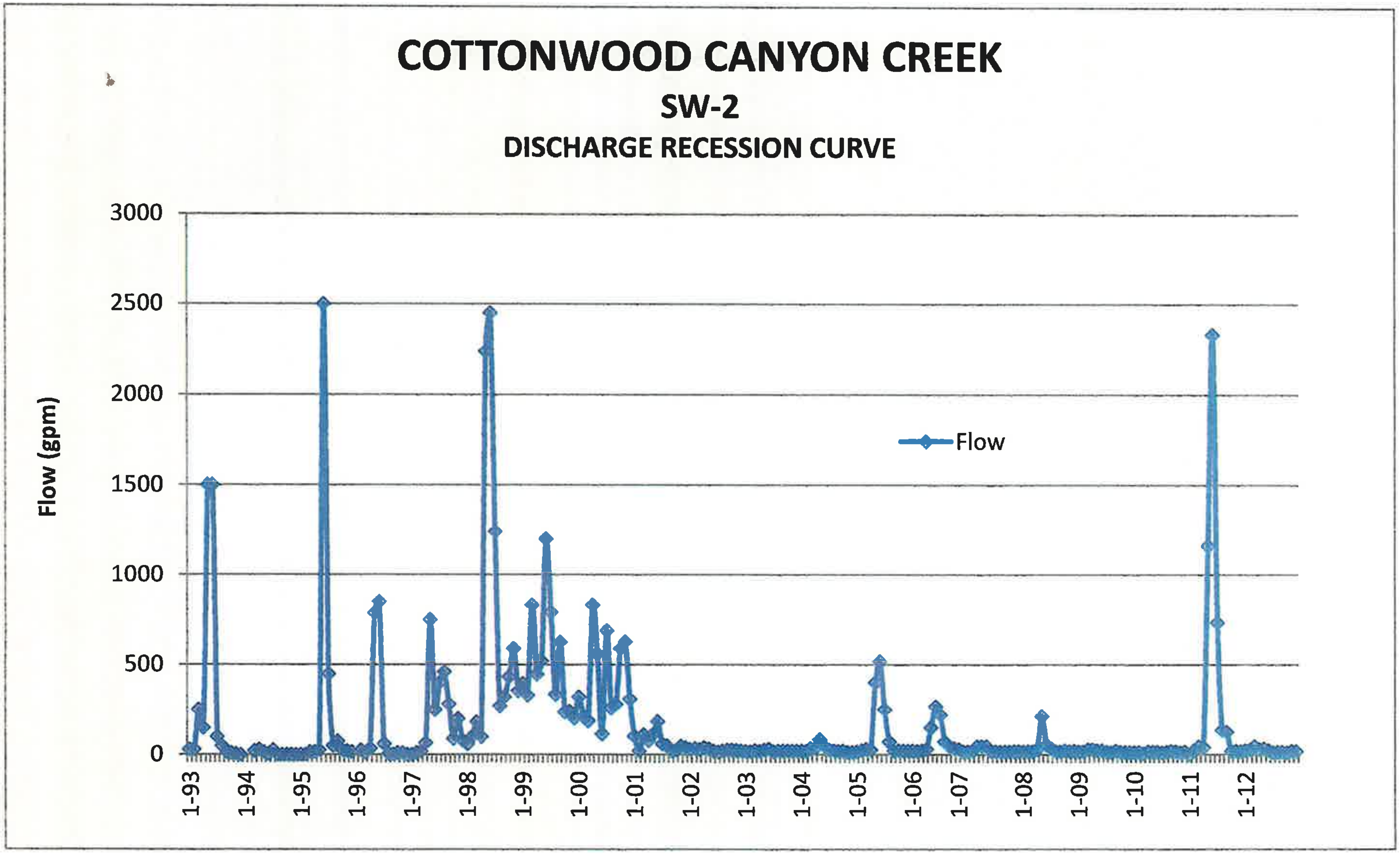

RILDA CANYON
(RCF3) BELOW NEWUSSD SPRINGS
DISCHARGE RECESSION CURVE
Flow (gpm)
30000
25000
20000
15000
10000
5000
0
Flow
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
1-01
1-02
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12

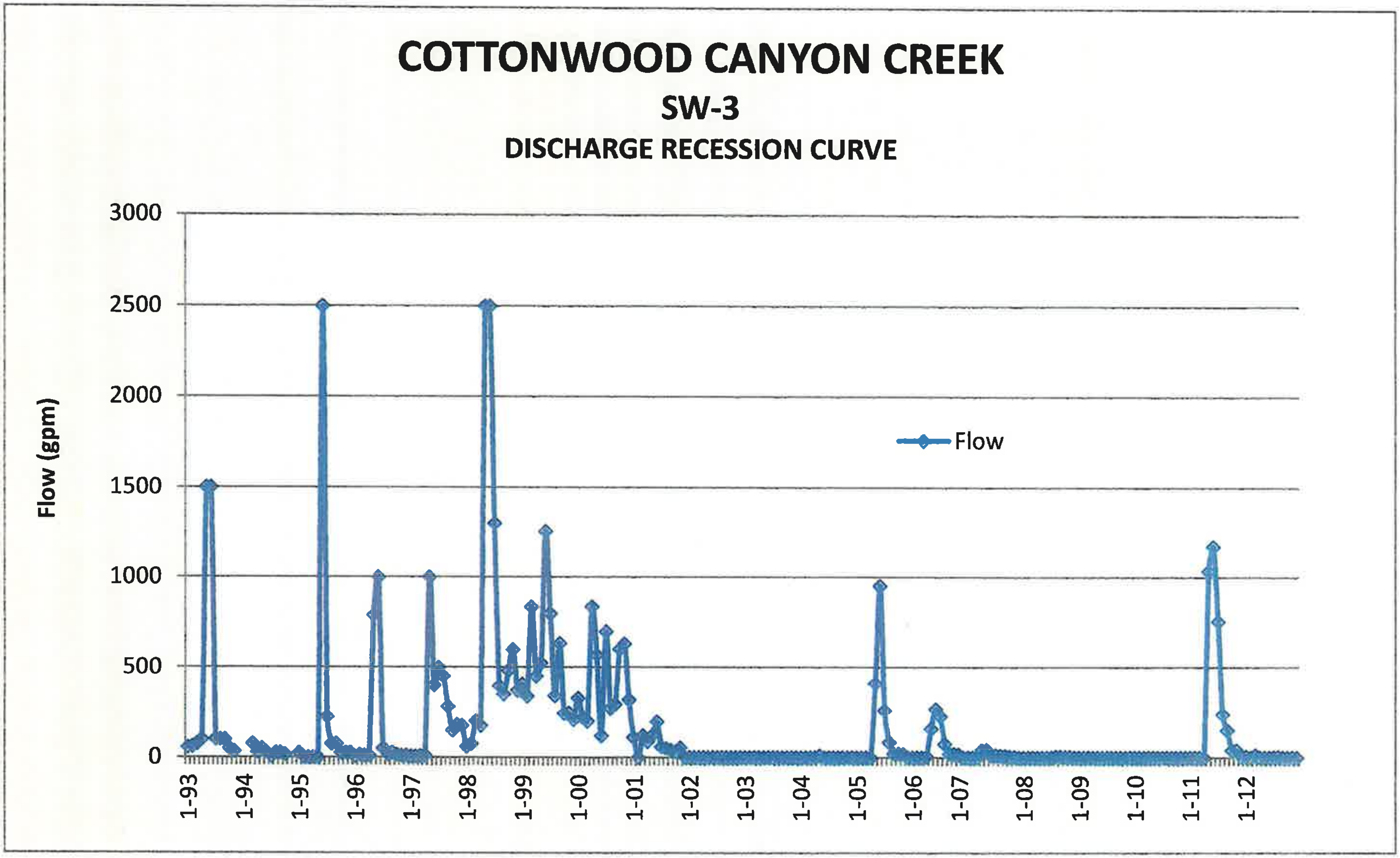

RILDA CANYON
(RCW4) NEAR HUNTINGTON CANYON
DISCHARGE RECESSION CURVE
Flow (gpm)
40000
35000
30000
25000
20000
15000
10000
5000
0
Flow
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
1-01
1-02
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12

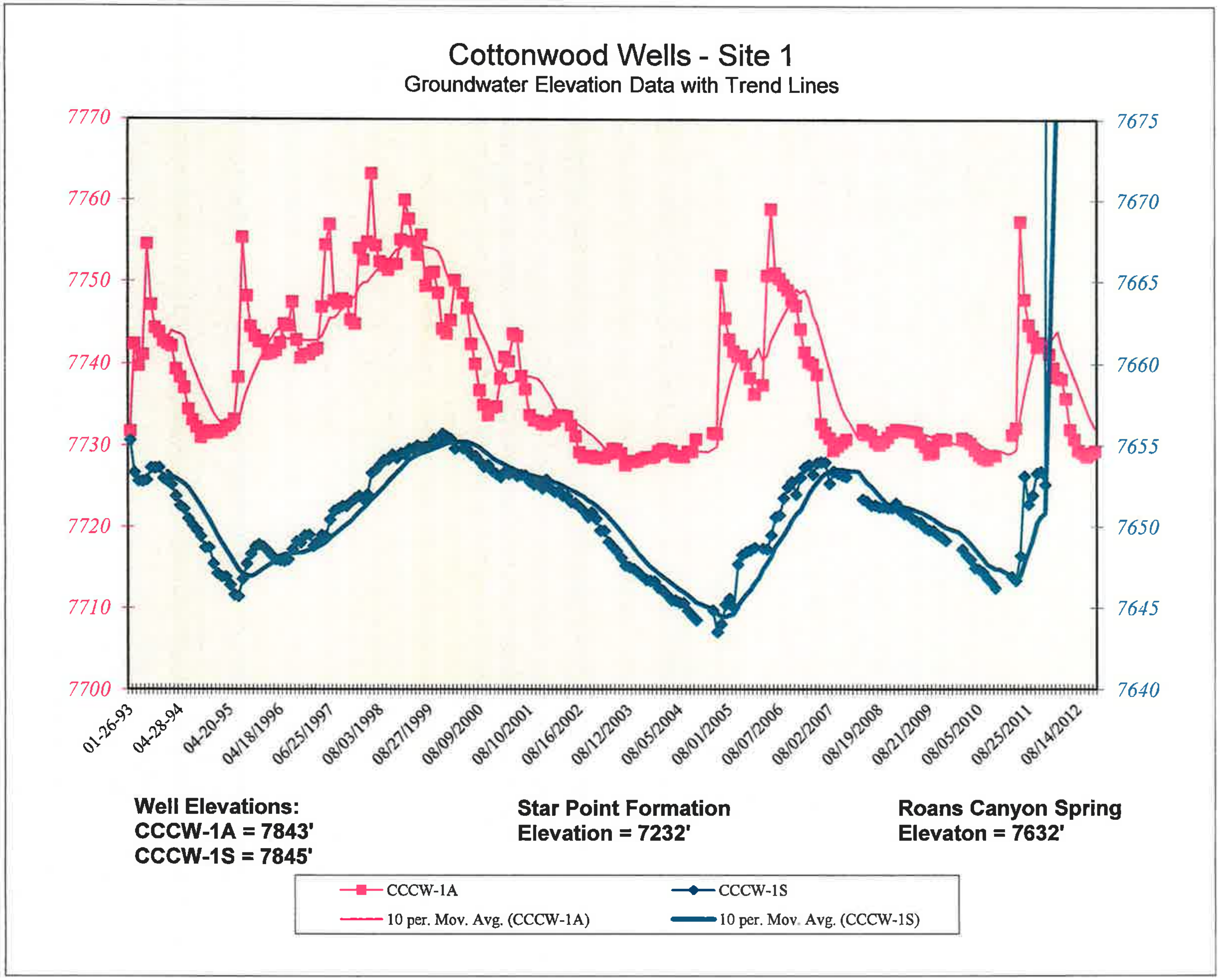


COTTONWOOD CANYON CREEK
(CCC01) AT USGS FLUME
DISCHARGE RECESSION CURVE
Flow (gpm)
8000.0
7000.0
6000.0
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
1-77
1-82
1-82
1-84
1-85
1-86
1-87
1-88
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
1-01
1-02
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12
Flow

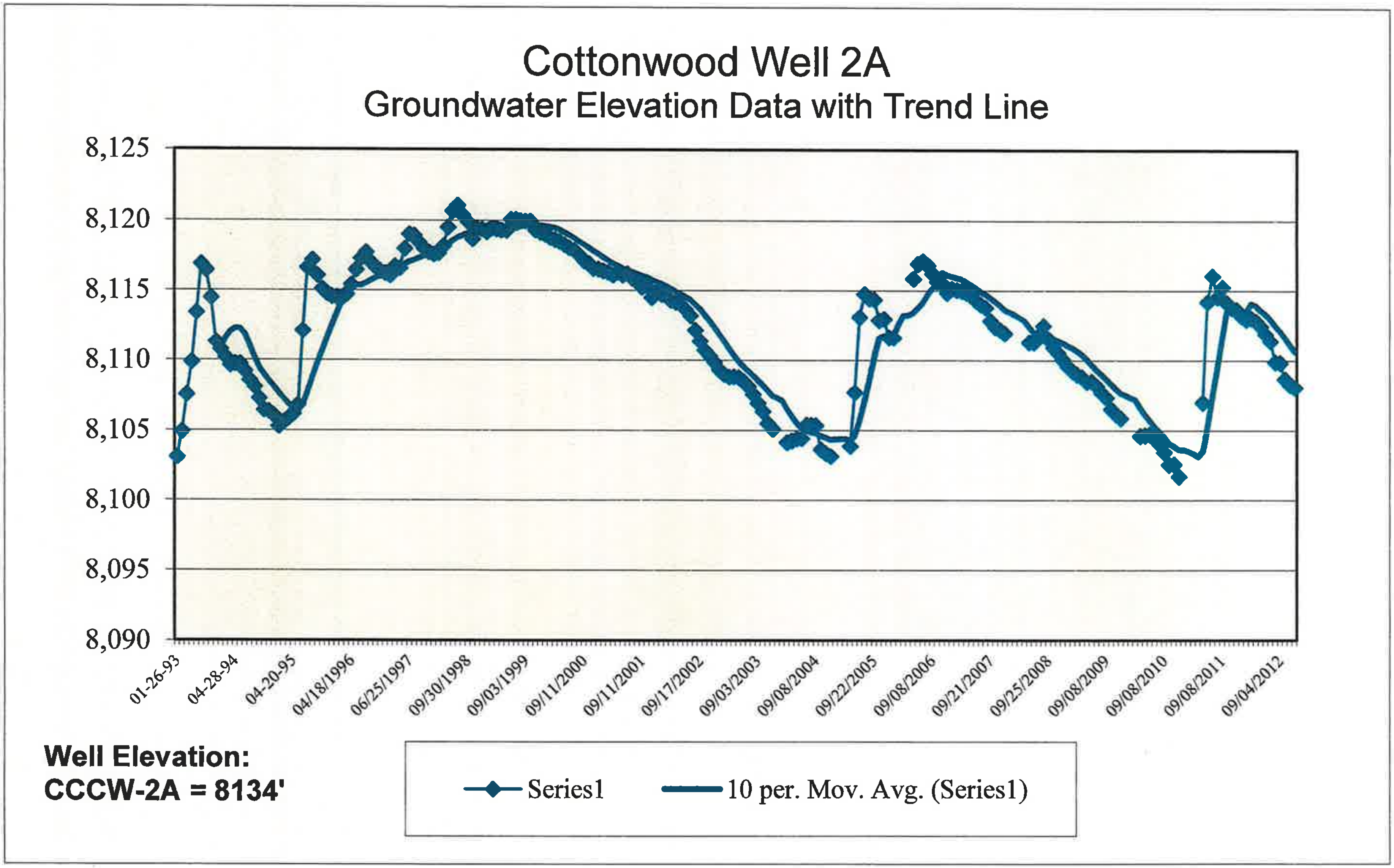

COTTONWOOD CANYON CREEK
SW-1
DISCHARGE RECESSION CURVE
Flow (gpm)
3500
3000
2500
2000
1500
1000
500
0
Flow
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
1-01
1-02
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12


COTTONWOOD CANYON CREEK
SW-2
DISCHARGE RECESSION CURVE
Flow (gpm)
3000
2500
2000
1500
1000
500
0
Flow
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
1-01
1-02
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12


COTTONWOOD CANYON CREEK
SW-3
DISCHARGE RECESSION CURVE
Flow (gpm)
3000
2500
2000
1500
1000
500
0
Flow
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
1-01
1-02
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12



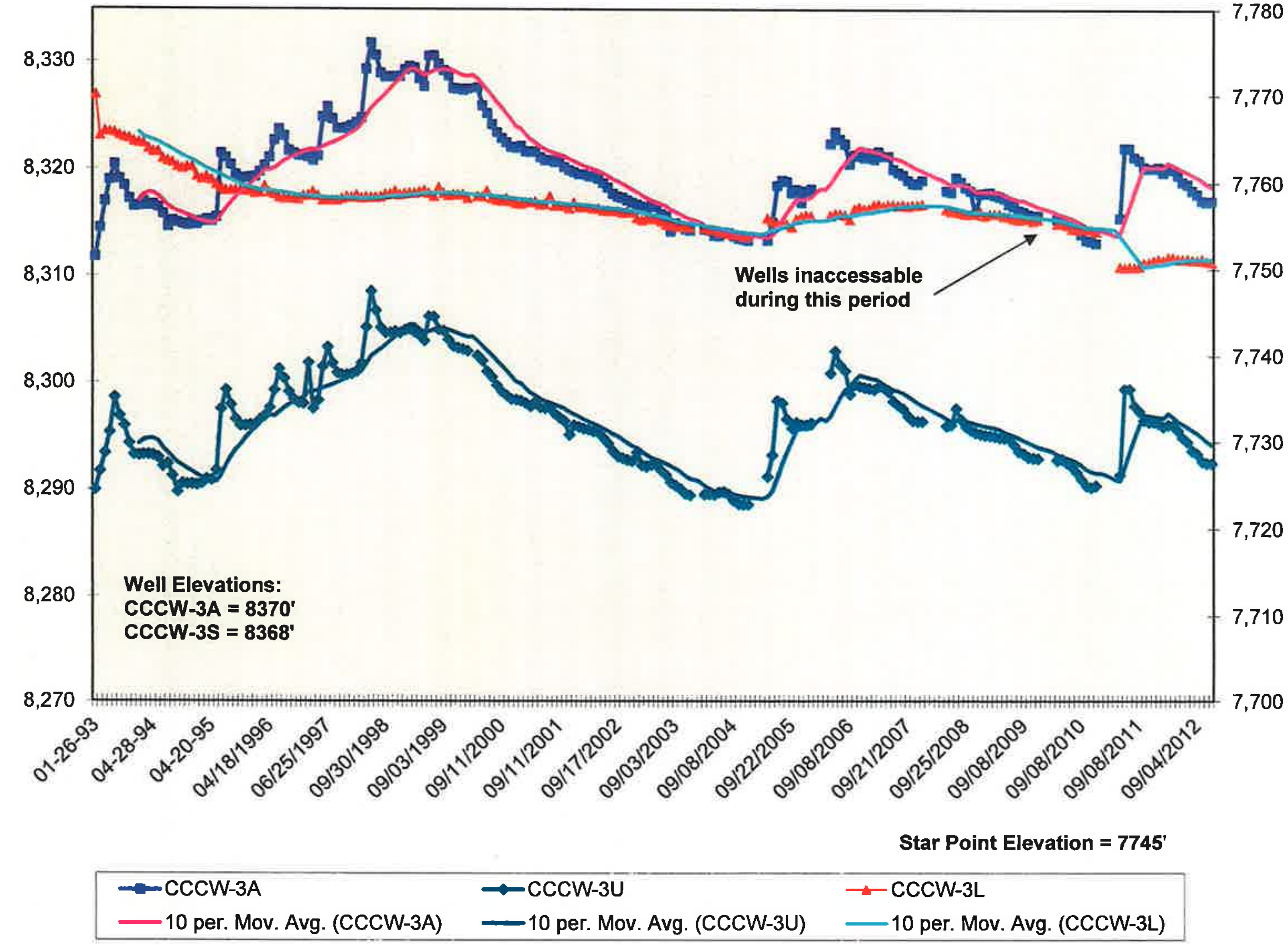
Cottonwood Wells - Site 1
Groundwater Elevation Data with Trend Lines
7770
7760
7750
7740
7730
7720
7710
7700
7675
7670
7665
7660
7655
7650
7645
7640
01-26-93
04-28-94
04-20-95
04/18/1996
06/25/1997
08/03/1998
08/27/1999
08/09/2000
08/10/2001
08/16/2002
08/12/2003
08/05/2004
08/01/2005
08/07/2006
08/02/2007
08/19/2008
08/21/2009
08/05/2010
08/25/2011
08/14/2012
Well Elevations:
CCCW-1A = 7843'
CCCW-1S = 7845'
Star Point Formation
Elevation = 7232'
Roans Canyon Spring
Elevaton = 7632'
CCCW-1A
CCCW-1S
10 per. Mov. Avg. (CCCW-1A)
10 per. Mov. Avg. (CCCW-1S)

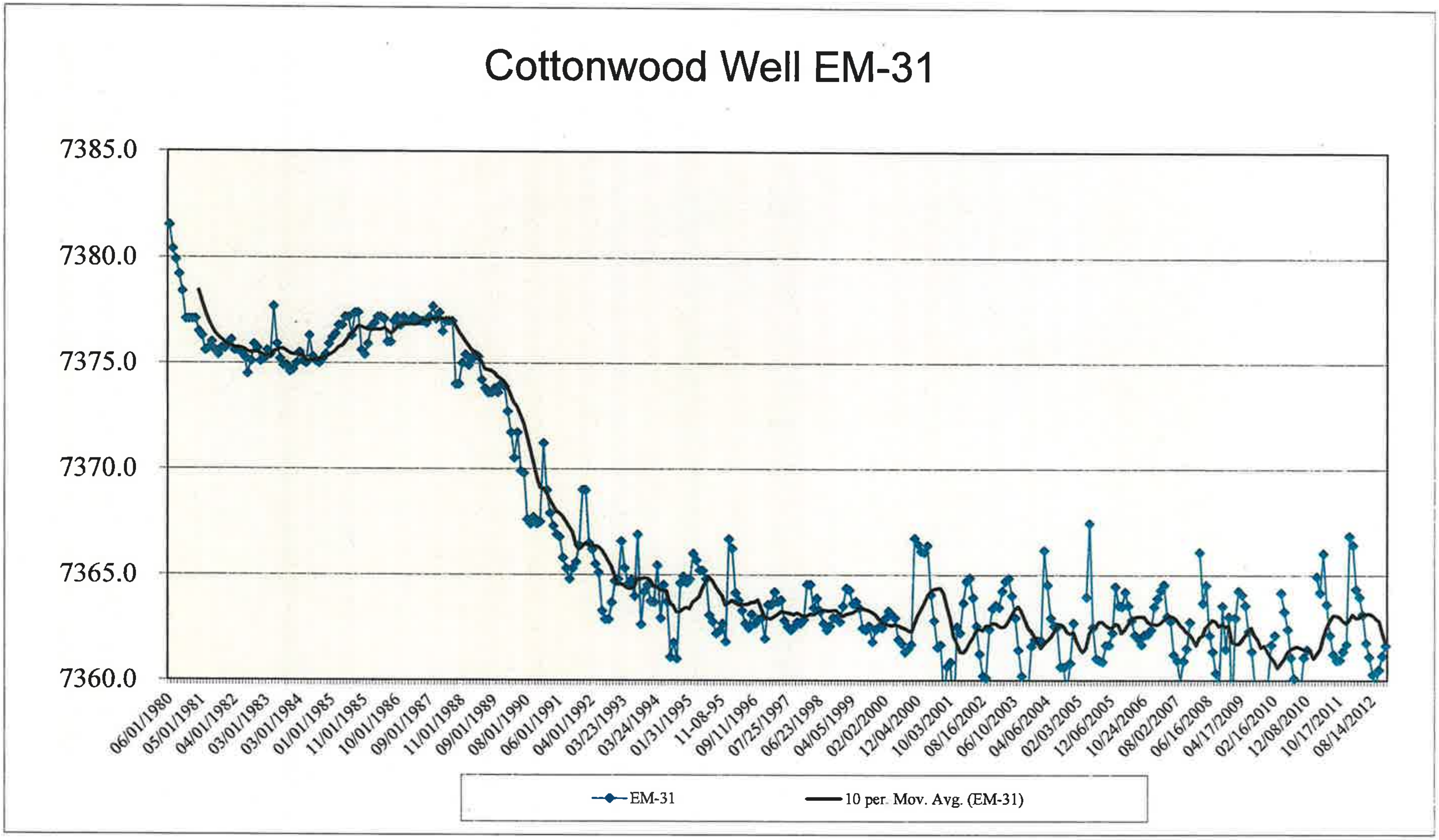


Cottonwood Well 2A
Groundwater Elevation Data with Trend Line
8,125
8,120
8,115
8,110
8,105
8,100
8,095
8,090
01-26-93
04-28-94
04-20-95
04/18/1996
06/25/1997
09/30/1998
09/03/1999
09/11/2000
09/11/2001
09/17/2002
09/03/2003
09/08/2004
09/22/2005
09/08/2006
09/21/2007
09/25/2008
09/08/2009
09/08/2010
09/08/2011
09/04/2012
Well Elevation:
CCCW-2A = 8134'
Series1
10 per. Mov. Avg. (Series1)

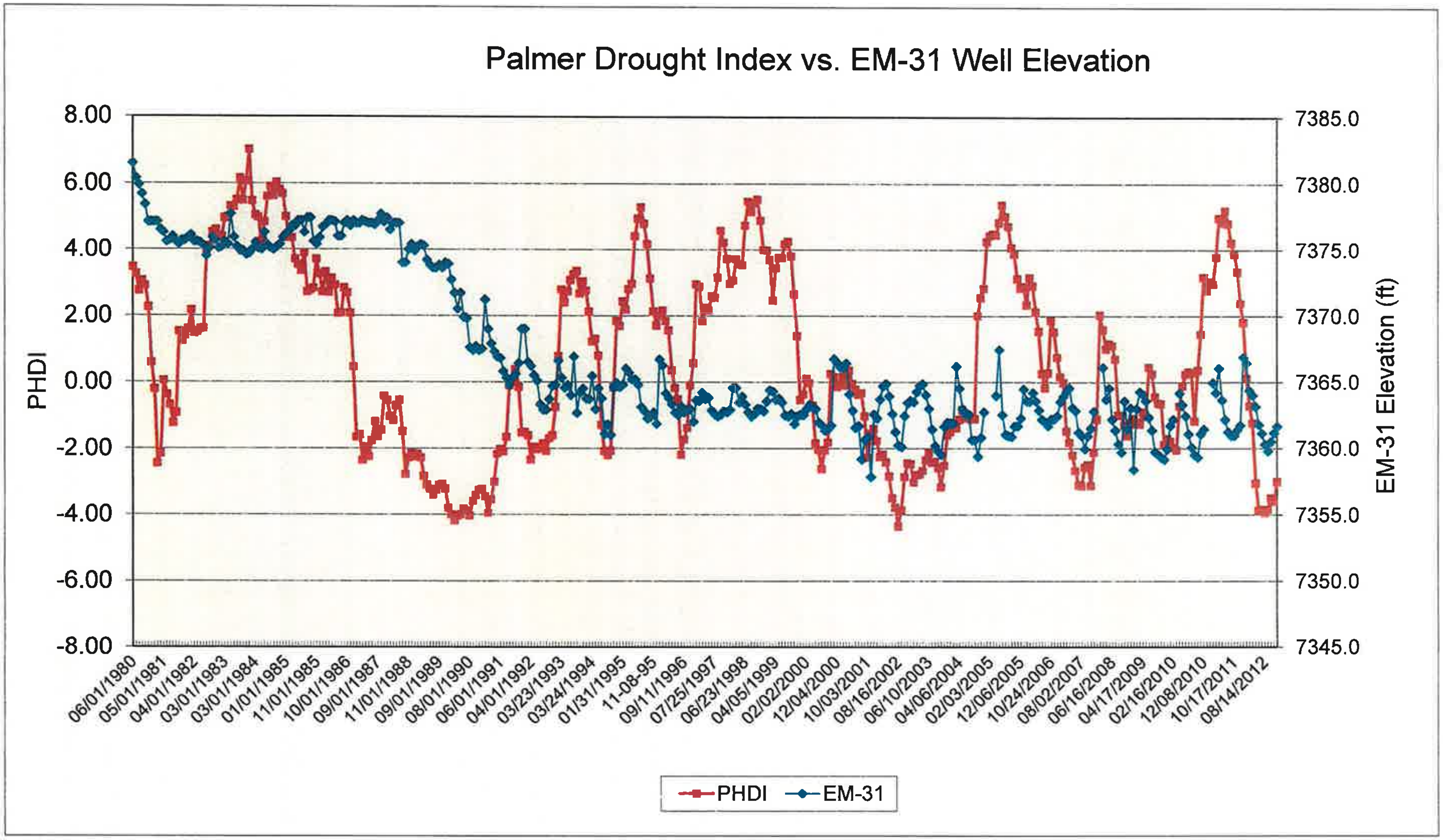
Cottonwood Wells - Site 3

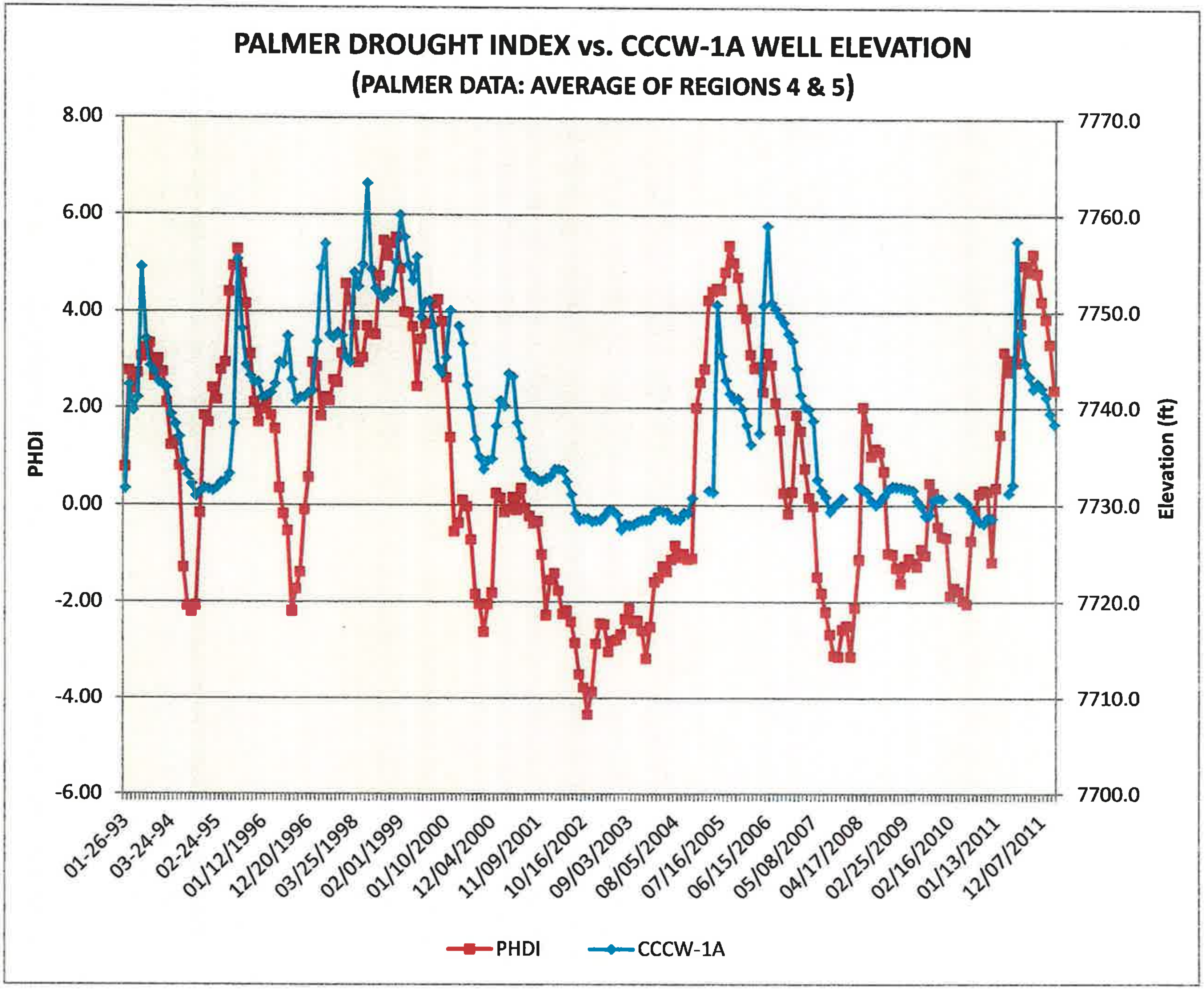
Groundwater Elevation Data with Trend Lines

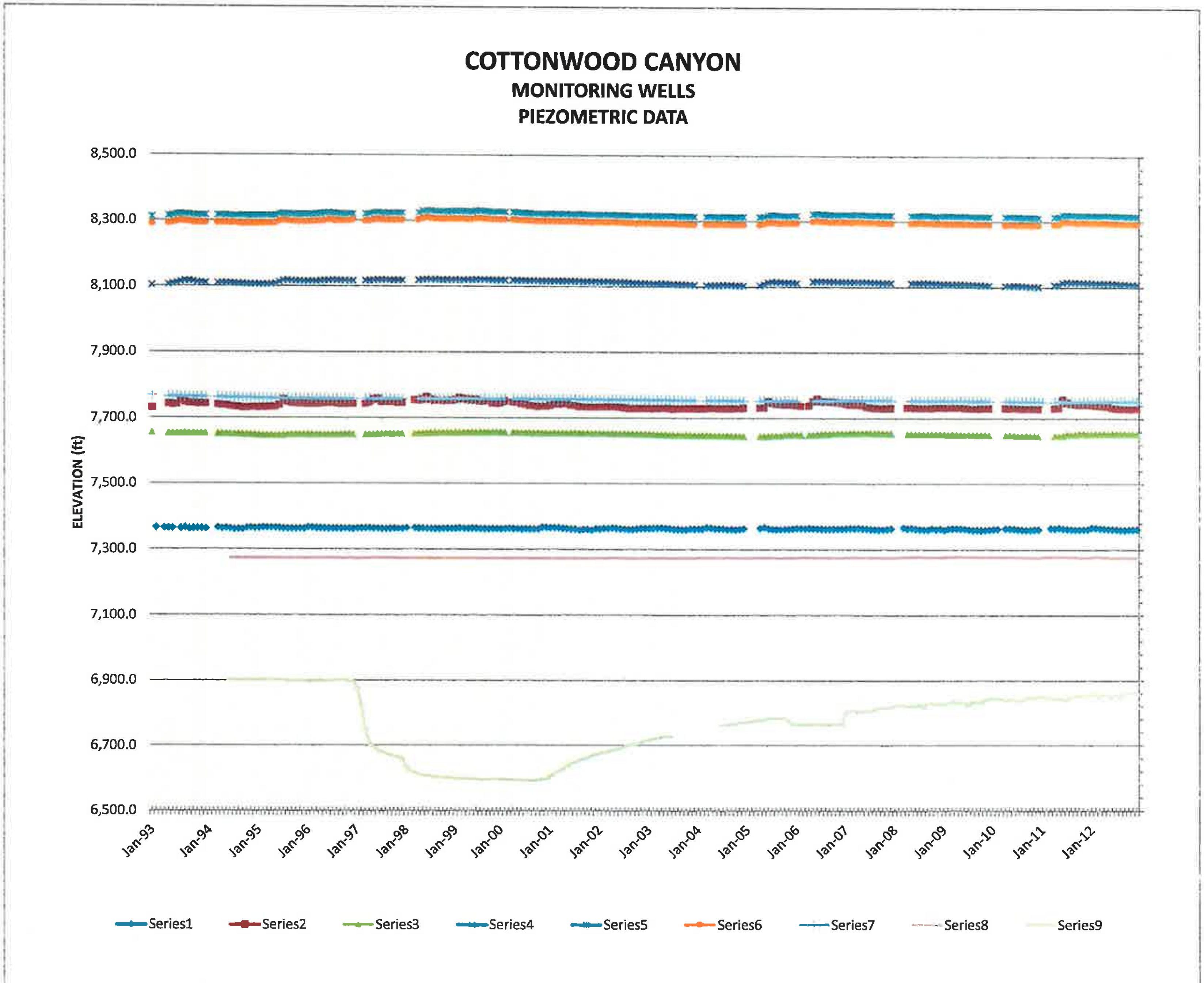




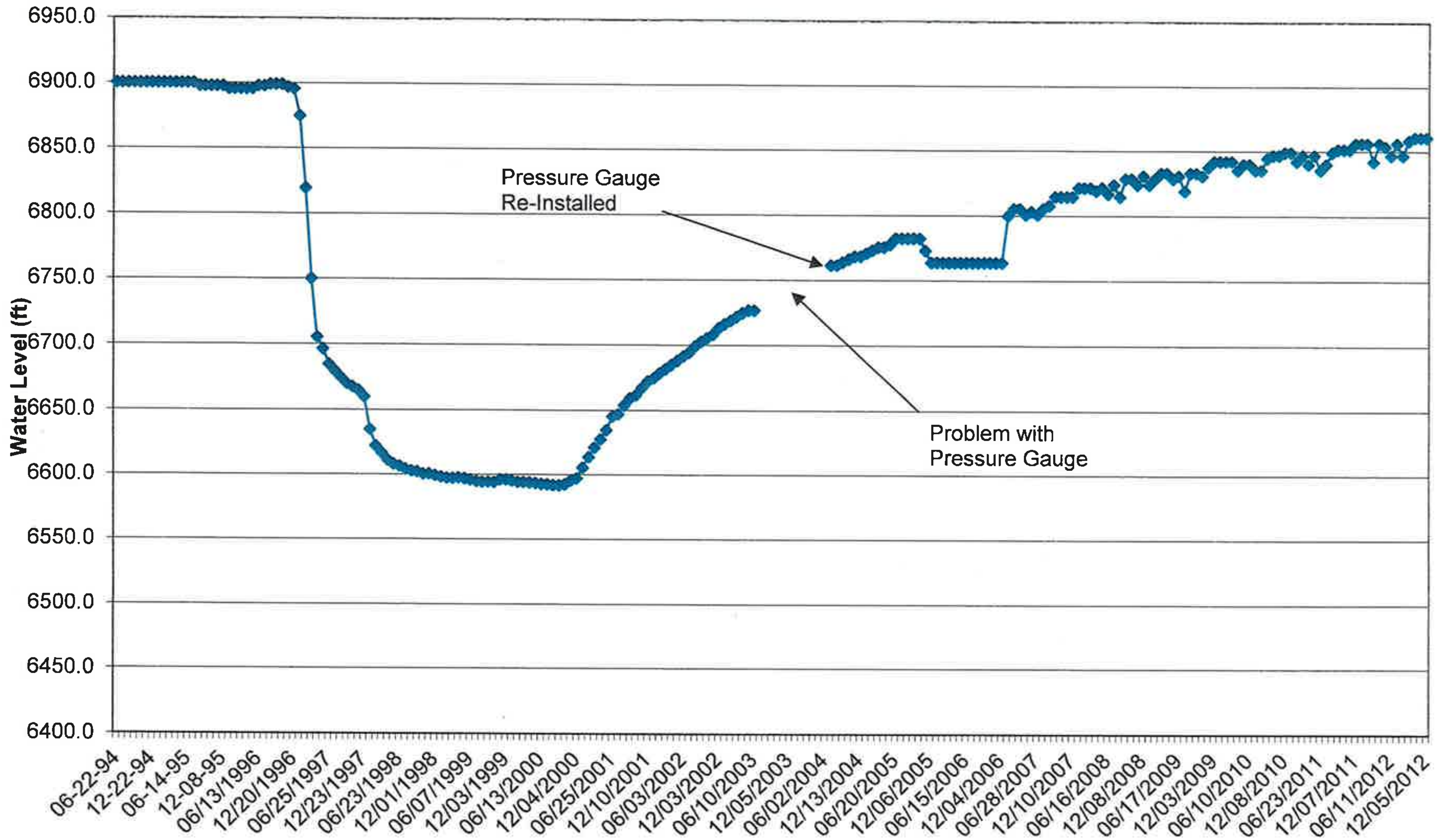
Cottonwood Well EM-31
7385.0
7380.0
7375.0
7370.0
7365.0
7360.0
06/01/1980
05/01/1981
04/01/1982
03/01/1983
03/01/1984
01/01/1985
11/01/1985
10/01/1986
09/01/1987
11/01/1988
09/01/1989
08/01/1990
06/01/1991
04/01/1992
03/23/1993
03/24/1994
01/31/1995
11-08-95
09/11/1996
07/25/1997
06/23/1998
04/05/1999
02/02/2000
12/04/2000
10/03/2001
08/16/2002
06/10/2003
04/06/2004
02/03/2005
12/06/2005
10/24/2006
08/02/2007
06/16/2008
04/17/2009
02/16/2010
12/08/2010
10/17/2011
08/14/2012
EM-31
10 per. Mov. Avg. (EM-31)


Palmer Drought Index vs. EM-31 Well Elevation
PHDI
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
EM-31 Elevation (ft)
7385.0
7380.0
7375.0
7370.0
7365.0
7360.0
7355.0
7350.0
7345.0
06/01/1980
05/01/1981
04/01/1982
03/01/1983
03/01/1984
01/01/1985
11/01/1985
10/01/1986
09/01/1987
11/01/1988
09/01/1989
08/01/1990
06/01/1991
04/01/1992
03/23/1993
03/24/1994
01/31/1995
11-08-95
09/11/1996
07/25/1997
06/23/1998
04/05/1999
02/02/2000
12/04/2000
10/03/2001
08/16/2002
06/10/2003
04/06/2004
02/03/2005
12/06/2005
10/24/2006
08/02/2007
06/16/2008
04/17/2009
02/16/2010
12/08/2010
10/17/2011
08/14/2012
PHDI
EM-31


PALMER DROUGHT INDEX vs. CCCW-1A WELL ELEVATION
(PALMER DATA: AVERAGE OF REGIONS 4 & 5)
PHDI
Elevation (ft)
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
7770.0
7760.0
7750.0
7740.0
7730.0
7720.0
7710.0
7700.0
01-26-93
03-24-94
02-24-95
01/12/1996
12/20/1996
03/25/1998
02/01/1999
01/10/2000
12/04/2000
11/09/2001
10/16/2002
09/03/2003
08/05/2004
07/16/2005
06/15/2006
05/08/2007
04/17/2008
02/25/2009
02/16/2010
01/13/2011
12/07/2011
PHDI
CCCW-1A


COTTONWOOD CANYON
MONITORING WELLS
PIEZOMETRIC DATA
ELEVATION (ft)
8,500.0
8,300.0
8,100.0
7,900.0
7,700.0
7,500.0
7,300.0
7,100.0
6,900.0
6,700.0
6,500.0
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Series1
Series2
Series3
Series4
Series5
Series6
Series7
Series8
Series9

Trail Mountain Mine
Straight Canyon Well: TM-3



STRAIGHT CANYON WATER QUALITY *
T-19
APPENDIX F

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
20120315	0	277	44	18	22	746	306	2	0	48	0	0	9	2	52	105	230	447
20120612	0	337	55	0	30	1088	475	0	0	82	0	0	9	5	71	230	6	680
20120905	0	404	89	0	34	1538	785	0	0	137	0	0	8	10	77	439	9	1074
20121205	0	363	71	0	31	1206	579	0	0	97	0	0	8	6	71	308	0	820
2012**																		
MIN	0	277	44	0	22	746	306	0	0	48	0	0	8	2	52	105	0	447
MAX	0	404	89	18	34	1538	785	2	0	137	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	91.06	0.00	0.00	8.50	5.77	67.61	270.50	61.25	755.25
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
2011**																		
MIN	0	255	43	0	19	650	301	0	0	47	0	0	9	2	33	63	0	387
MAX	0	334	67	31	35	1160	533	1	0	89	0	0	9	5	80	315	94	804
MEAN	0	295	54	14	25	882	417	0	0	68	0	0	9	3	57	168	40	579
2010**																		
MIN	0	310	73	0	37	1322	636	0	0	110	0	0	8	6	72	374	0	931
MAX	0	412	88	38	38	1591	857	0	0	155	0	0	8	10	91	481	14	1138
MEAN	0	352	78	23	37	1438	708	0	0	125	0	0	8	8	82	425	5	1018
2009**																		
MIN	0	190	14	0	19	581	178	0	0	24	0	0	7	1	12	39	0	340
MAX	14	500	99	78	68	1840	993	5	0	162	0	5	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	73.57	0.05	3.28	8.42	4.14	73.80	218.94	79.27	671.09
2008**																		
MIN		286	53	0	30	959	434	0		73	0		8	4	60	182	0	577
MAX		368	78	22	36	1494	732	0		131	0		9	8	78	434	7	1016
MEAN		326	66	7	33	1210	538	0		96	0		8	5	70	303	4	794
2007**																		
MIN	9	322	56	6	29	1016	420	2		68	0		8	3	68	179	158	622
MAX	9	364	99	49	43	1840	836	2		143	0		8	9	90	518	158	1154
MEAN	9	350	73	23	37	1398	611	2		104	0		8	6	82	355	158	898
2006**																		
MIN		290	43	13	19	843	338	0		56	0		8	2	36	99	13	456
MAX		312	62	13	30	1127	461	1		75	0		9	3	66	203	51	658
MEAN		298	52	13	25	944	387	1		62	0		8	3	51	139	31	526
2005**																		
MIN		287	42	17	22	827	360	0		62	0		9	2	44	124	33	498
MAX		329	68	24	37	1493	552	1		93	0		9	5	92	341	338	879
MEAN		306	55	20	28	1097	438	1		73	0		9	3	64	211	135	657
2004**																		
MIN		334	51.9	8	33	1060	429	0.07		73			8.41	3.93	63	271	10	698
MAX		430	95.7	8	38	1716	906	2.54		162			8.46	10.10	88	609	177	1256
MEAN		381	70.4	8	36	1326	617	0.90		107			8.43	6.09	78	393	94	913
2003**																		
MIN		376	64.1	5	32	1324	605	0.03	0.04	107		2	8.42	5.46	77	362	5	885
MAX		500	86.7	19	43	1646	836	0.08	0.04	154		2	8.67	9.48	90	542	8	1205
MEAN		425	74.7	12	36	1462	706	0.06	0.04	126		2	8.54	7.14	84	440	7	1026
2002**																		
MIN		410	58.0	5	33	1252	495	0.50		85			8.38	4.00	88	303	46	816
MAX		498	79.0	14	40	1674	786	0.50		143			8.55	9.00	90	520	46	1198
MEAN		459	68.0	8	37	1423	622	0.50		110			8.46	6.00	89	397	46	983
2001**																		
MIN		345	42.0	12	42	1105	400	0.30		68			8.18	3.00	103	181	7	722
MAX		424	58.0	23	53	1319	516	2.50		92			8.53	5.00	109	340	309	868
MEAN		393	50.8	16	48	1221	454	1.10		80			8.33	3.75	105	266	113	792
2000**																		
MIN		345	42.0	12	42	1105	400	0.30		68			8.18	3.00	103	181	7	722
MAX		424	58.0	23	53	1319	516	2.50		92			8.53	5.00	109	340	309	868
MEAN		393	50.8	16	48	1221	454	1.10		80			8.33	3.75	105	266	113	792
HISTORICAL 1988-2011																		
MIN	0.0	0	0.0	0.0	0.0	0	0	0.000	0.00	0	0.000	0.0	0.00	0.00	0	0.0	0.0	0
MAX	27.0	27	27.0	27.0	27.0	27	27	27.00	27.00	27	27.00	27.0	27.00	27.00	27	27.0	27.0	27
MEAN	5.1	5	5.1	5.1	5.1	5	5	5.08	5.08	5	5.08	5.1	5.08	5.08	5.08	5.1	5.1	5.08367
No. of Analysis	29	87	87	65	87	83	87	70	29	87	36	26	86	85	87	87	68	87

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

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

INDIAN CREEK WATER QUALITY *
ICA
APPENDIX F

2012** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20121008	0	253	74	0	2	490		281	0	0	24	0	0	8	1	3	9	0	273
2011** MEAN	0	274	77	0	2	507		277	0	0	21	0		8	1	3	6	7	295
2010** MEAN	0	264	72.59	0	3	512		270	0.21	0	21.56	0		8.19	1.05	3.26	12	0	313
2009** MEAN	5	262	72.65		2	511		278	0.09		23.39			8.22	1.05	3.32	11	0	277
2008** MEAN		257	74.26		2	499		280	0.12		22.97	0.002		8.3	0.89	3.27	10	0	286
2007** MEAN		251	72.0		2	496		274	0.30		22.8	0.02		8.02	1.07	3.01	14	26	294
2006** MEAN		297	77.5		3	554		282	0.06		21.5	0.01		7.96	0.64	2.71	8		282
2005** MEAN		265	80.8		3	571	10	294	0.07		23	0		8.30	1.56	3.27	8	5	291
2004** MEAN		262	77.4		2	493		281	0.08		21.4	0.03		8.06	0.79	2.92	13	7	299
2003** MEAN		312	71.5		2	493		271	0.02		22.4			8.24	0.91	2.93	19		265
2002** MEAN		286	67.0		2	483		258			22.0			8.25		4.00	23		304
2001** MEAN		327	71.0		3	633		264	0.20		21.0			8.21		3.00	9		289
2000** MEAN		313	69.0		2	487		255	0.20		20.0			8.10		3.00	10	43	274
HISTORICAL 2000-2011																			
MIN	0	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	5	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	73.6	0.0	2	520		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	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 then laboratory minimum detection limit.

