

July 18, 2013

Electronically Submitted

Utah Coal Program  
Utah Division of Oil, Gas, and Mining  
1594 West North Temple, Suite 1210  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

**Subj: Amendment to Volume 9, Appendix  A to Reduce the Hydrologic Monitoring Program for Sites Within and Outside Mine Permit Boundaries, PacifiCorp, Wilberg/Cottonwood Mine C/015/0019, Deer Creek Mine C/015/0018, and Trail Mountain Mine C/015/0009, Task ID #4332, Emery County, Utah.**

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company “Energy West” as mine operator, hereby submits an amendment to amend Volume 9, Hydrologic Volume, Appendix A, to reduce the water monitoring responsibilities as outlined in the hydrologic monitoring program. This is the second submittal by Energy West as the original submittal (May 3, 2013) was denied.

Energy West proposes to reduce the extent of the mine’s hydrologic monitoring by eliminating sites that are either 1) outside of its current mine permit boundaries, 2) outside its current federal coal lease boundaries, 3) in areas that have been mined and are not planned for future underground mining operations, or 4) those areas that are considered to have no economic value because of either poor coal quality or problematic mining conditions and will not be mined. Those sites to be removed are outlined in the attached summary sheet.

To justify removal from the monitoring program, Energy West has detailed pertinent information for each proposed site to be removed. Much of the information was retrieved from the current Supplemental Volume 1 – “Lease Relinquishment; Phases I, II, and III,” or “Partial Lease Relinquishment, Federal Coal Lease UTU-64375 January 9, 2009”. Justification for removal is outlined by mine (i.e. Wilberg/Cottonwood, Deer Creek, etc.). First, tables (Summary List) are presented that show which sites are proposed to be removed, suspended, or continued to be monitored. For those sites to be removed from the monitoring, general information for each is presented which includes location description, lease association, subsidence monitoring results, water quality and quantity data, and a justification for removal statement. Water quality data is presented giving (in most cases) pre- and post-mining water quality, and historic water quality. A subsidence profile (copied from the Annual Subsidence Report) is also included to show the maximum subsidence that has occurred within the vicinity of the site, if applicable. And lastly, a map illustrates the physical location of each site on both East and Trail mountains.

In 2002, Energy West submitted and received approval (by DOGM) to include in its Mining and Reclamation Plan its “Volume 1 – Lease Relinquishment, Phase’s I, II, and III.” This volume is a collection of information to support lease relinquishment and the issue of “substantial completeness” as it pertains to areas of mining-induced subsidence. Lease-specific information supplied to regulatory agencies (surface ownership, United States Forest Service, Bureau of Land Management) contains the

disposition of subsided areas with descriptions of hydrologic and vegetative impacts, if any. Subsidence monitoring contains several years of a collection of both aerial photogrammetric and conventional surveying information. From this information, the determination was made that mining-induced subsidence had reached its predicted value and was considered “substantially complete” with no significant or irreparable damage to the environment, inclusive of the hydrology, vegetation, wildlife and other land uses. The BLM accepted this information and approved all three phases of relinquishment in April and October of 1992, April 1997, and again in 2009. Energy West included all the information associated with the phased relinquishment into the State mining and reclamation permit which was approved for addition in November 2002. The BLM also approved the partial relinquishment of lease UTU-64375 and UTU-49332 within the Trail Mountain LMU in January 2009. The map provided with this submittal shows all federal coal leases previously approved for relinquishment.

Also include with this submittal is the amended Volume 9, Appendix A. Sites that are proposed for removal are “~~struck out~~”.

The required C1/C2 forms are also included with this submittal. If you have any questions concerning this action, please contact Dennis Oakley at 435-687-4825.

Sincerely,



Kenneth Fleck

Geology and Environmental Affairs Manager

Cc: file

The following responses to deficiencies are formatted as found in the technical analysis document. They are broken down into logical section headings similar to the R645 regulations. In each section, the regulation number along with the associated deficiency is followed by the permittee's italicized response

**R645-301-731.214:** The Permittee requests to suspend monitoring of springs 80-48, 89-66, 89-67, 89-68, 17-25-1, 17-26-4, 79-28, and 89-65 and well TM-1B. In order to grant suspension of these locations a detailed analysis of the water quality data for each location must be submitted.