INDIAN CREEK WATER QUALITY *

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APPENDIX F

2012** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20121008	0	226	60	0	2	436		247	0	0	24	0	0	8	1	4	10	11	207
2010** MEAN	0	251	68	0	2	484		259	0	0	21	0		8	1	5	11	9	271
2010** MEAN	0	240	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	246	68		2	480		267	0.41		24	0.000		8.35	1.1	4.34	13	14	261
2008** MEAN	7	236	66	0	2	465		259	0.25		23	0.006		8.27	0.9	3.99	11	0	276
2007** MEAN		237	64.9		2.0	466		258	1.43		23	0.046		8.09	1.01	3.73	14.0	37	286
2006** MEAN		239	72.0		3.0	527		268	0.24		22	0.005		8.25	0.61	3.62	9.0		278
2005** MEAN		238	68.2	5	2.0	534	9	258	0.20		21	0.013		8.41	1.00	4.29	10.0	9	268
2004** MEAN		258	73.4		2.0	490		271	0.72		21	0.025		7.94	0.75	3.29	12.0	10	284
2003** MEAN		276	59.3		2.0	427		236	0.37		21			8.13	0.93	3.41	11.0	21	216
2002** MEAN		282	57.0		2.0	432		233	0.40		22			8.21		4.00	8.0		235
2001** MEAN		293	59.0		2.4	559		234	0.20		21			8.26		3.00	7.7	6	253
2000** MEAN	12	301	65.0		2.0	468		245	0.10		20			8.19	1.00	3.00	9.0	9	266
HISTORICAL 2000-2011																			
MIN	0.0	236	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	301	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	258	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	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 then laboratory minimum detection limit.

INDIAN CREEK WATER QUALITY *

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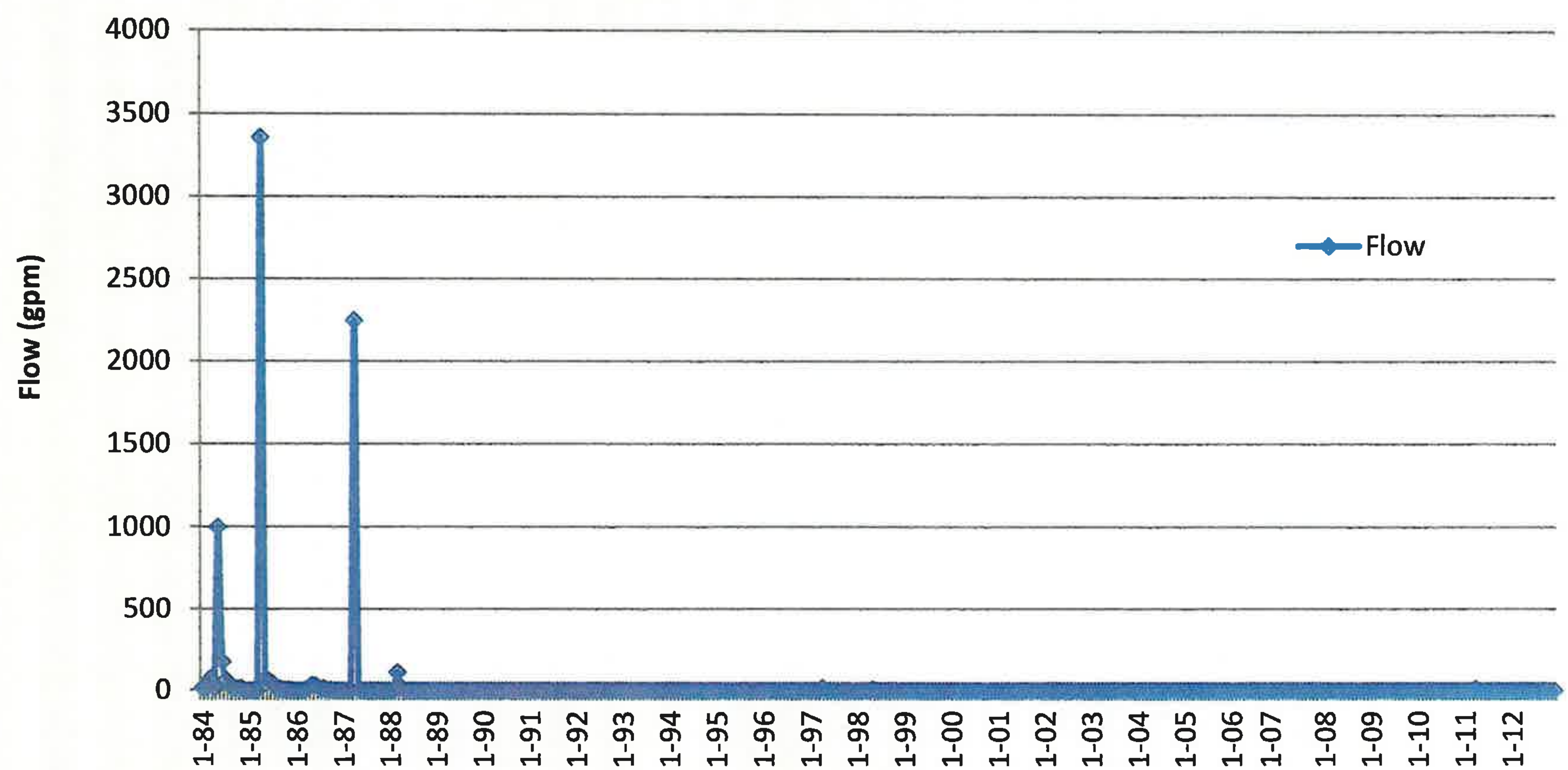
APPENDIX F

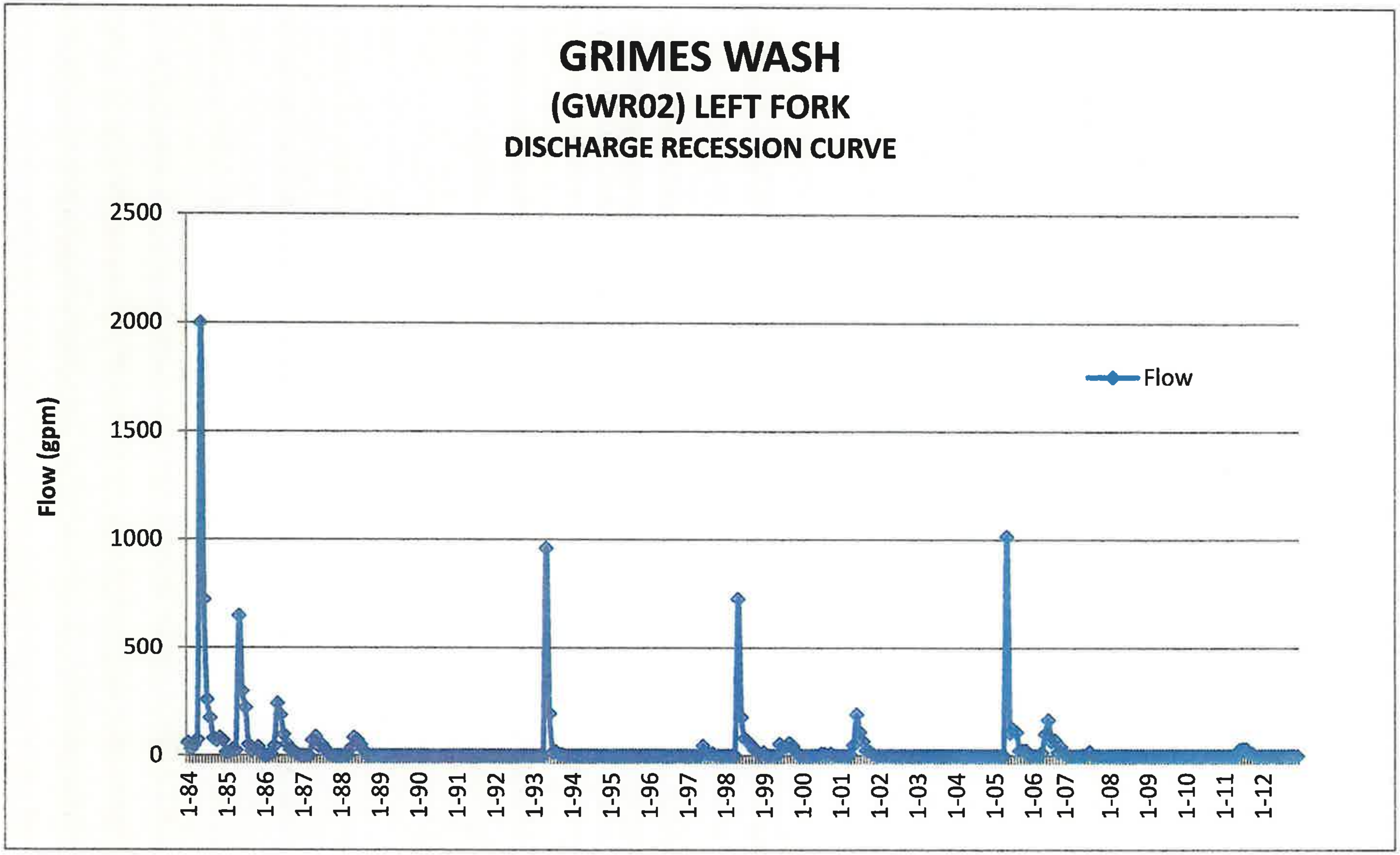
2012** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS
20121008	0	303	95.16	0	4	670		386	0.11	0	36.15	0.023	0	8.26	1.03	11.14	72	0	388
2011**																			
MEAN	0	324	95.37	0	5	670		370	0.06	0	31.99	0.005		8.33	1.58	11.38	47	0	414
2010**																			
MEAN	0	273	93.72	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 2004																			
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

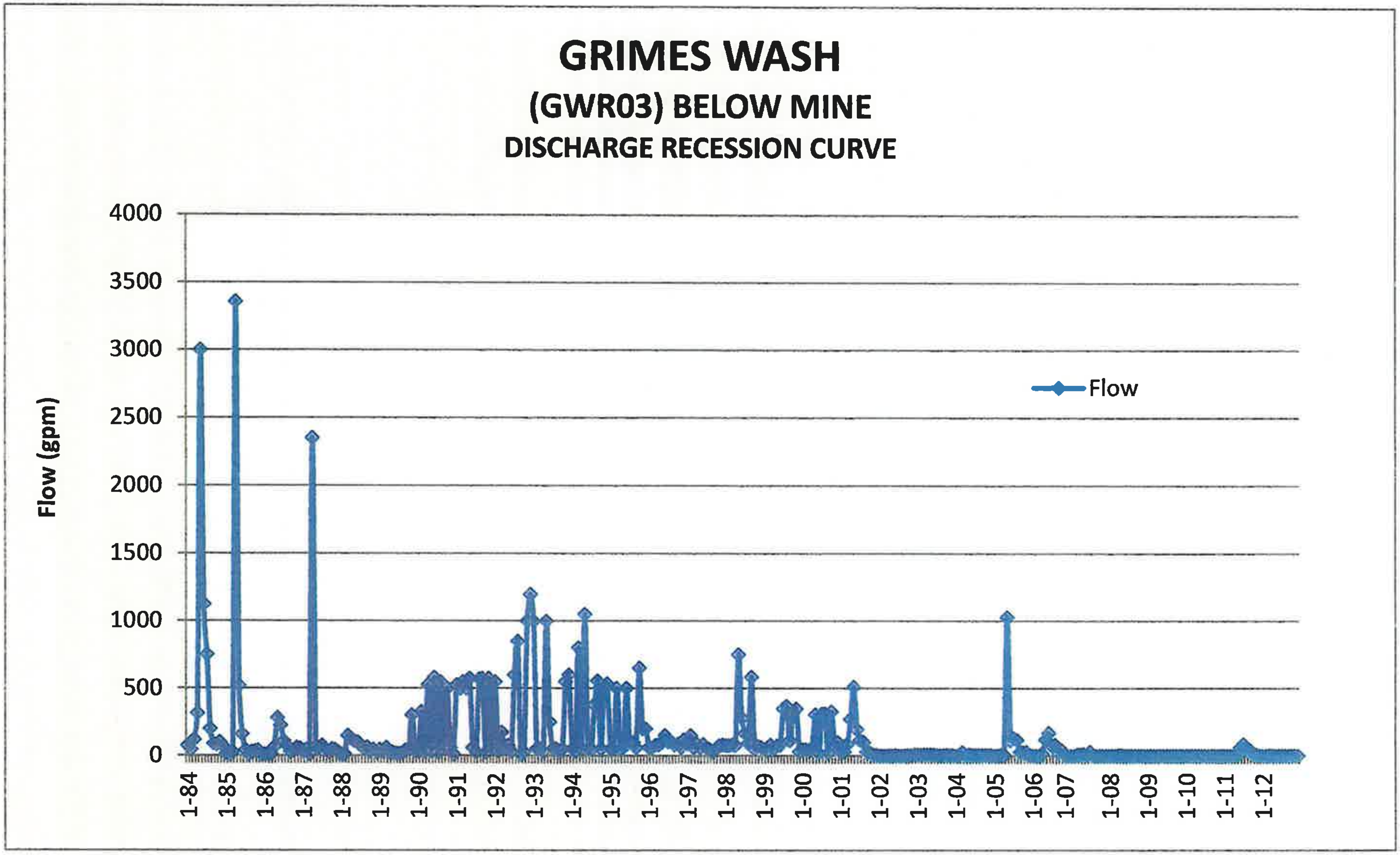
* Quality parameters are reported as mg/l unless otherwise noted.

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

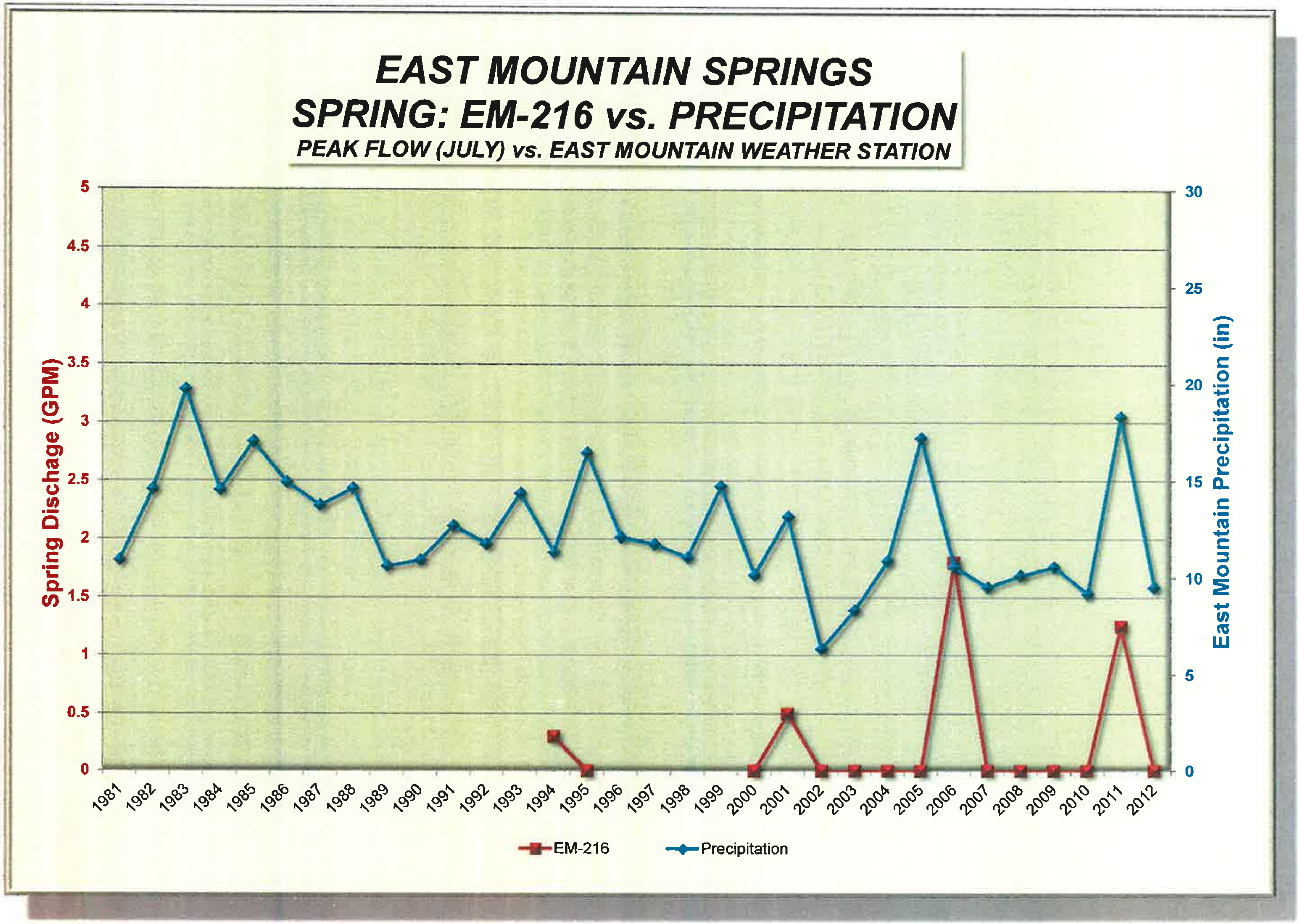
GRIMES WASH
(GWR01) RIGHT FORK
DISCHARGE RECESSION CURVE

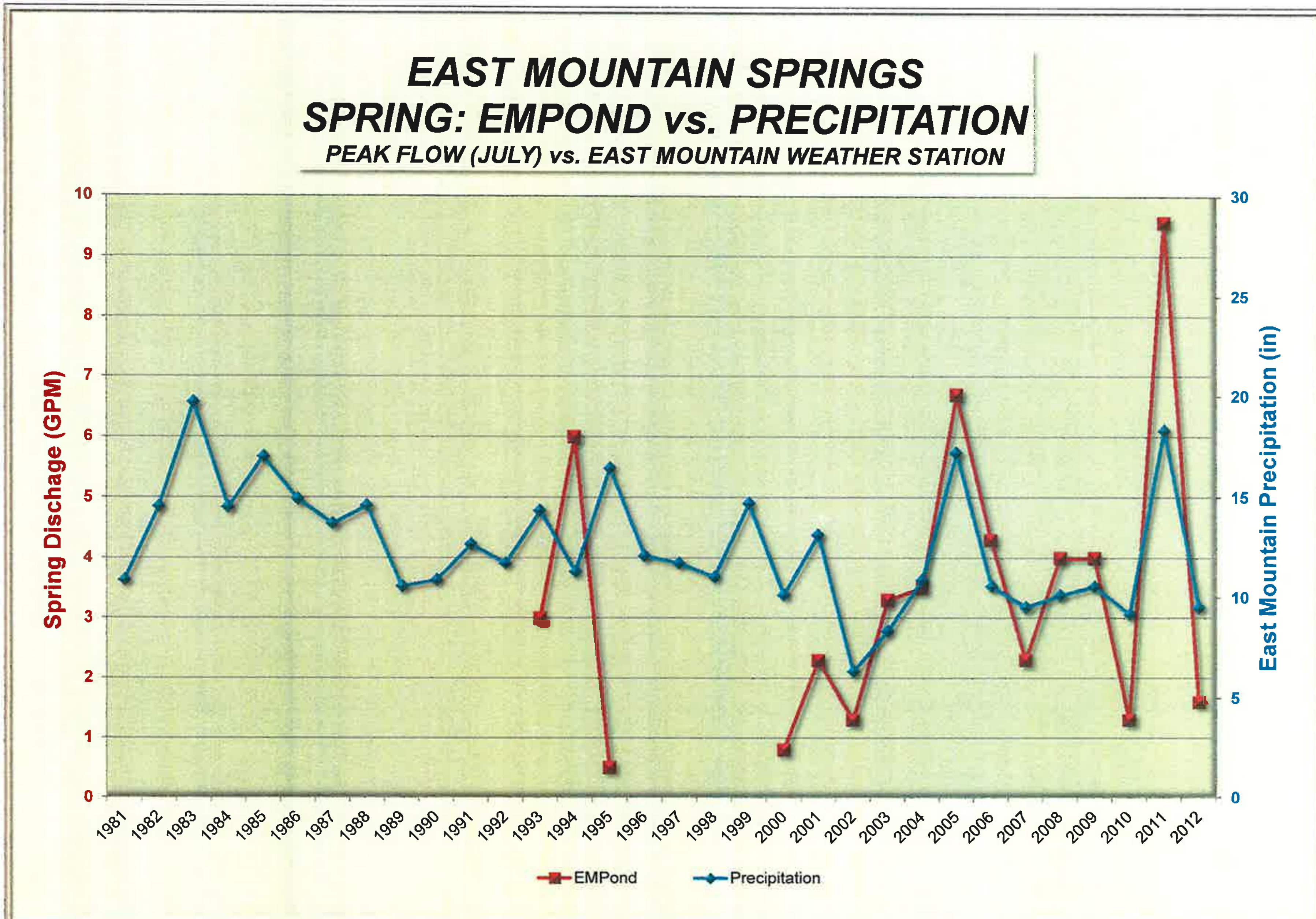


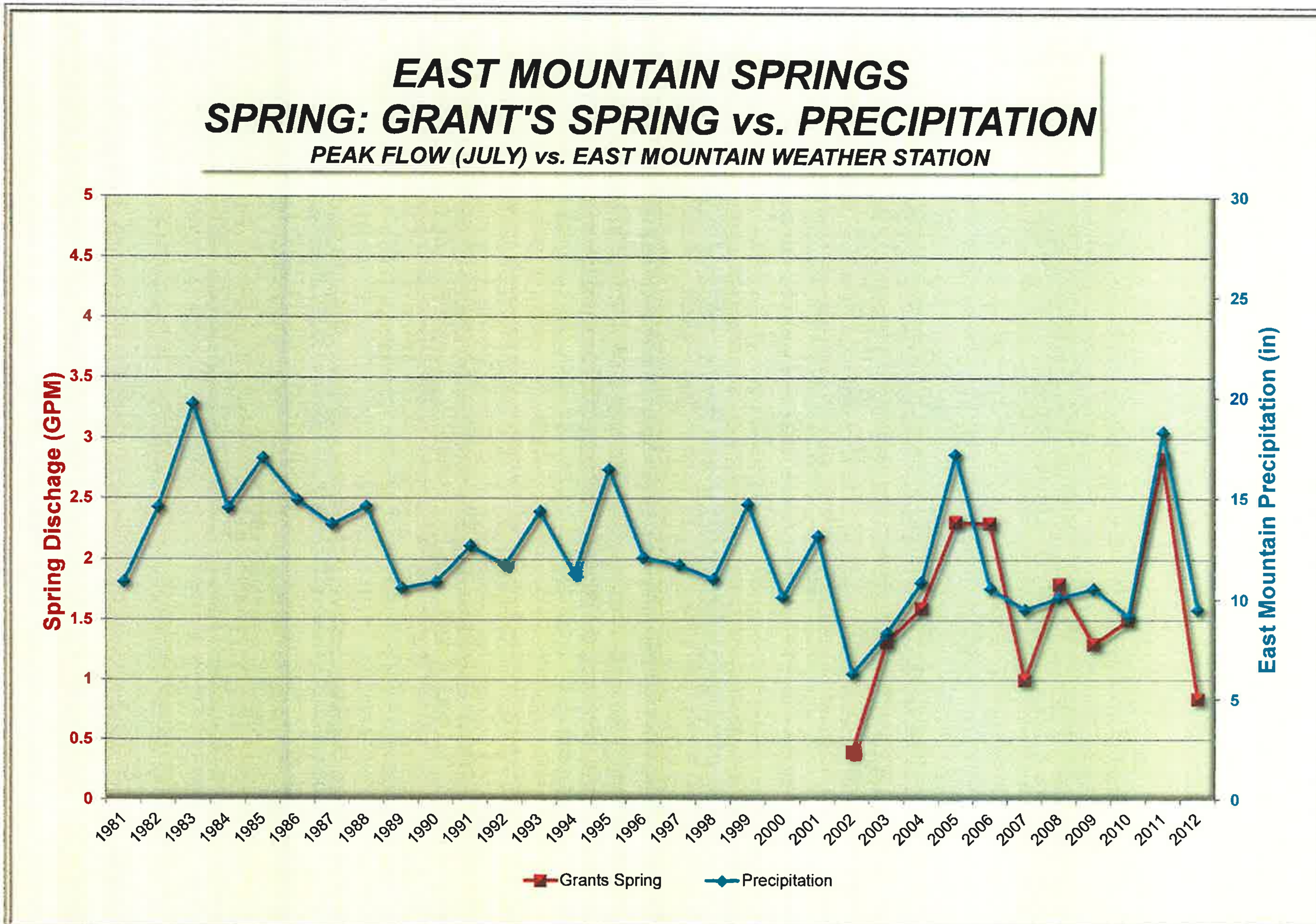

GRIMES WASH
(GWR02) LEFT FORK
DISCHARGE RECESSION CURVE
Flow (gpm)
2500
2000
1500
1000
500
0
1-84
1-85
1-86
1-87
1-88
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
1-01
1-02
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12
Flow

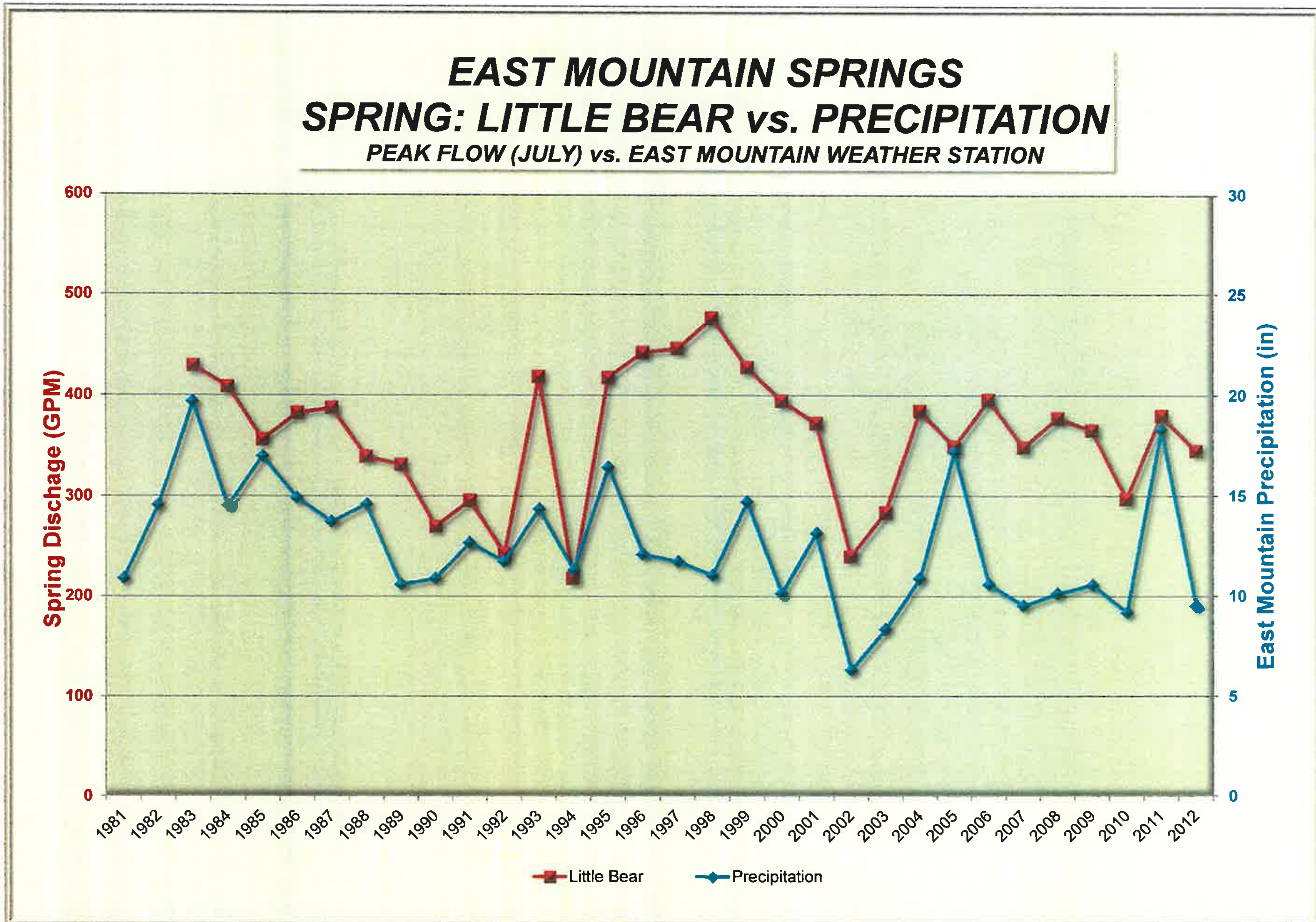

GRIMES WASH
(GWR03) BELOW MINE
DISCHARGE RECESSION CURVE
Flow (gpm)
4000
3500
3000
2500
2000
1500
1000
500
0
Flow
1-84
1-85
1-86
1-87
1-88
1-89
1-90
1-91
1-92
1-93
1-94
1-95
1-96
1-97
1-98
1-99
1-00
1-01
1-02
1-03
1-04
1-05
1-06
1-07
1-08
1-09
1-10
1-11
1-12

East Mountain Springs
Northern Area

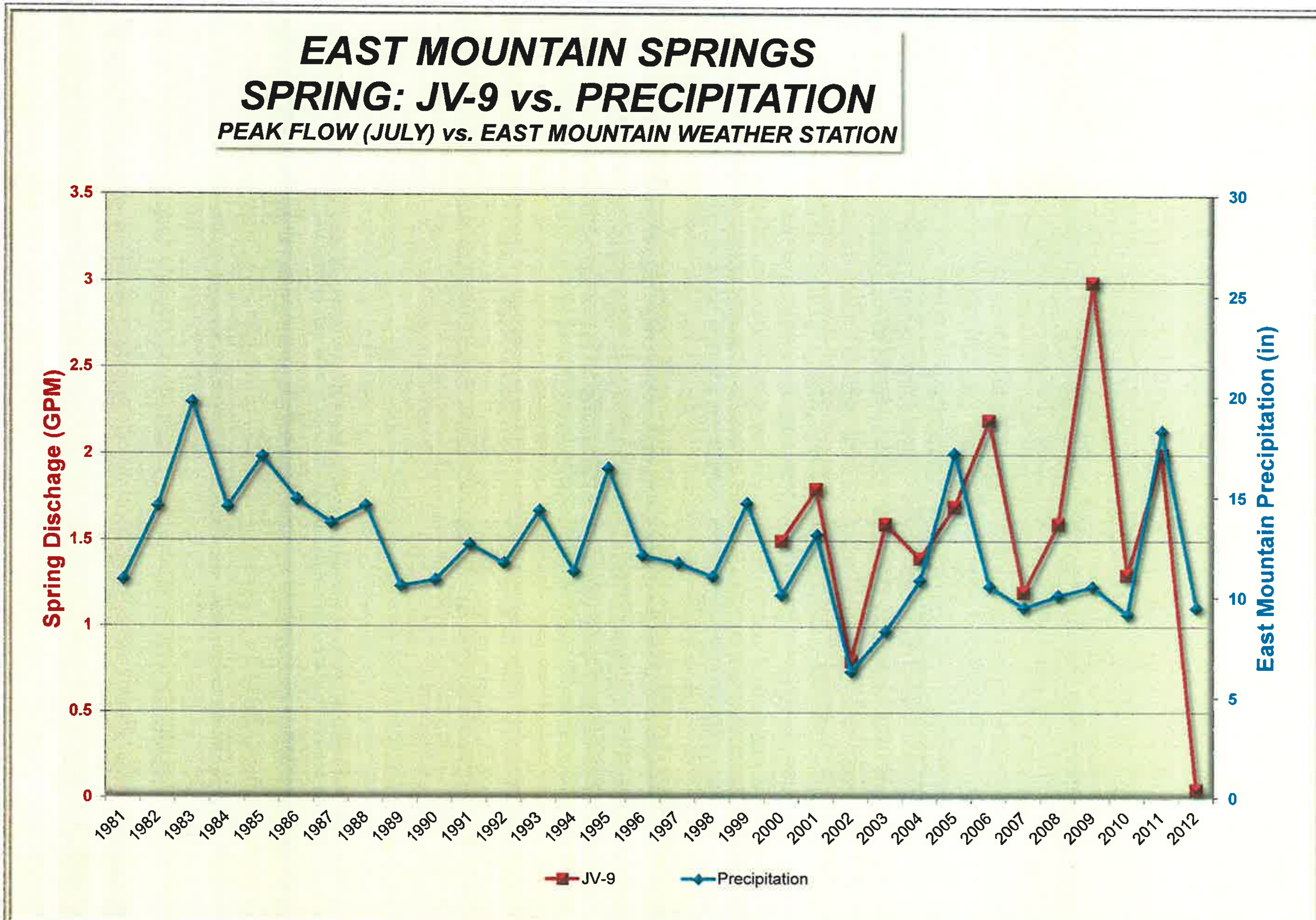

EAST MOUNTAIN SPRINGS
SPRING: EM-216 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
EM-216
Precipitation


EAST MOUNTAIN SPRINGS
SPRING: EMPOND vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
1
2
3
4
5
6
7
8
9
10
0
5
10
15
20
25
30
1981
1982
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
EMPond
Precipitation

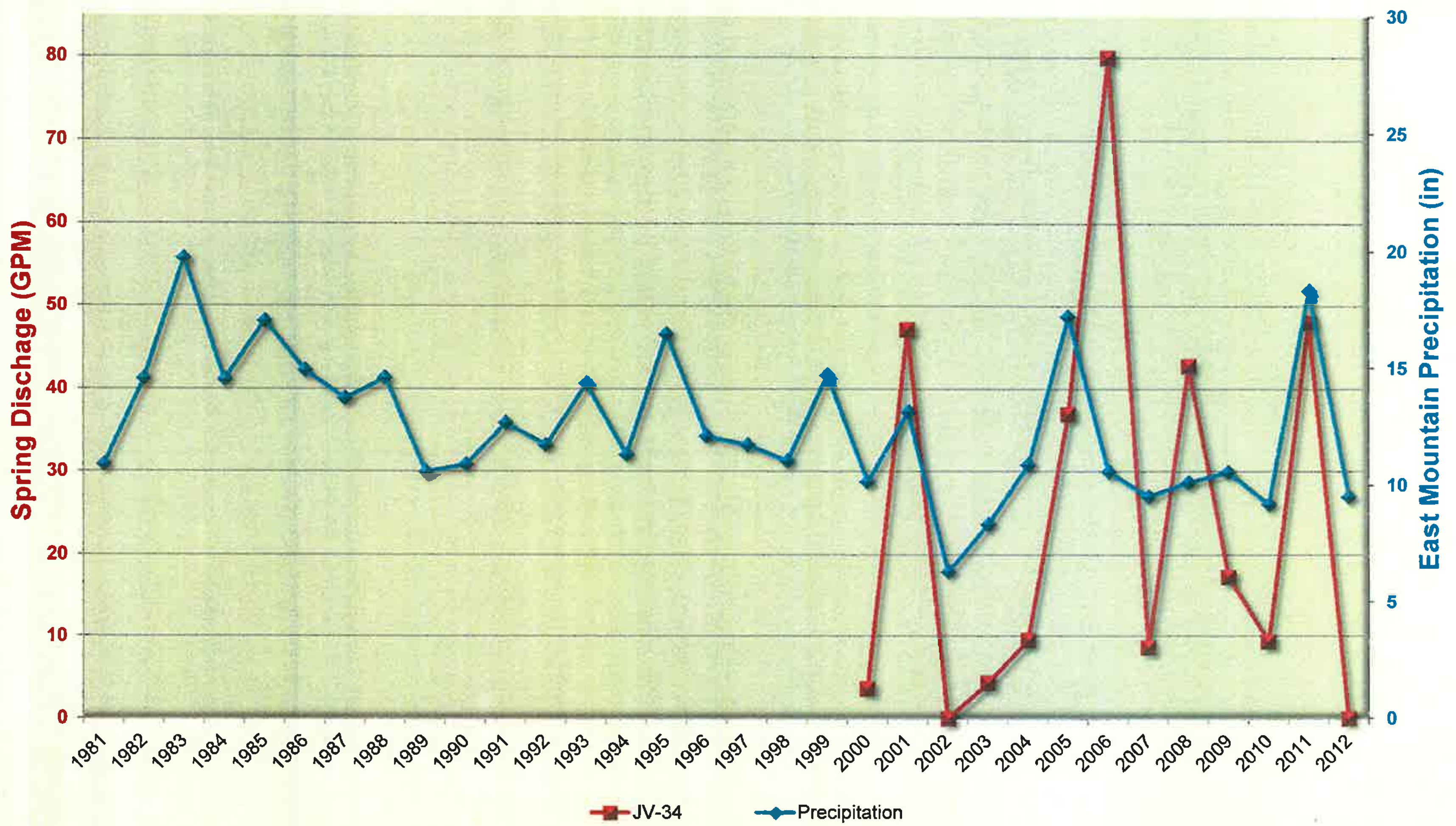

EAST MOUNTAIN SPRINGS
SPRING: GRANT'S SPRING vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Grants Spring
Precipitation

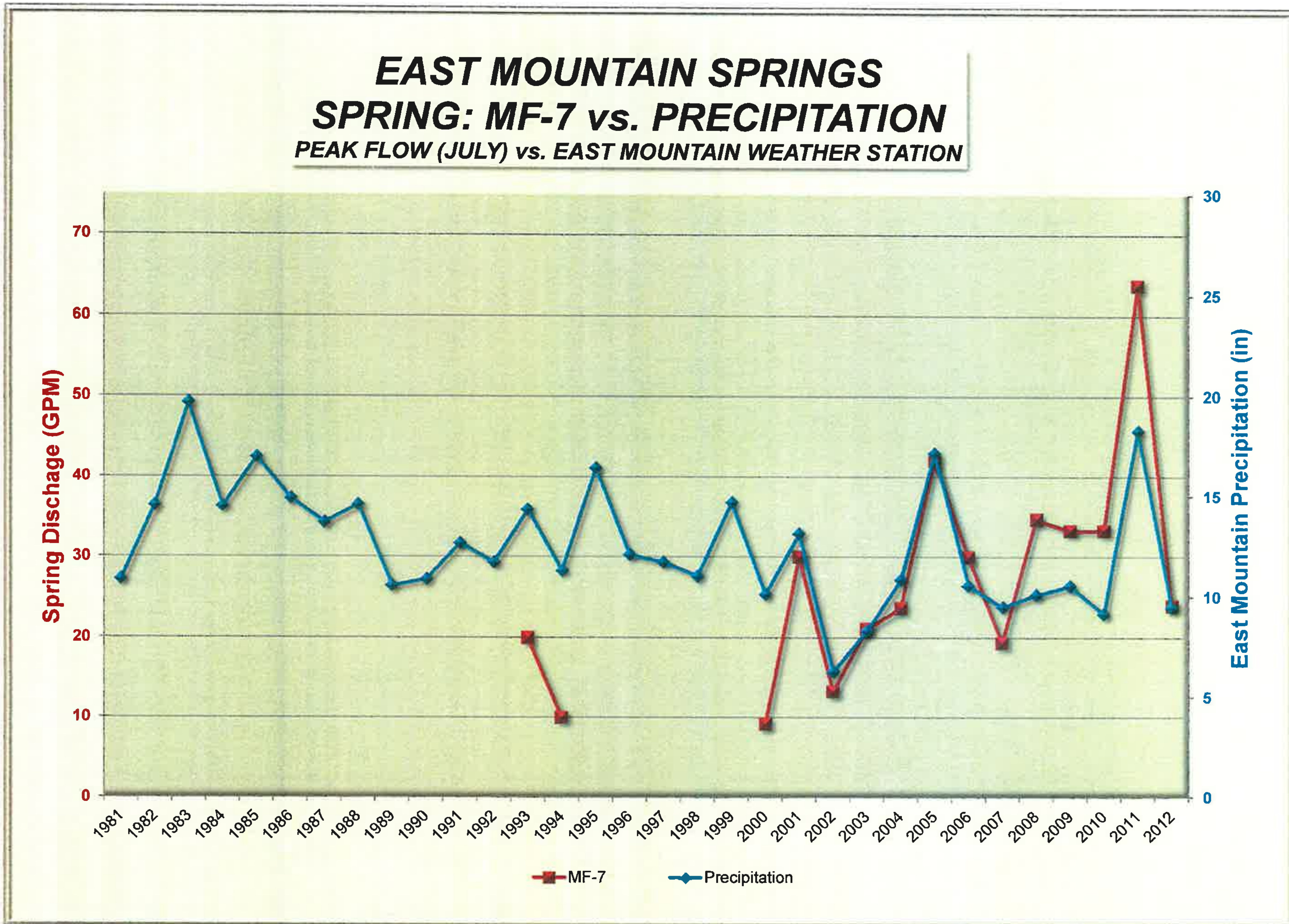


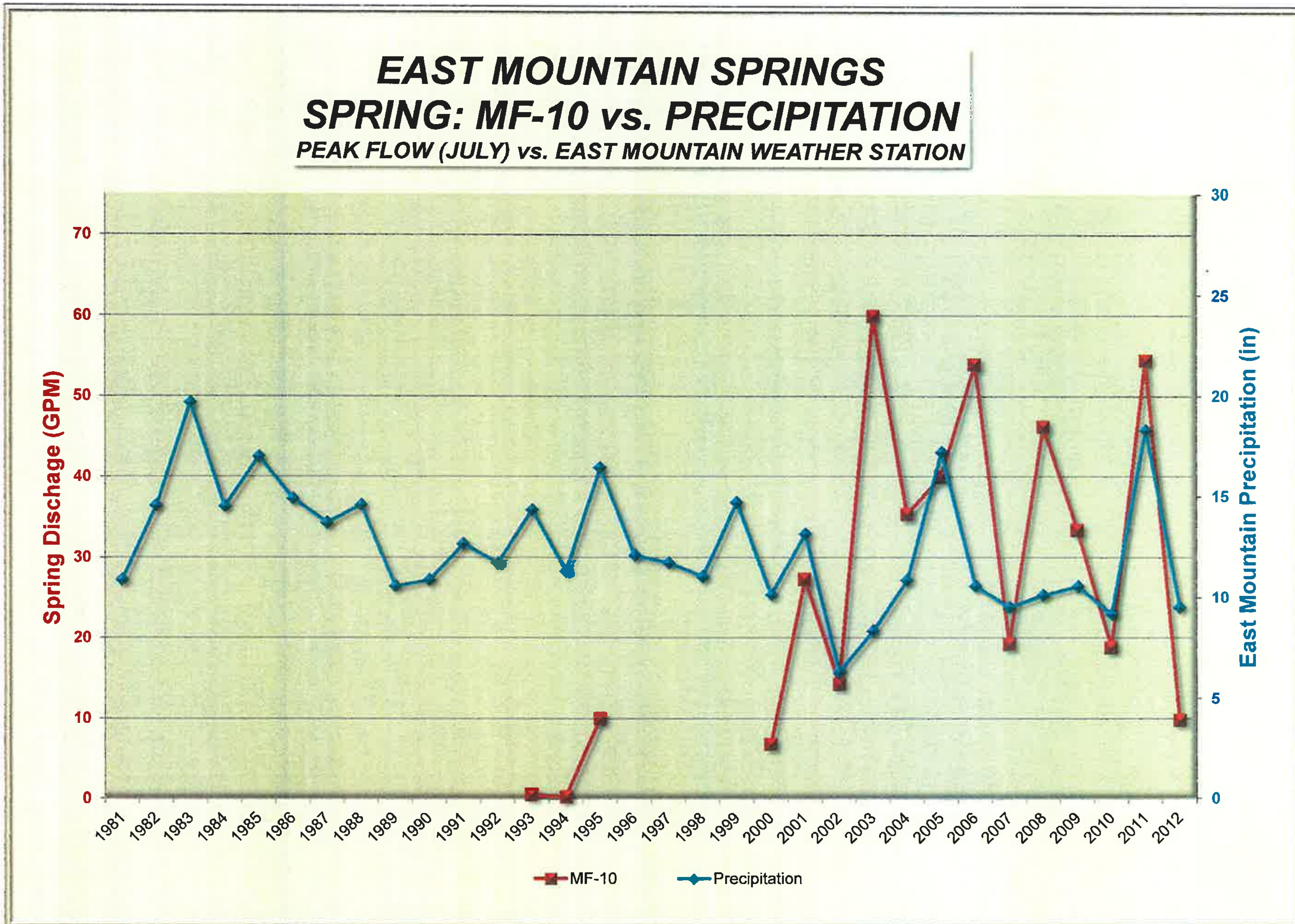
EAST MOUNTAIN SPRINGS
SPRING: LITTLE BEAR vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
600
500
400
300
200
100
0
East Mountain Precipitation (in)
30
25
20
15
10
5
0
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Little Bear
Precipitation

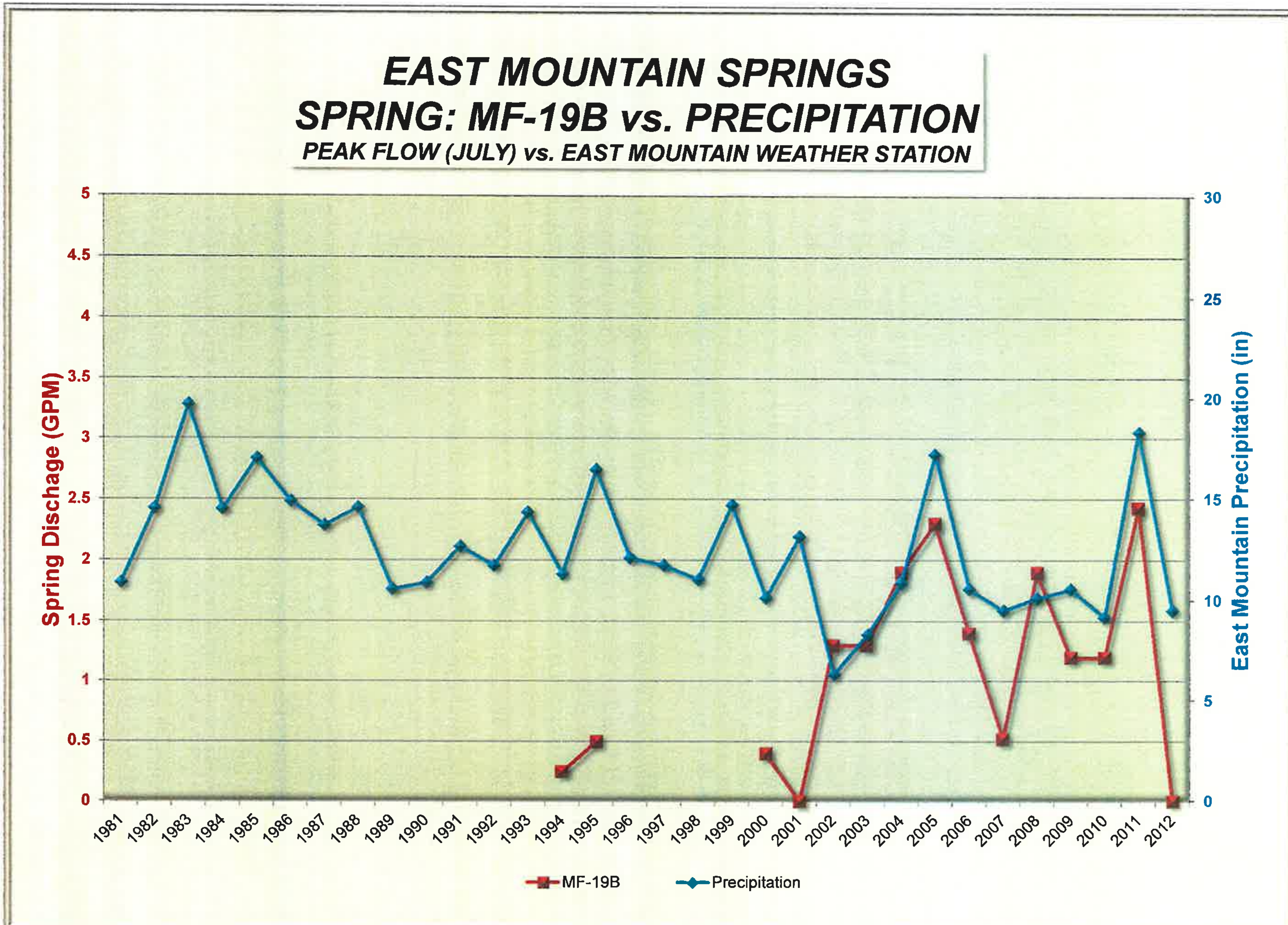

EAST MOUNTAIN SPRINGS
SPRING: JV-9 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
0.5
1
1.5
2
2.5
3
3.5
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
JV-9
Precipitation

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

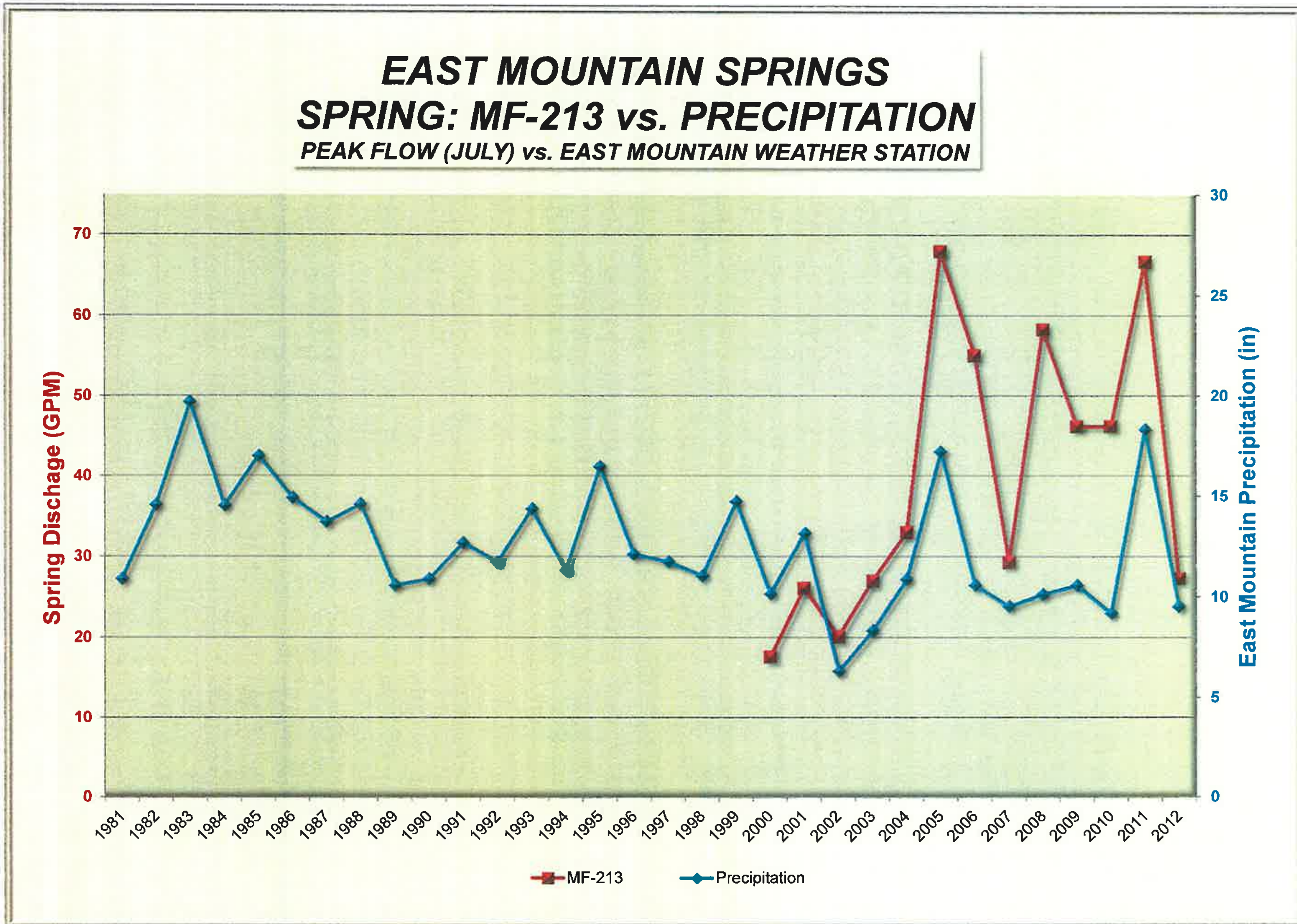



EAST MOUNTAIN SPRINGS
SPRING: MF-7 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
0
10
20
30
40
50
60
70
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
MF-7
Precipitation

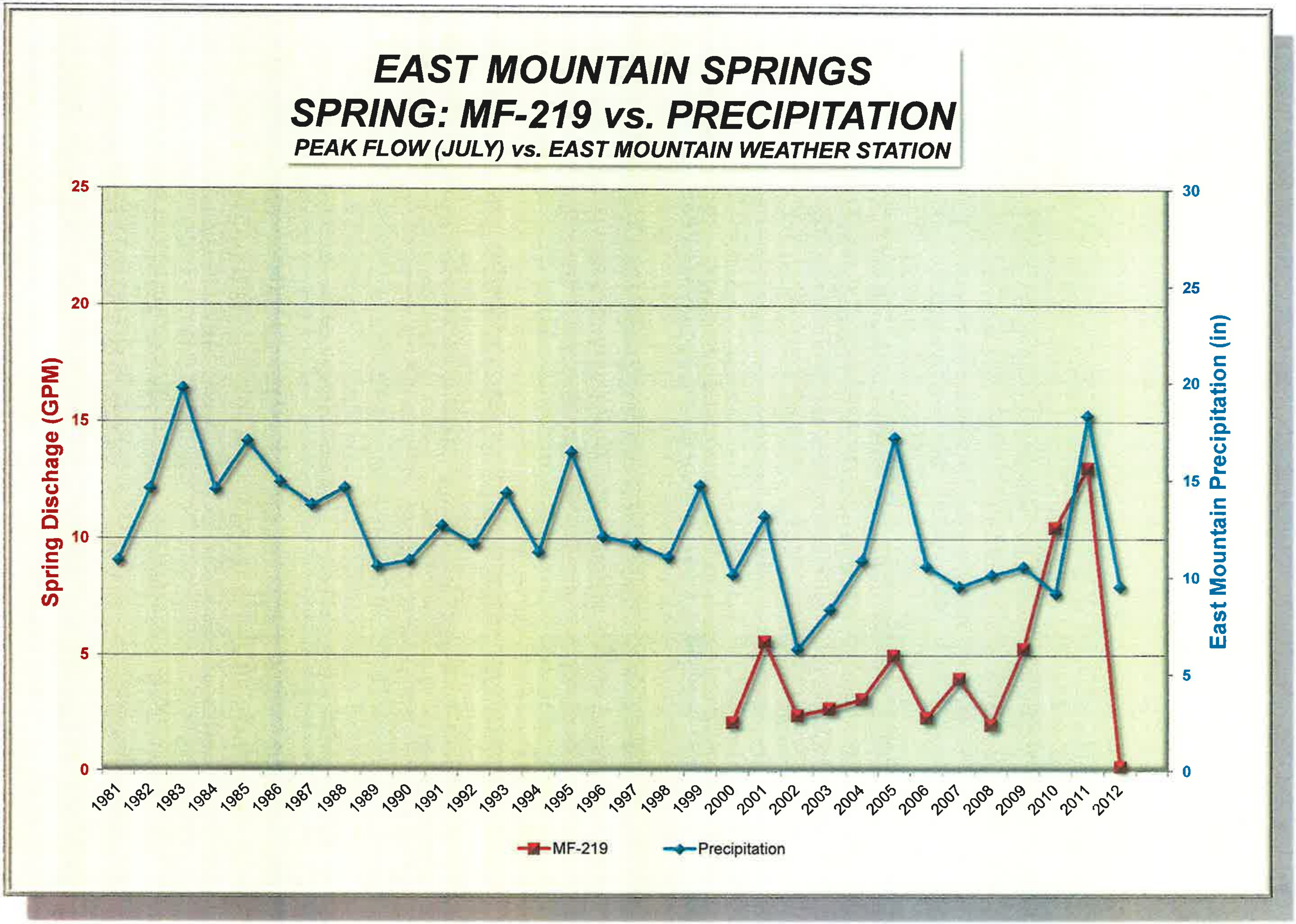

EAST MOUNTAIN SPRINGS
SPRING: MF-10 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
10
20
30
40
50
60
70
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
MF-10
Precipitation

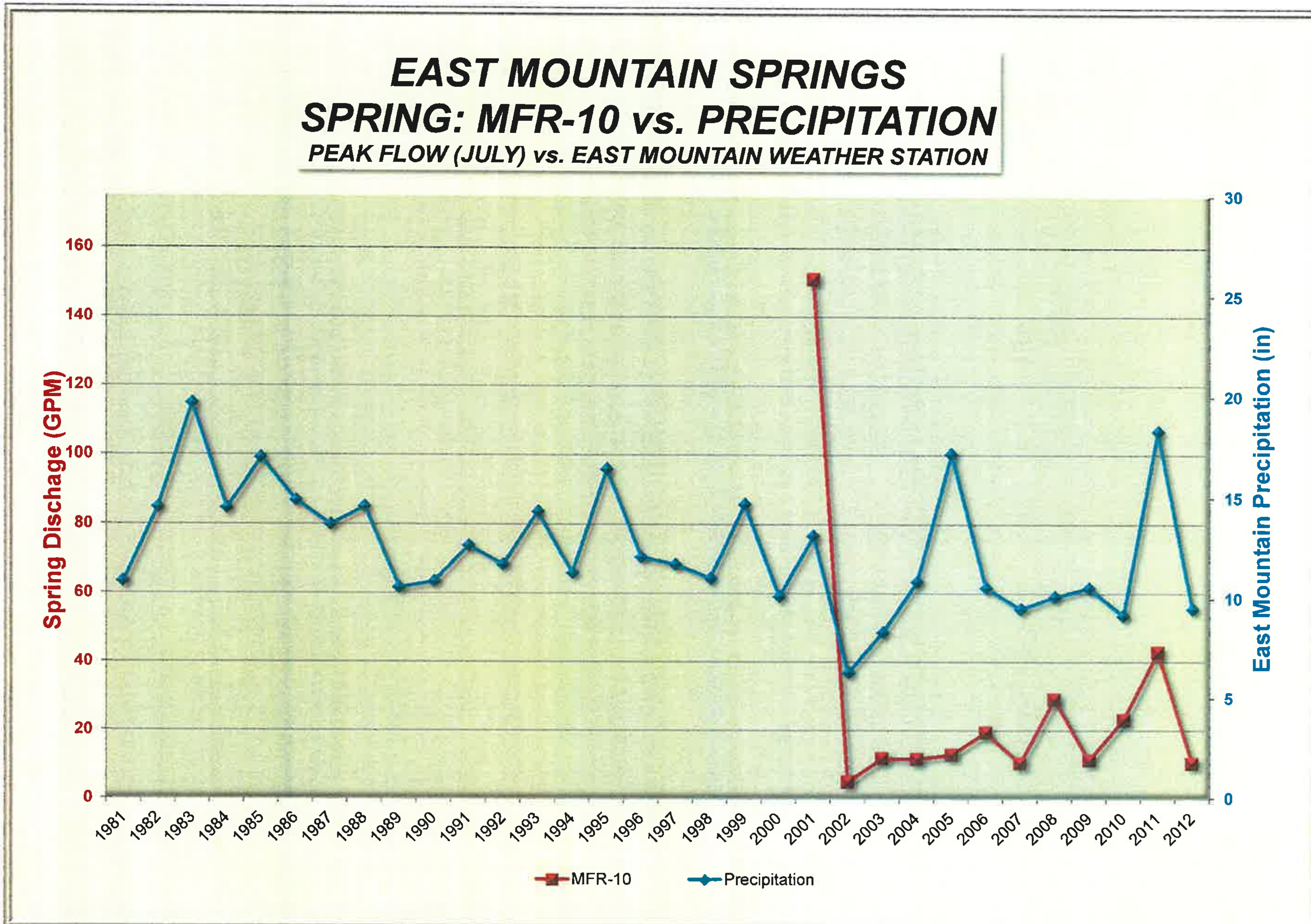


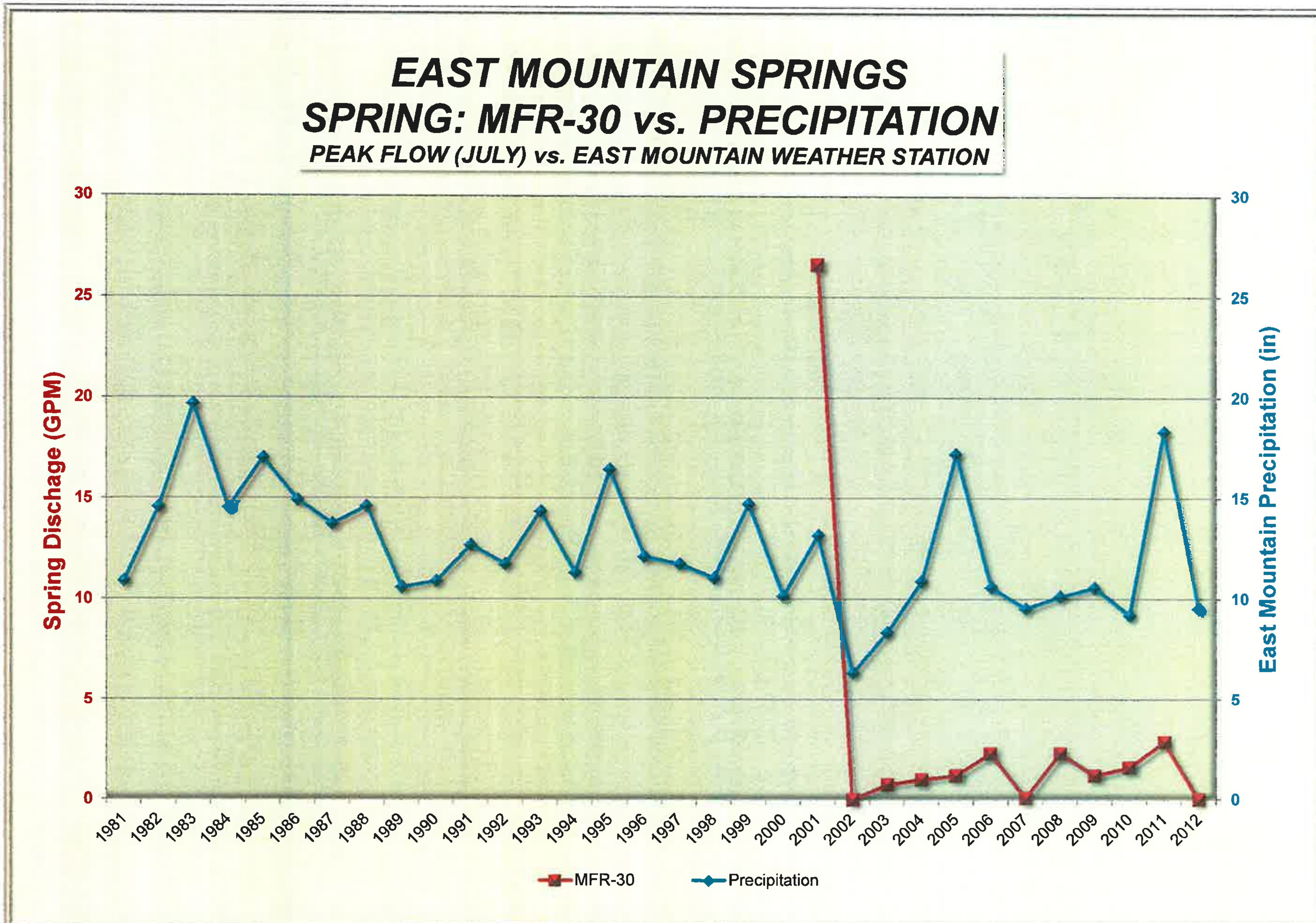
EAST MOUNTAIN SPRINGS
SPRING: MF-19B vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
30
25
20
15
10
5
0
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
MF-19B
Precipitation



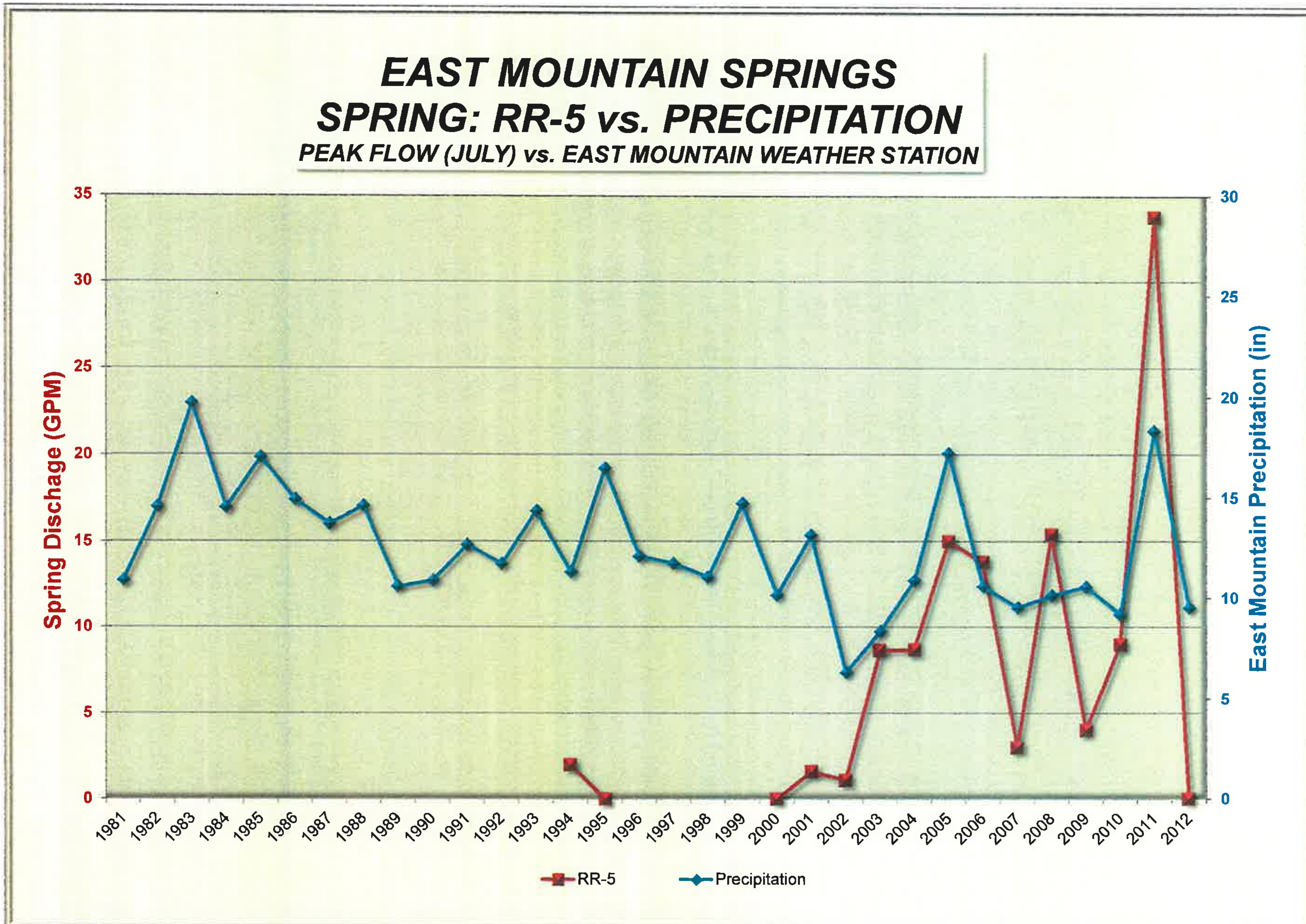
EAST MOUNTAIN SPRINGS
SPRING: MF-213 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
10
20
30
40
50
60
70
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
MF-213
Precipitation

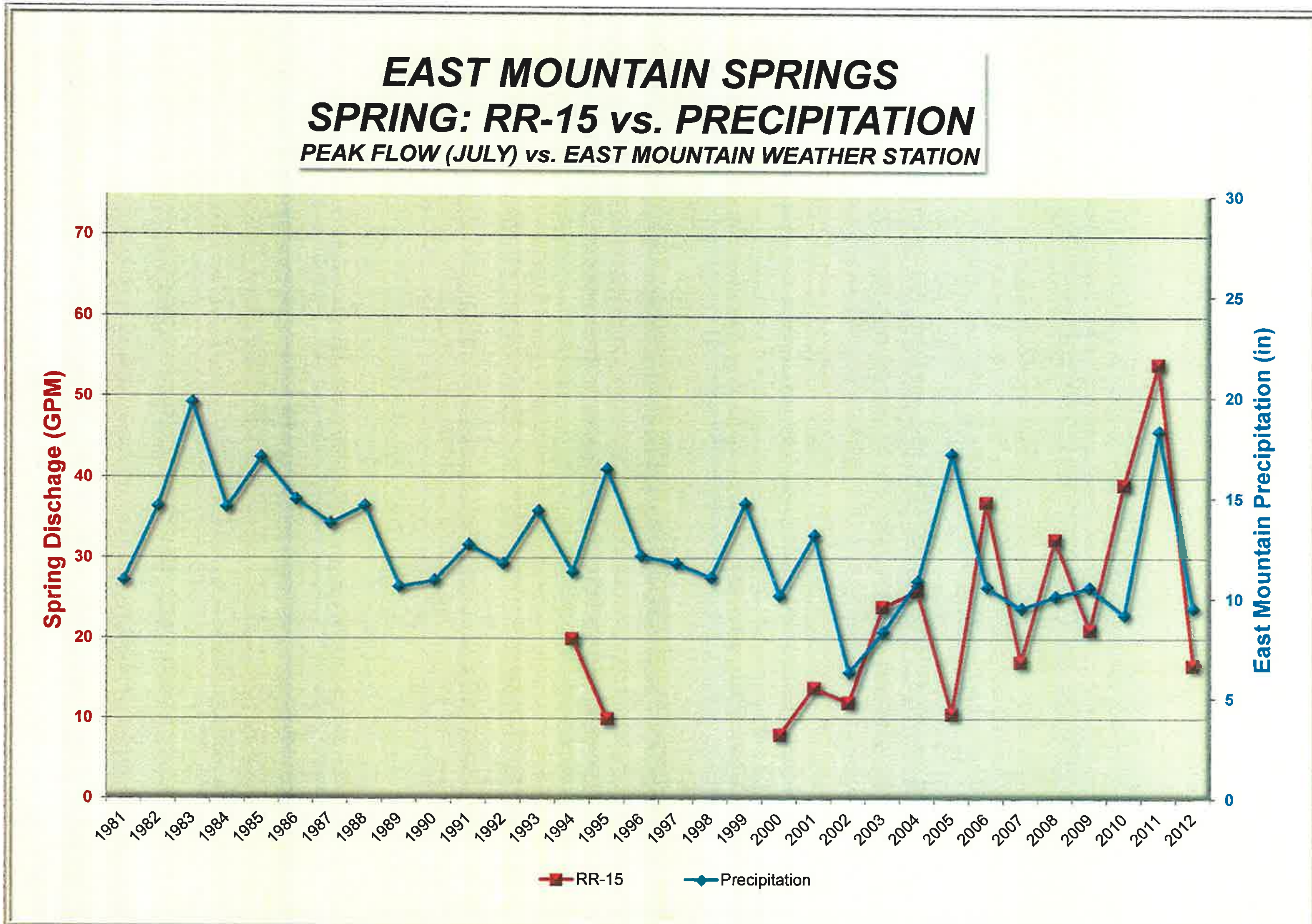

EAST MOUNTAIN SPRINGS
SPRING: MF-219 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
MF-219
Precipitation

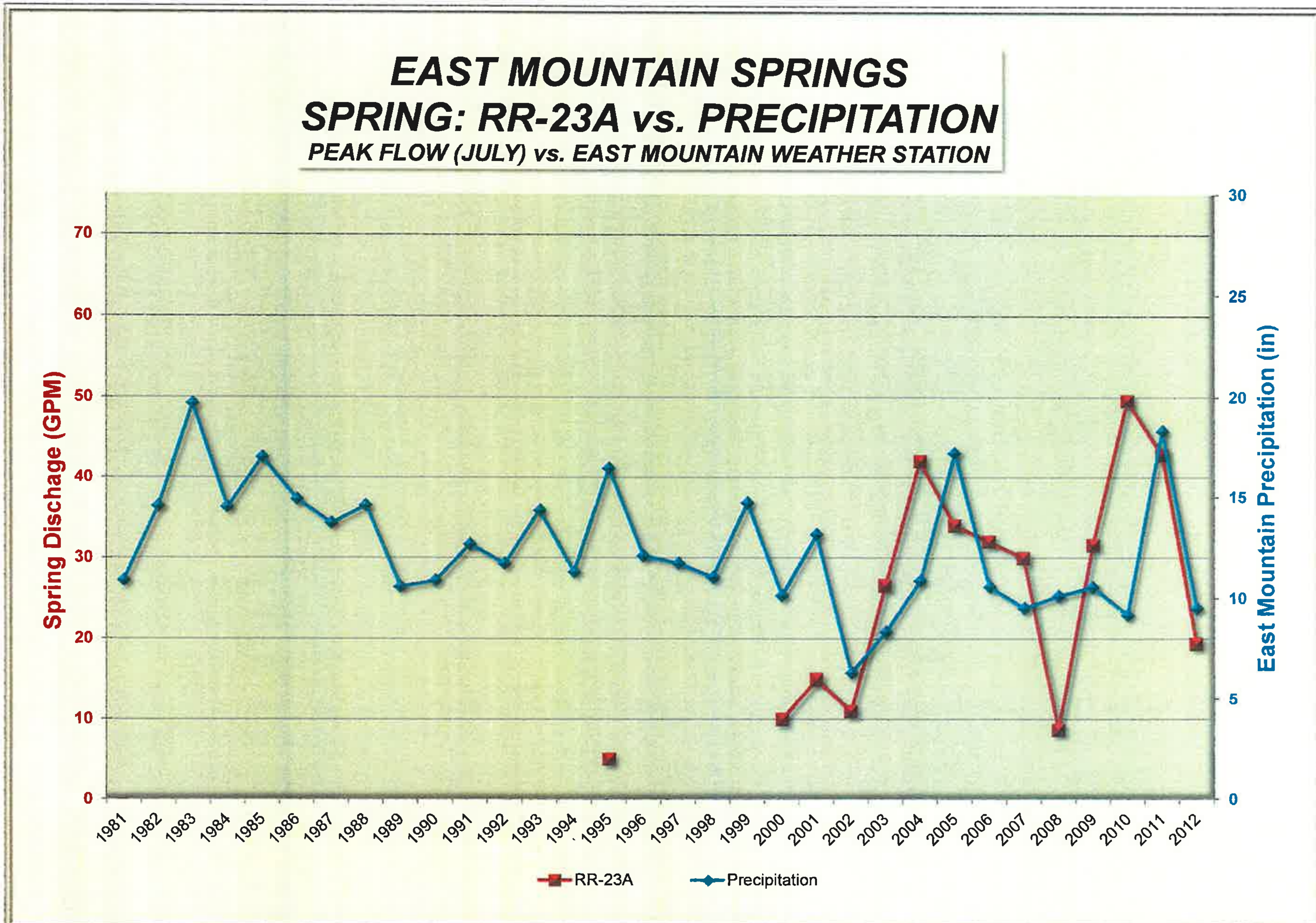

EAST MOUNTAIN SPRINGS
SPRING: MFR-10 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
0
20
40
60
80
100
120
140
160
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
MFR-10
Precipitation

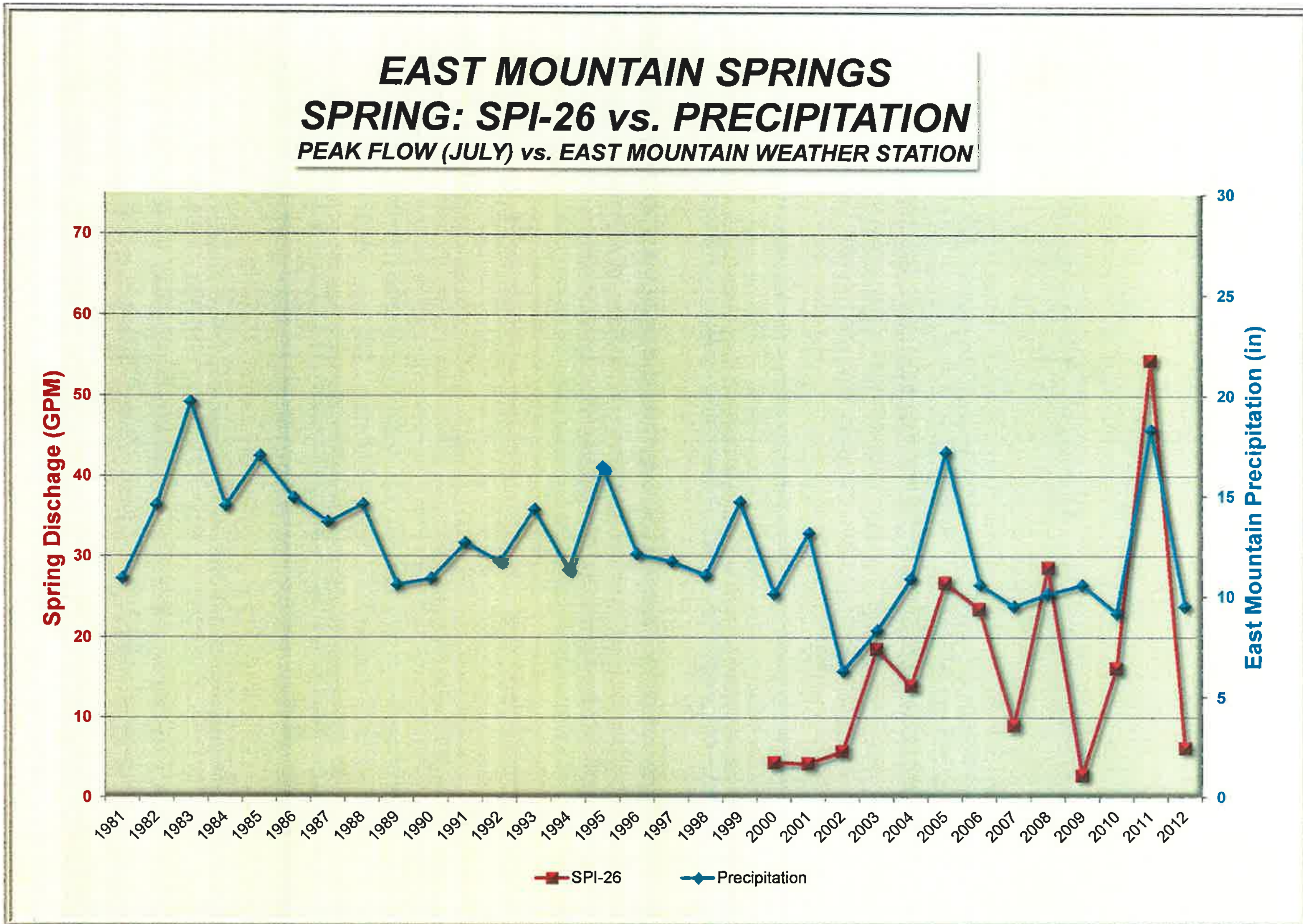


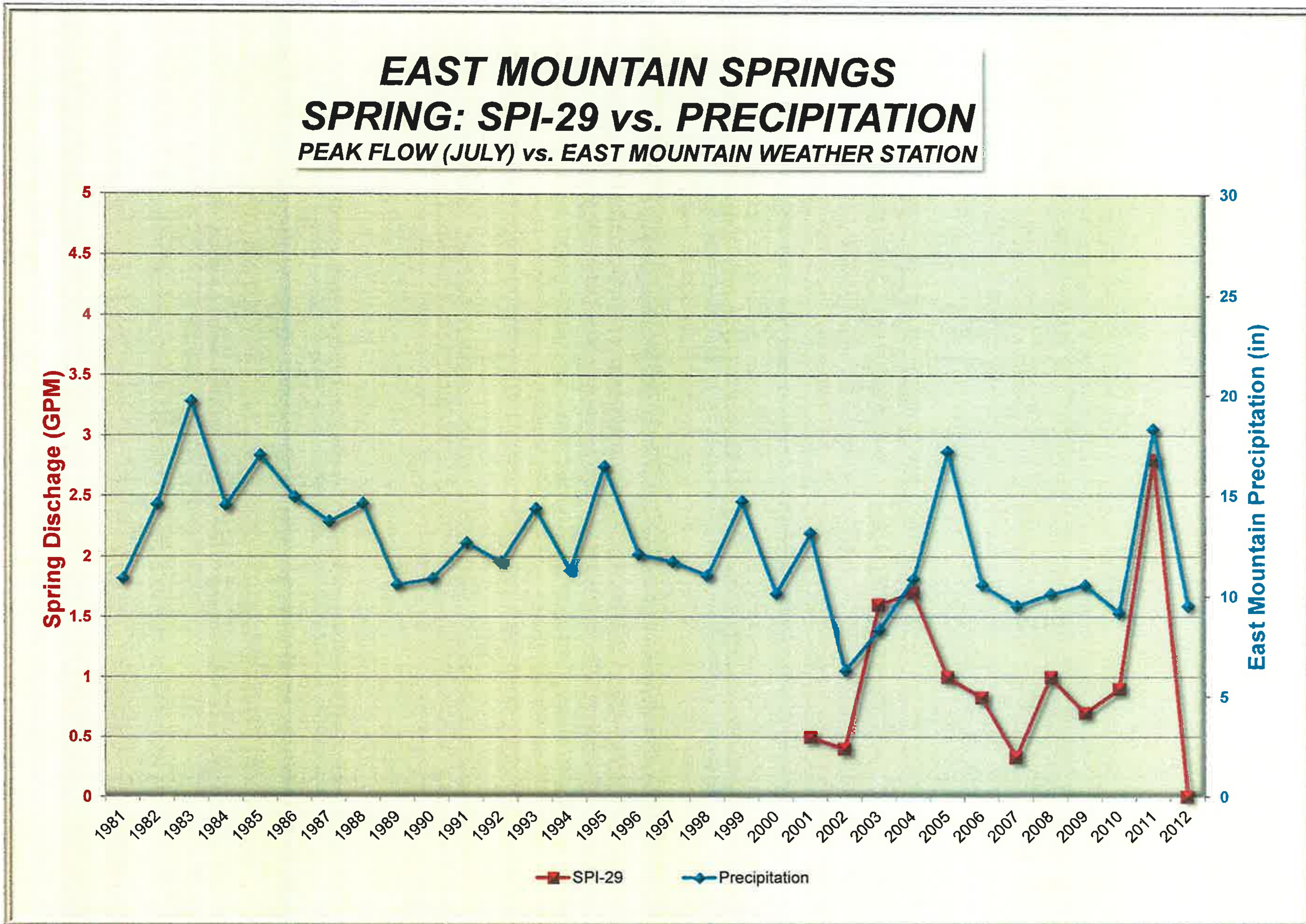
EAST MOUNTAIN SPRINGS
SPRING: MFR-30 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
MFR-30
Precipitation


EAST MOUNTAIN SPRINGS
SPRING: RR-5 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
35
1981
1982
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
RR-5
Precipitation

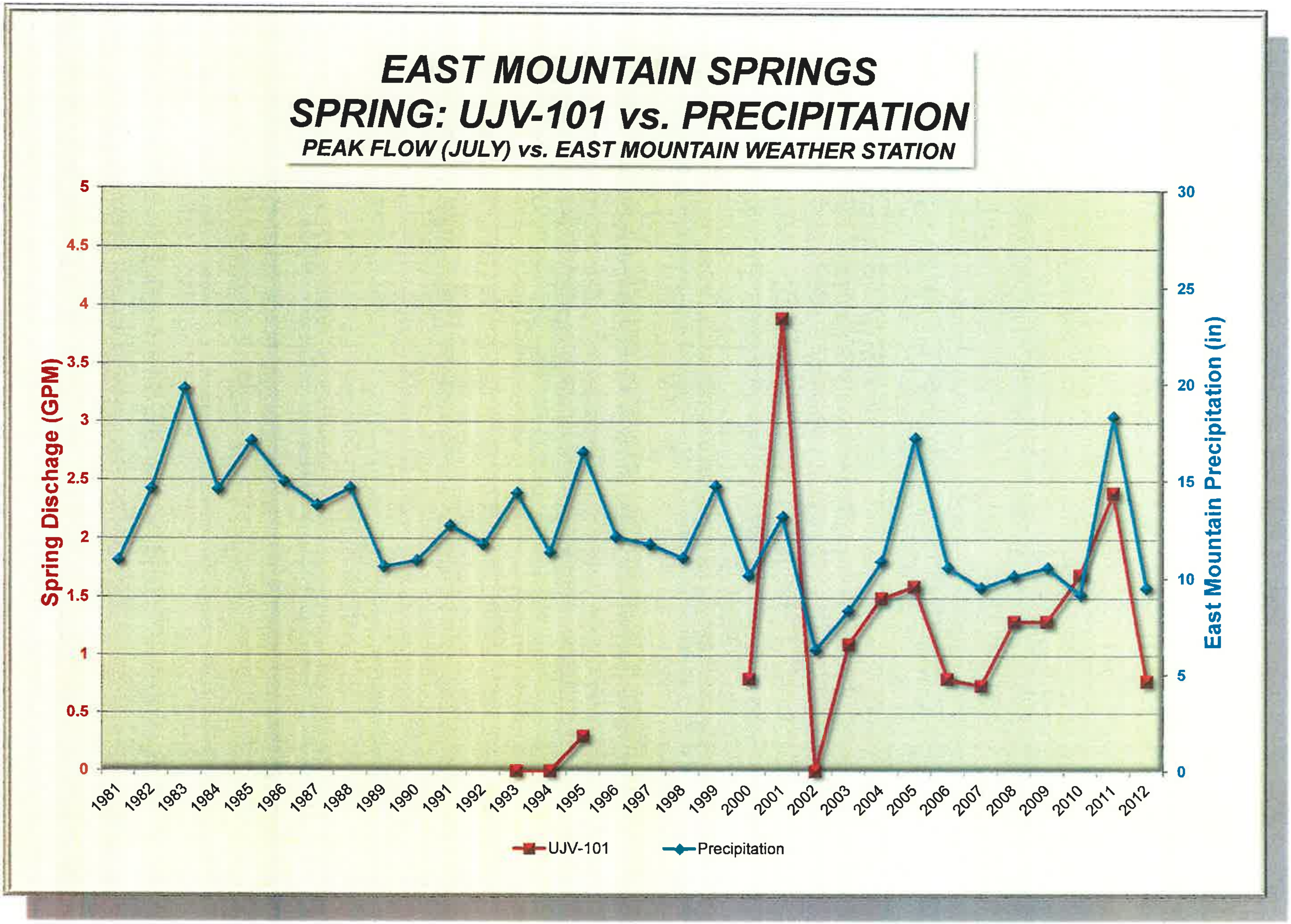

EAST MOUNTAIN SPRINGS
SPRING: RR-15 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
0
10
20
30
40
50
60
70
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
RR-15
Precipitation

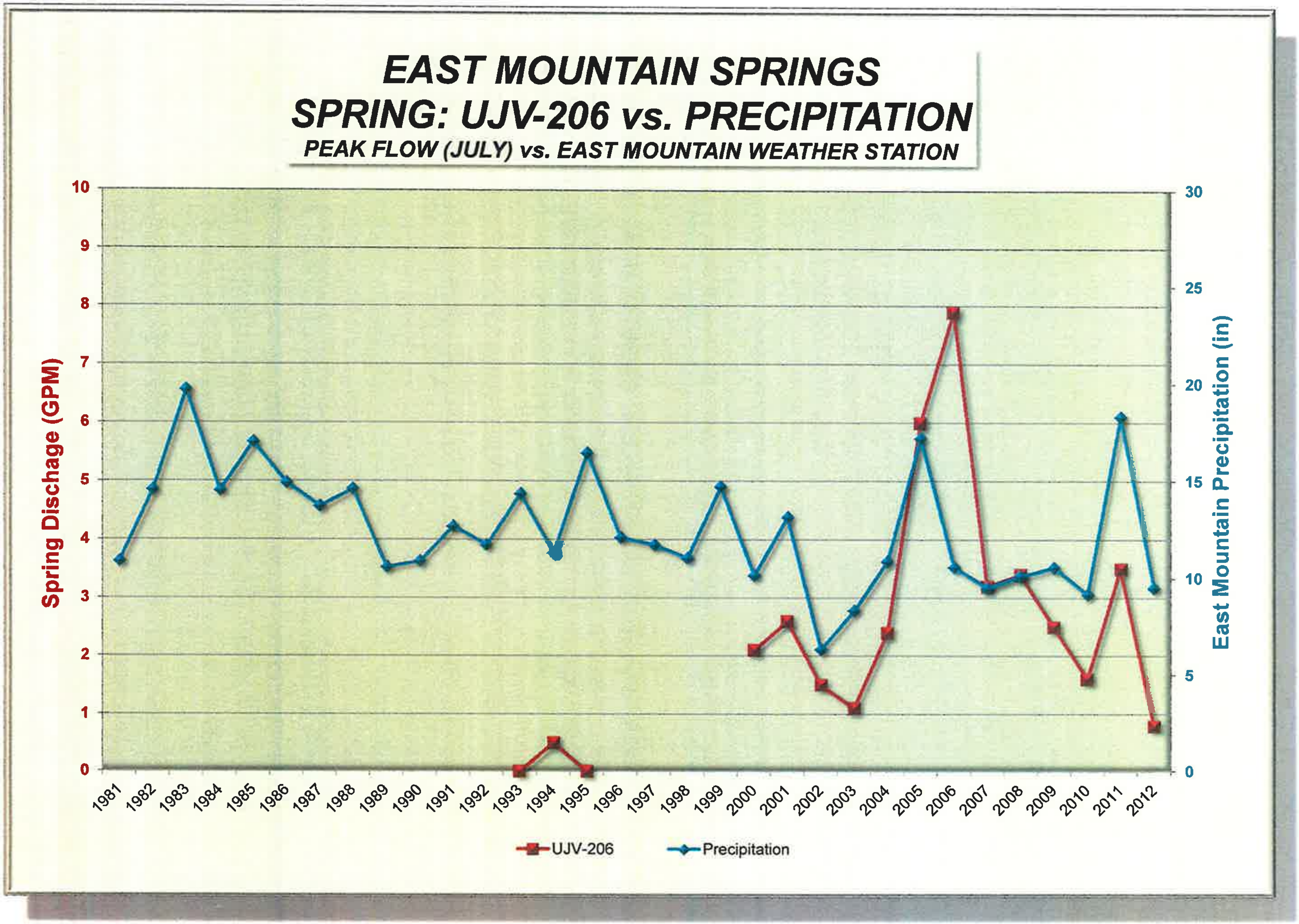

EAST MOUNTAIN SPRINGS
SPRING: RR-23A vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
0
10
20
30
40
50
60
70
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
RR-23A
Precipitation


EAST MOUNTAIN SPRINGS
SPRING: SPI-26 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
10
20
30
40
50
60
70
0
5
10
15
20
25
30
1981
1982
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
SPI-26
Precipitation

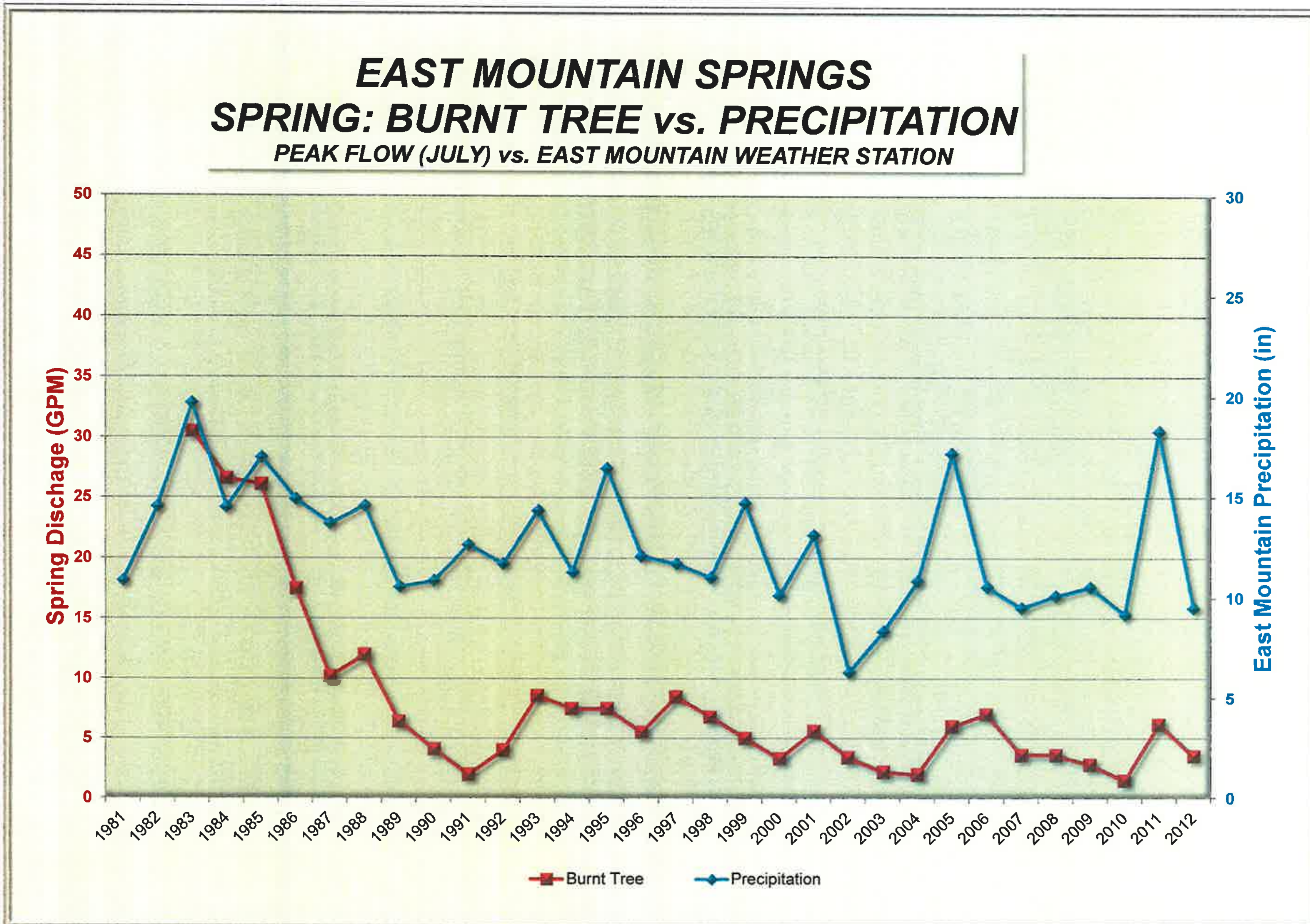


EAST MOUNTAIN SPRINGS
SPRING: SPI-29 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
SPI-29
Precipitation

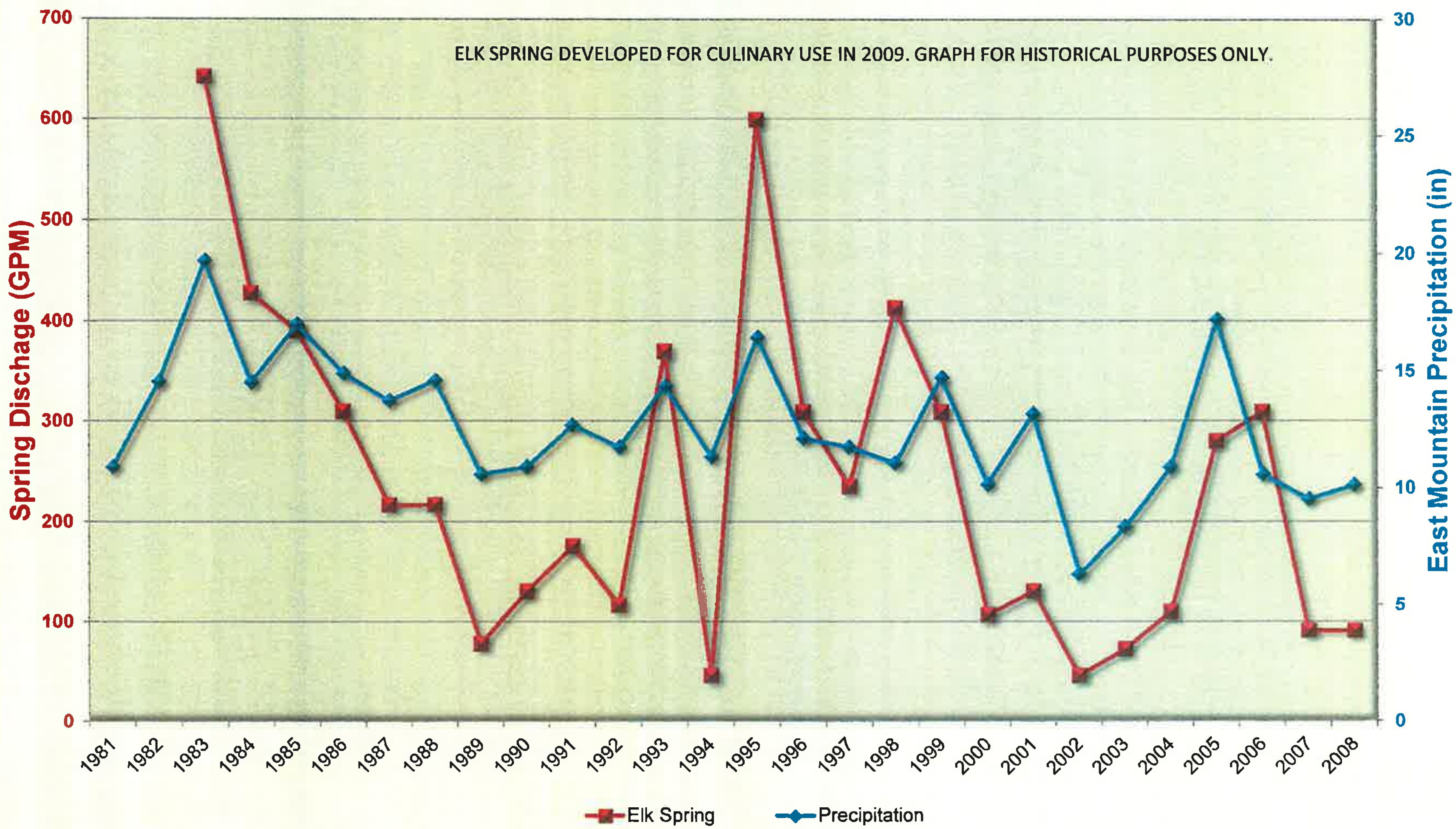

EAST MOUNTAIN SPRINGS
SPRING: UJV-101 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
UJV-101
Precipitation