*Energy West shall remove the request to suspend monitoring of the said springs and well site and continue monitoring as required by the approved monitoring program.*

**R645-301-731.214:** Springs 80-47, 82-52, 89-60 appear to lack pre-mining dataset, however the Permittee's analysis justification is that pre- and post-mining data are similar. The Permittee shall either define their justification in more detail or reexamine their justification in light that a pre-mining dataset might not be available.

*Spring 80-47: Analysis shows a pre- and post-mining dataset.*

*Spring 82-52: First mining was conducted and completed in the area of spring 82-52 in 1975 prior to SMCRA and before any water monitoring program was required. The site was not added to the monitoring program until 1982 approximately seven years after mining was complete. The quality dataset does not show abnormalities of the characteristic groundwaters of the East Mountain Price River Formation. Flows for this spring show a very good correlation to both precipitation and the Palmer Hydrologic Drought Index.*

*Spring 89-60: The groundwater in the area of the Deer Creek 3<sup>rd</sup> South Mains and longwall panels was initially monitored using the spring labeled 79-38. This spring was included in the original groundwater monitoring program in 1981. Spring 89-60 was added to the monitoring program in 1989 at the request of the Manti-LaSal National Forest Service even though the two springs are in relatively close proximity both laterally and stratigraphically. Energy West was doubtful that adding this site to the monitoring program would gain useful data but decided to agree with the USFS and their request.*

*Relinquishment of the lease in which this spring is located was approved by the BLM as of April 1992 with concurrence by DOGM. Issues related to the relinquishment that were documented included potential hydrological impacts caused by mining. No impacts were noted as agreed upon by BLM, USFS, and DOGM. This justification write-up has been amended to qualify spring 89-60 for removal.*

**R645-301-731.214:** The Division requires greater analysis and justification of springs 17-35-1, 18-1-1, 18-2-1, 79-23, 79-24, 80-43, 80-44, 80-46, and 84-56. In particular, when mining was conducted compared to flows.

*Energy West's Dennis Oakley conversed with the Division's Ken Hoffman about what the Division expected as the Permittee argued its case for removal of certain monitoring responsibilities. A verbal agreement was made that a more detailed analysis and justification was needed for springs recommended to be removed that still exist within the permit area. However, because the BLM, USFS, and DOGM concurred on the relinquishment of certain lease areas where some of the above mentioned springs exist, there was no need to reproduce any of the past hydrological issues. Therefore, springs 84-56, 17-35-1, and 18-2-1 shall be acceptable to remove from the monitoring program since they reside within the relinquished lease boundaries and outside of the permit boundary.*

*Mr. Hoffman suggested that this amendment be separated into two amendments; 1) One amendment would be submitted to allow for the removal of springs from the monitoring program that the Division has no issues with, and 2) A second amendment would be developed and submitted for the remaining springs that need a more detailed analysis and justification (i.e. 79-23, 79-24, 80-43, 80-44, 80-46, and 18-1-1. Mr. Oakley was agreeable to this suggestion. Energy West, therefore, shall submit by August 2<sup>nd</sup> an amendment to remove those springs that the Division has no arguments with. After submittal of this amendment, a second amendment shall be submitted to remove the remaining springs 79-23, 79-24, 80-43, 80-44, 80-46, and 18-1-1 which will include a more detailed analysis and justification statement.*

**R645-301-731.214:** The Permittee should apply for removal of monitoring of well TM-3 once 6,900 ft. is reached so the full dataset available at that time may be analyzed. The Division does not find compelling reason to stipulate the removal of this monitoring

*Energy West shall continue to monitor and report the levels of TM-3.*

**R645-301-731.224:** Sampling of surface water upstream and downstream of surface facilities will continue to be required. GWR01, GWR02, GWR03, SW-1, SW-2, SW-3 and USGS Flume must be continued to be monitored. If the Permittee continues to feel these sites should be suspended a detailed analysis must be submitted.