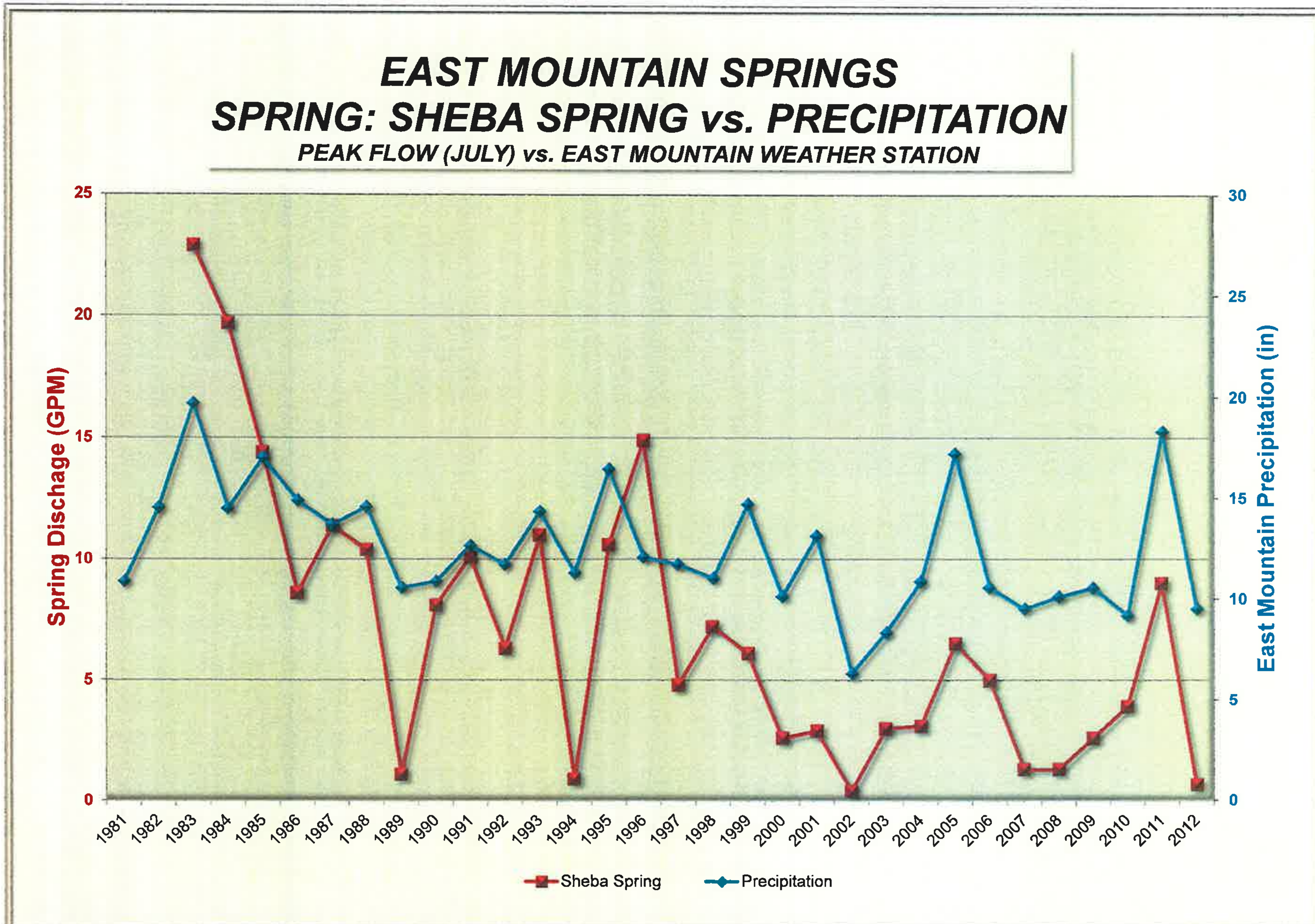

EAST MOUNTAIN SPRINGS
SPRING: UJV-206 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
1
2
3
4
5
6
7
8
9
10
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
UJV-206
Precipitation

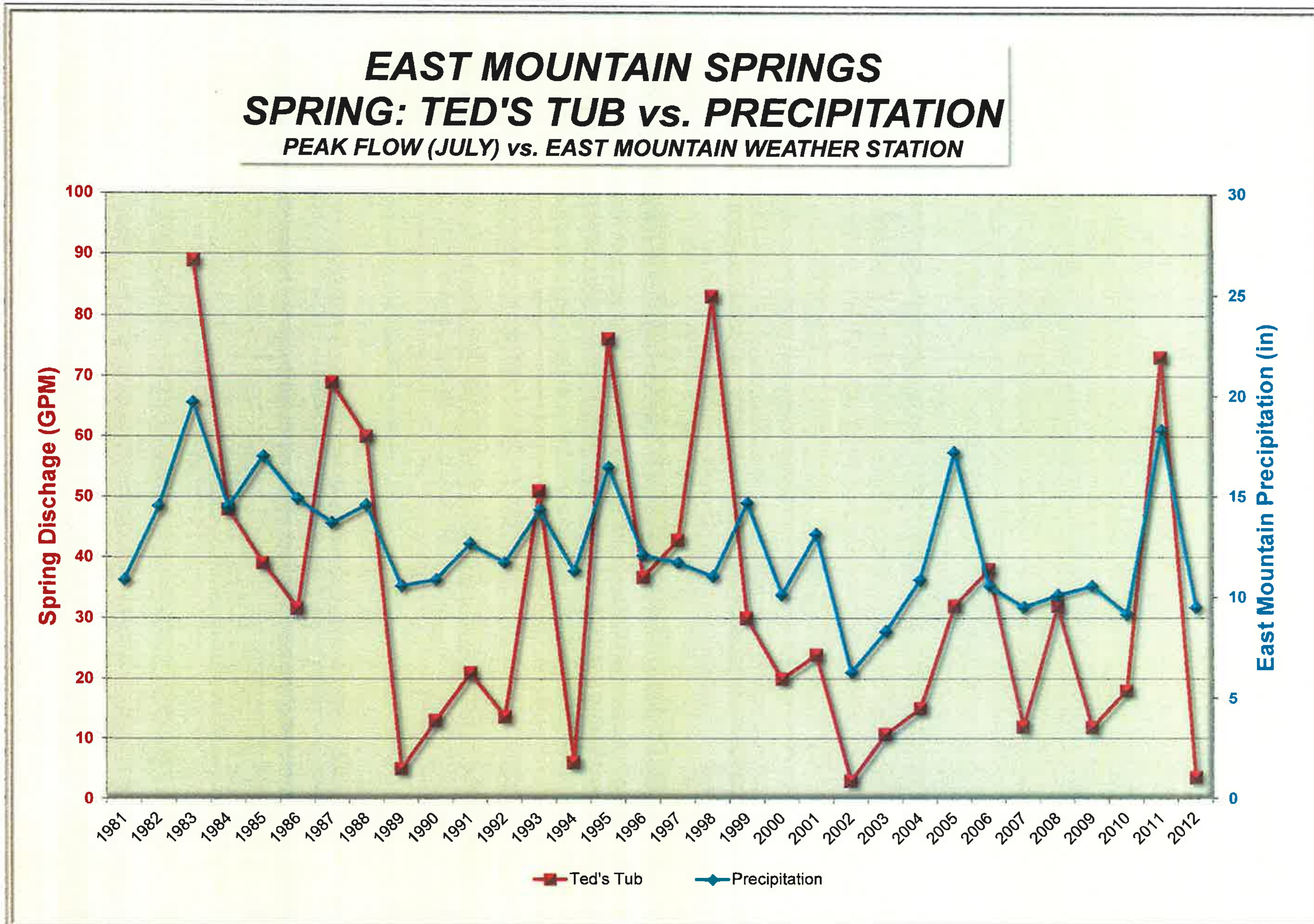
East Mountain Springs
Southern Area

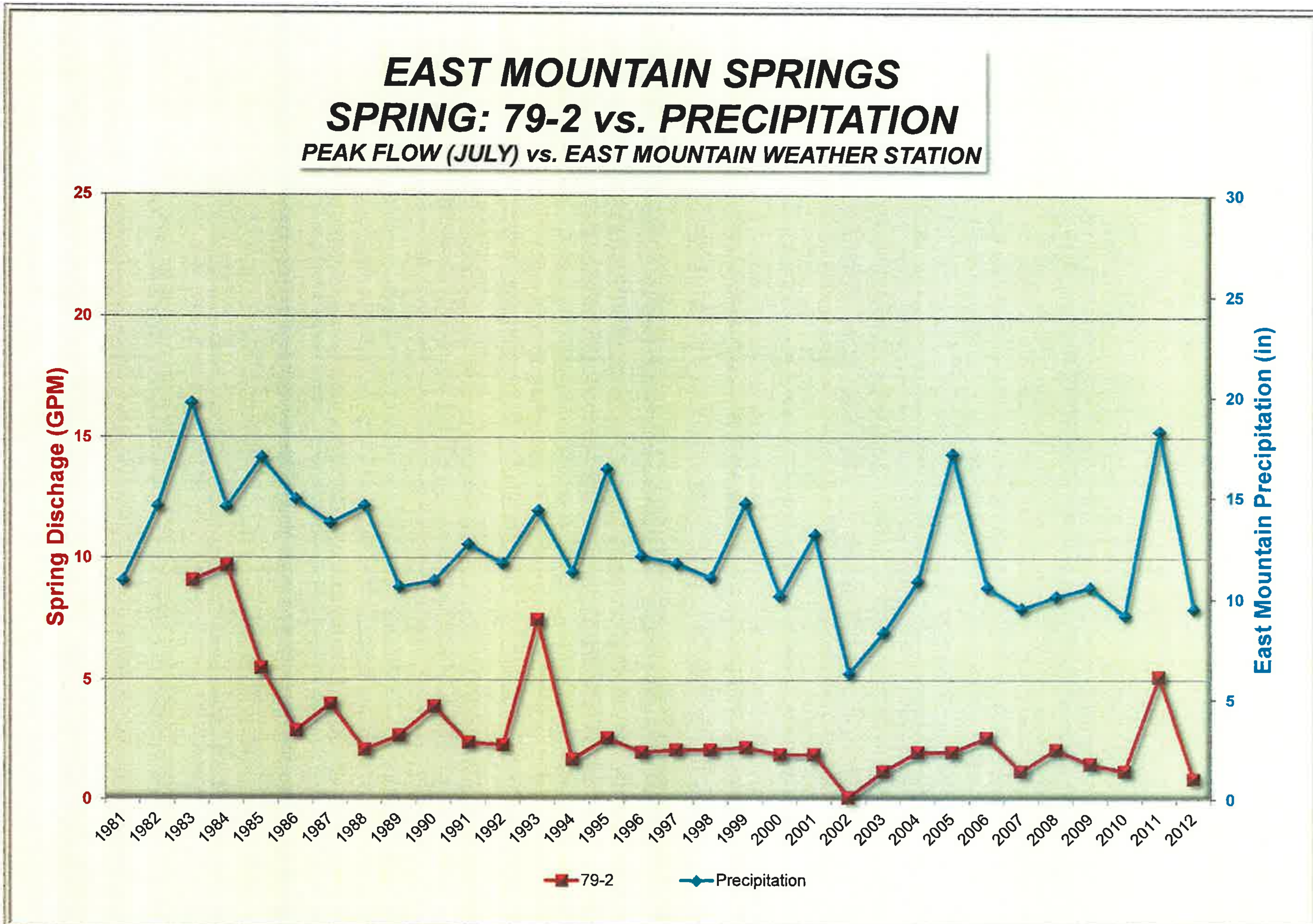

EAST MOUNTAIN SPRINGS
SPRING: BURNT TREE vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
35
40
45
50
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Burnt Tree
Precipitation

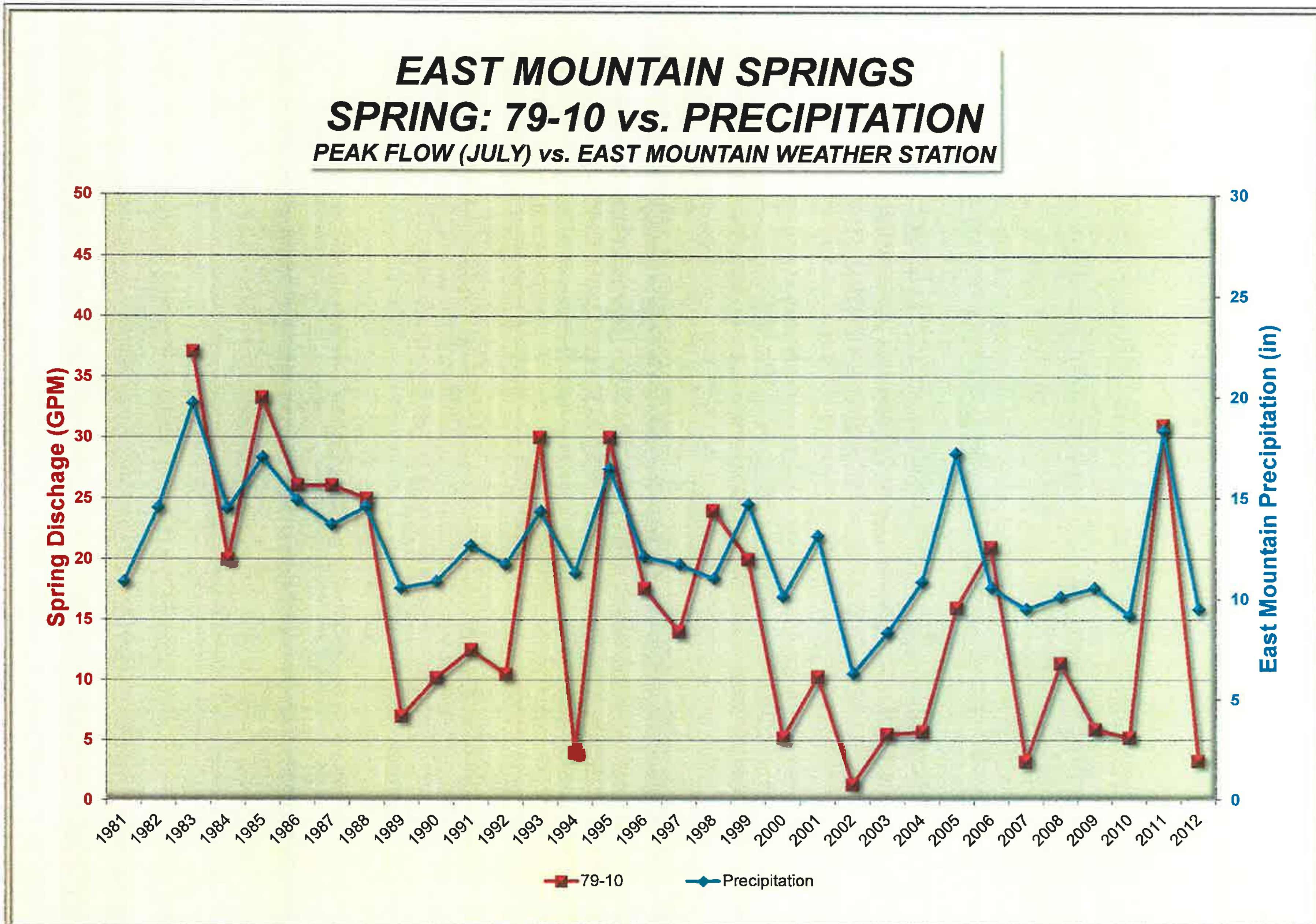
EAST MOUNTAIN SPRINGS
SPRING: ELK SPRING vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION

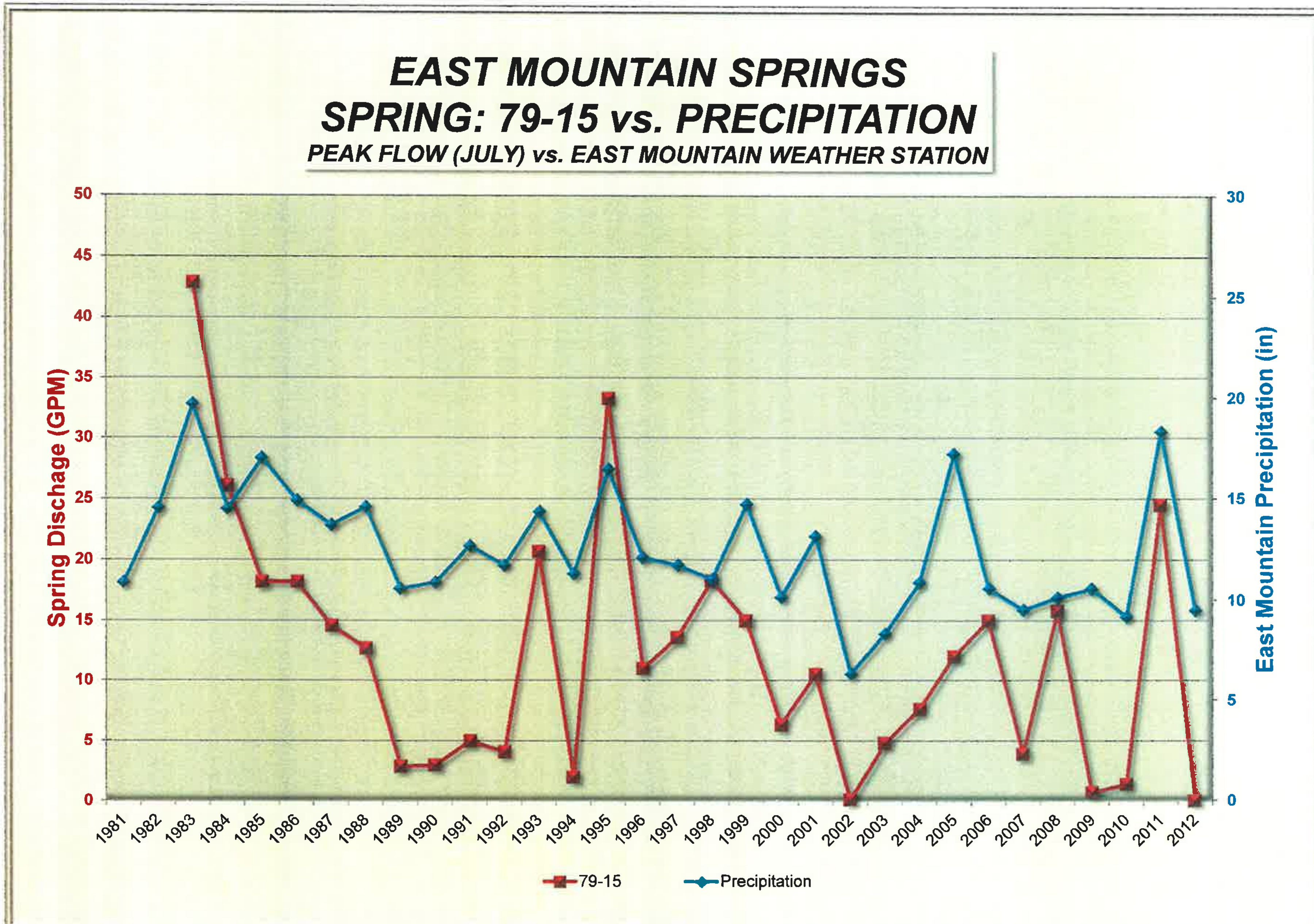


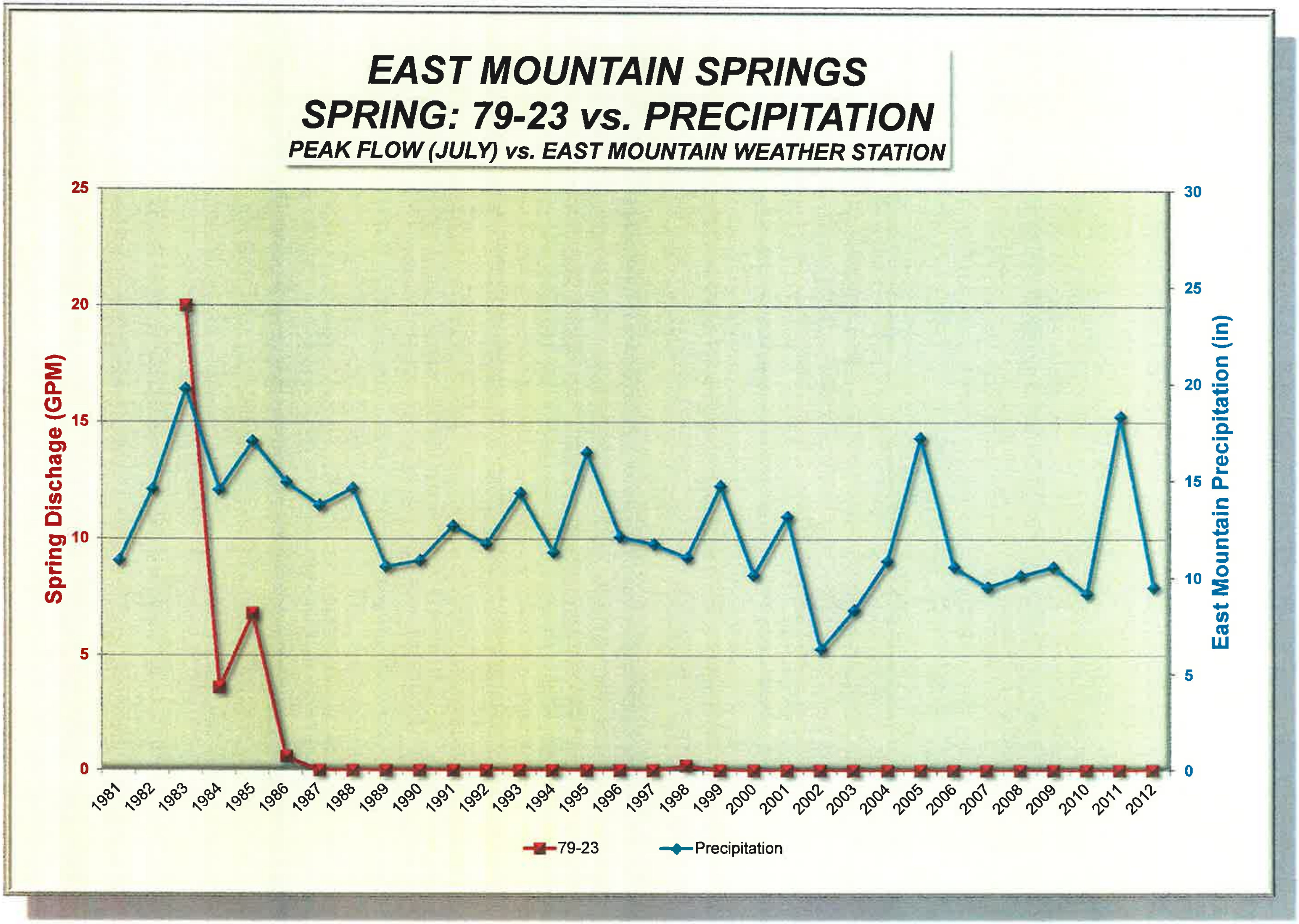

EAST MOUNTAIN SPRINGS
SPRING: SHEBA SPRING vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
0
5
10
15
20
25
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Sheba Spring
Precipitation

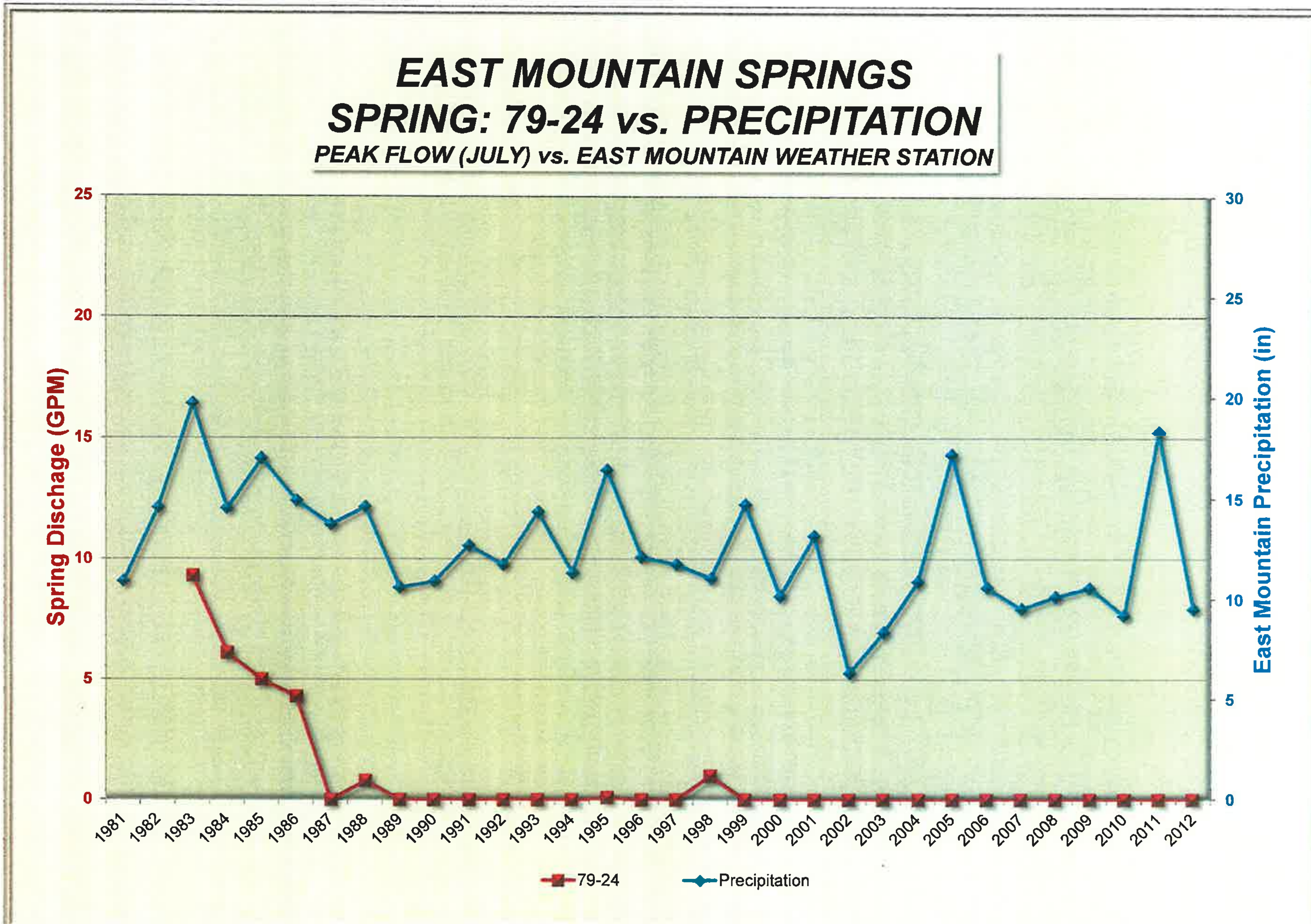

EAST MOUNTAIN SPRINGS
SPRING: TED'S TUB vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
100
90
80
70
60
50
40
30
20
10
0
30
25
20
15
10
5
0
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Ted's Tub
Precipitation


EAST MOUNTAIN SPRINGS
SPRING: 79-2 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
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
79-2
Precipitation

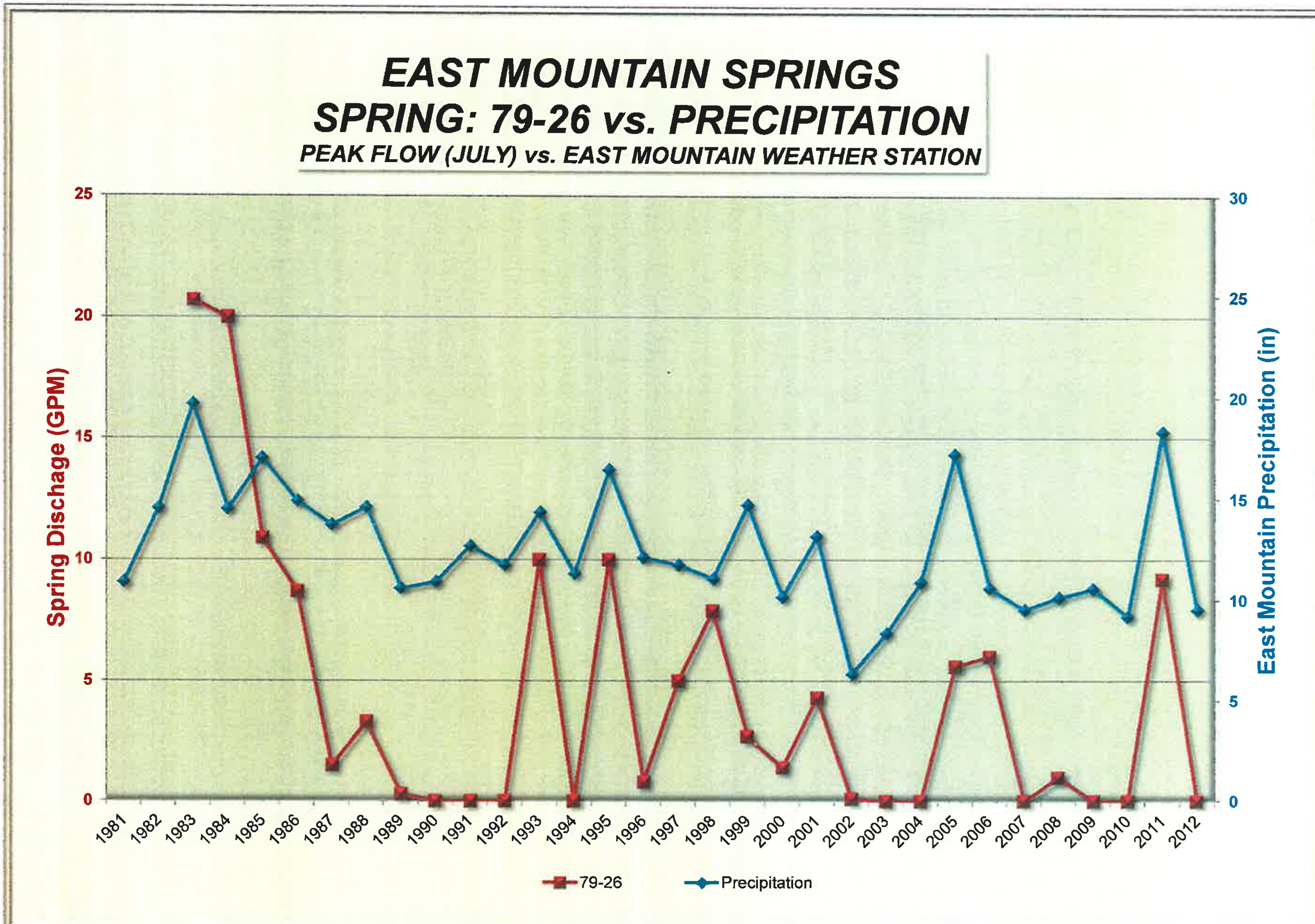

EAST MOUNTAIN SPRINGS
SPRING: 79-10 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
35
40
45
50
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
79-10
Precipitation

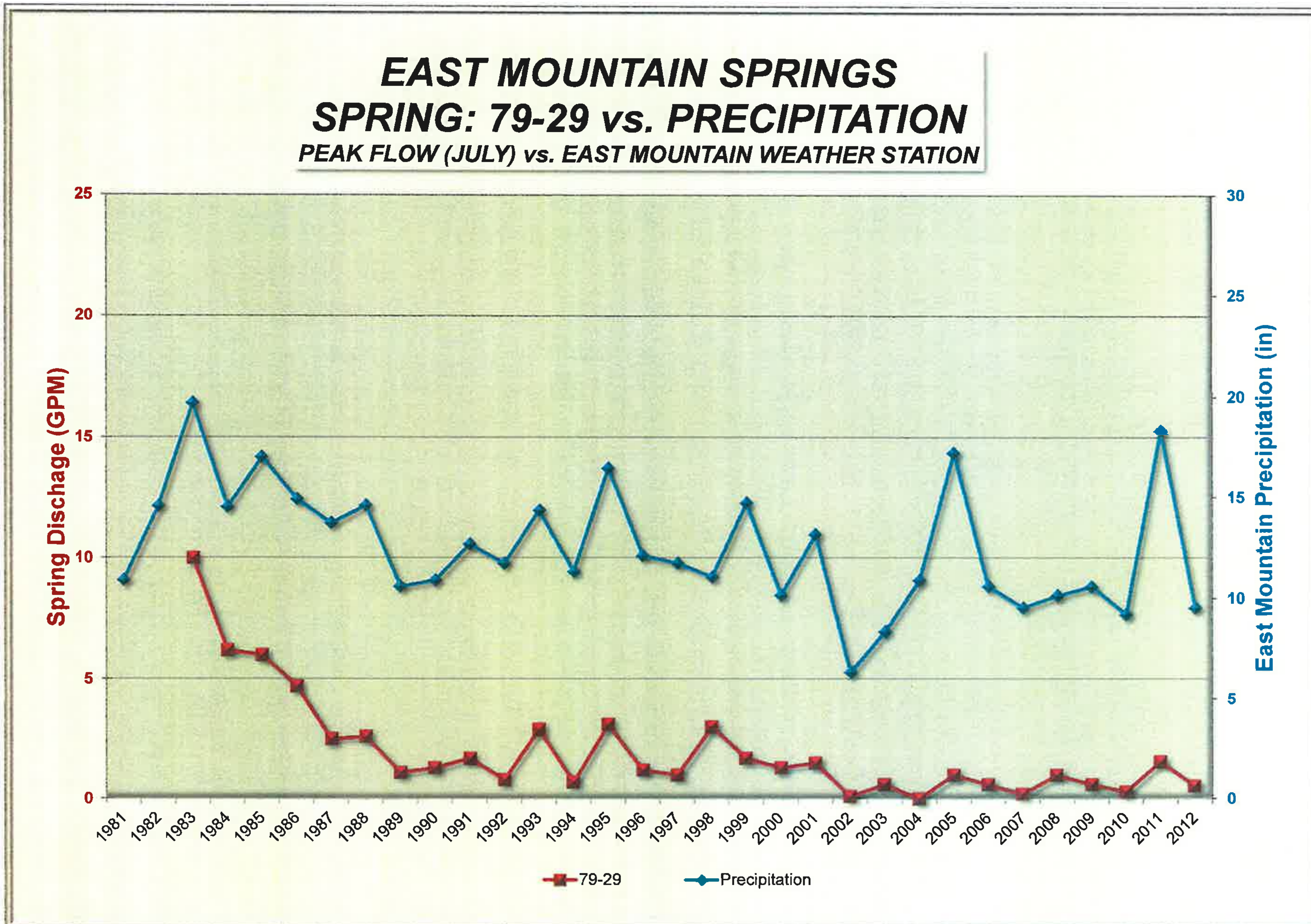

EAST MOUNTAIN SPRINGS
SPRING: 79-15 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
35
40
45
50
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
79-15
Precipitation

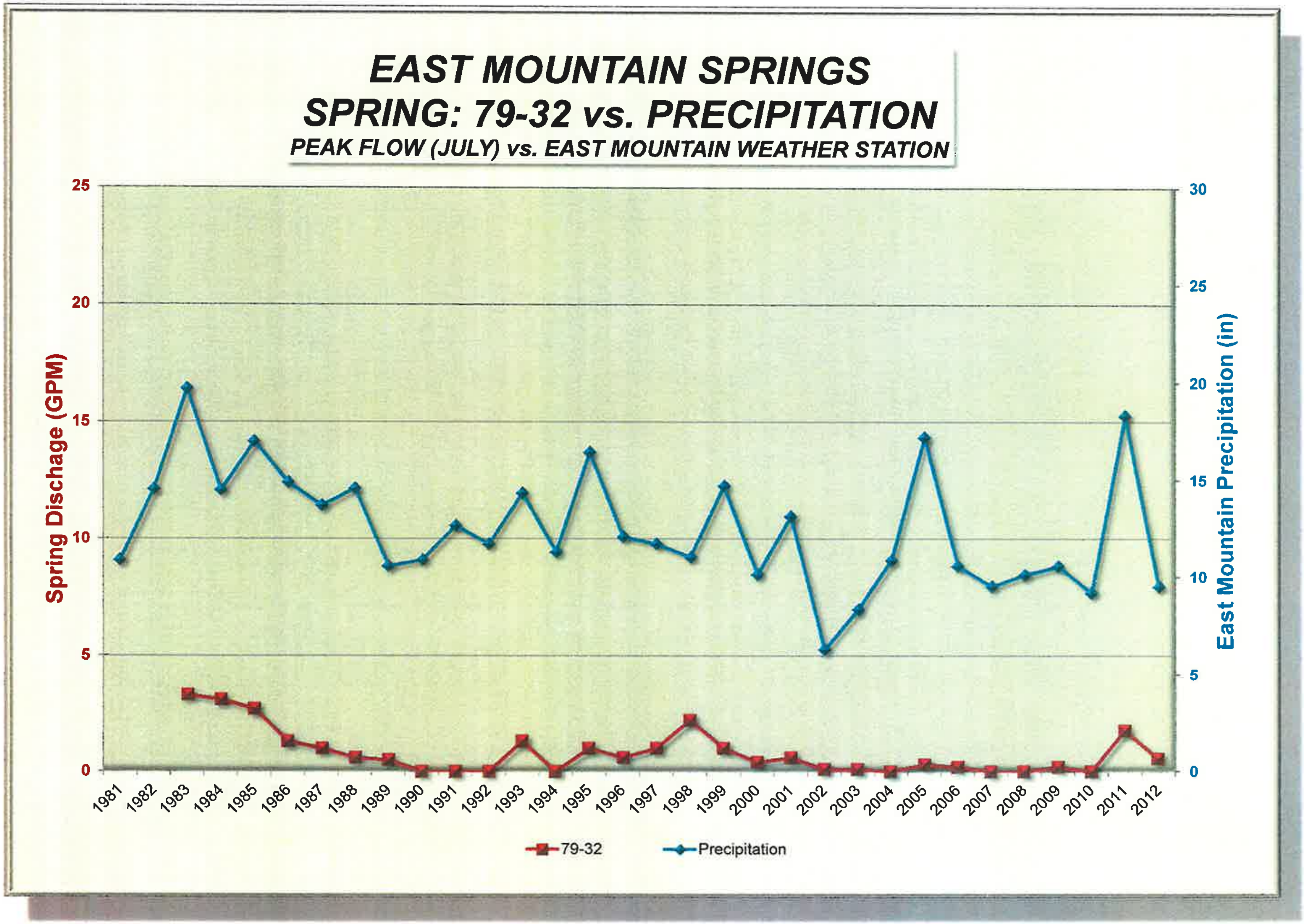

EAST MOUNTAIN SPRINGS
SPRING: 79-23 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
79-23
Precipitation

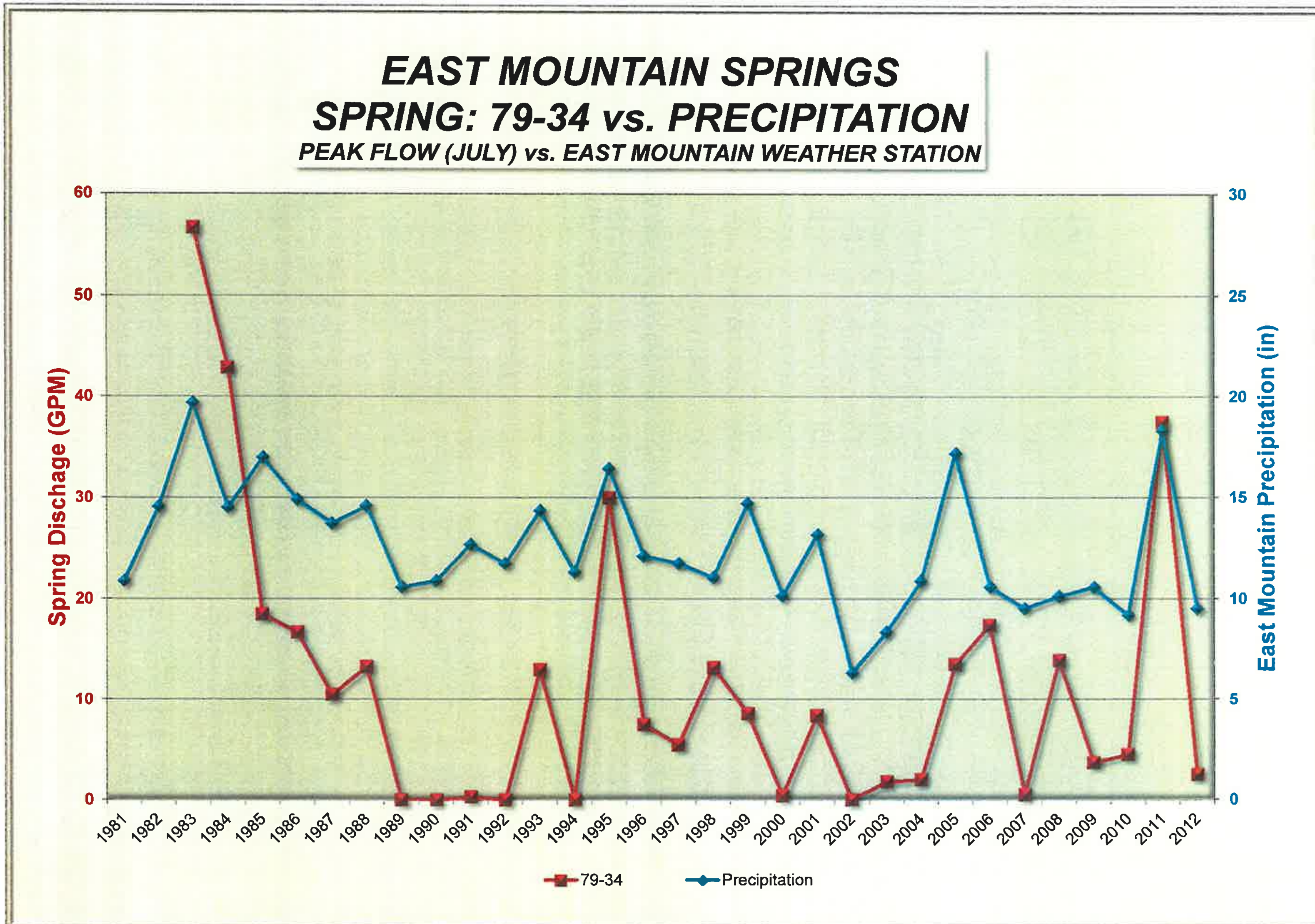


EAST MOUNTAIN SPRINGS
SPRING: 79-24 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
79-24
Precipitation


EAST MOUNTAIN SPRINGS
SPRING: 79-26 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
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
79-26
Precipitation

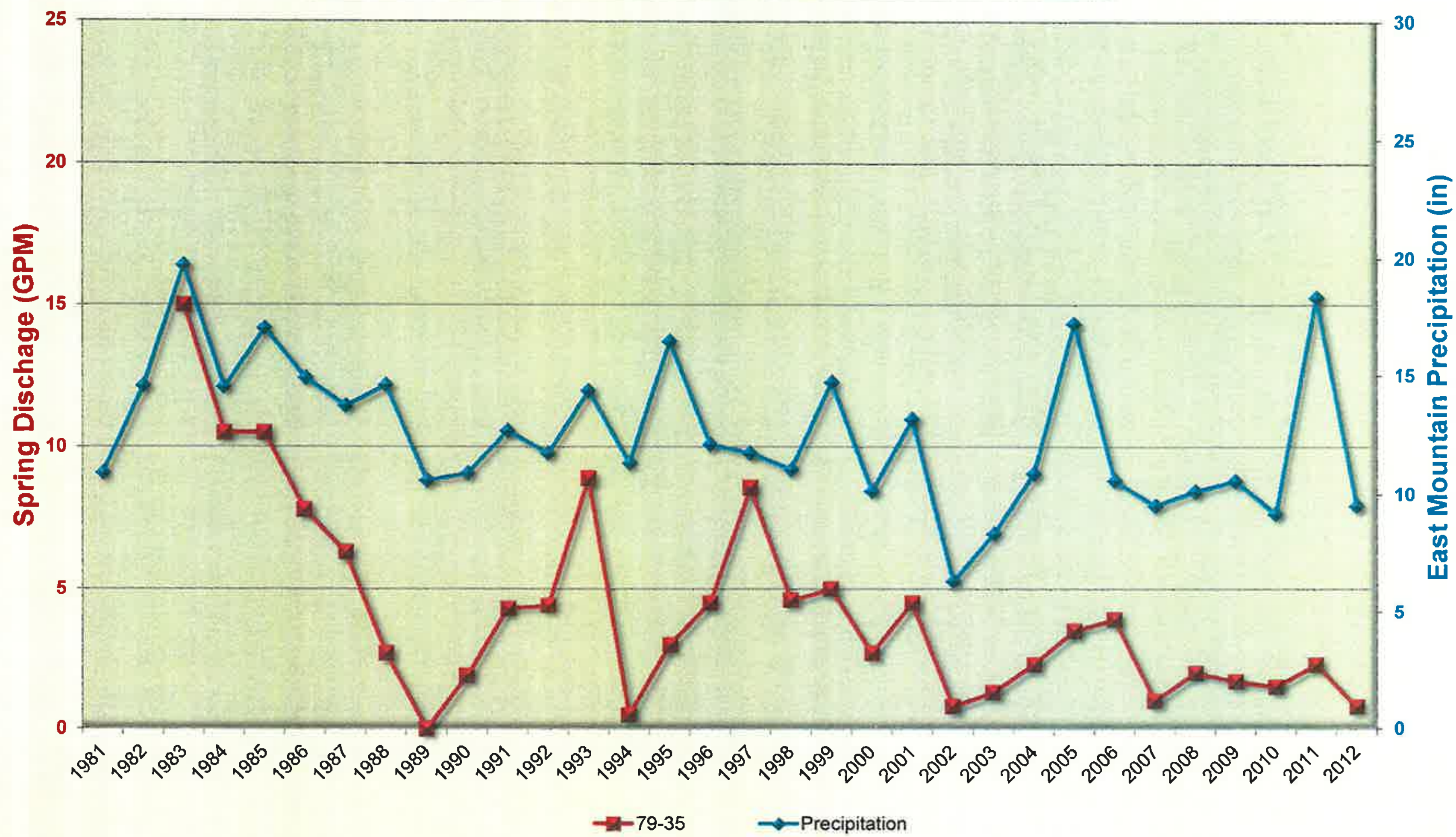

EAST MOUNTAIN SPRINGS
SPRING: 79-29 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
79-29
Precipitation

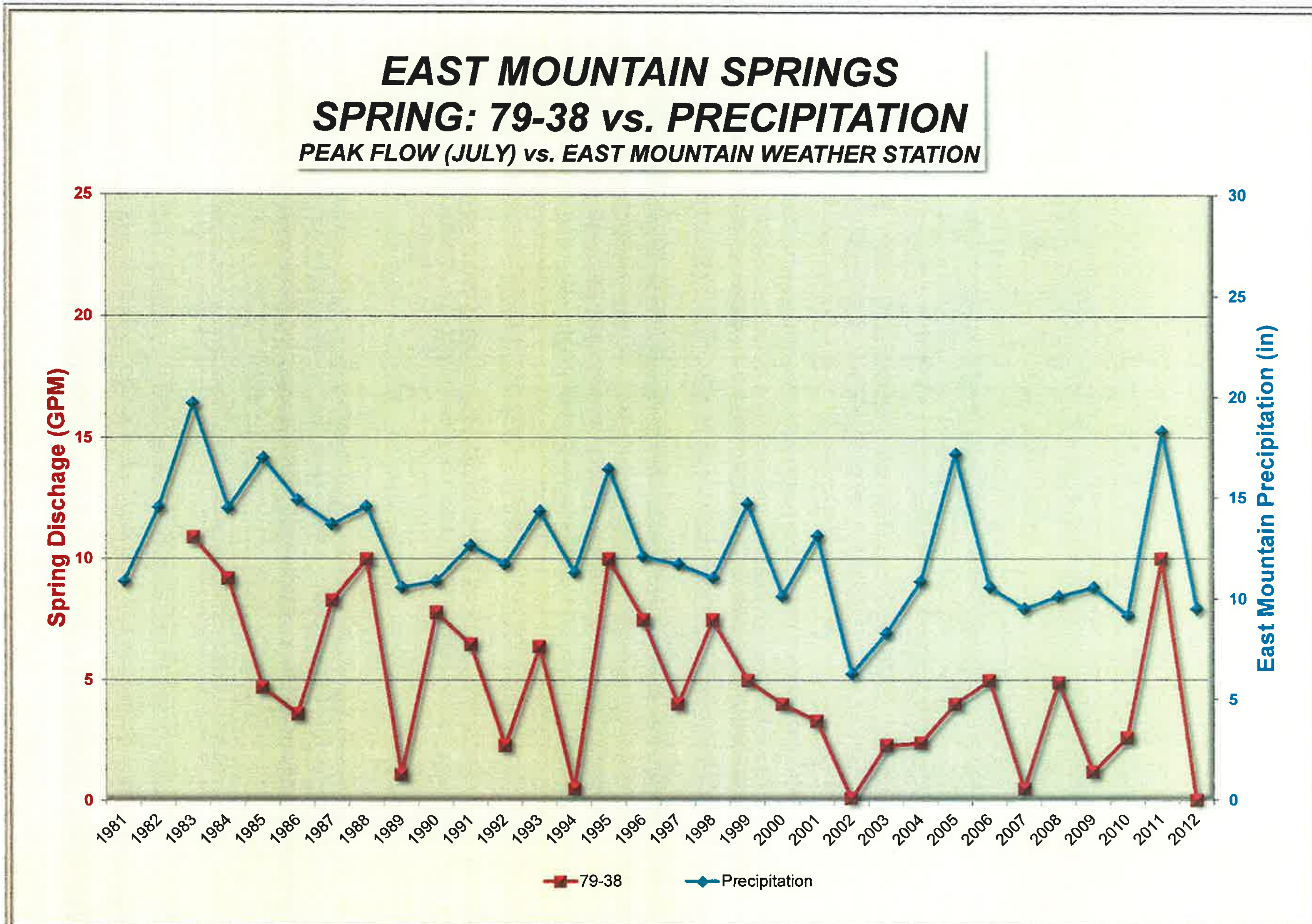

EAST MOUNTAIN SPRINGS
SPRING: 79-32 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
79-32
Precipitation

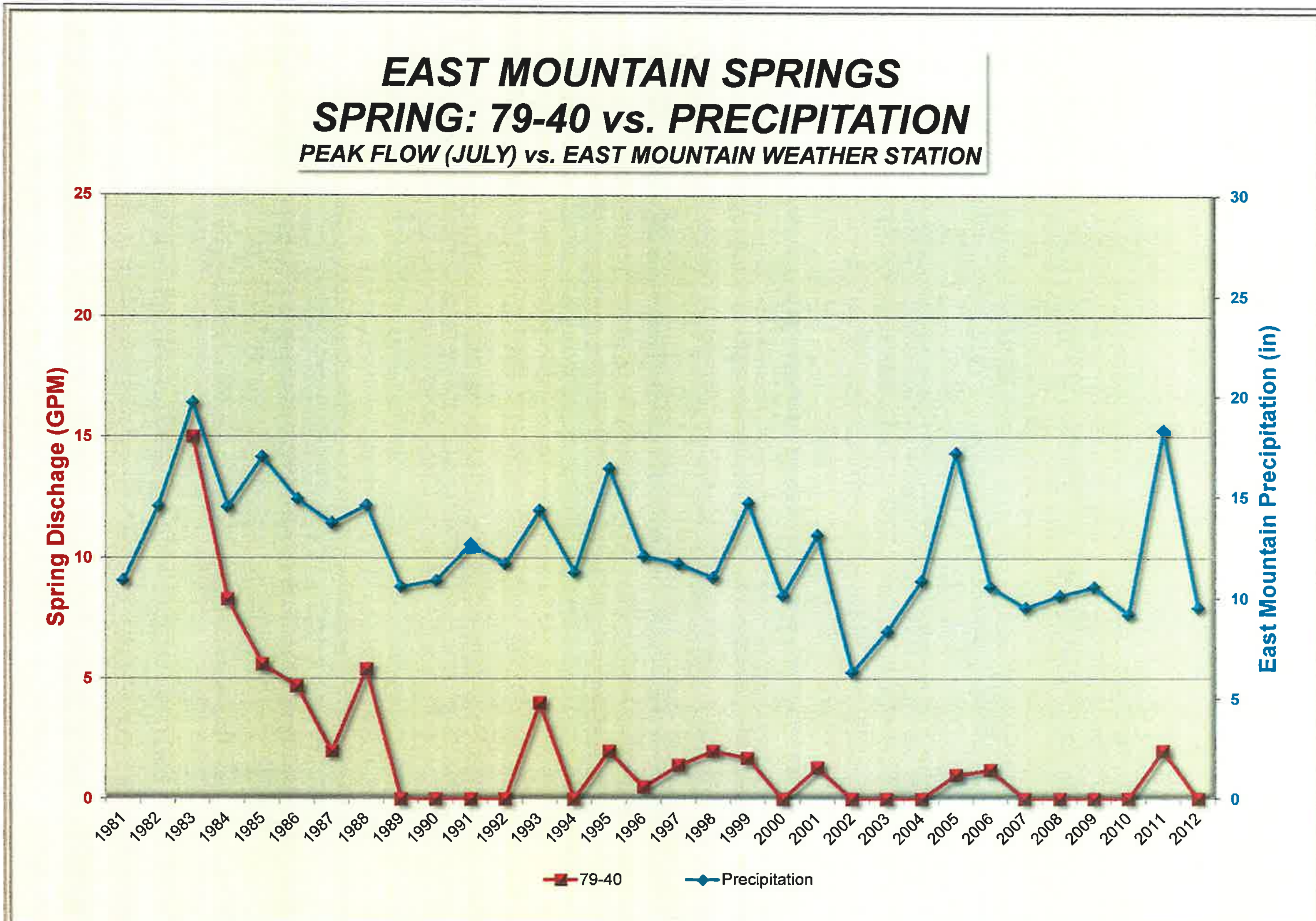


EAST MOUNTAIN SPRINGS
SPRING: 79-34 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
10
20
30
40
50
60
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
79-34
Precipitation

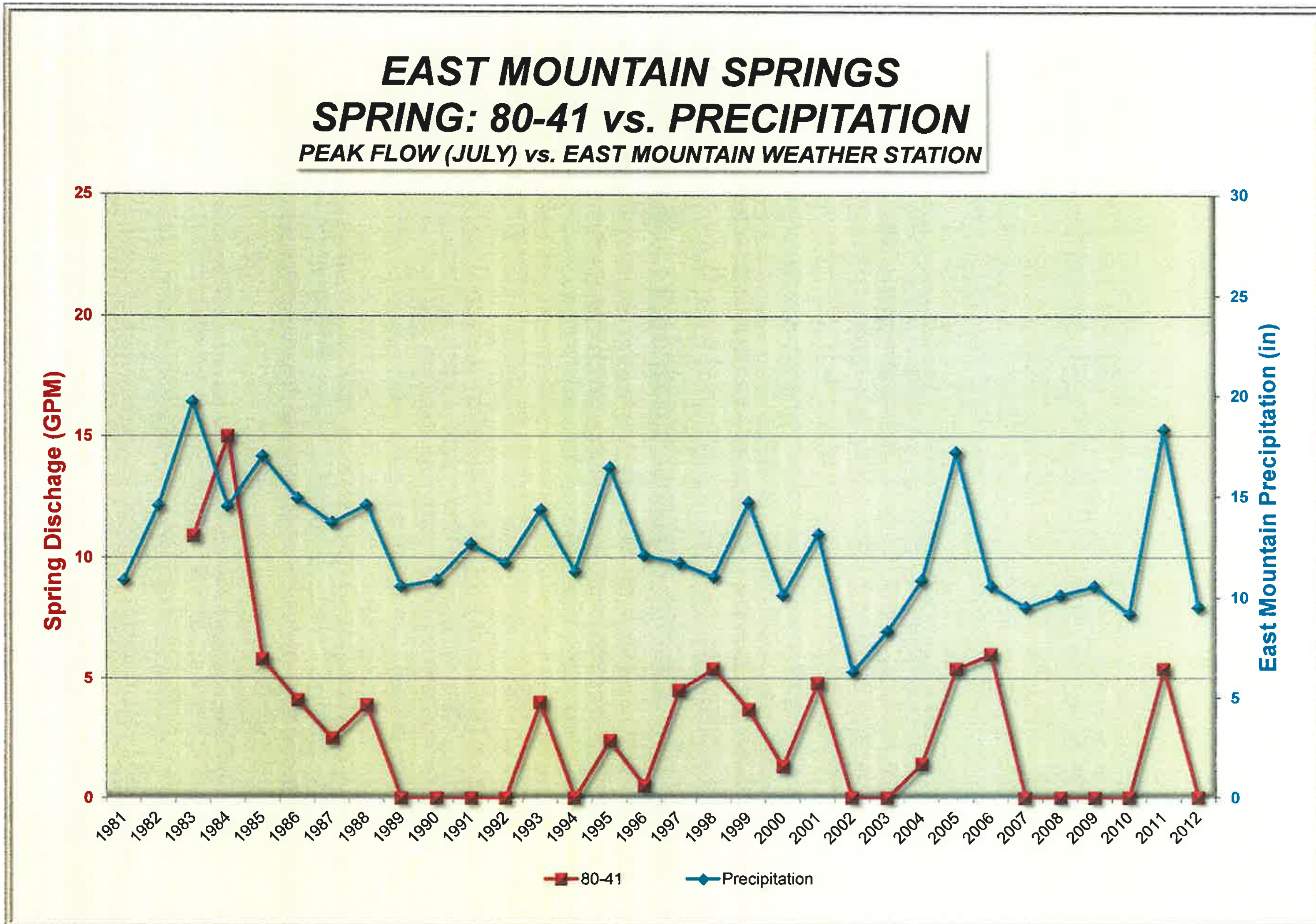
EAST MOUNTAIN SPRINGS
SPRING: 79-35 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION

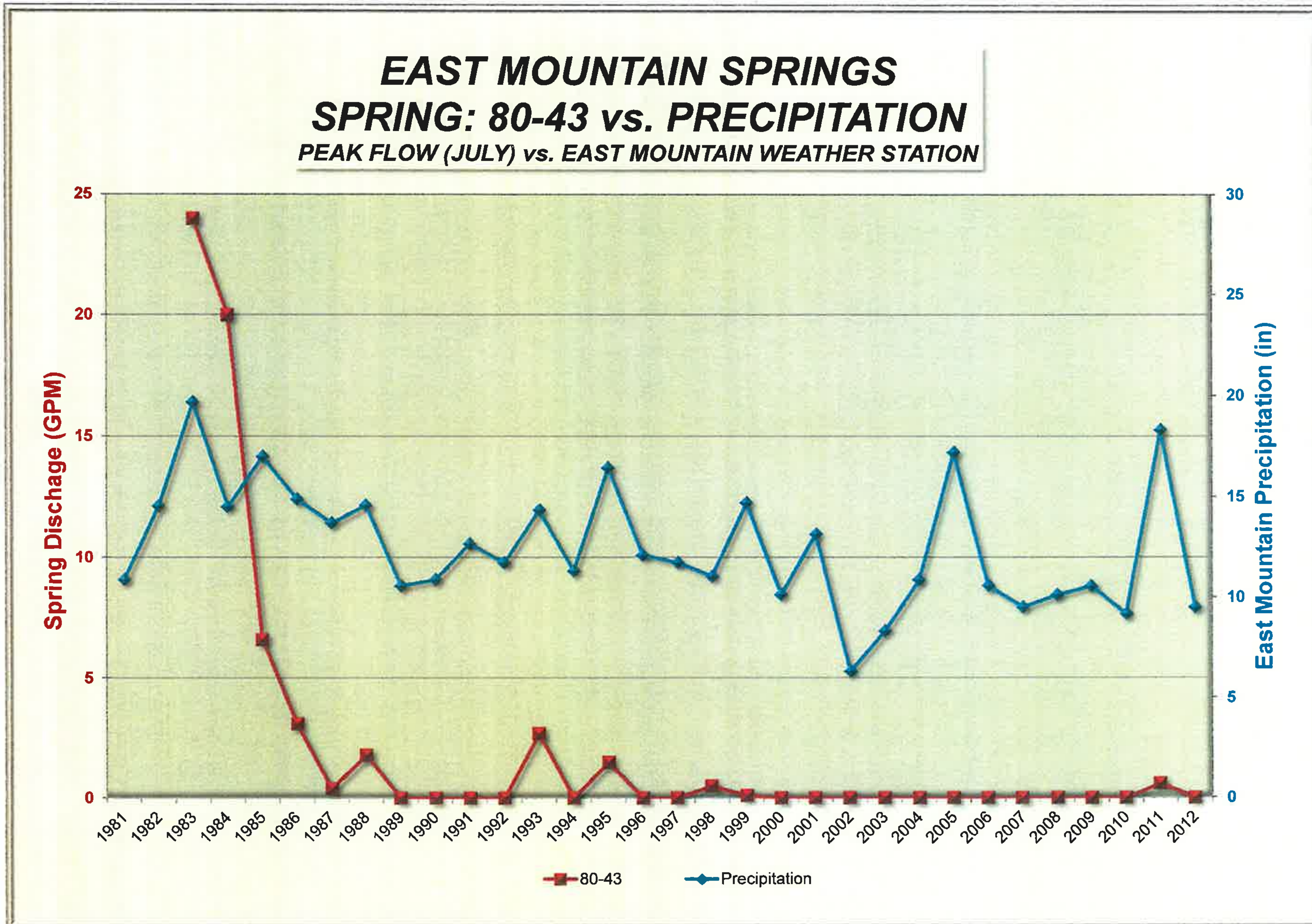


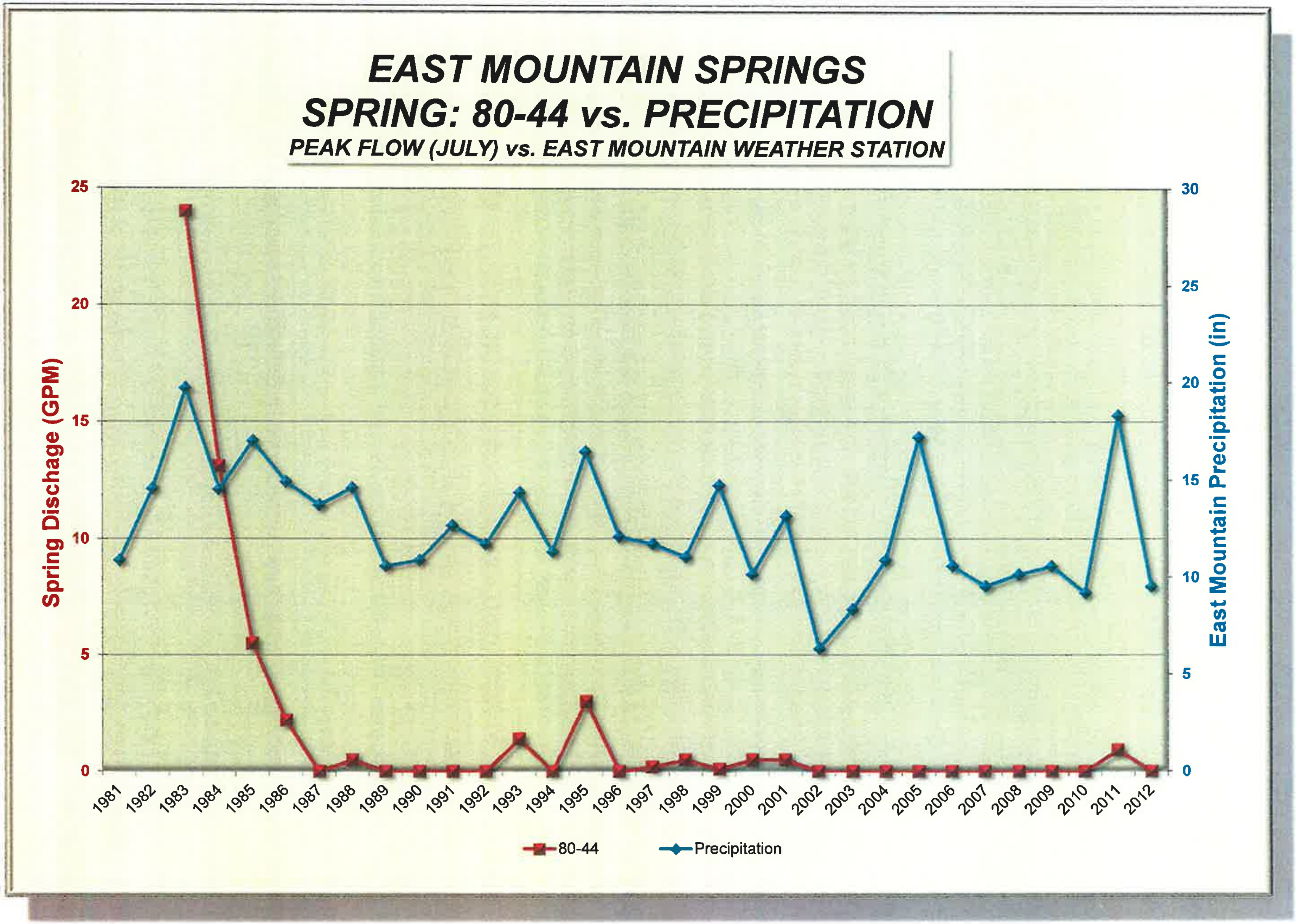

EAST MOUNTAIN SPRINGS
SPRING: 79-38 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
79-38
Precipitation



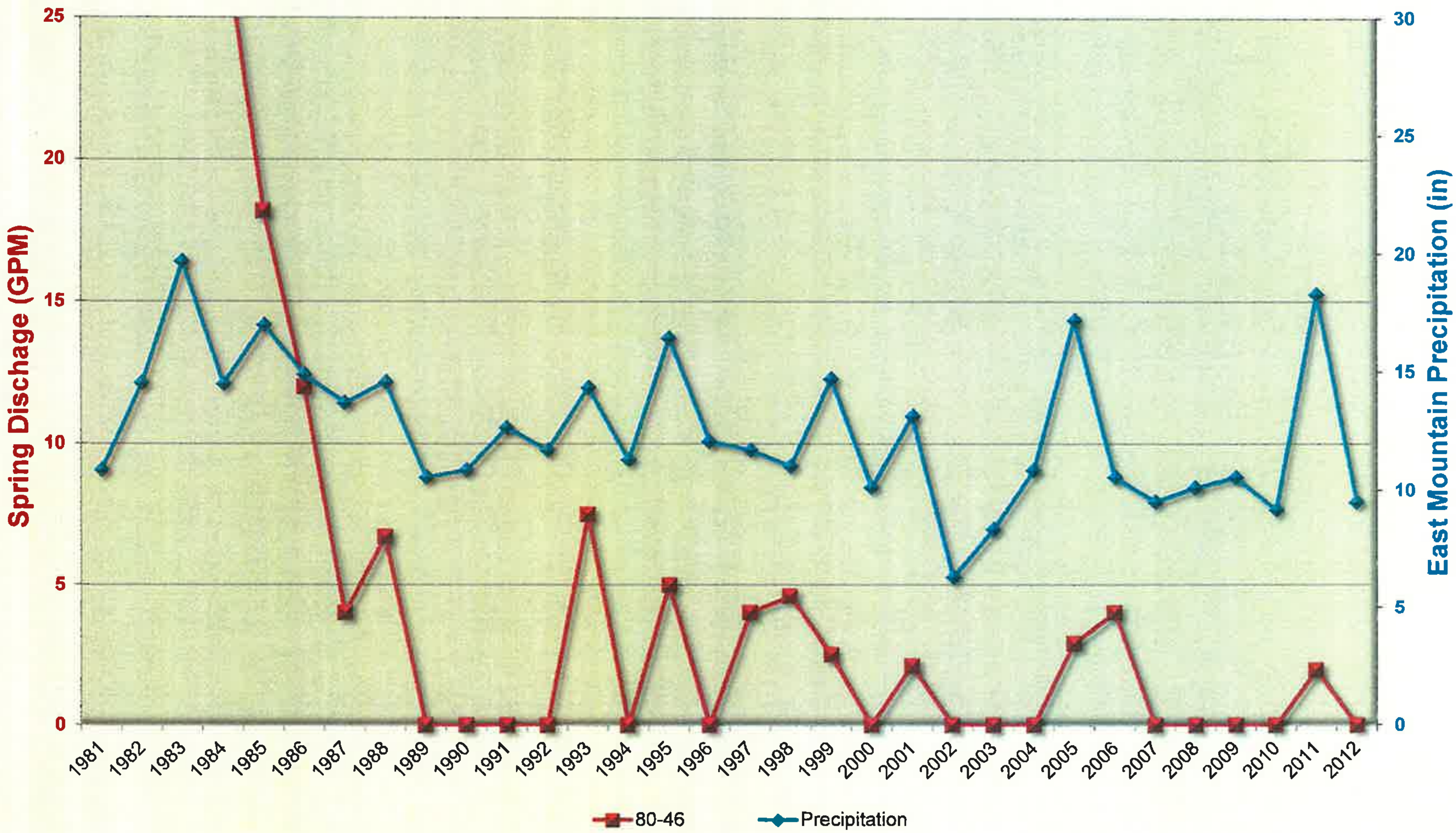
EAST MOUNTAIN SPRINGS
SPRING: 79-40 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
79-40
Precipitation

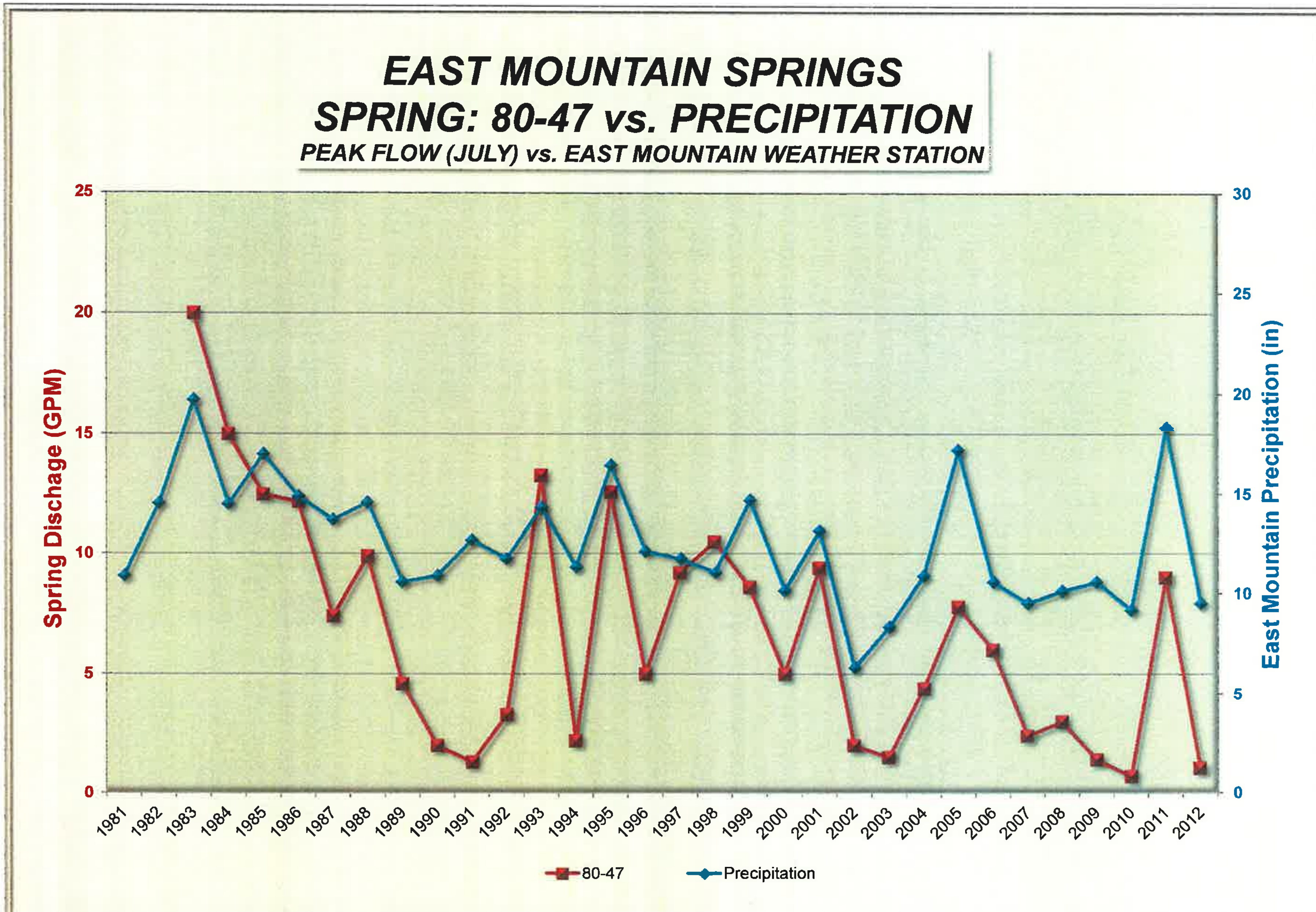

EAST MOUNTAIN SPRINGS
SPRING: 80-41 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
80-41
Precipitation


EAST MOUNTAIN SPRINGS
SPRING: 80-43 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
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
80-43
Precipitation

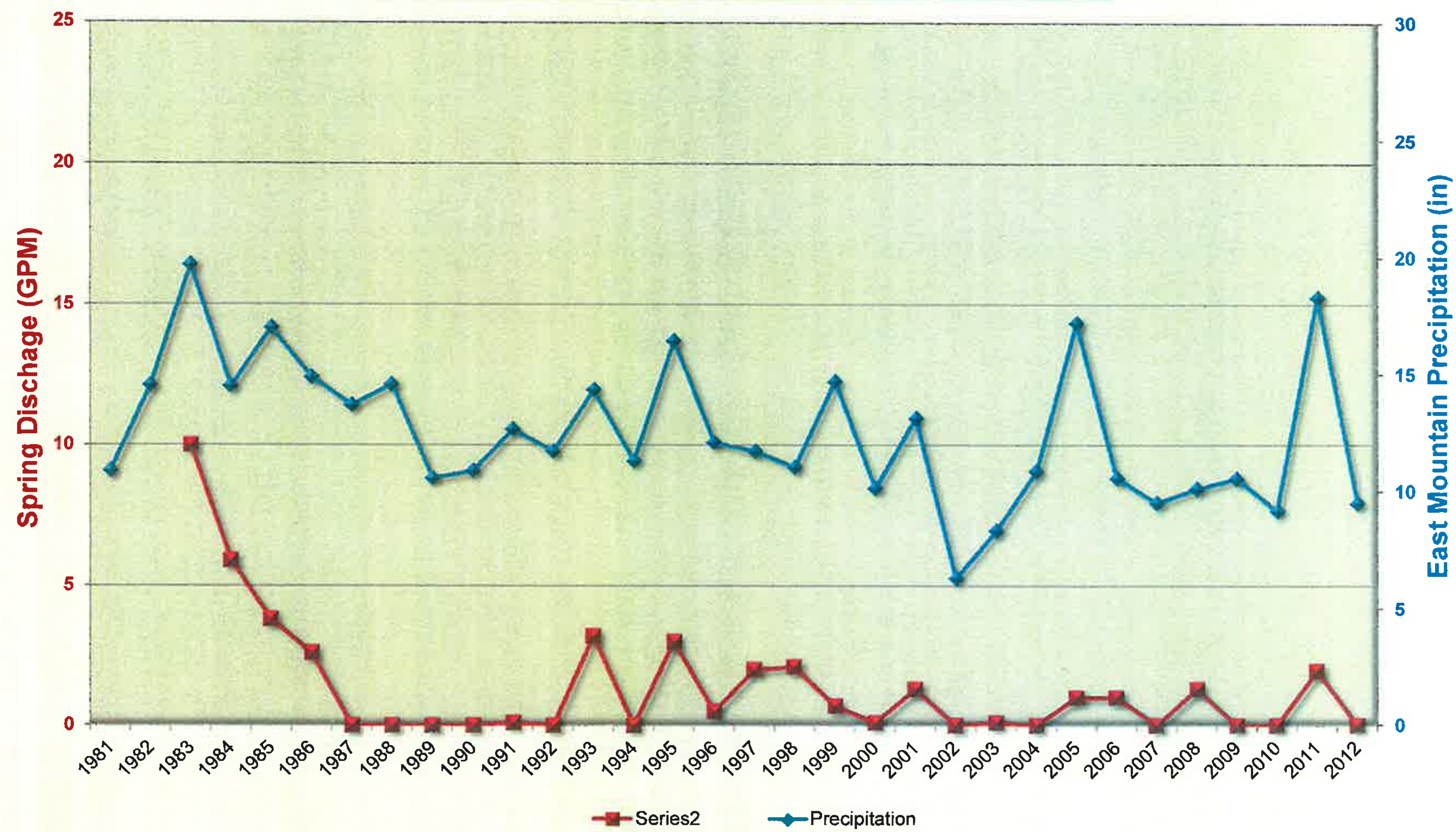

EAST MOUNTAIN SPRINGS
SPRING: 80-44 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
80-44
Precipitation

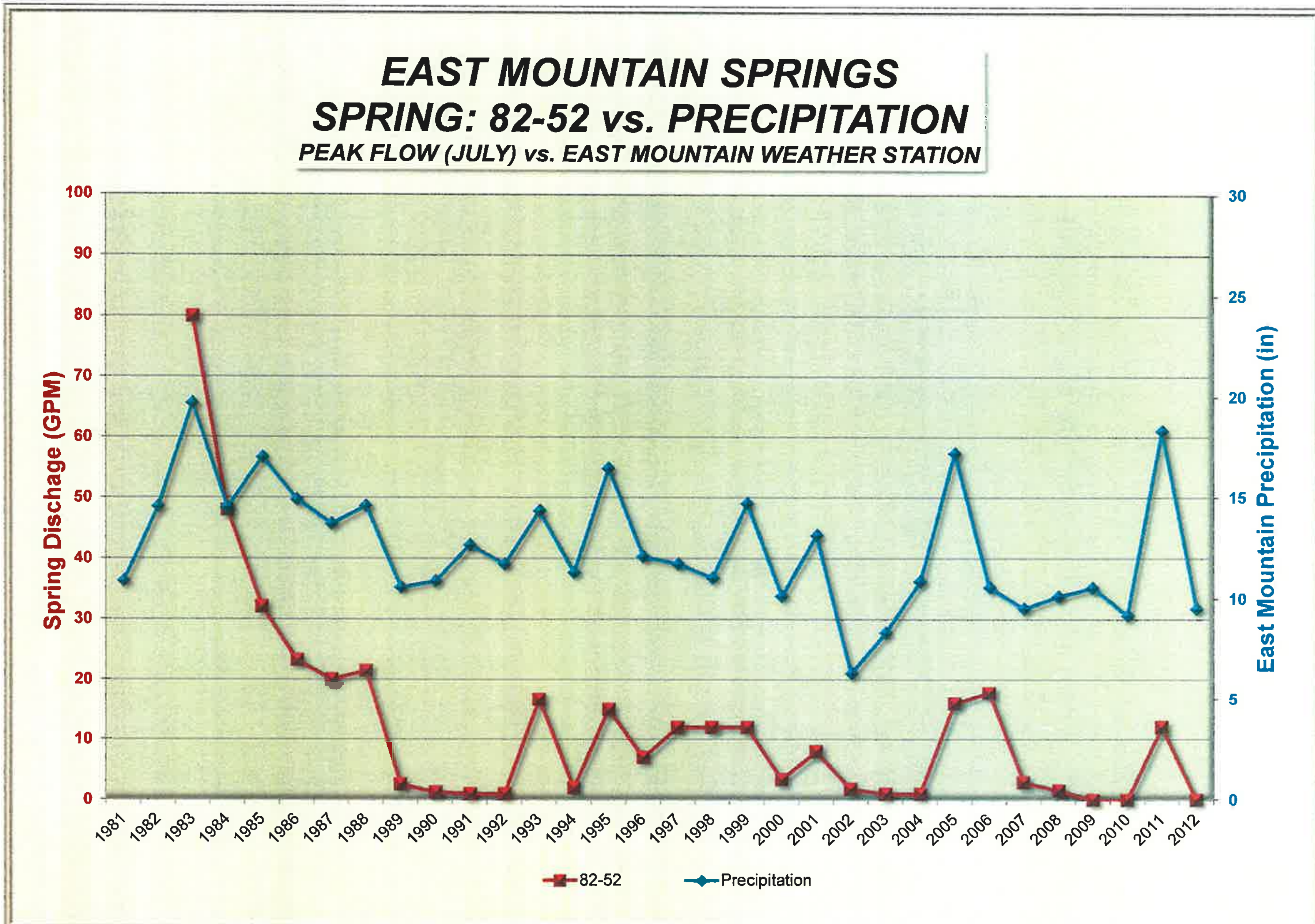
EAST MOUNTAIN SPRINGS
SPRING: 80-46 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION

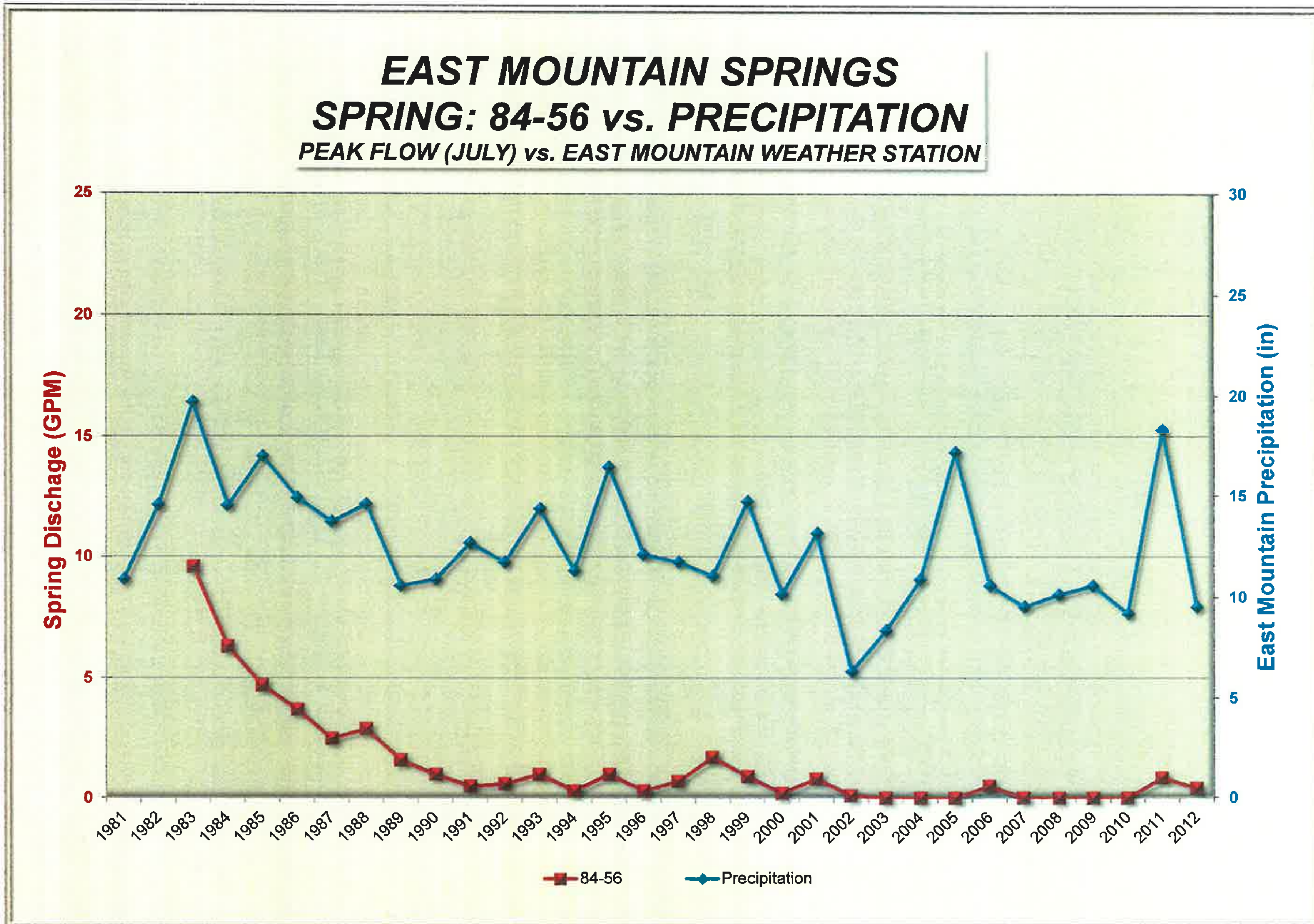



EAST MOUNTAIN SPRINGS
SPRING: 80-47 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
80-47
Precipitation

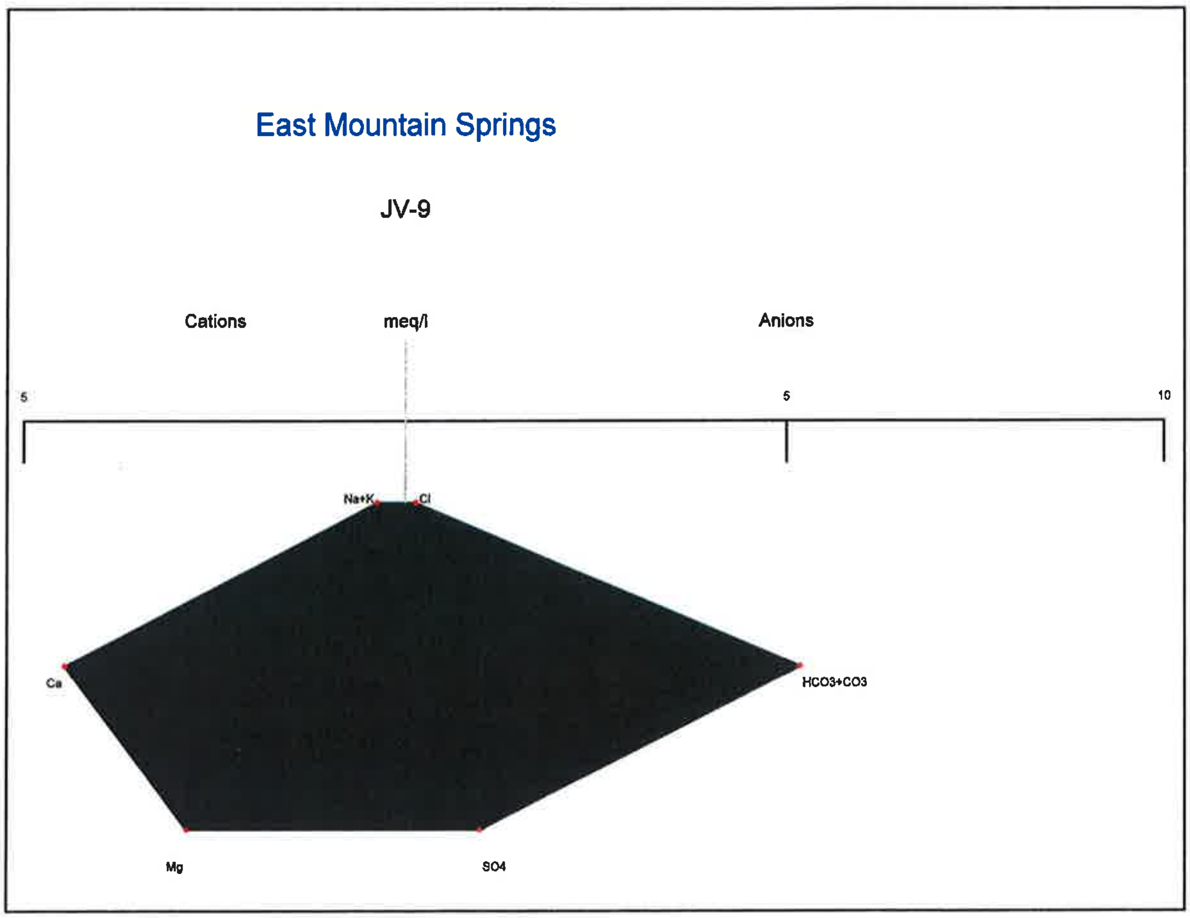
EAST MOUNTAIN SPRINGS
SPRING: 82-51 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION



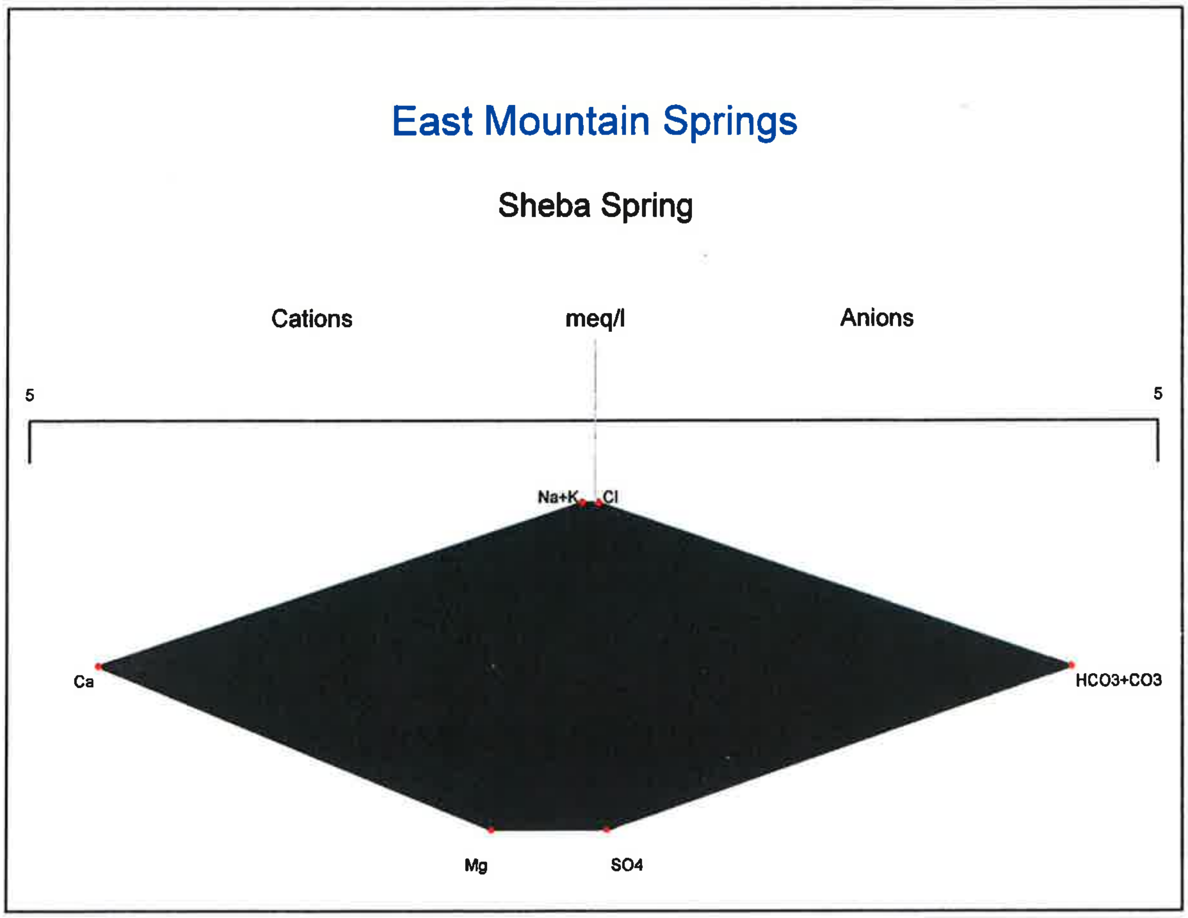

EAST MOUNTAIN SPRINGS
SPRING: 82-52 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
10
20
30
40
50
60
70
80
90
100
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
82-52
Precipitation


EAST MOUNTAIN SPRINGS
SPRING: 84-56 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981 1982 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
84-56
Precipitation

East Mountain Springs
Stiff Diagrams
Alluvium

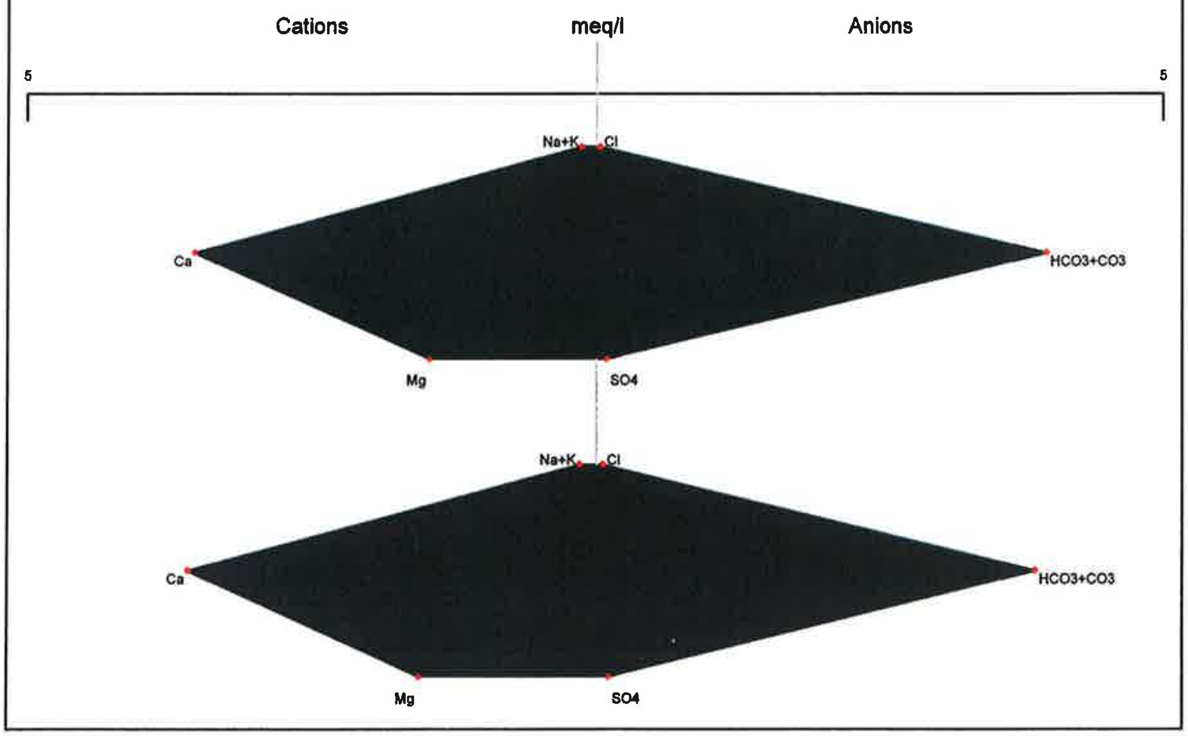

East Mountain Springs
JV-9
Cations
meq/l
Anions
5
5
10
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

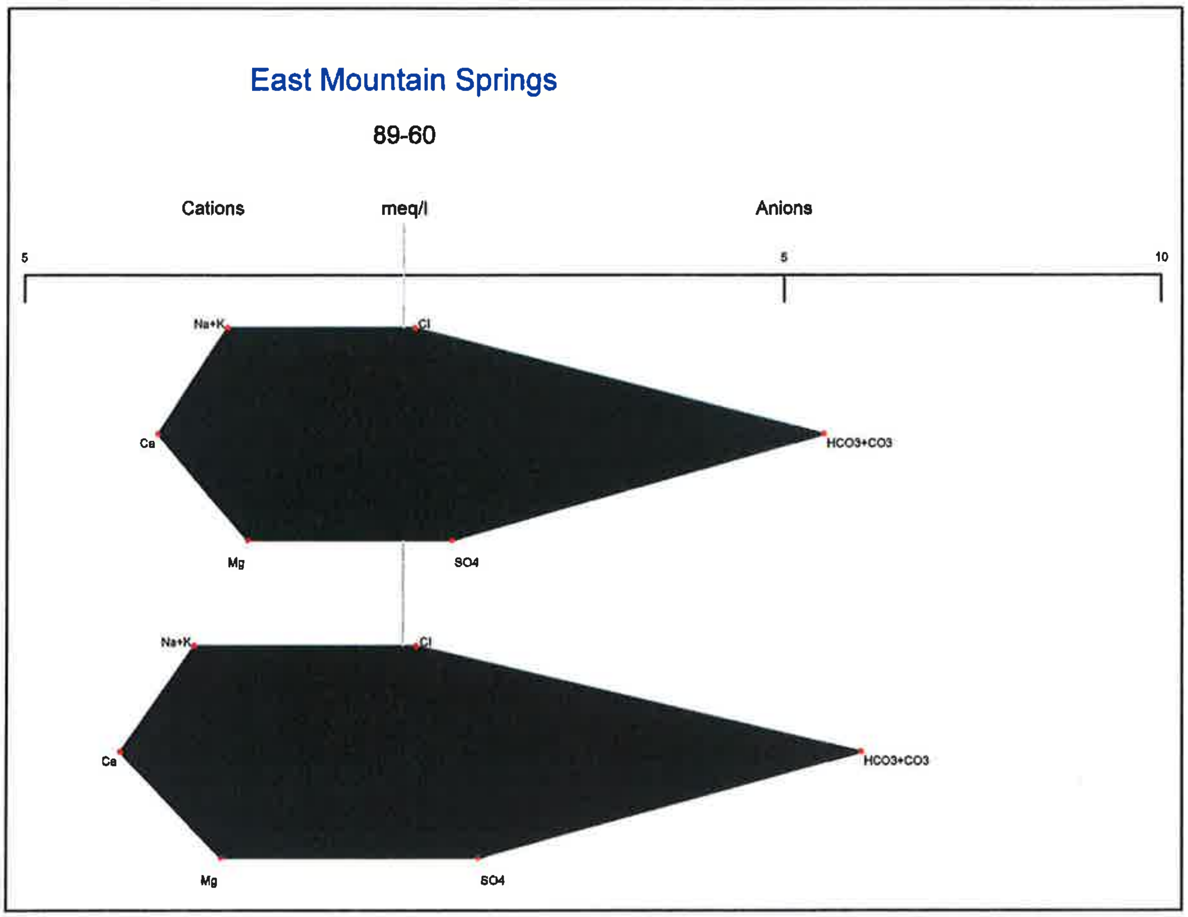
East Mountain Springs
Stiff Diagrams
Flagstaff Limestone


East Mountain Springs
Sheba Spring
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