*Energy West shall continue to monitor and report flow quantity and quality according to its current monitoring program requirements.*



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Form DOGM- C1 (Revised March 12, 2002)



OPB = Outside Permit Boundaries  
CCC = Cottonwood Canyon Creek  
DC = Deer Creek  
MF = Mill Fork  
RC = Rilda Creek  
HU = Huntington Creek  
MHC = Meetinghouse Creek  
GW = Grimes Wash  
ST = Straight Canyon  
IC = Indian Creek

DOGM Database #	Monitoring Site	Mine	Location (Section)	Location (Twnshp/Rng)	Within Relinquished Area? (Y/N)	Lease #	Relinquishment Date	Date Mined (Blind Canyon)*	Date Mined (Hiawatha)*	Type	Stratigraphic Structure/Water Body Influence	Remarks
31	84-56	CTW	28	T17S, R7E	Y	U-47978	Apr-92			Spring	North Horn Form.	No legal right of entry into area
29	82-51	DBD	26	T17S, R7E	N	U-02664	Dec-06	1980 (1st) 1986 (2nd)		Spring	Price River Form.	DBD Mine reclaimed
9	79-10	DC	12	T17S, R6E	N	U-084924		No Mining	No Mining	Spring	North Horn Form.	Sheba being retained and located 1907' N and 1333' E of 79-10
10	79-15	DC	8	T17S, R7E	Y	U-02664	Apr-92	1975 (1st)		Spring	North Horn Form.	No legal right of entry into area
16	79-29	DC	18	T17S, R7E	N	U-084923		1991 (1st) 1992 (2nd)		Spring	North Horn Form.	Located far southern end of DC on border of relinquished lease U-084923
18	79-34	DC	8	T17S, R7E	Y	U-02664	Apr-92	1974 (1st)		Spring	North Horn Form.	No legal right of entry into area
19	79-35	DC	8	T17S, R7E	Y	U-02664	Apr-92	1990 (1st) 1990 (2nd)		Spring	Flagstaff Form.	No legal right of entry into area
30	82-52	DC	15	T17S, R7E	N	SL-070645/U-02292		1975 (1st)	1982 (1st)	Spring	Price River Form.	Located far southern end of DC - 1st mining only - No future mining planned
33	89-61	DC	5	T17S, R7E	N	U-084923		No Mining	No Mining	Spring	North Horn Form.	developed spring NEWUSSD - Mining to the east of spring
38	Burnt Tree	DC	16	T17S, R7E	Y	U-040151	Apr-97	1987 (2nd)	1992 (1st) 1993 (2nd)	Spring	North Horn Form.	No legal right of entry into area
39	Elk Spring	DC	5	T17S, R7E	N	U-084923		No Mining	No Mining	Spring	North Horn Form.	developed spring NEWUSSD - Mining to the east of spring
60	Ted's Tub	DC	17	T17S, R7E	Y	U-083066	Apr-97	1988 (2nd) 1988-1991	1992 (1st) 1993 (2nd)	Spring	North Horn Form.	No legal right of entry into area
20	79-38	DC/CTW	16	T17S, R7E	Y	U-040151	Apr-92	(2nd) 1988-1991	1992 (2nd)	Spring	North Horn Form.	No legal right of entry into area
32	89-60	DC/CTW	16	T17S, R7E	Y	SL-070645/U-02292	Apr-92	(2nd) 1982-1986	1992 (2nd) 1994 (1st)	Spring	Price River Form.	No legal right of entry into area
11	79-2	DC/CTW	21	T17S, R7E	N	U-040151		(2nd) 1982-1986	1995 (2nd) 1994 (1st)	Spring	North Horn Form.	Area mined out. No future mining proposed
21	79-40	DC/CTW	21	T17S, R7E	N	U-040151		(2nd) 1982-1986	1995 (2nd) 1994 (1st)	Spring	Price River Form.	Area mined out. No future mining proposed
22	80-41	DC/CTW	21	T17S, R7E	N	U-040151		(2nd) 1982-1986	1994 (1st) 1995 (2nd)	Spring	Price River Form.	Area mined out. No future mining proposed
26	80-47	DC/CTW	21	T17S, R7E	N	U-040151		(2nd) 1982-1986	1994 (1st) 1977 (1st)	Spring	North Horn Form.	Area mined out. No future mining proposed
1	17-21-1 (T-8)	TM	21	T17S, R6E	OPB	ML-51191				Spring	North Horn Form.	Controlled by Fossil Rock Fuels
2	17-22-1 (T-9)	TM	22	T17S, R6E	OPB	ML-51191				Spring	North Horn Form.	Controlled by Fossil Rock Fuels
5	17-35-1 (T-15)	TM	35	T17S, R6E	Y	UTU-64375	Sep-10		1998 (1st) 2000 (2nd)	Spring	North Horn Form.	No legal right of entry into area
6	17-35-2 (T-16)	TM	35	T17S, R6E	Y	UTU-64375	Sep-10			Spring	North Horn Form.	No legal right of entry into area - No flow data ever recorded
89	T-19	TM	3	T18S, R6E	OPB	No Lease Assoc.				Surface		
14	79-26	CTW	17	T17S, R7E	N	U-083066		No Mine Workings	No Mine Workings	Spring	North Horn Form.	No mining conducted in area of spring
17	79-32	CTW	19	T17S, R7E	N	U-083066		No Mine Workings	No Mine Workings	Spring	Base of Flagstaff Form.	No mining conducted in area of spring
8	18-2-1 (T-6)	TM	2	T18S, R6E	Y	UTU-64375	Sep-10		1996 (1st) 1998 (2nd)	Spring	Upper Price River	No legal right of entry into area