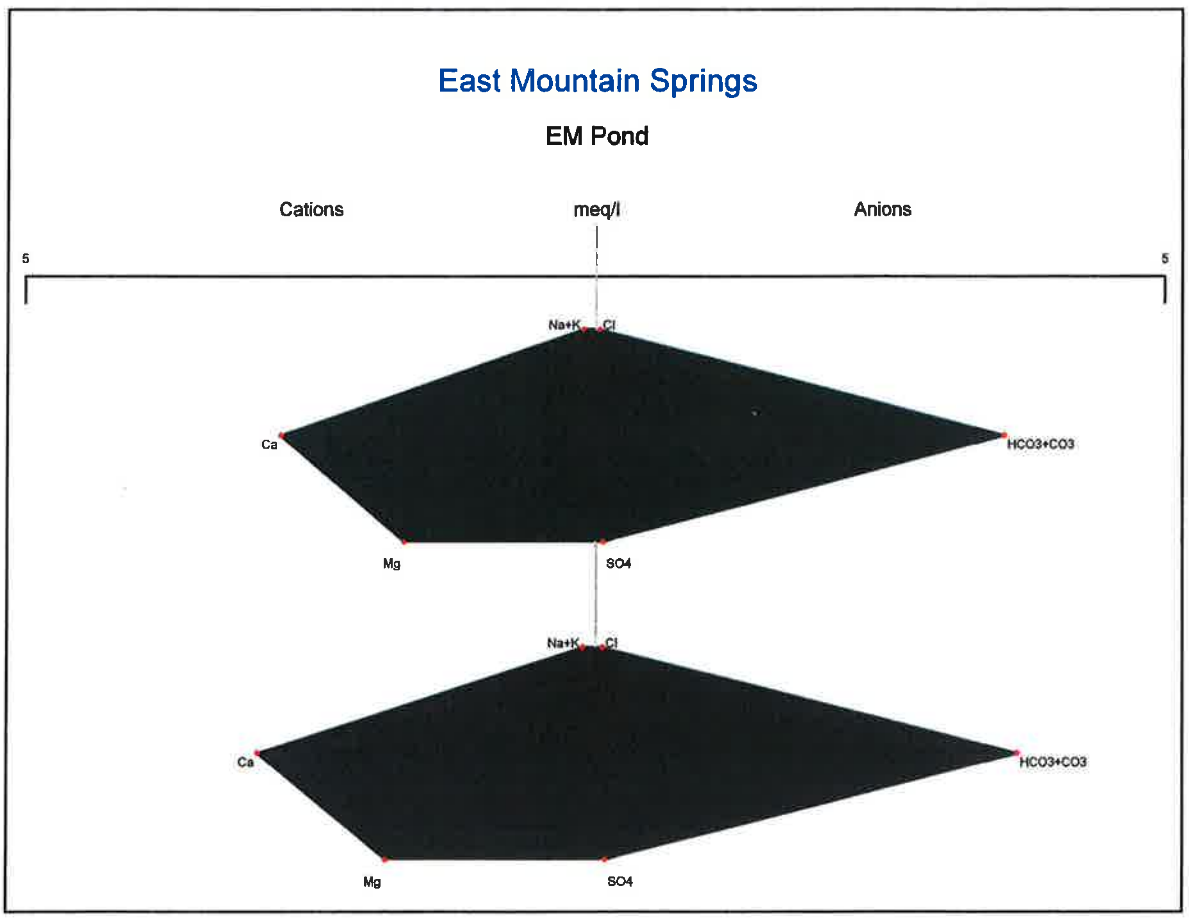
East Mountain Springs

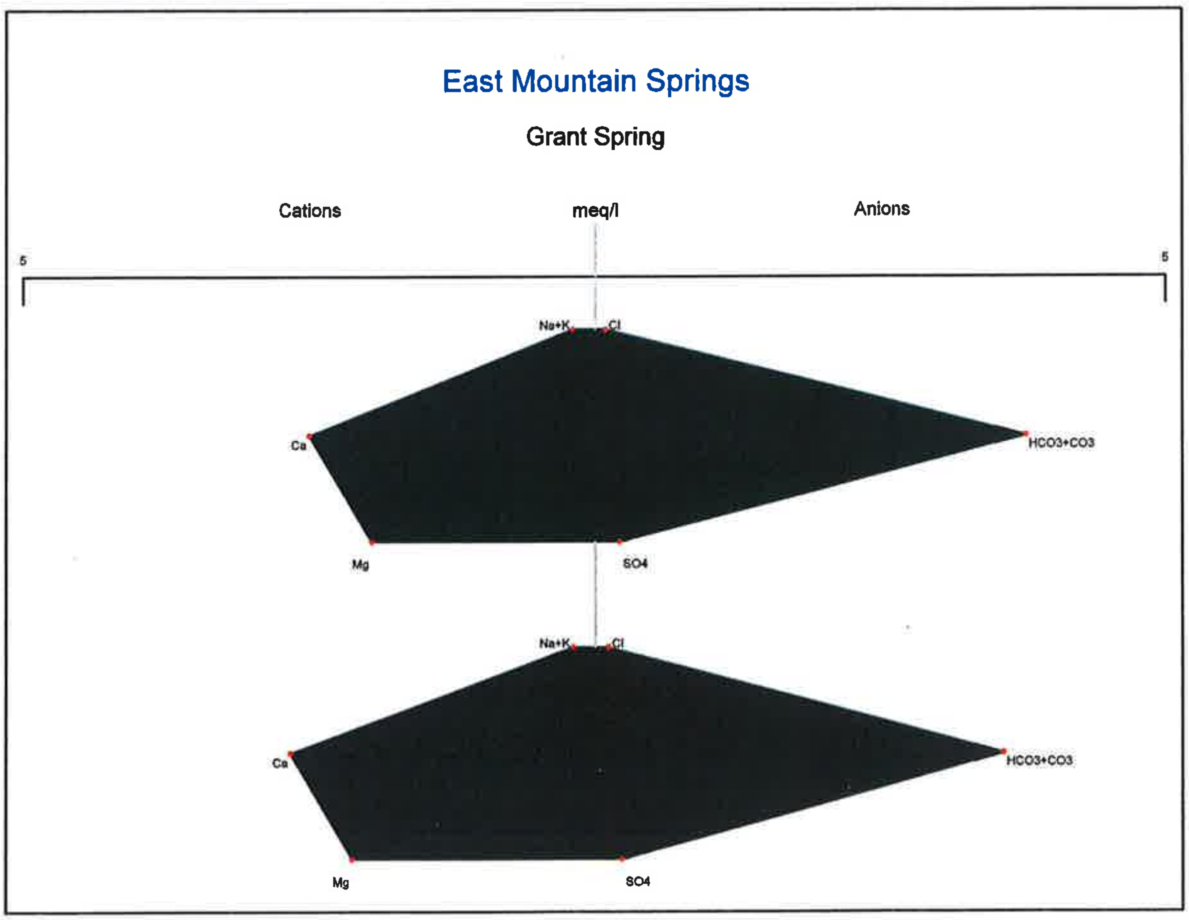
79-35

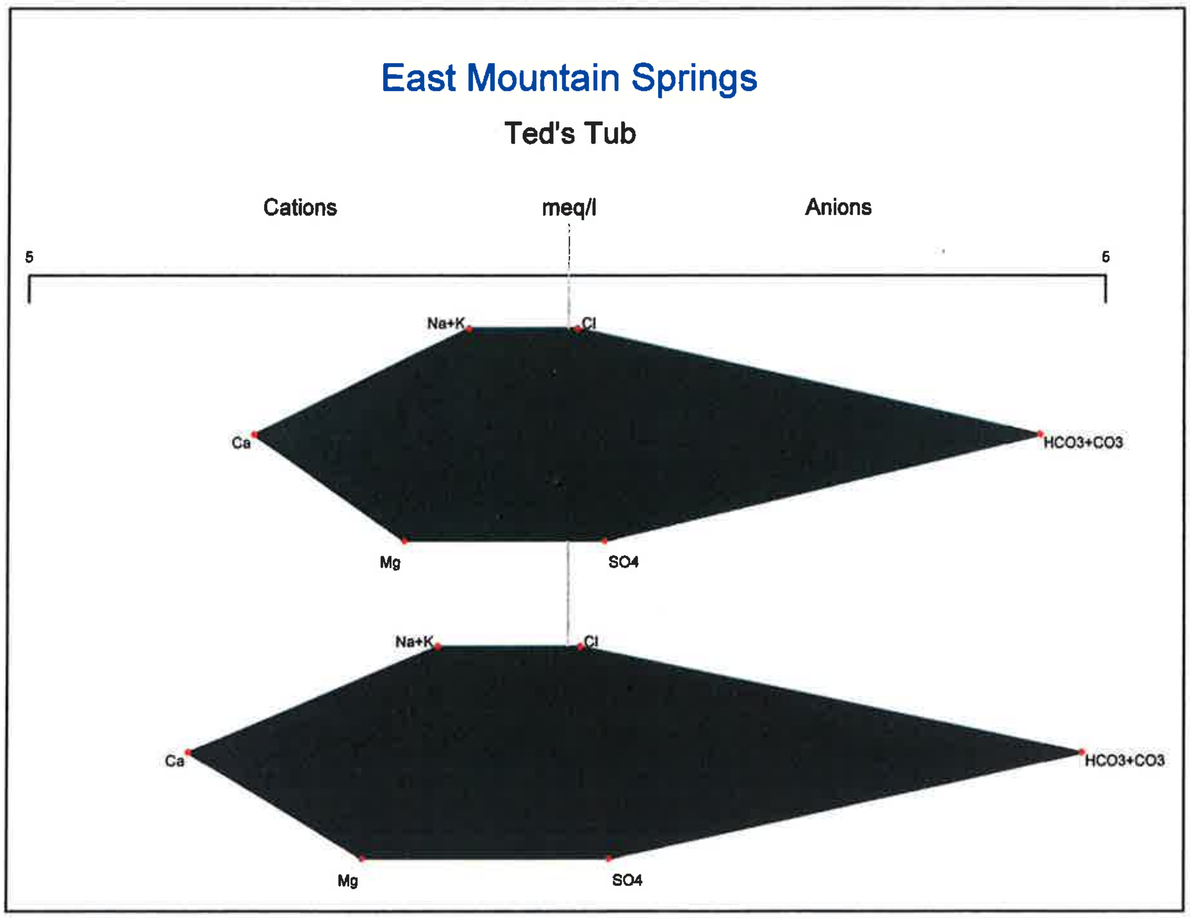


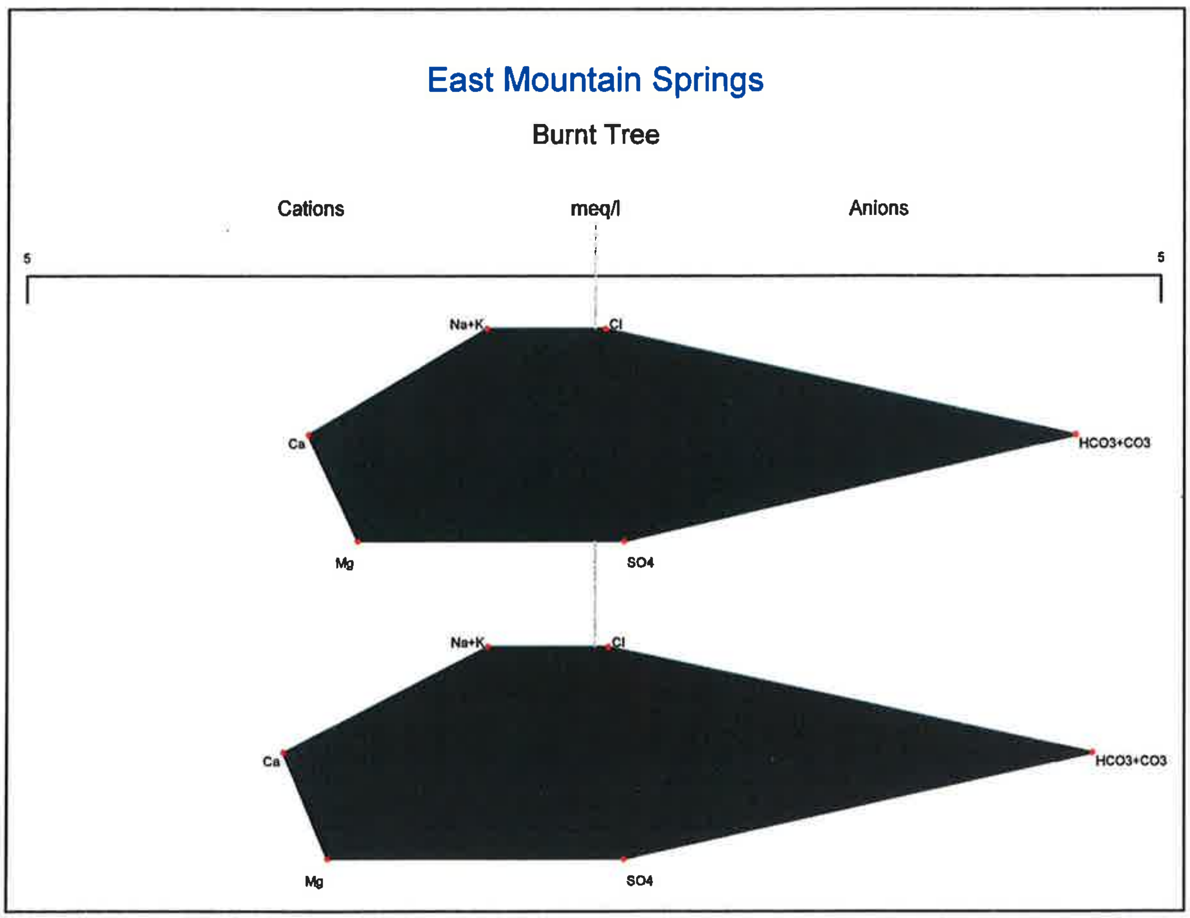

East Mountain Springs
89-60
Cations
meq/l
Anions
5
5
10
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

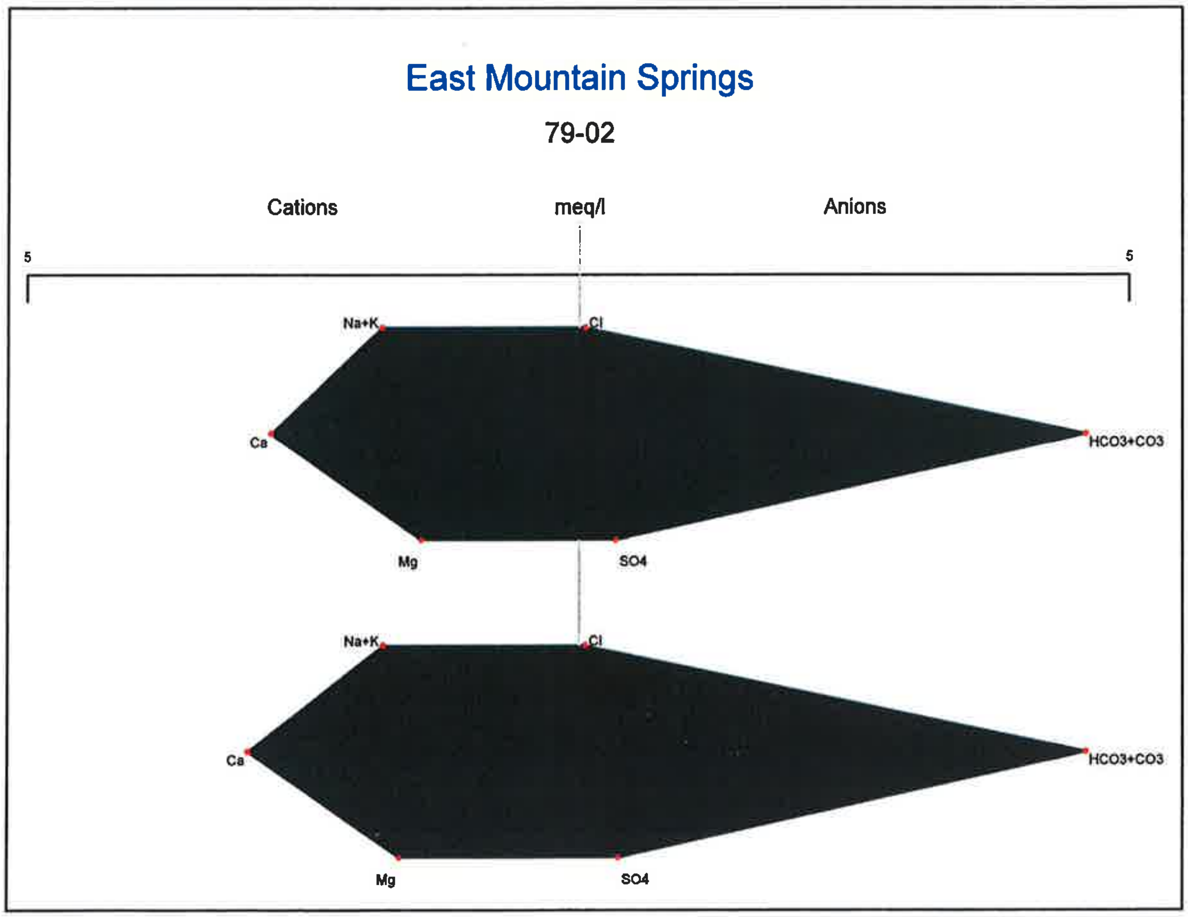
East Mountain Springs
Stiff Diagrams
North Horn Formation

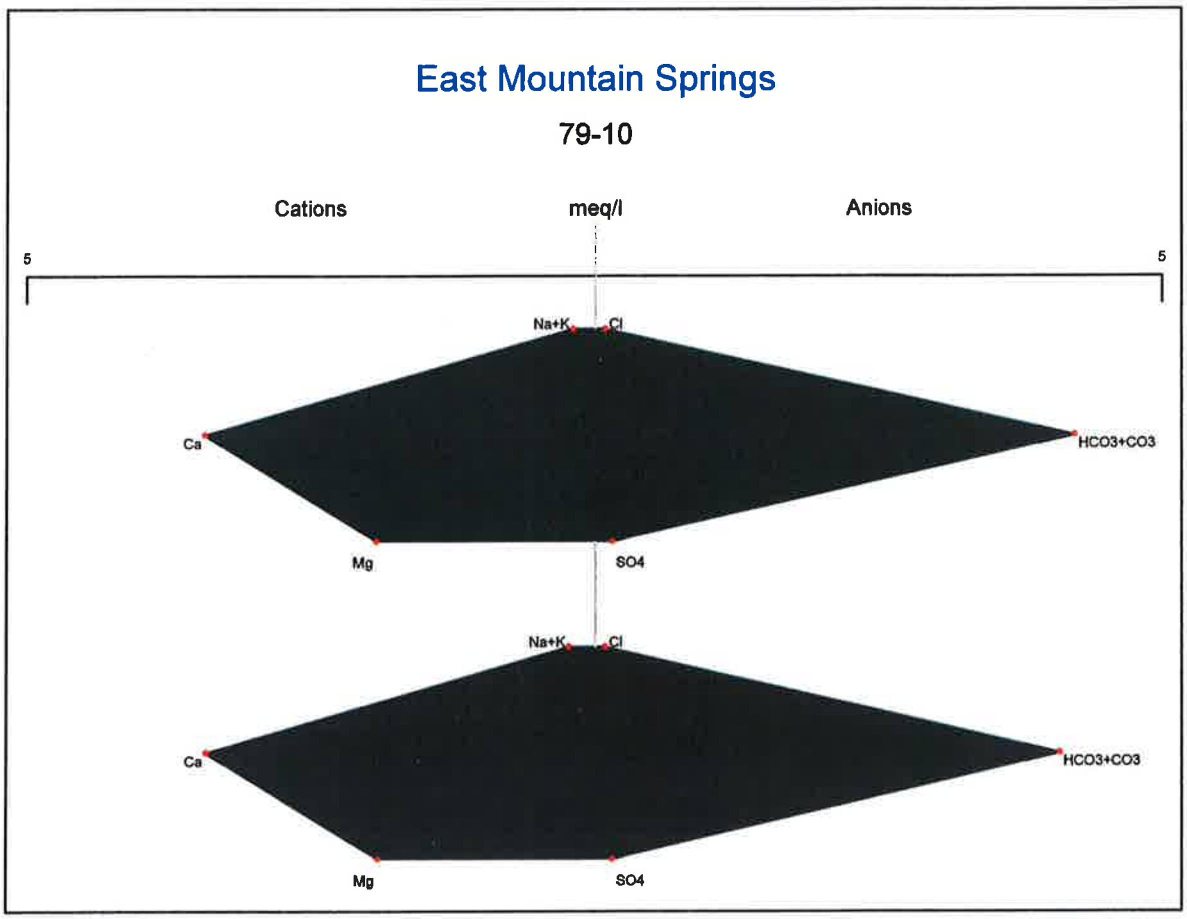

East Mountain Springs
EM Pond
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4


East Mountain Springs
Grant Spring
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

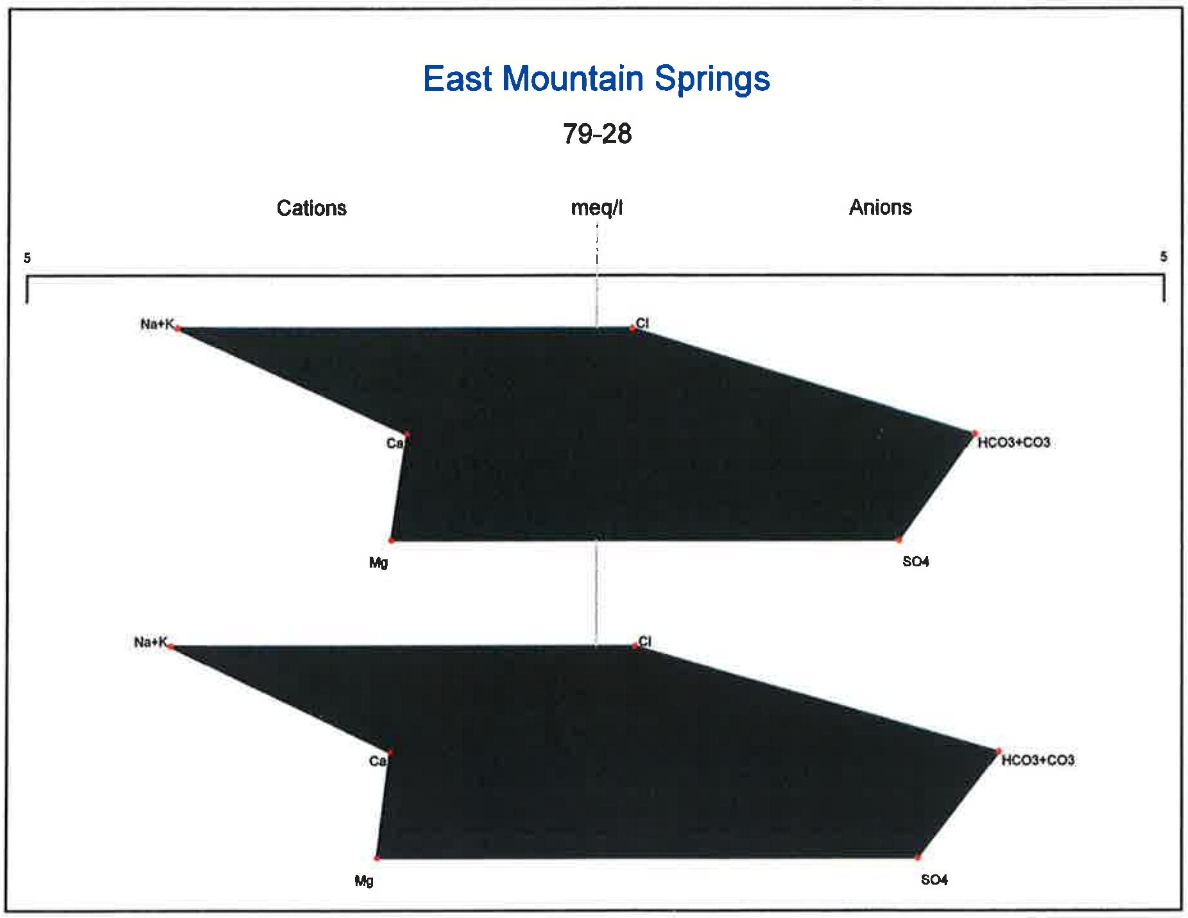

East Mountain Springs
Ted's Tub
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4


East Mountain Springs
Burnt Tree
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4


East Mountain Springs
79-02
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4



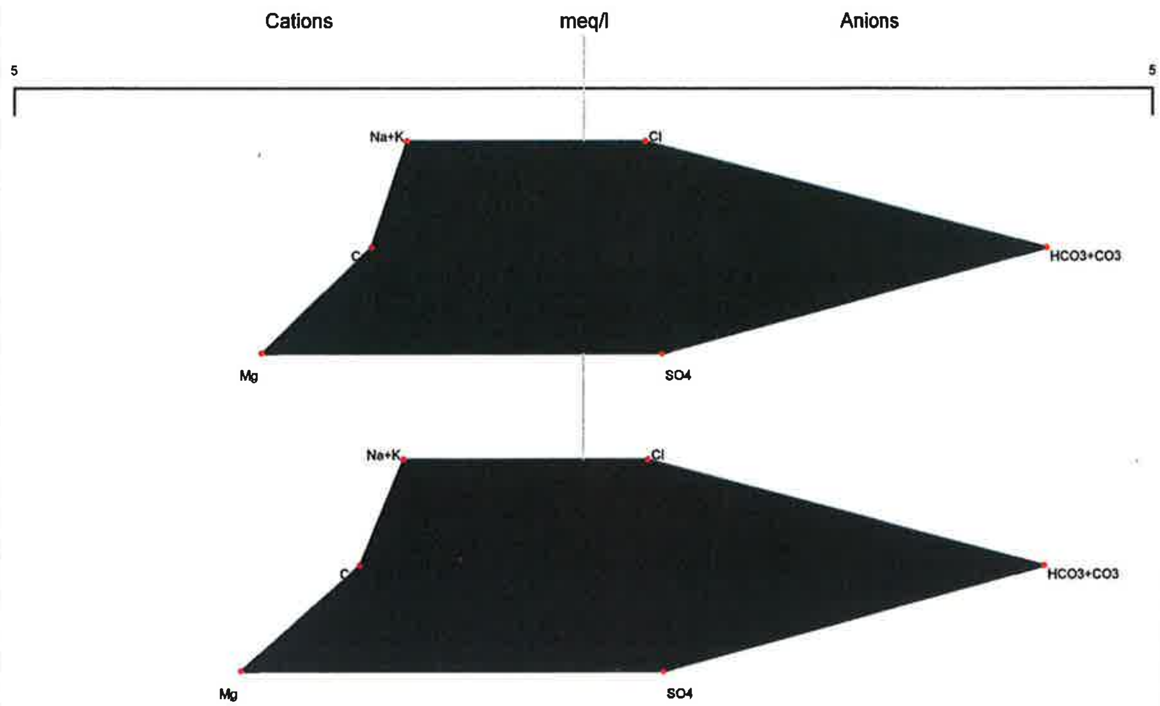
East Mountain Springs
79-10
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

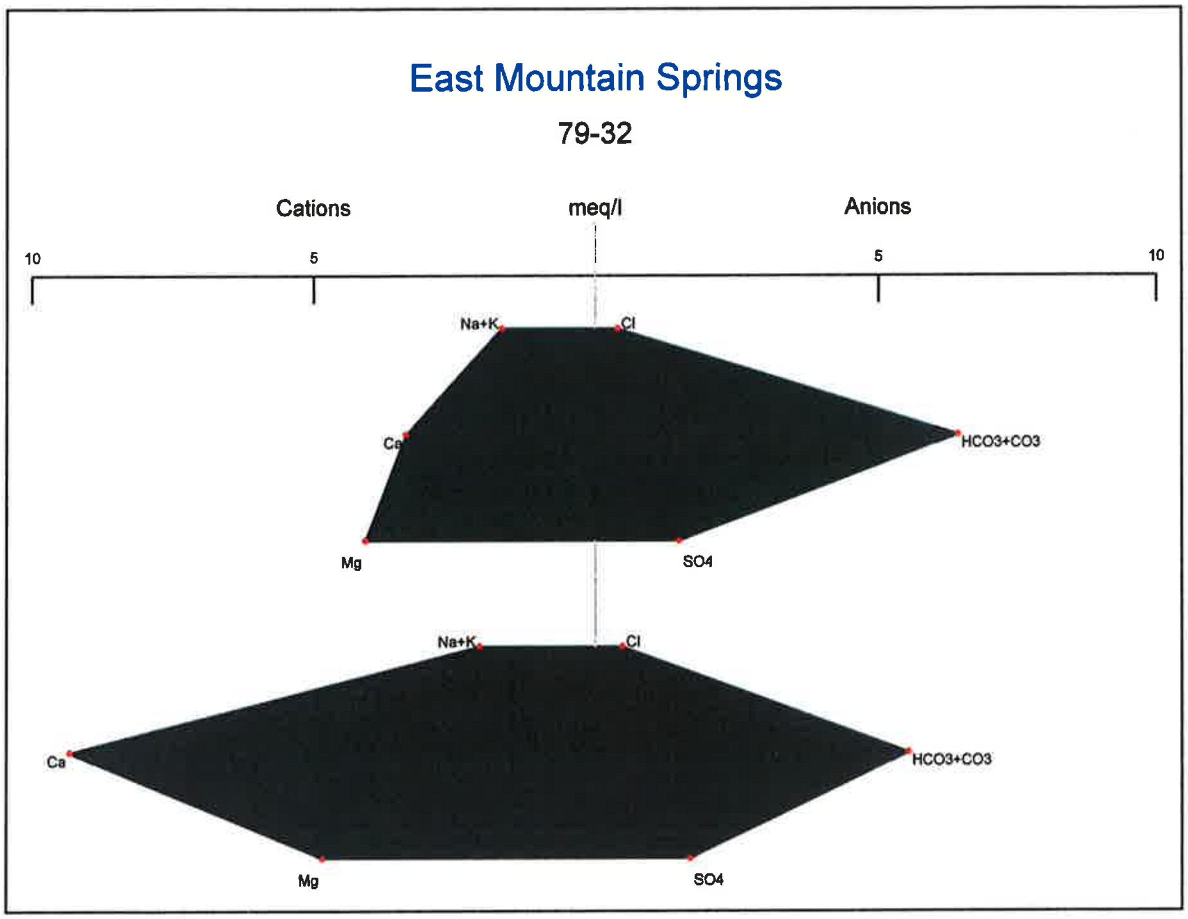


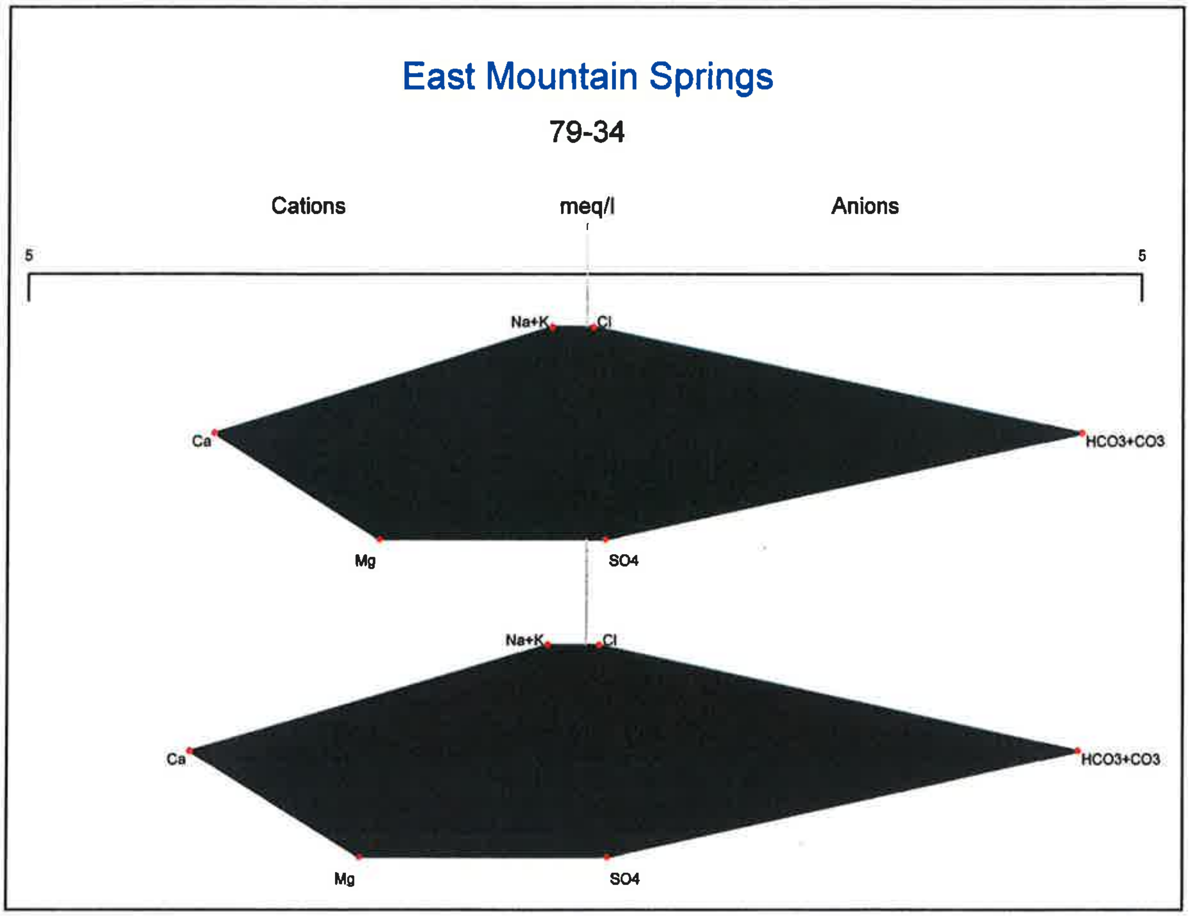
East Mountain Springs
79-28
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

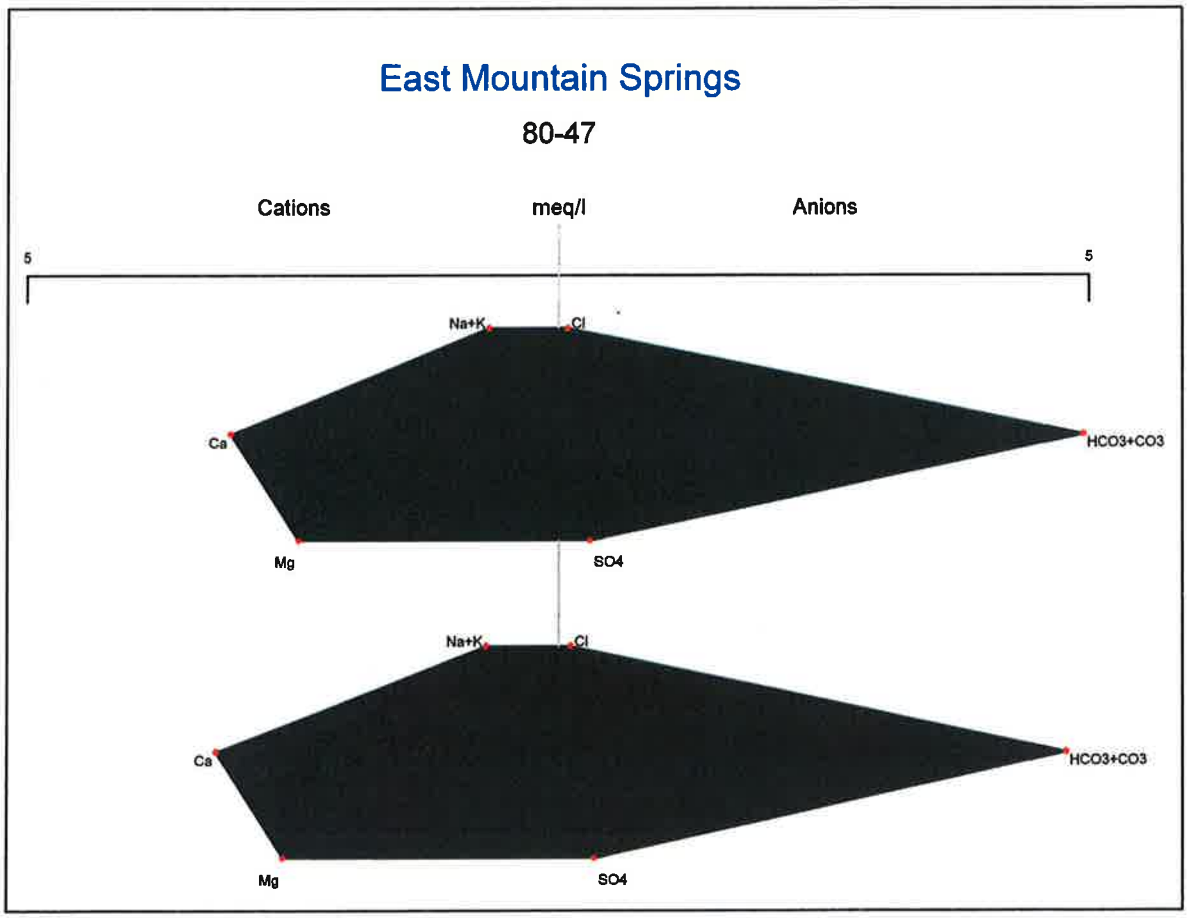
East Mountain Springs

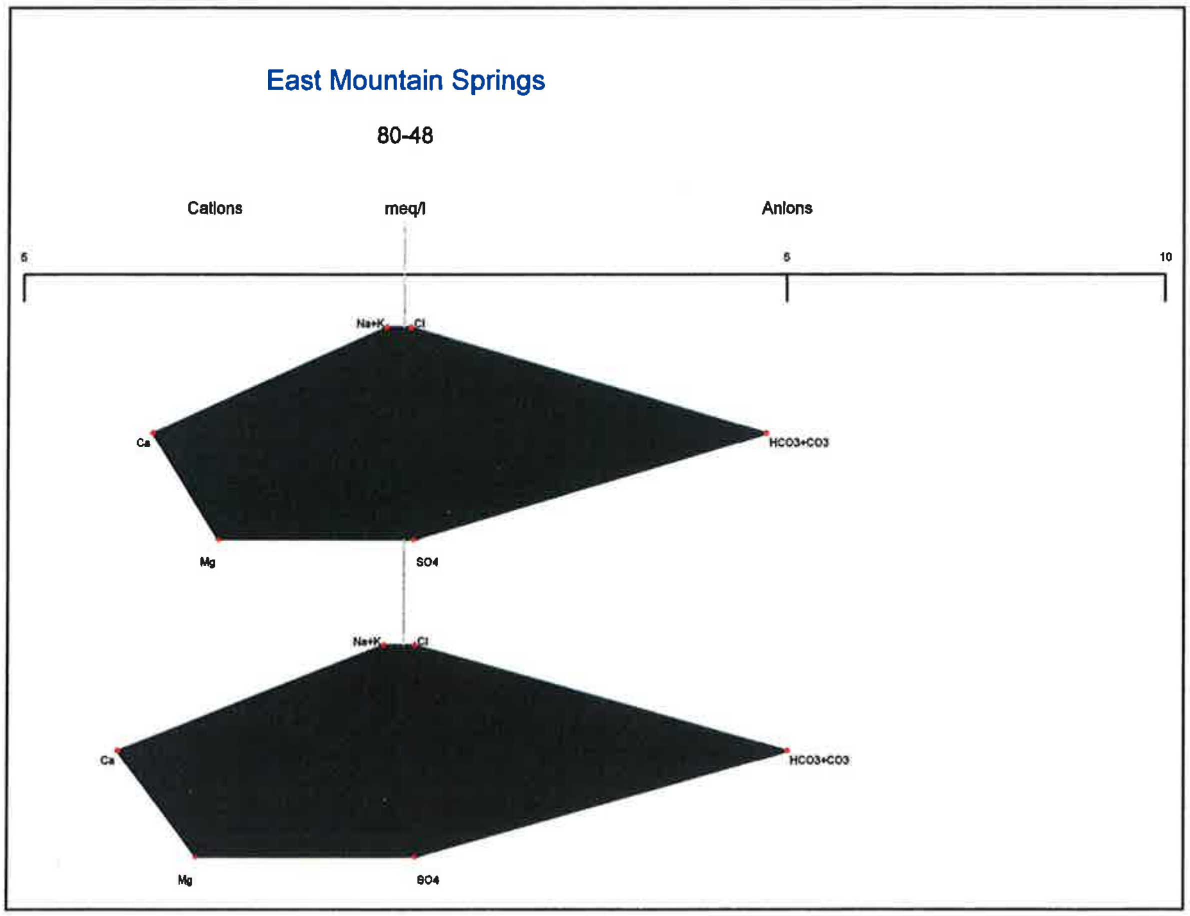
79-29

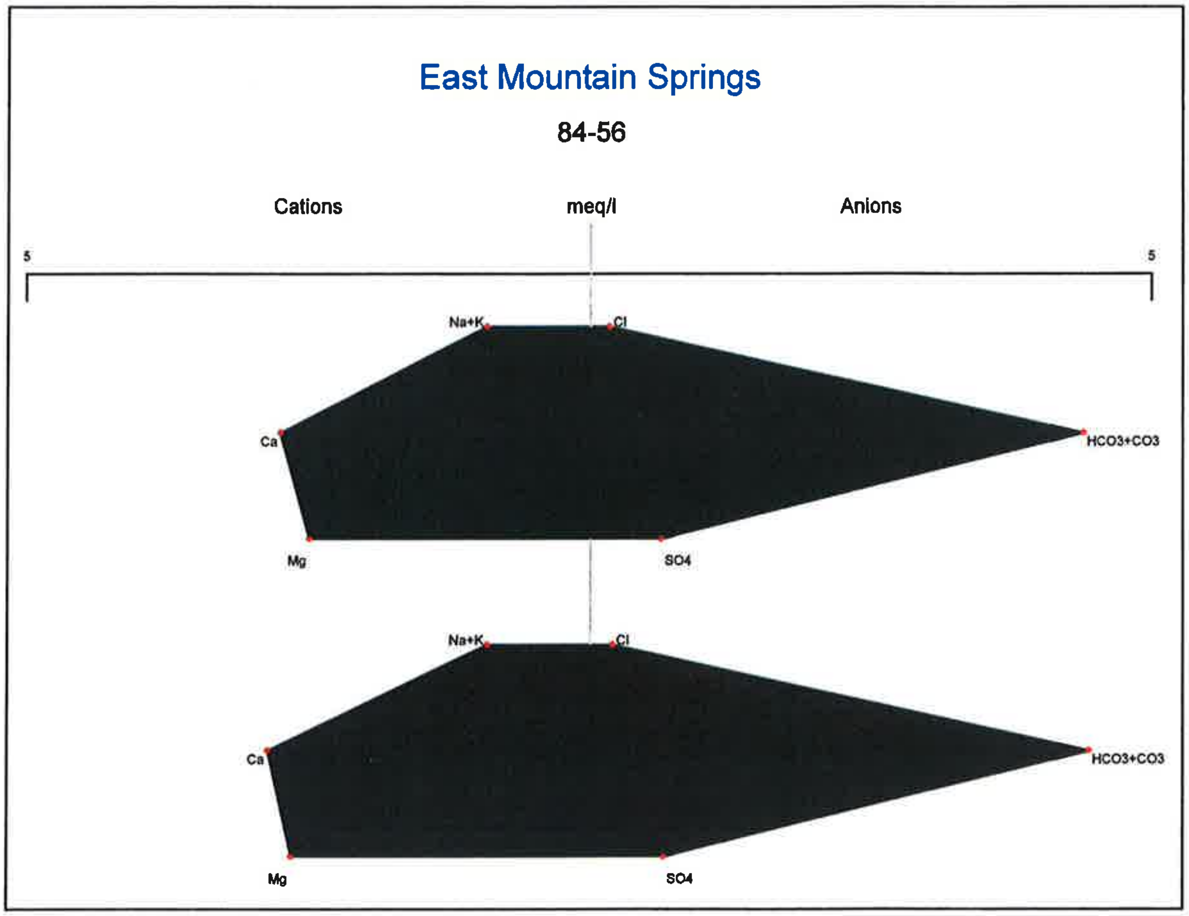


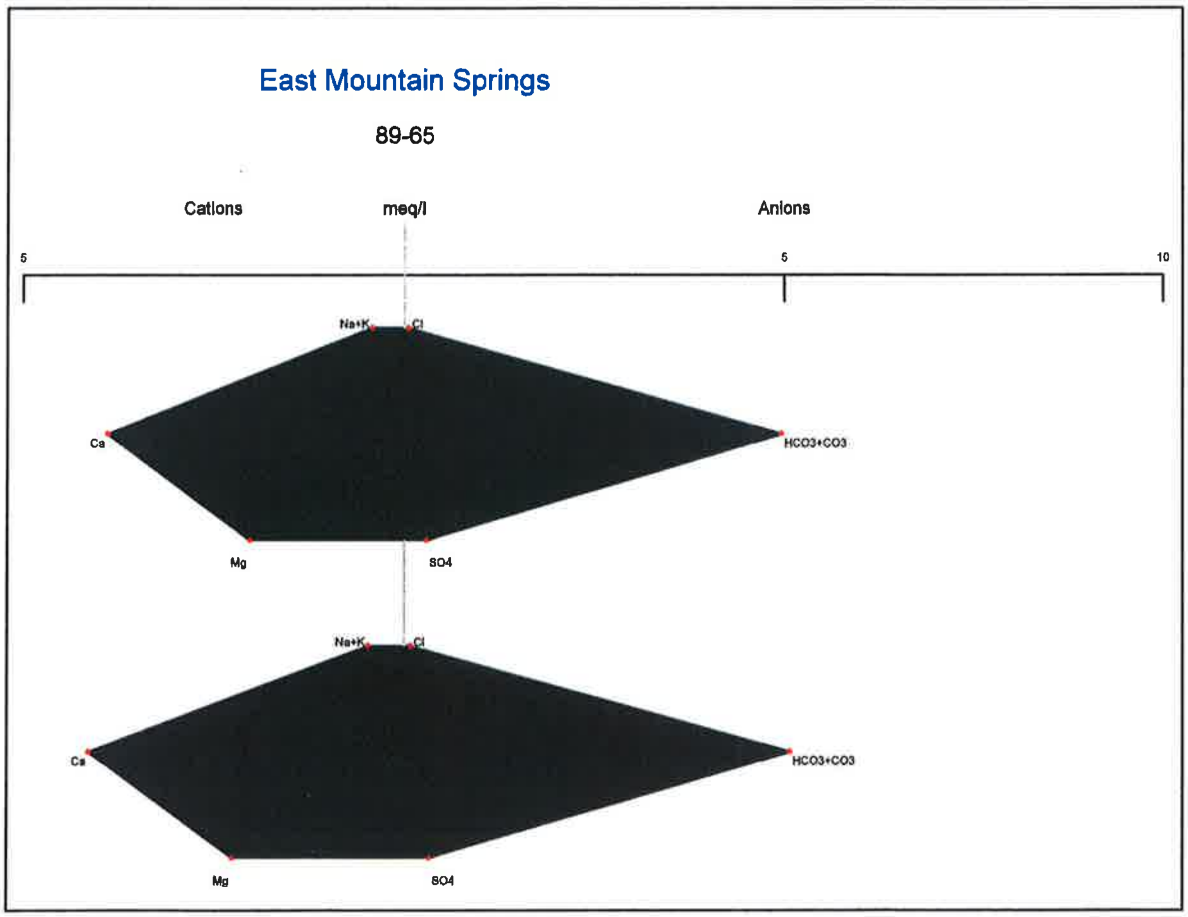

East Mountain Springs
79-32
Cations
meq/l
Anions
10
5
5
10
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

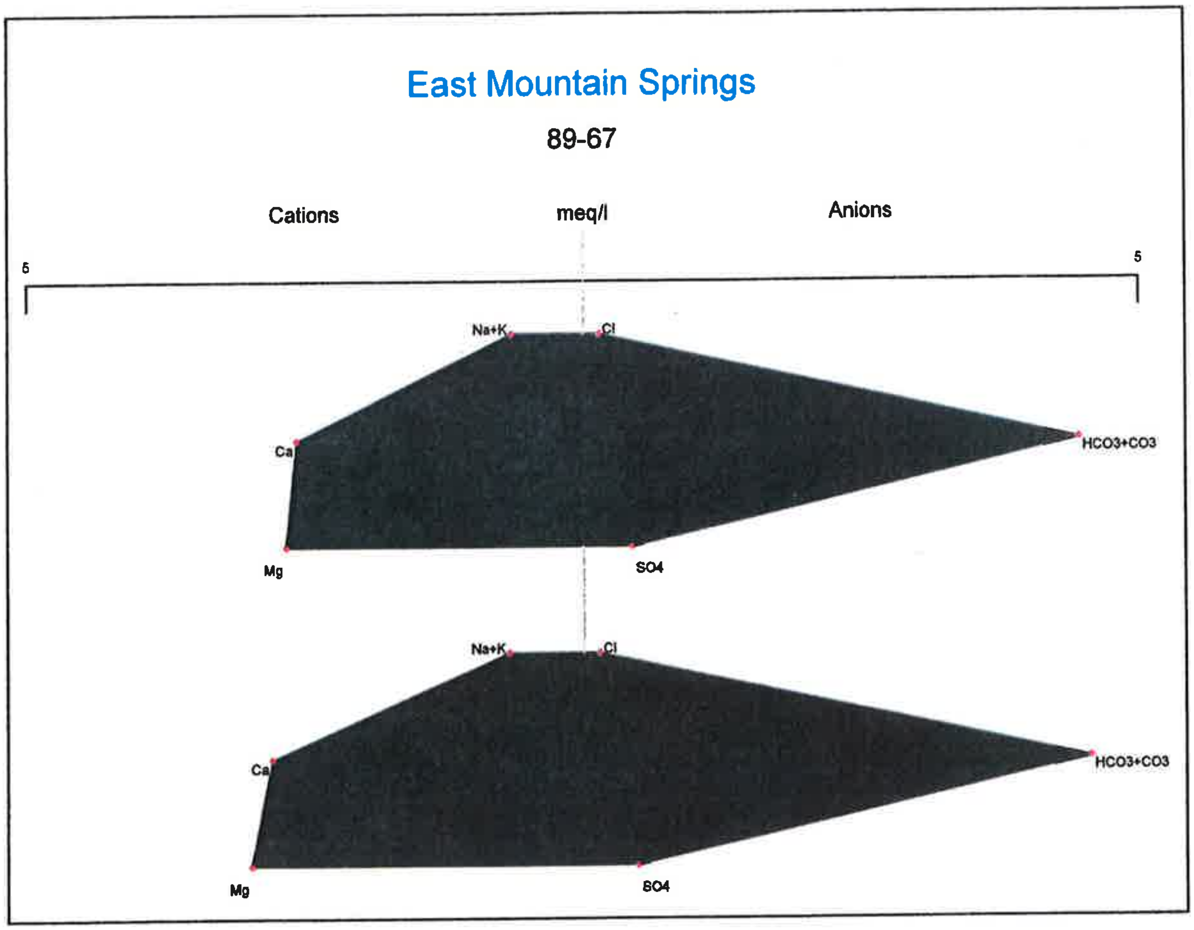

East Mountain Springs
79-34
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4


East Mountain Springs
80-47
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4


East Mountain Springs
80-48
Cations
meq/l
Anions
5
5
10
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

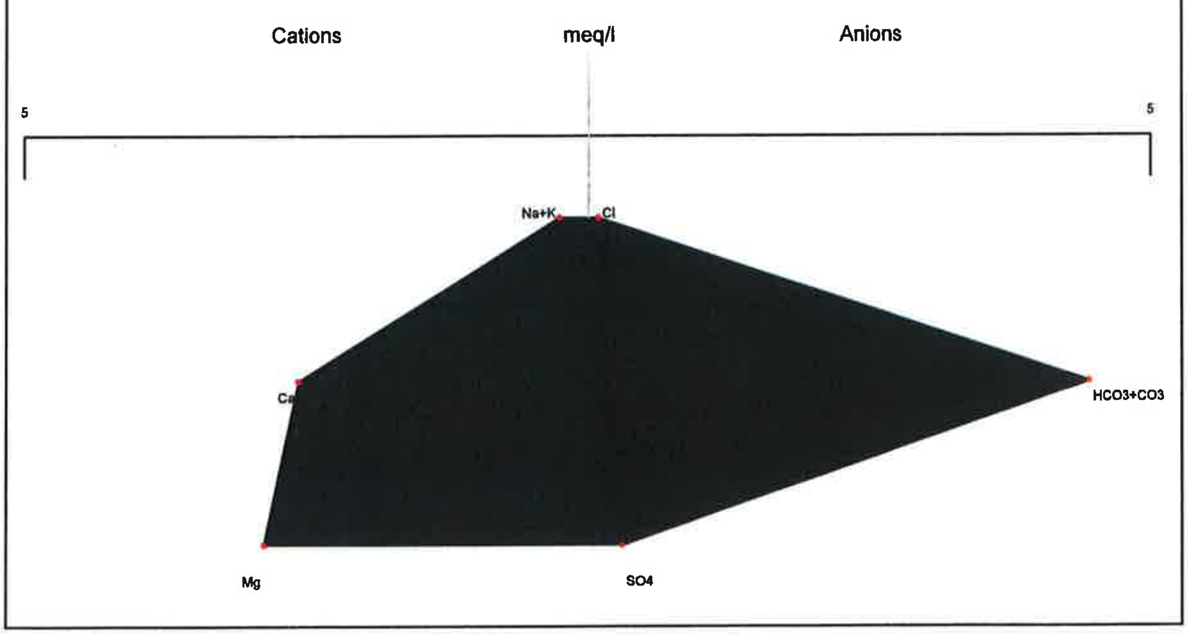

East Mountain Springs
84-56
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

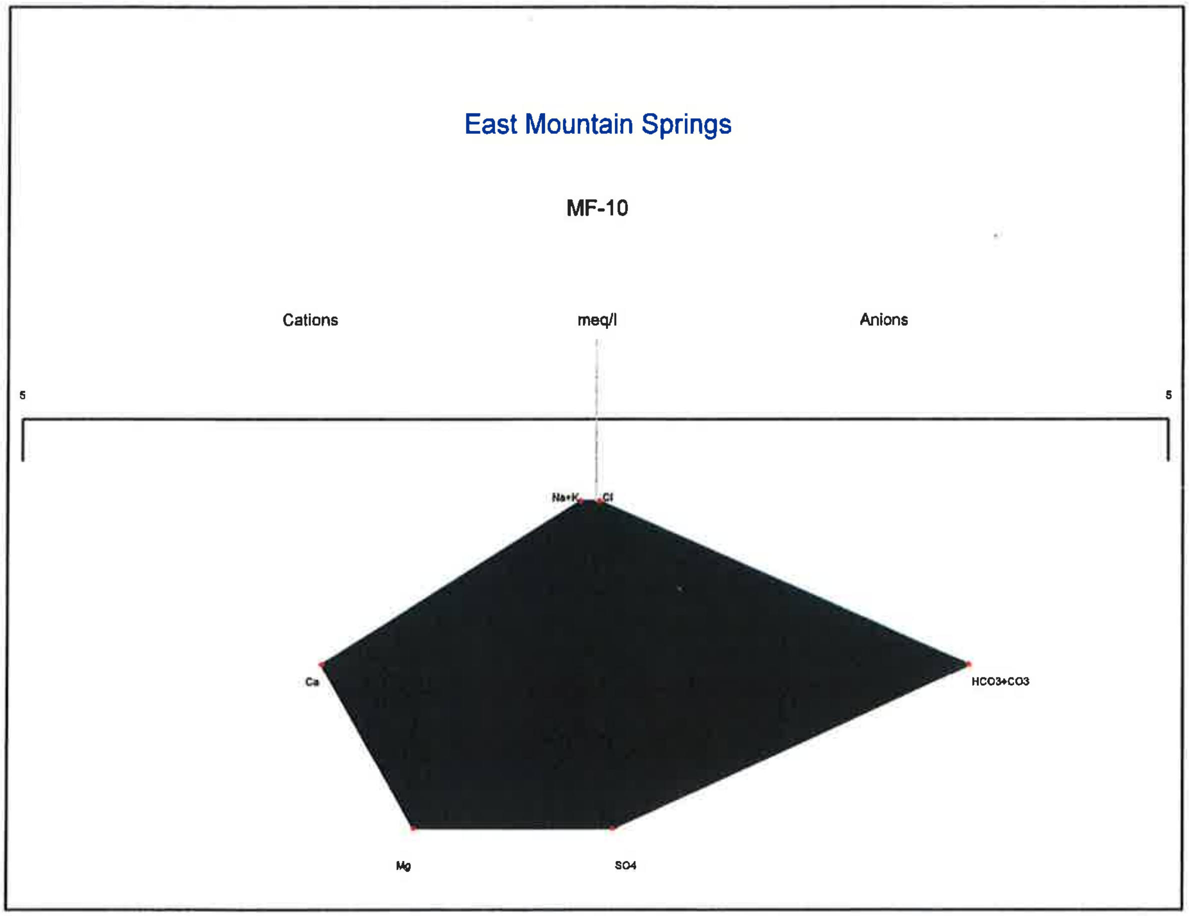

East Mountain Springs
89-65
Cations
meq/l
Anions
5
5
10
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

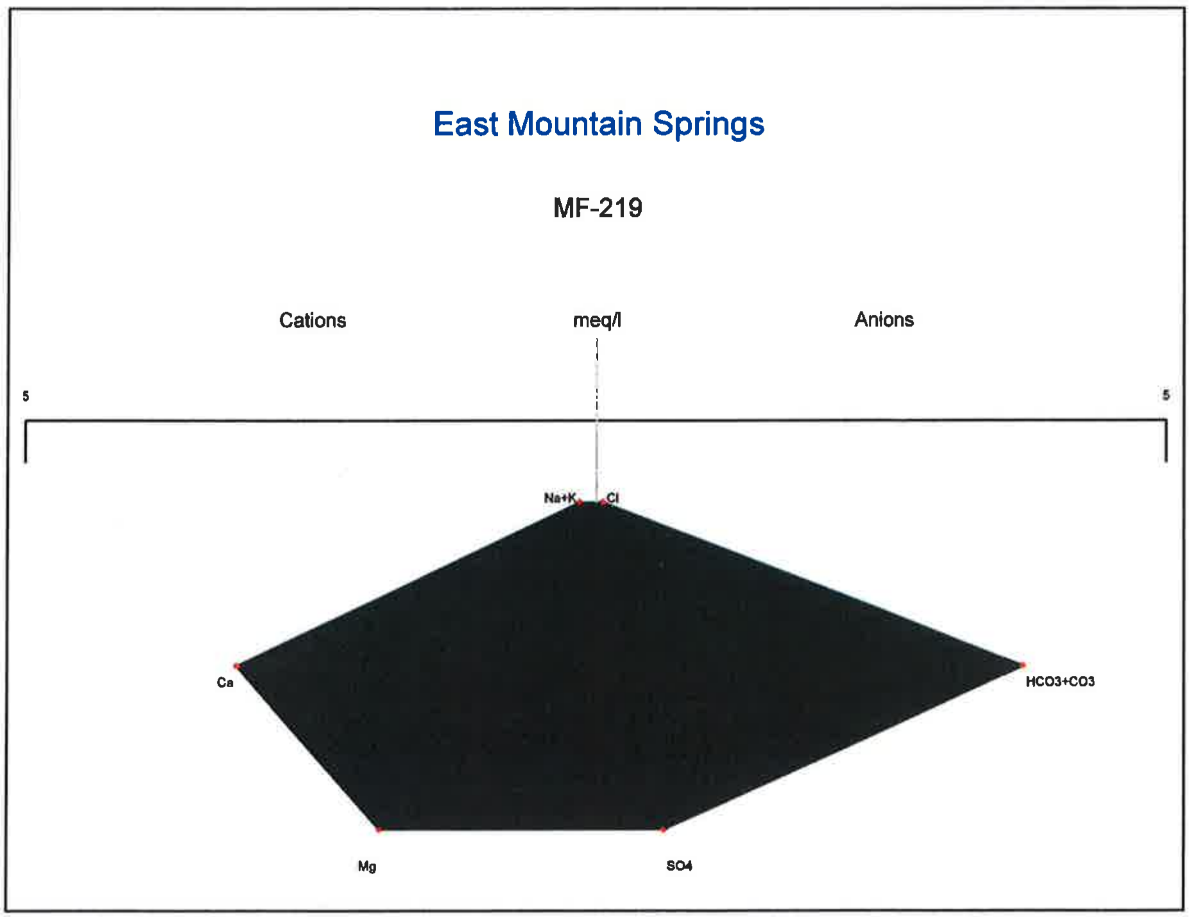

East Mountain Springs
89-67
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

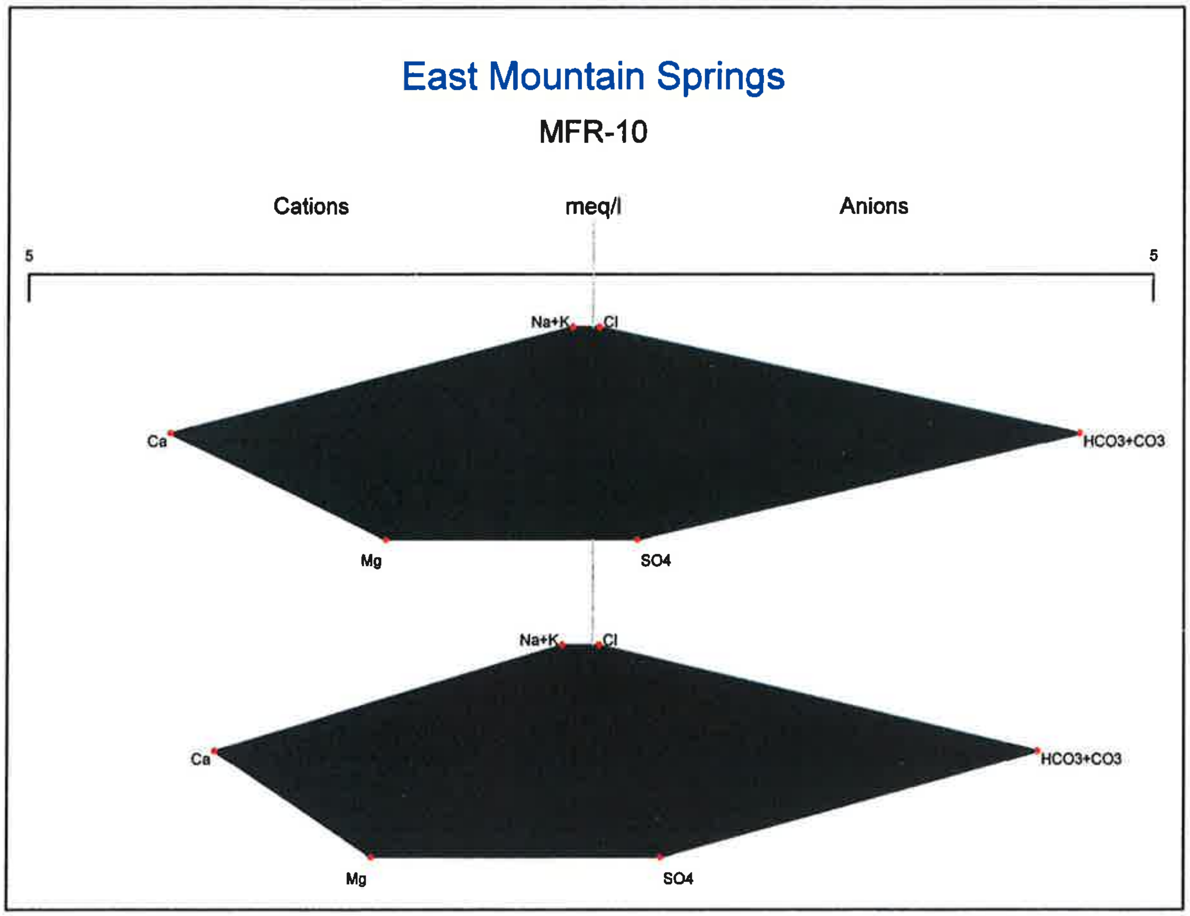
East Mountain Springs

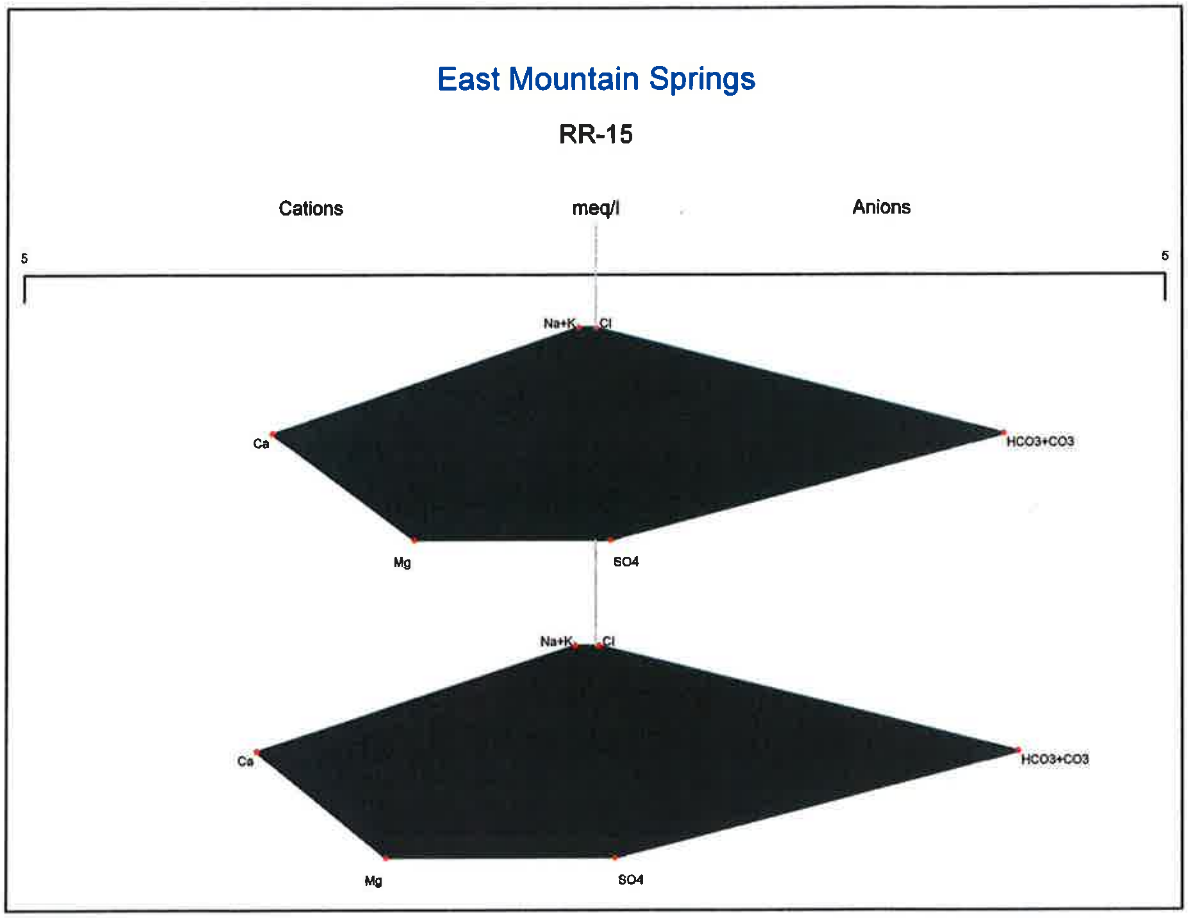
89-68

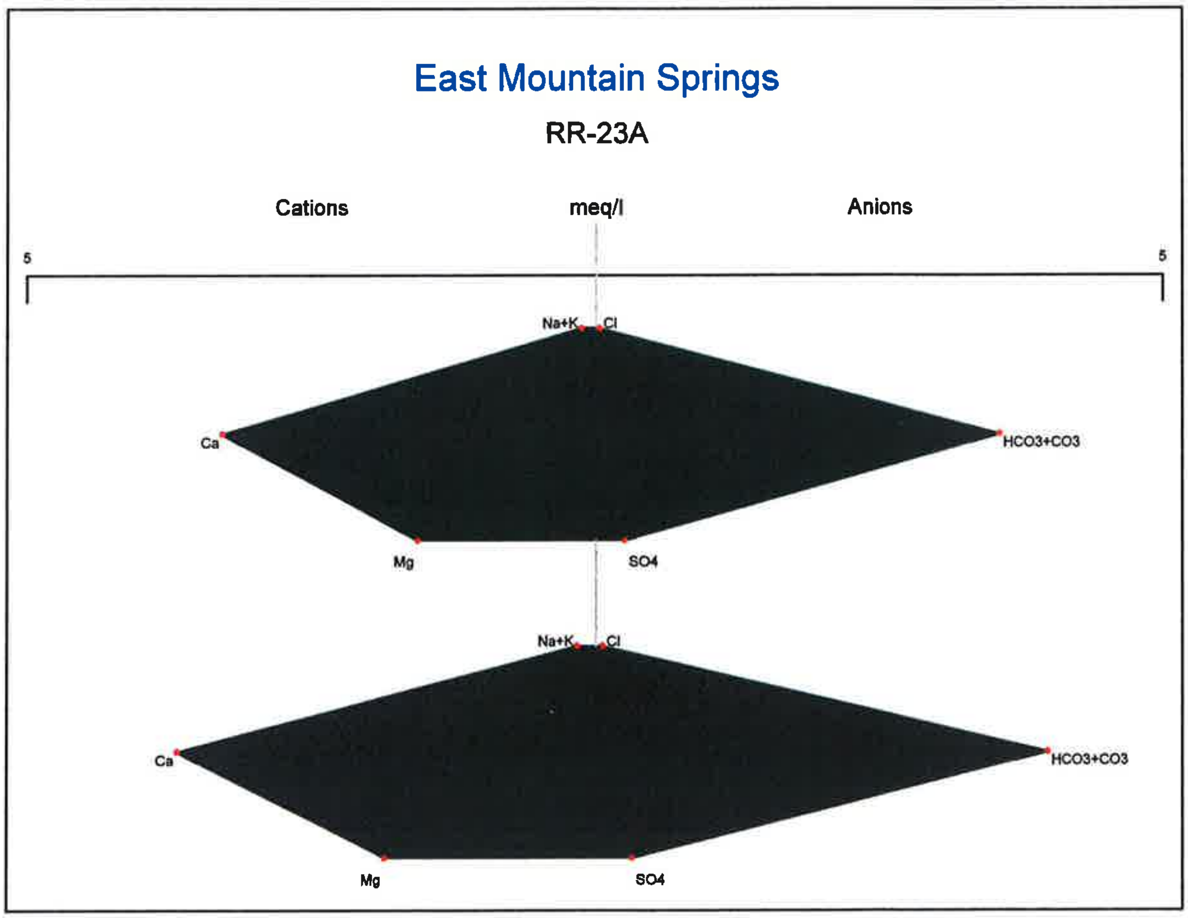


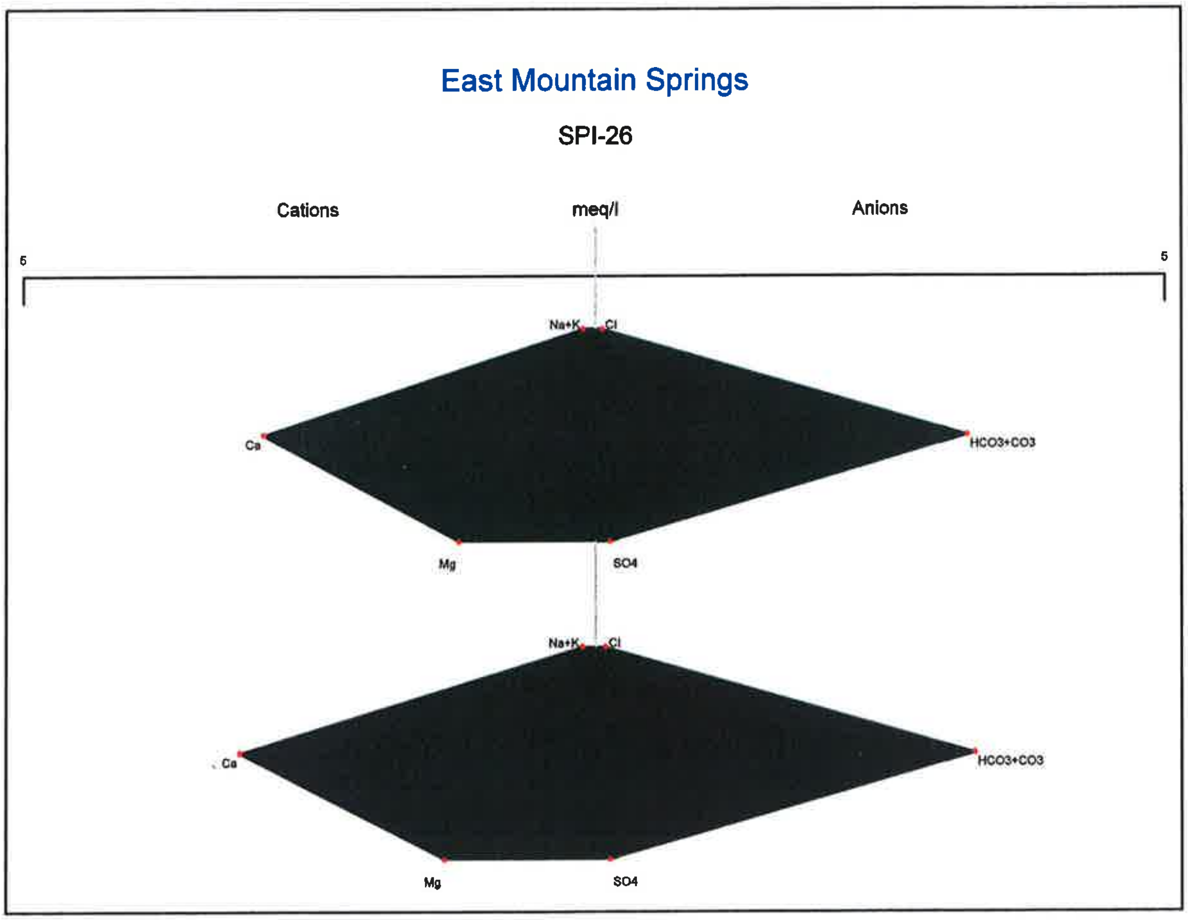

East Mountain Springs
MF-10
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4


East Mountain Springs
MF-219
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

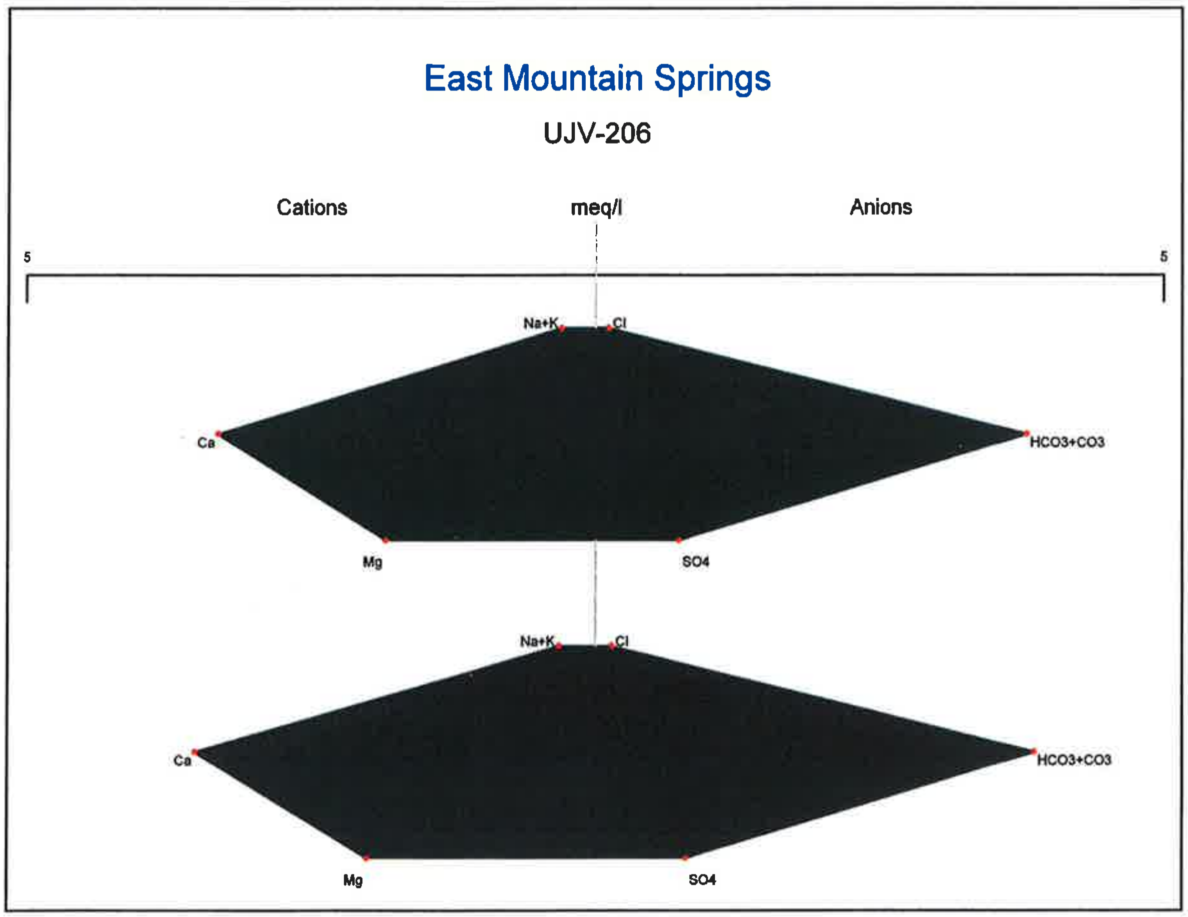

East Mountain Springs
MFR-10
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4


East Mountain Springs
RR-15
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

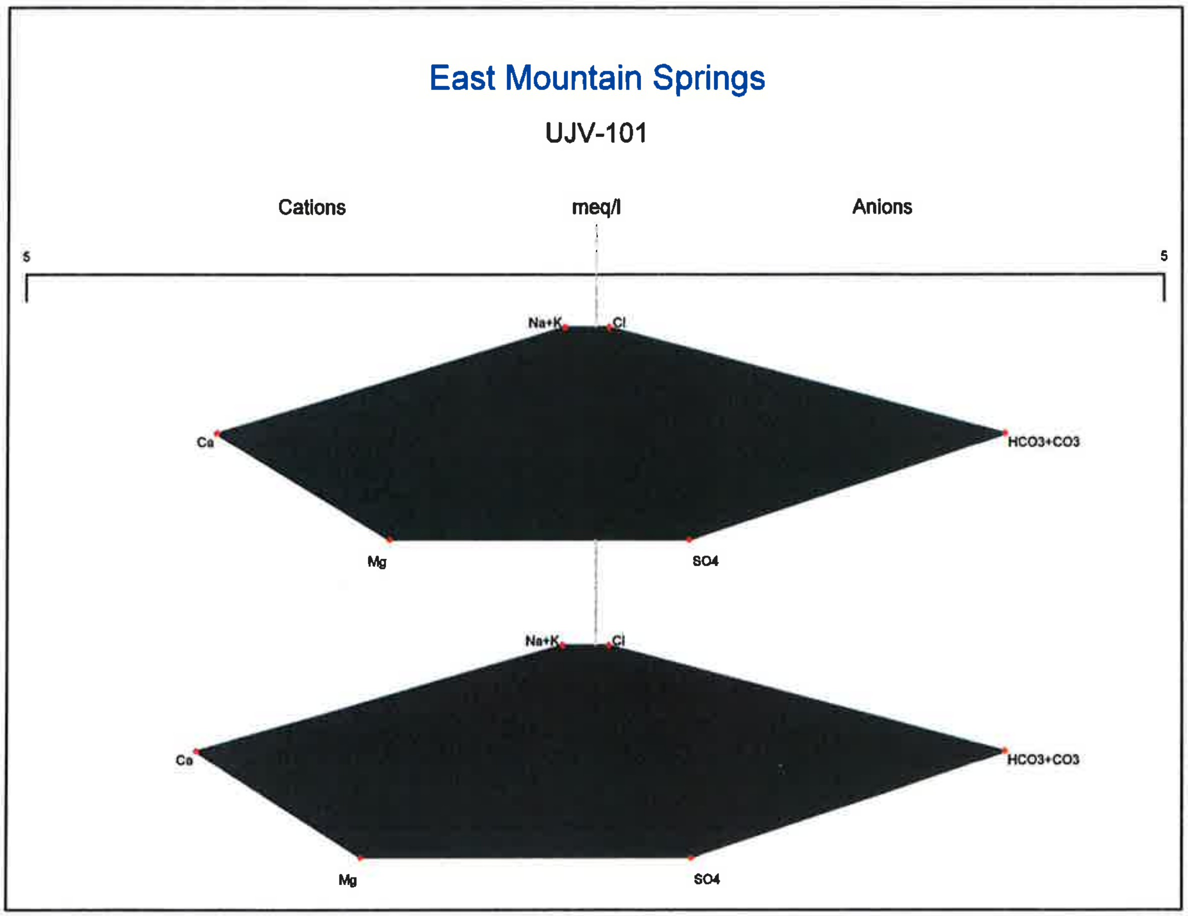

East Mountain Springs
RR-23A
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4


East Mountain Springs
SPI-26
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

East Mountain Springs
Stiff Diagrams
Price River Formation

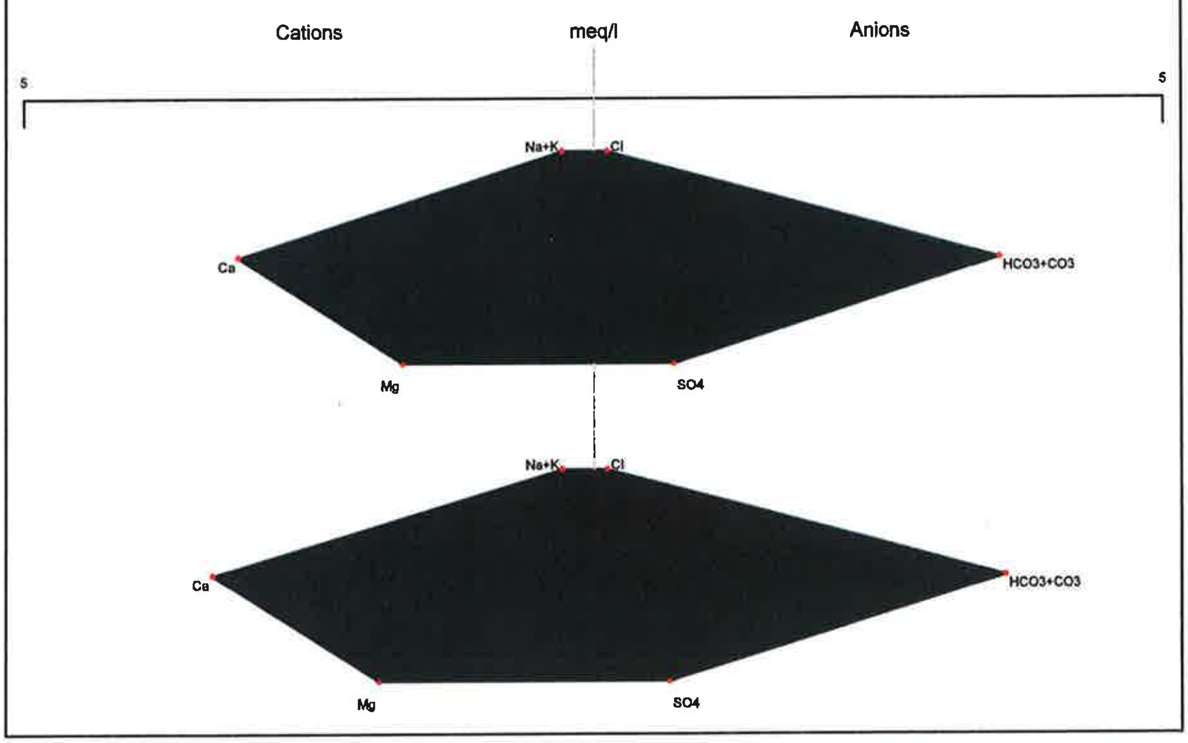

East Mountain Springs
UJV-206
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

East Mountain Springs
Stiff Diagrams
Castlegate Sandstone

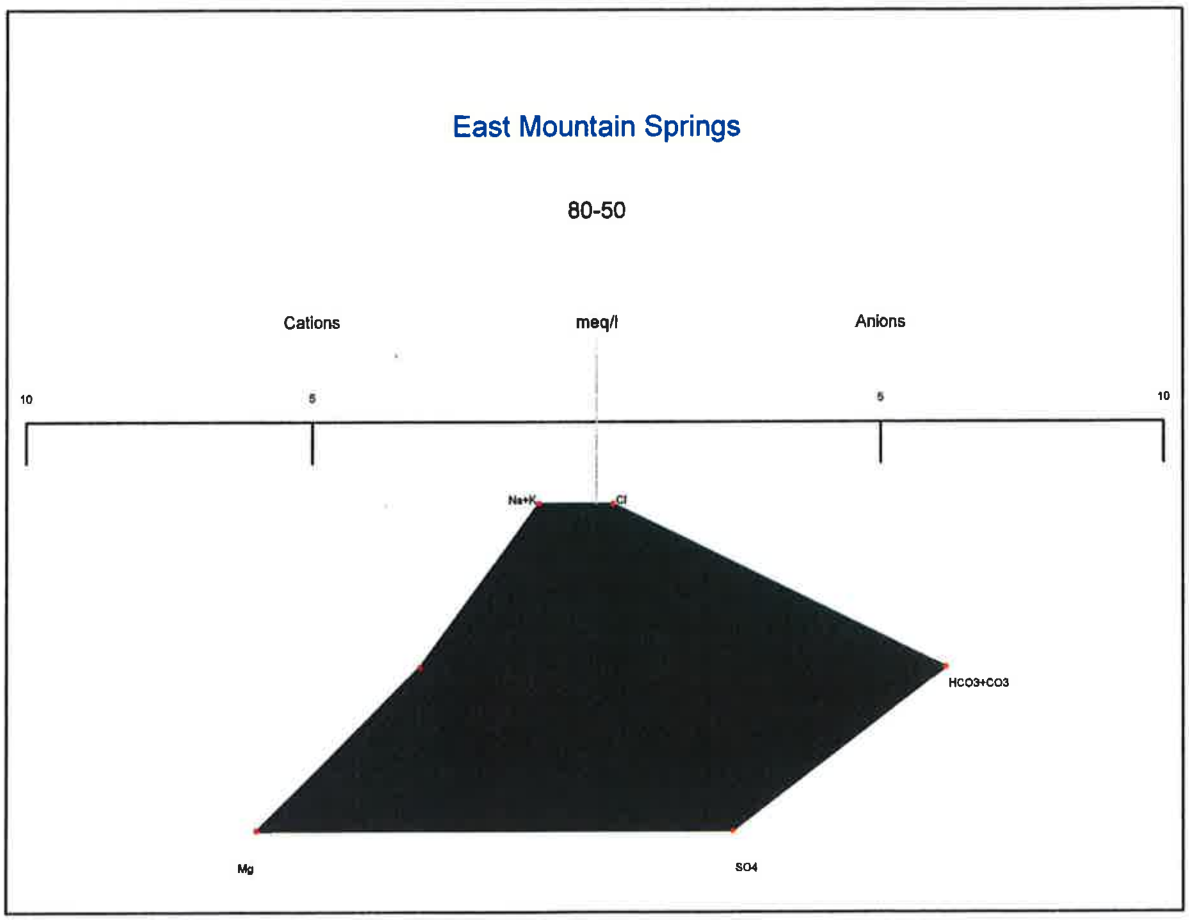

East Mountain Springs
UJV-101
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

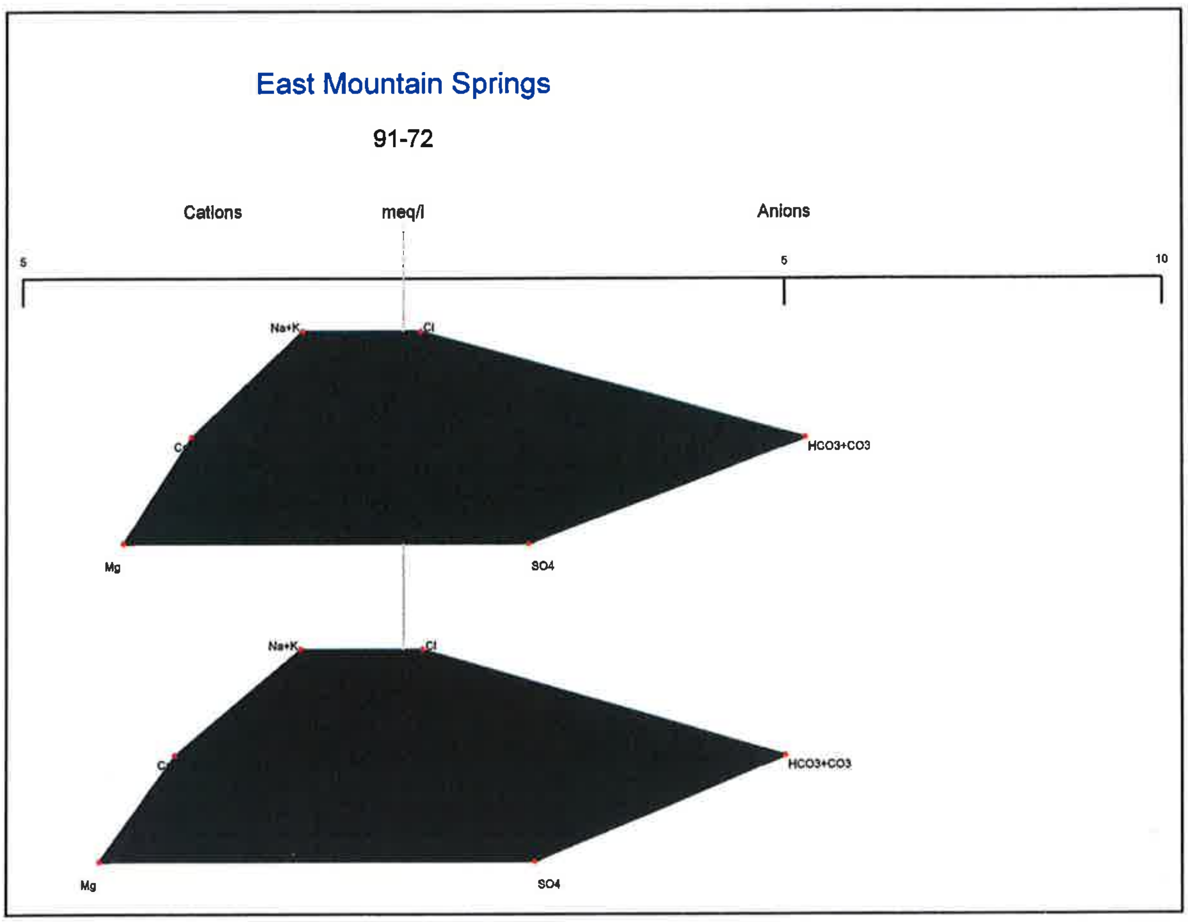
East Mountain Springs

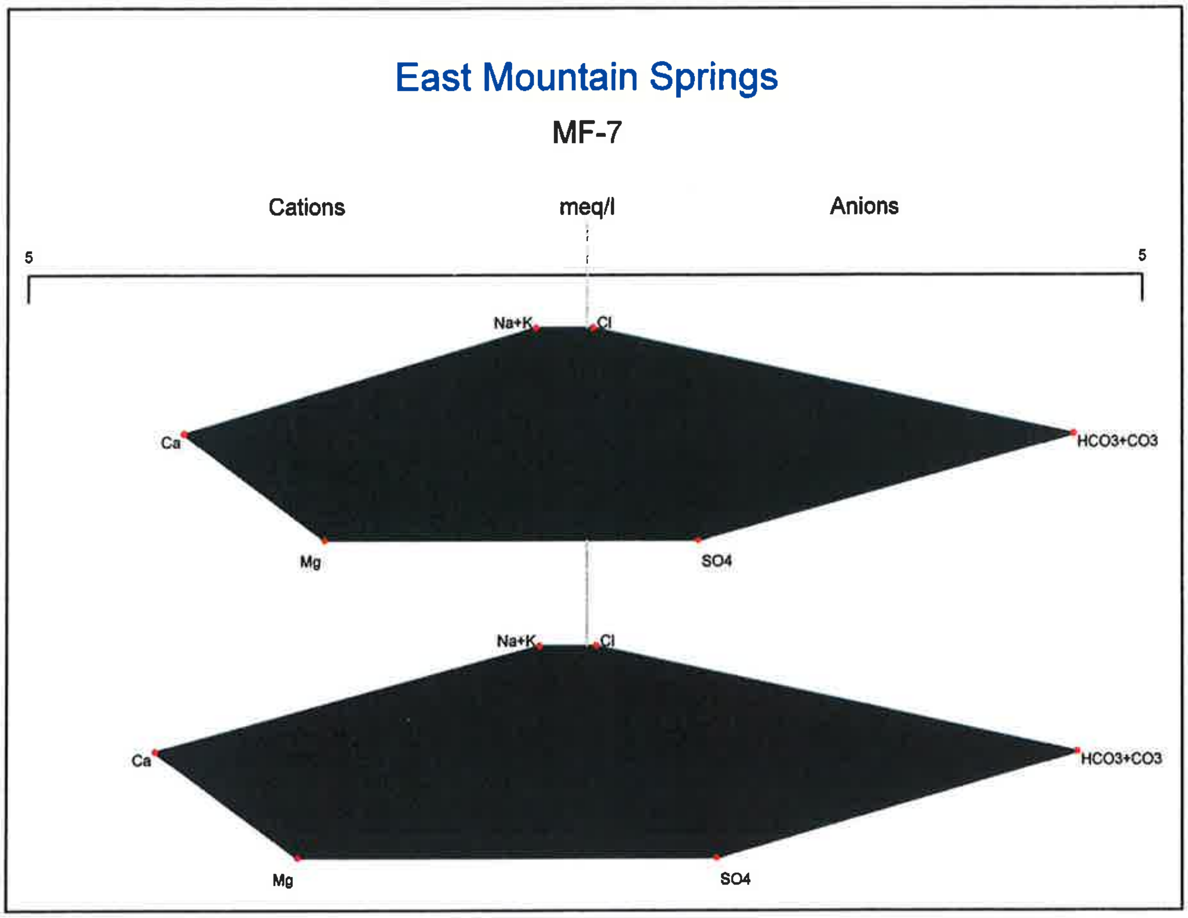
UJV-213

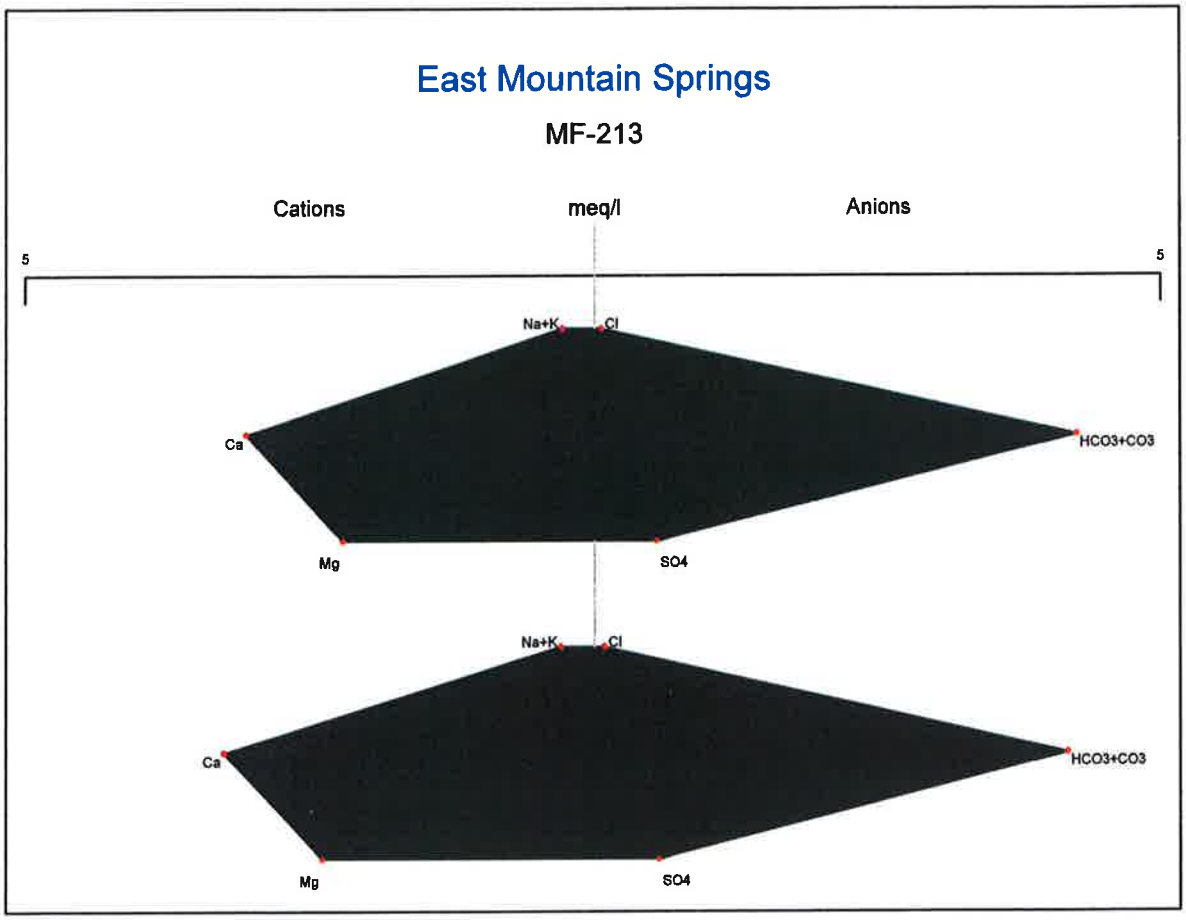


East Mountain Springs
Stiff Diagrams
Blackhawk Formation

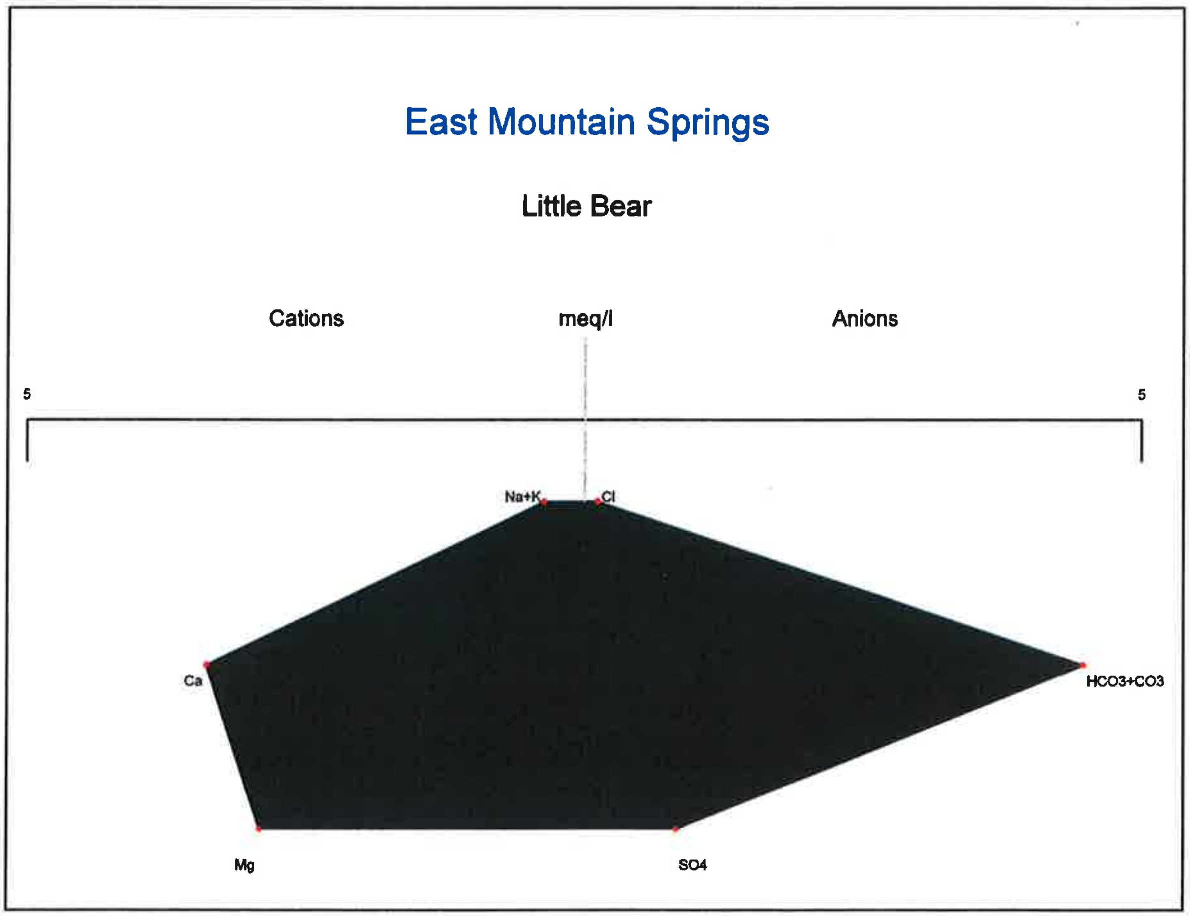

East Mountain Springs
80-50
Cations
meq/l
Anions
10
5
5
10
Na+K
Cl
HCO3+CO3
Mg
SO4


East Mountain Springs
91-72
Cations
meq/l
Anions
5
5
10
Na+K
Cl
HCO3+CO3
Mg
SO4
Na+K
Cl
HCO3+CO3
Mg
SO4

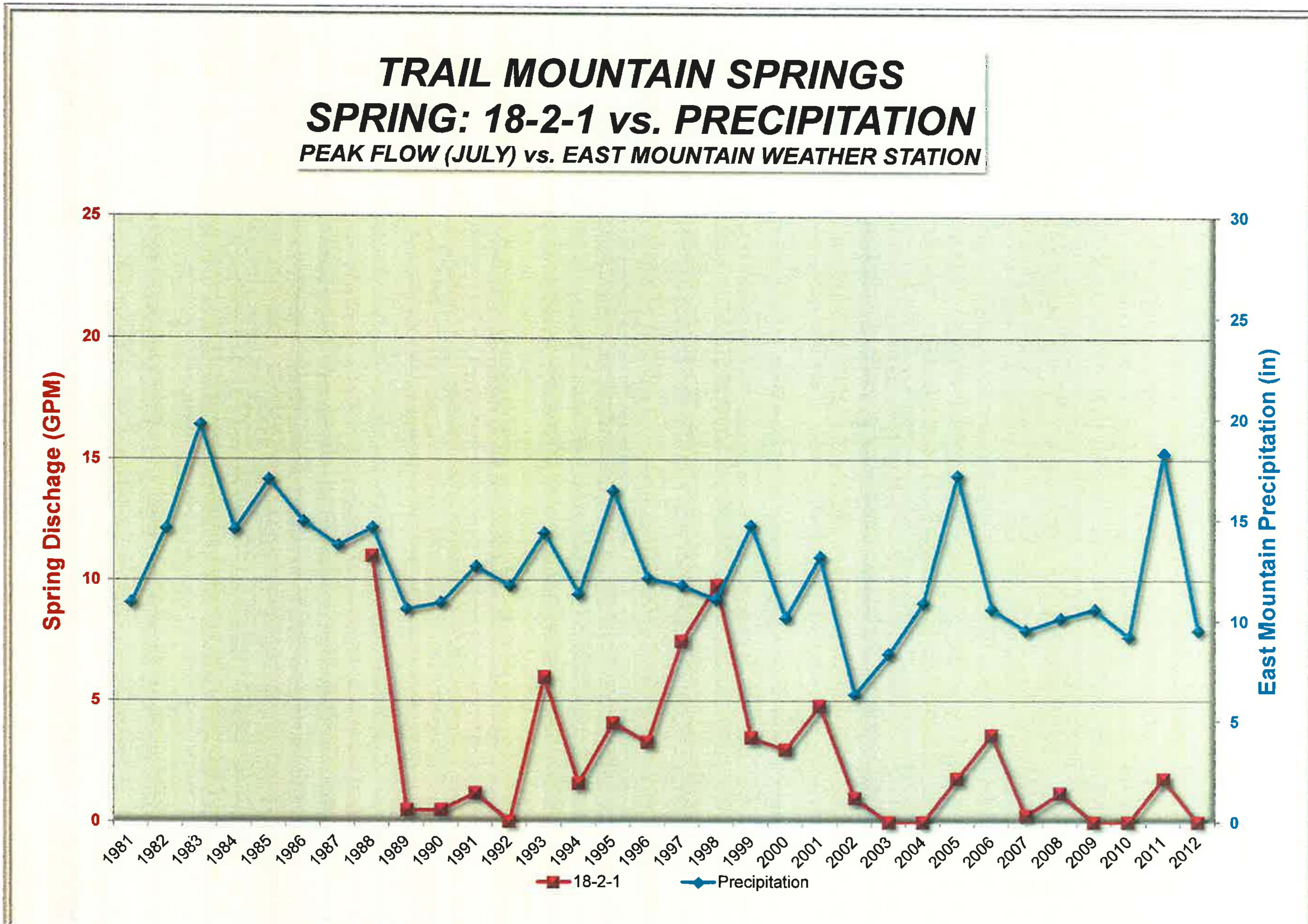

East Mountain Springs
MF-7
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

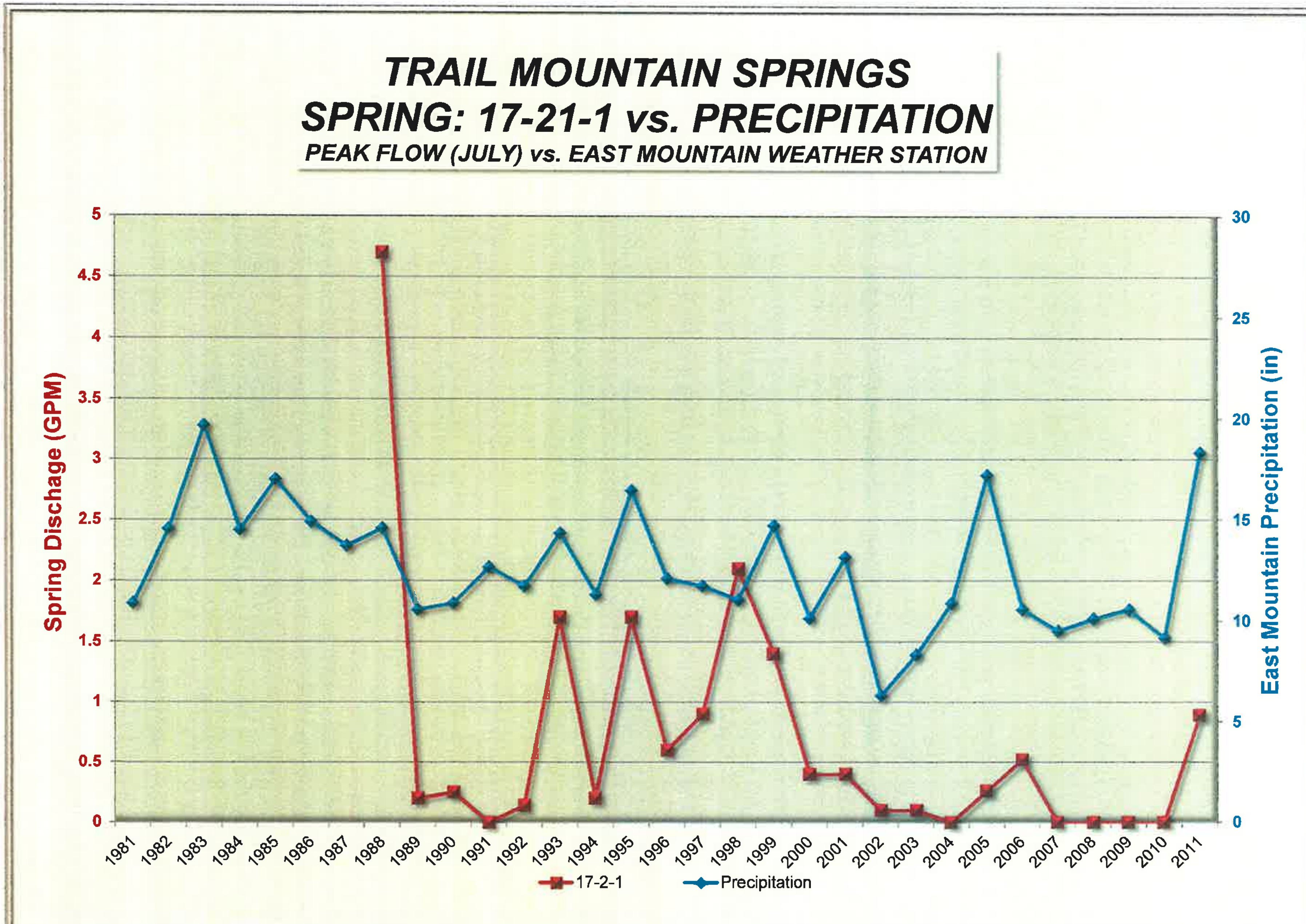

East Mountain Springs
MF-213
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

East Mountain Springs
Stiff Diagrams
Star Point Sandstone

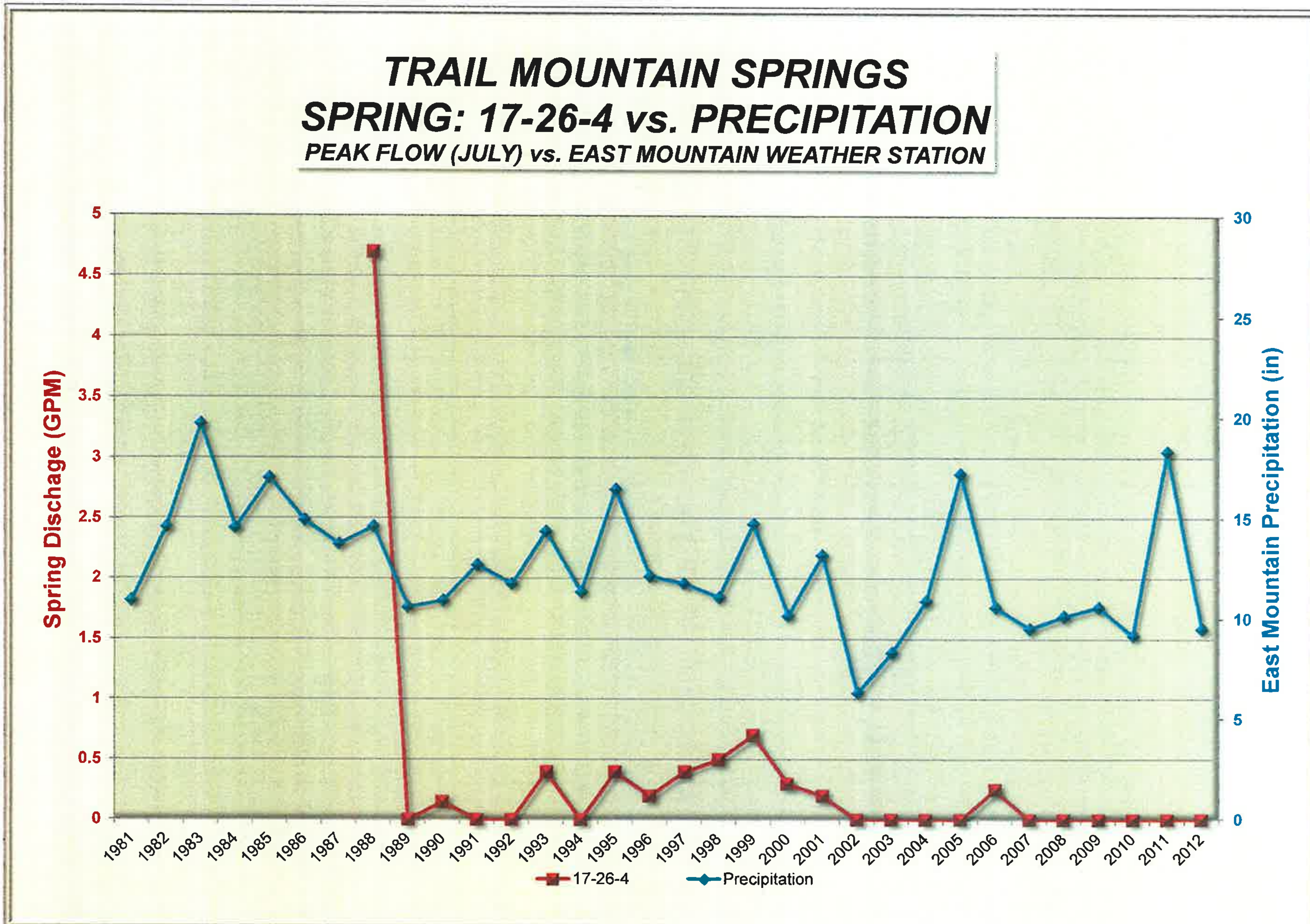

East Mountain Springs
Little Bear
Cations
meq/l
Anions
5
5
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

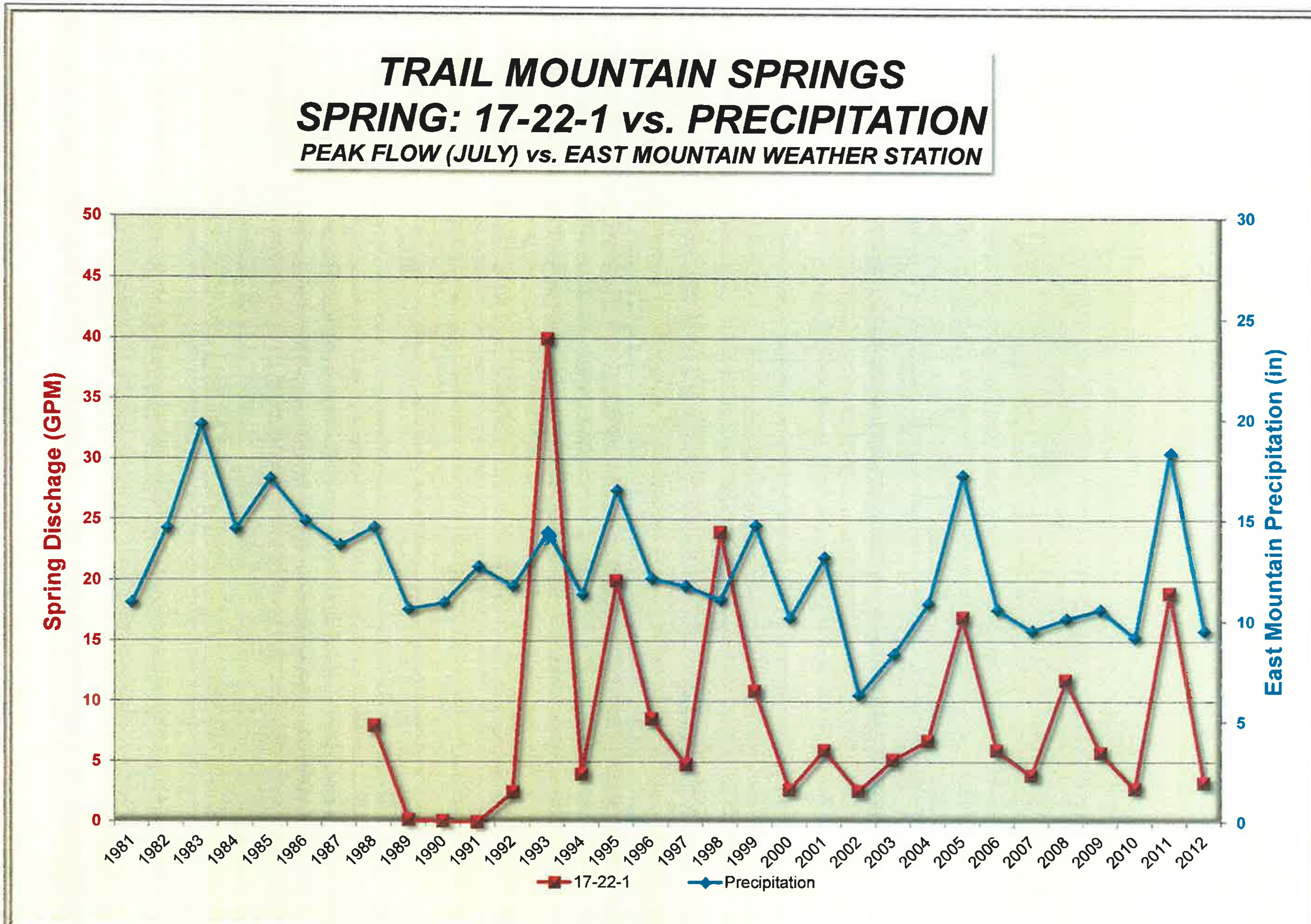
Trail Mountain Springs
Flow vs Precipitation

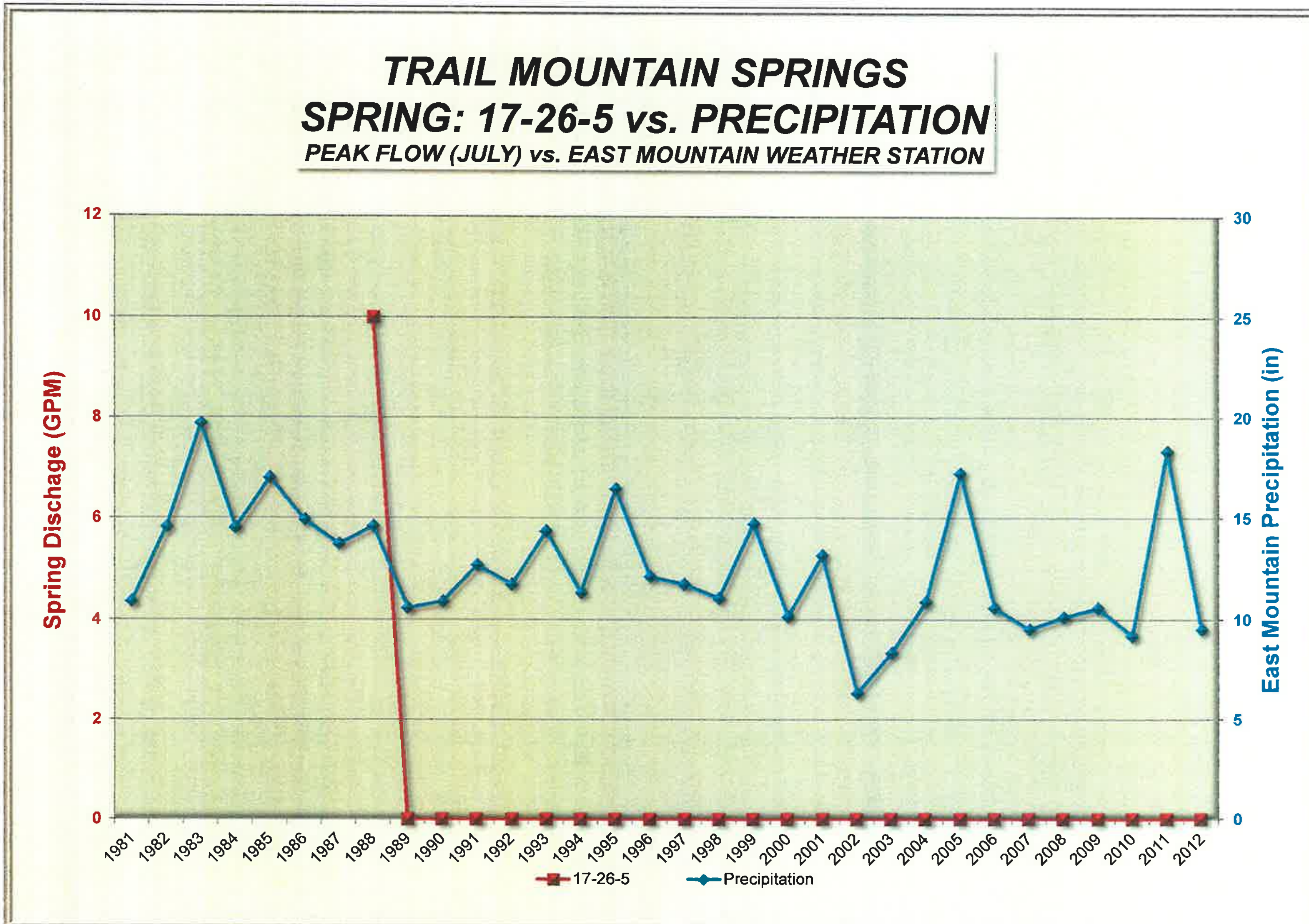

TRAIL MOUNTAIN SPRINGS
SPRING: 18-2-1 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
18-2-1
Precipitation

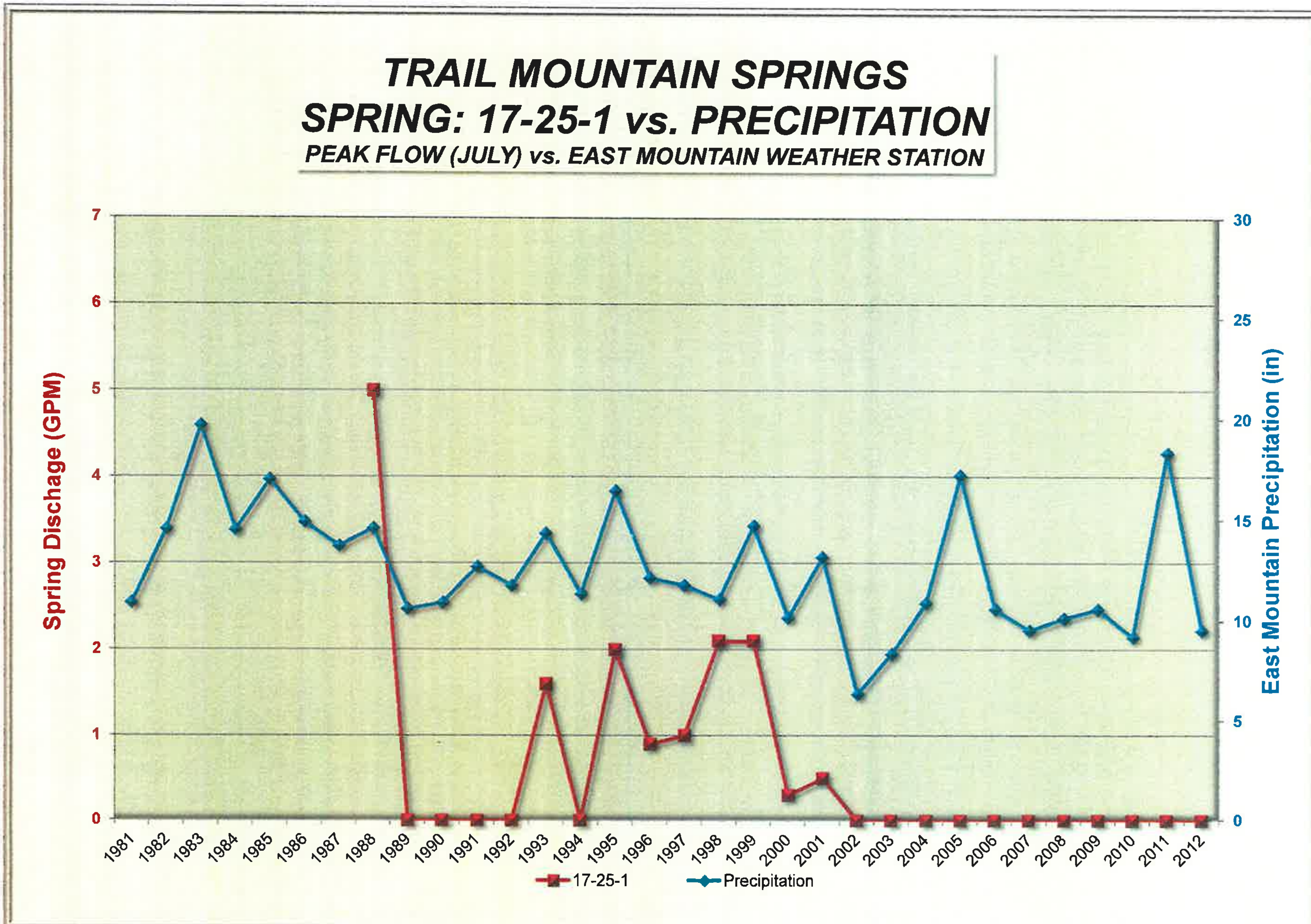


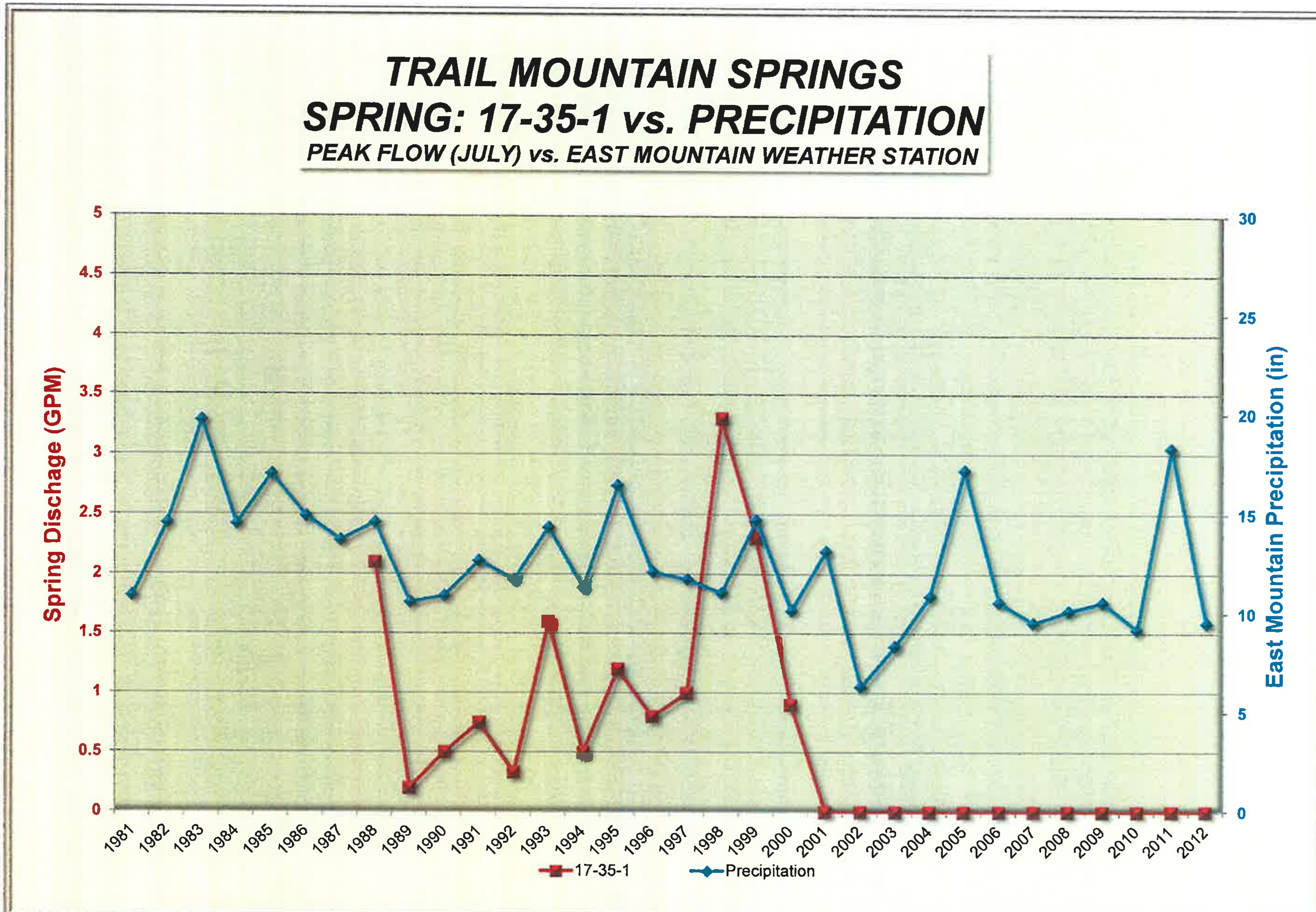
TRAIL MOUNTAIN SPRINGS
SPRING: 17-21-1 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
17-2-1
Precipitation

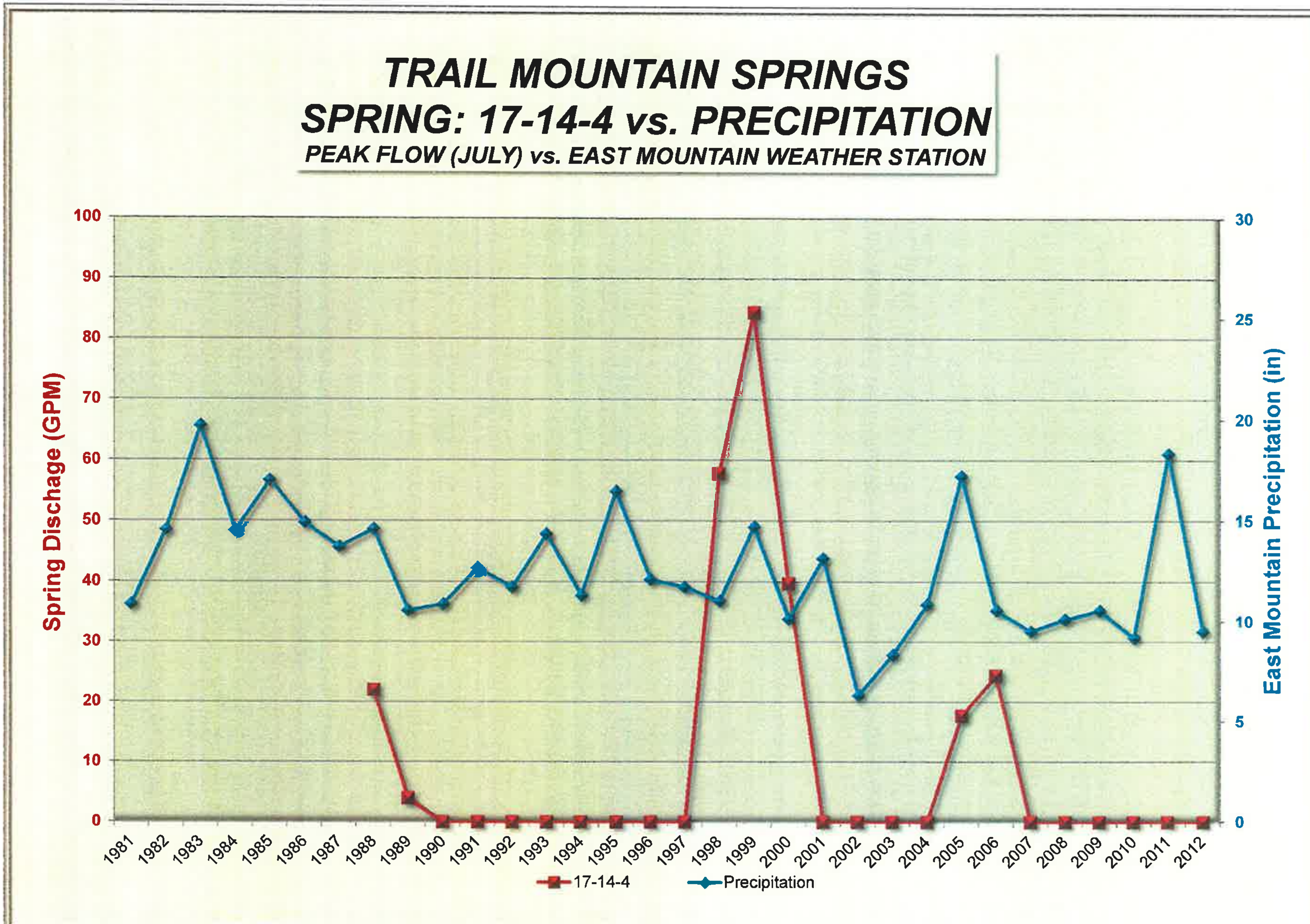

TRAIL MOUNTAIN SPRINGS
SPRING: 17-26-4 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
17-26-4
Precipitation


TRAIL MOUNTAIN SPRINGS
SPRING: 17-22-1 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
0
5
10
15
20
25
30
35
40
45
50
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
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
17-22-1
Precipitation

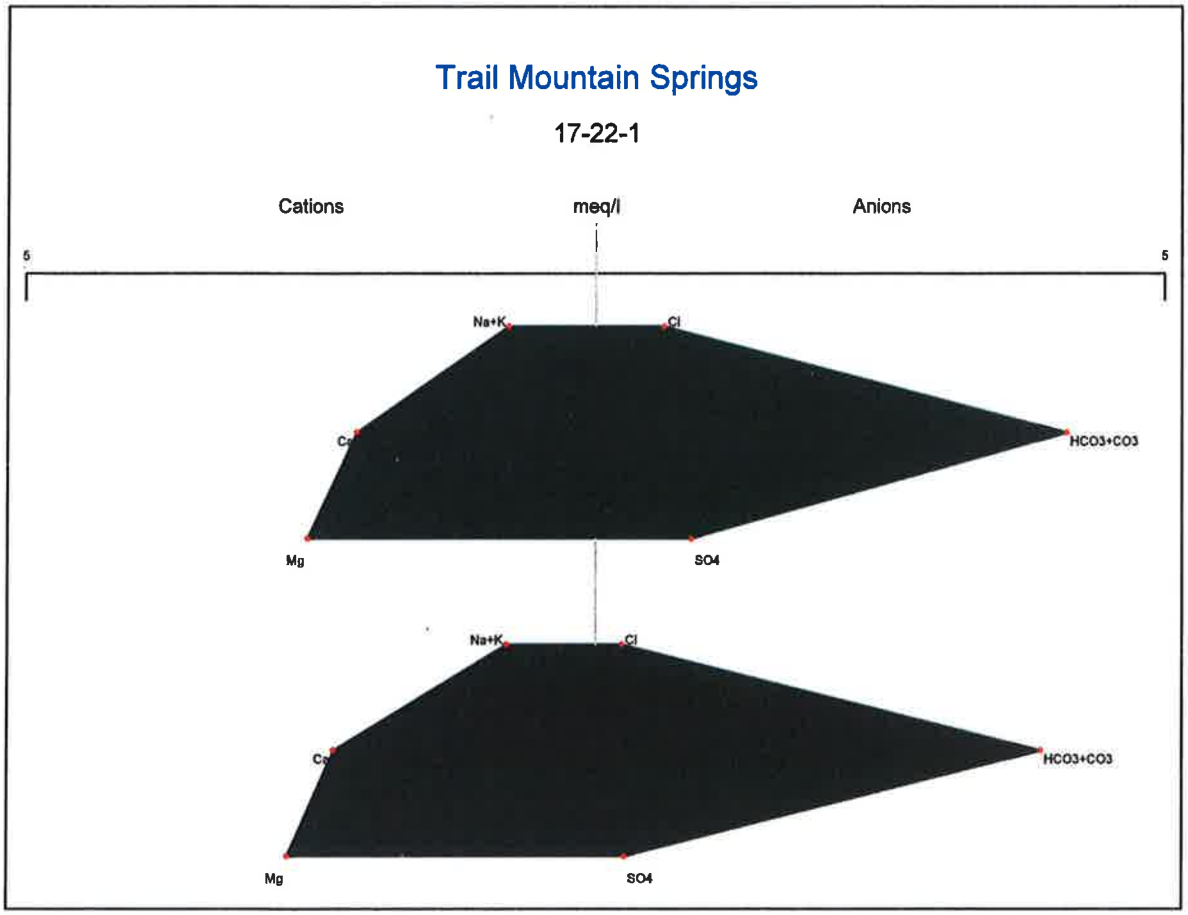

TRAIL MOUNTAIN SPRINGS
SPRING: 17-26-5 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
2
4
6
8
10
12
5
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
17-26-5
Precipitation

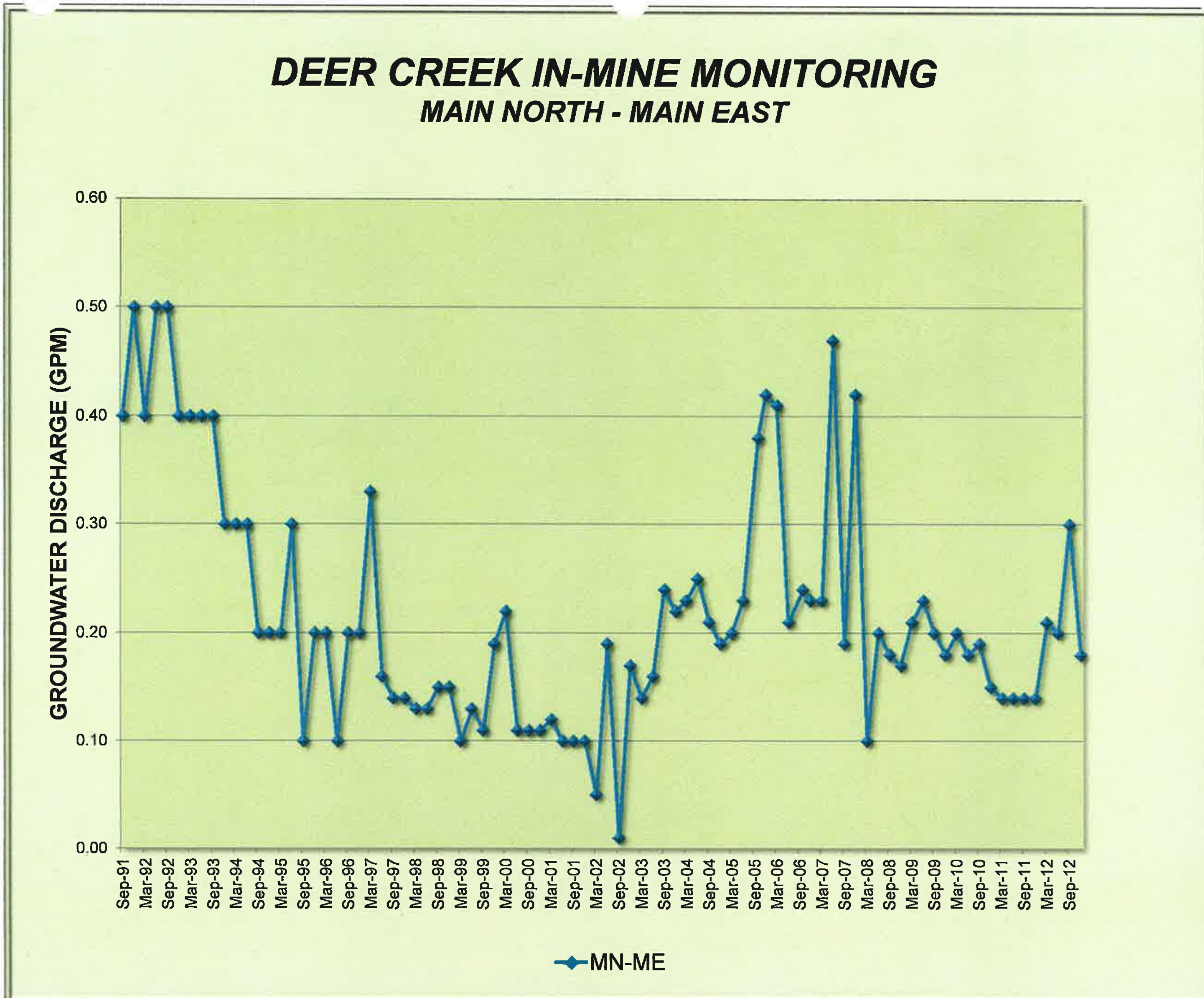

TRAIL MOUNTAIN SPRINGS
SPRING: 17-25-1 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
1
2
3
4
5
6
7
0
5
10
15
20
25
30
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
17-25-1
Precipitation


TRAIL MOUNTAIN SPRINGS
SPRING: 17-35-1 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
East Mountain Precipitation (in)
0
5
10
15
20
25
30
1981
1982
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
17-35-1
Precipitation


TRAIL MOUNTAIN SPRINGS
SPRING: 17-14-4 vs. PRECIPITATION
PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION
Spring Dischage (GPM)
East Mountain Precipitation (in)
0
10
20
30
40
50
60
70
80
90
100
0
5
10
15
20
25
30
1981
1982
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
17-14-4
Precipitation

Trail Mountain Springs
Stiff Diagrams
North Horn Formation


Trail Mountain Springs
17-22-1
Cations
meq/l
Anions
5
5
Na+K
Cl
HCO3+CO3
Mg
SO4
Na+K
Cl
HCO3+CO3
Mg
SO4


DEER CREEK IN-MINE MONITORING
MAIN NORTH - MAIN EAST
GROUNDWATER DISCHARGE (GPM)
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Sep-91
Mar-92
Sep-92
Mar-93
Sep-93
Mar-94
Sep-94
Mar-95
Sep-95
Mar-96
Sep-96
Mar-97
Sep-97
Mar-98
Sep-98
Mar-99
Sep-99
Mar-00
Sep-00
Mar-01
Sep-01
Mar-02
Sep-02
Mar-03
Sep-03
Mar-04
Sep-04
Mar-05
Sep-05
Mar-06
Sep-06
Mar-07
Sep-07
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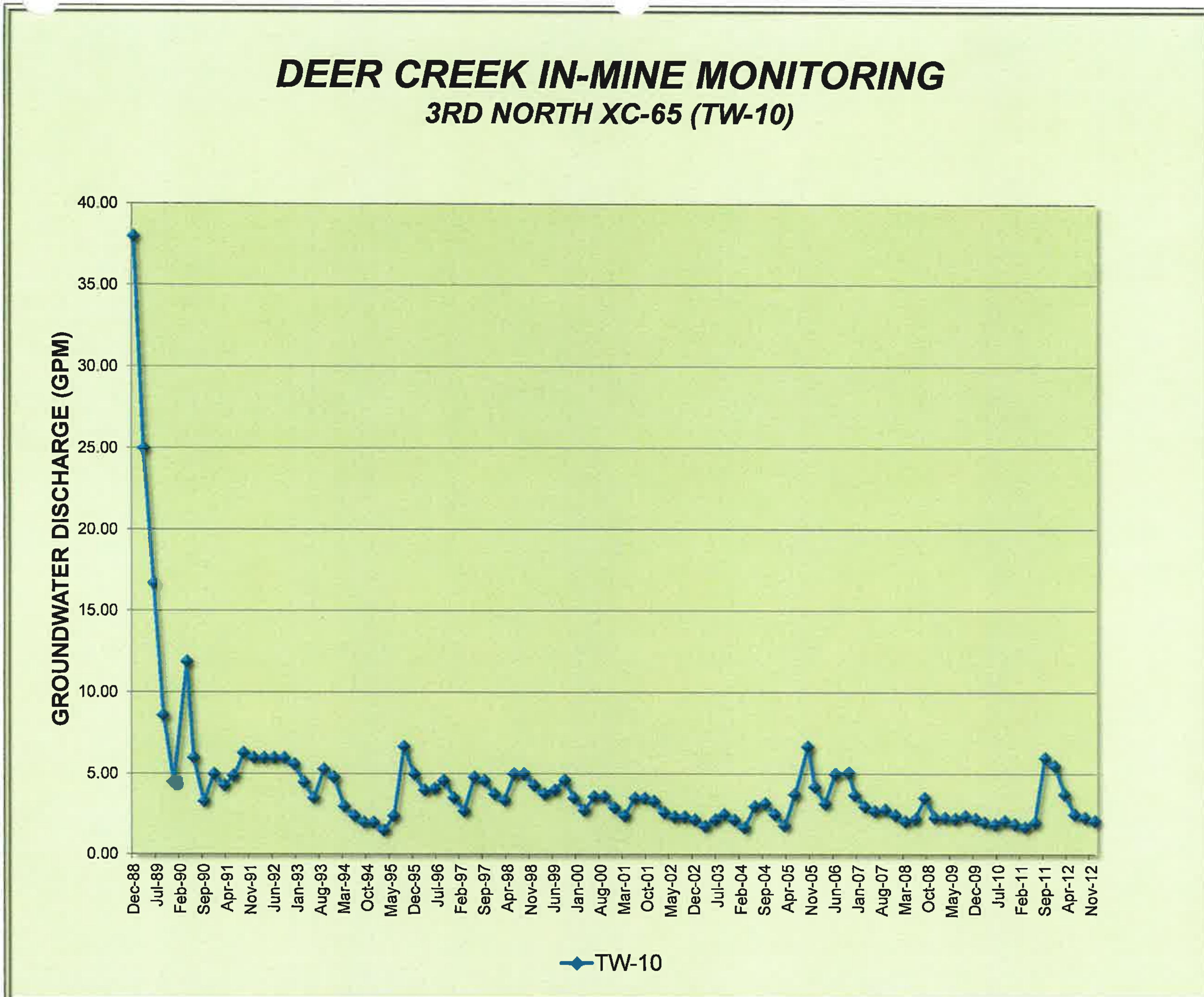
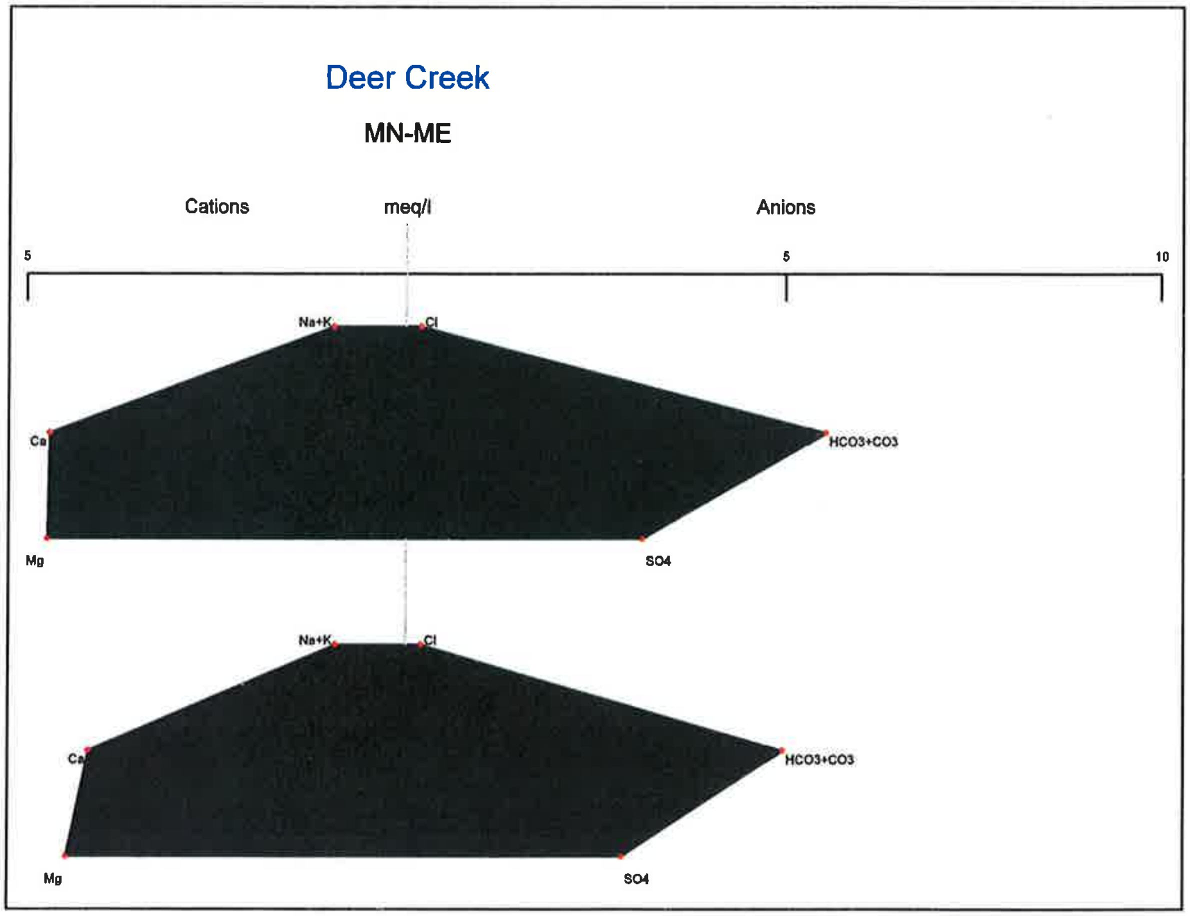
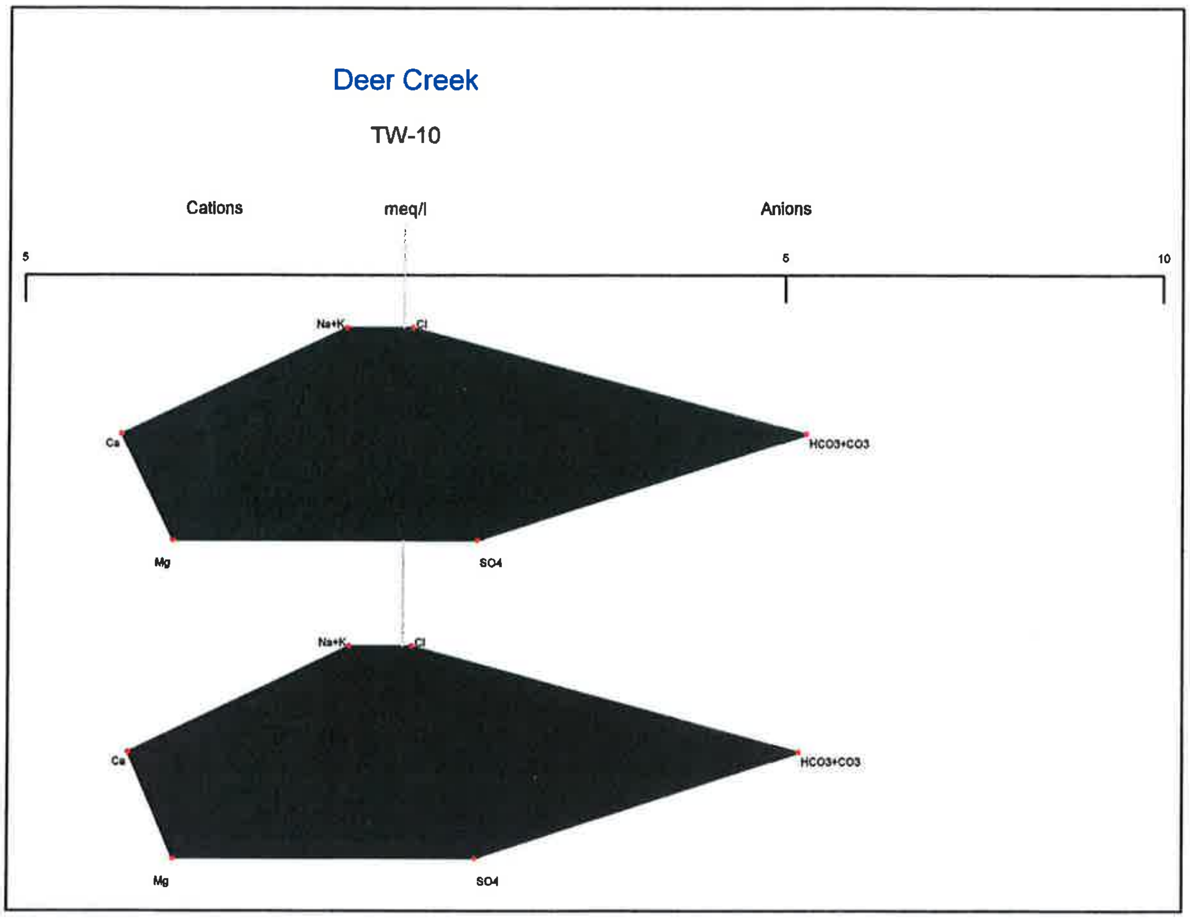
Mar-10
Sep-10
Mar-11
Sep-11
Mar-12
Sep-12
MN-ME


DEER CREEK IN-MINE MONITORING
3RD NORTH XC-65 (TW-10)
GROUNDWATER DISCHARGE (GPM)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Dec-88
Jul-89
Feb-90
Sep-90
Apr-91
Nov-91
Jun-92
Jan-93
Aug-93
Mar-94
Oct-94
May-95
Dec-95
Jul-96
Feb-97
Sep-97
Apr-98
Nov-98
Jun-99
Jan-00
Aug-00
Mar-01
Oct-01
May-02
Dec-02
Jul-03
Feb-04
Sep-04
Apr-05
Nov-05
Jun-06
Jan-07
Aug-07
Mar-08
Oct-08
May-09
Dec-09
Jul-10
Feb-11
Sep-11
Apr-12
Nov-12
TW-10

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


Deer Creek
MN-ME
Cations
meq/l
Anions
5
5
10
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4


Deer Creek
TW-10
Cations
meq/l
Anions
5
5
10
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4

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.

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.

(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

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.

(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.

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 [1] *	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 [1]
79-32	89-65
79-34	89-66
79-35 *	89-67
79-38	89-68
79-40	Rilda Canyon-(Meters 2&3) [2]

* Recession Study Springs (Flow August & September)
[1]-Developed by NEWUSSD in 2009
[2]-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)

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

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

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

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

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

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

(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

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

(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

(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 5th and 9th 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

(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^{th} and 9^{th} 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.

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.