\* 1st = Development mining, 2nd = Retreat (Longwall or Pillar) Mining

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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.

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- (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: **(SUSPEND)**  
(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: **(SUSPEND)**  
(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: **(SUSPEND)**  
(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

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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)

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- (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.

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

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

**B. Groundwater Hydrology**

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

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

\* ~~Recession Study Springs (Flow August & September)~~

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

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

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

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

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

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

**4. Piezometric Data**

a. Surface

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

P1  
P5  
P6  
P7  
EM-47

- (2) Cottonwood Canyon Creek

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

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

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

TM-1B  
TM-3

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

**5. In-Mine Water Locations**

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

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

- a. Deer Creek
- b. Cottonwood

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**C. UPDES Monitoring Locations**

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

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

**A. Field Measurements**

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

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

**Surface Monitoring**

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

**1. Cottonwood Canyon Creek**

- a. Cottonwood Canyon Creek
  - (1) SW-1
  - (2) SW-2
  - (3) CCC01 - USGS Flume
  - (4) SW-3
  
- b. Grimes Wash
  - (1) GWR01
  - (2) GWR02
  - (3) GWR03
  
- c. Indian Creek
  - (1) ICA
  - (2) ICF
  - (3) ICD
  - (4) ICB

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DEER CREEK, WILBERG/COTTONWOOD, DES-BEE-DOVE,  
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d. ~~Straight Canyon~~

(1) ~~T 19 (Unnamed Side Drainage)~~

**2. Huntington Canyon Drainage**

a. Deer Creek

- (1) DCR01
- (2) DCR04
- (3) DCR06

b. Huntington Creek

- (1) HCC01
- (2) HCC02
- (3) HCC04

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

c. Meetinghouse Canyon - South Fork:

- (1) MCH01

d. Rilda Canyon

- (1) RCF1\*
- (2) RCLF 1
- (3) RCLF 2
- (4) RCF2
- (5) RCF3
- (6) RCW4

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

e. Mill Fork Canyon

- (1) MFA01
- (2) MFB02
- (3) MFU03

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**Groundwater Monitoring**

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

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

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

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

5. Piezometric Wells
  - a. Surface

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

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

P1  
P5  
P6  
P7  
EM-47

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and TRAIL MOUNTAIN MINES

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

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

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

**UPDES Monitoring**

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

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

**Reclamation Monitoring**

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

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

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

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

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

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

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

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

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

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

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

a. **Cottonwood Creek Drainage**

(1) Cottonwood Canyon Creek

(a) SW-1

(b) SW-2

(c) SW-3

(2) Grimes Wash

(a) GWR01

(b) GWR02

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(c) GWR03

(3) Indian Creek

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

~~(4) Straight Canyon~~

~~(a) T-19~~

**b. Huntington Creek Drainage**

(1) Deer Creek

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

(2) Huntington Creek

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

(3) Meetinghouse Canyon - South Fork:

(a) MCH01

(5) Rilda Canyon

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

(6) Mill Fork Canyon

- (a) MFA01
- (b) MFB02

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and TRAIL MOUNTAIN MINES

(c) MFU03

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

**2. Groundwater Hydrology**

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

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

**Reclamation Monitoring - Groundwater Hydrology:**

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

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

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

**3. UPDES Monitoring Sites**

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

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

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

***III. ANNUAL REPORTS***

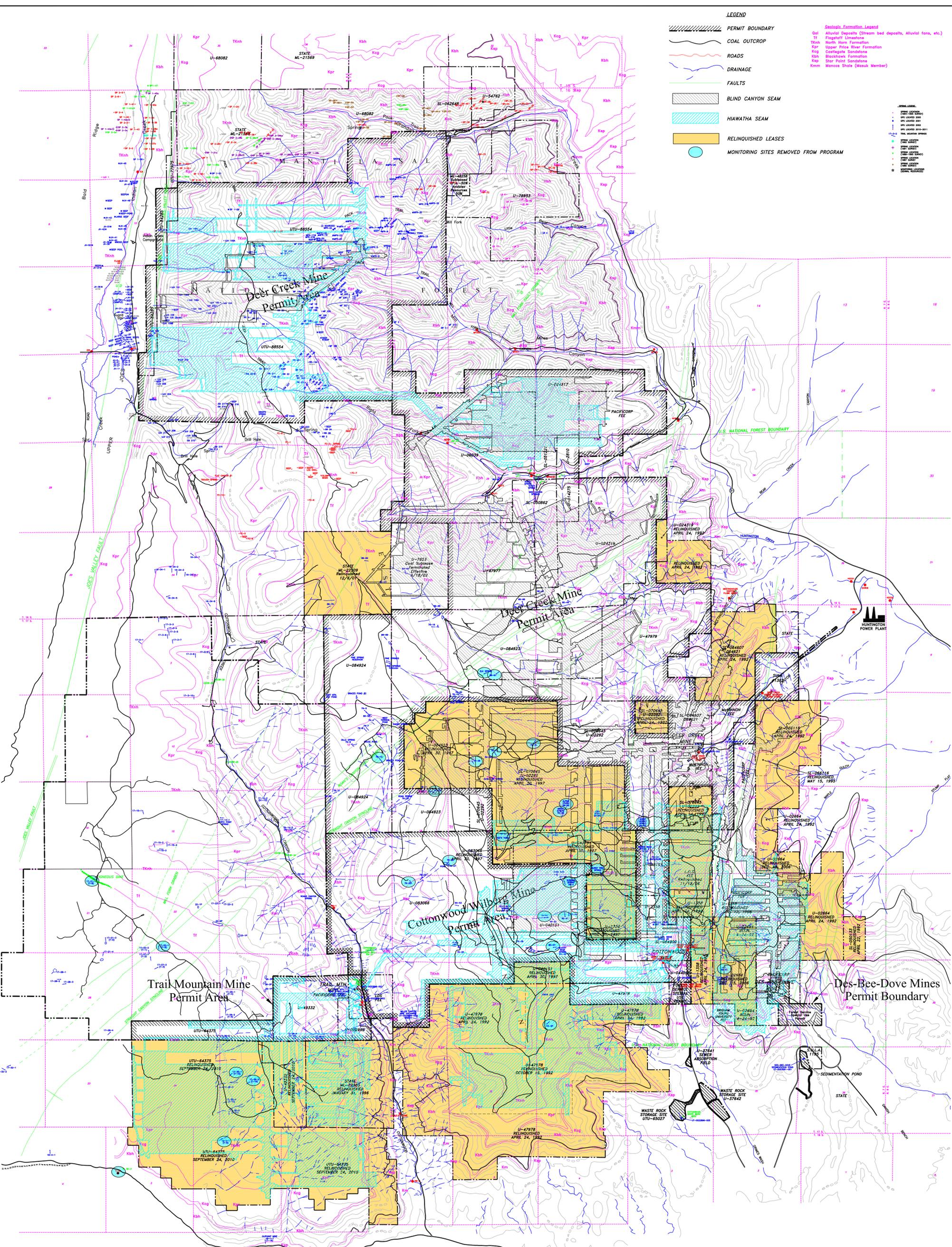
All data collected regarding the hydrology of East/Trail Mountain will be summarized by the applicant in an annual Hydrologic Monitoring Report. Copies of the report will be submitted to the Utah State Division of Oil, Gas and Mining. In addition, any raw data collected will be submitted to the Utah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

LEGEND

- PERMIT BOUNDARY
- COAL OUTCROP
- ROADS
- DRAINAGE
- FAULTS
- BLIND CANYON SEAM
- HIAWATHA SEAM
- RELINQUISHED LEASES
- MONITORING SITES REMOVED FROM PROGRAM

- Geologic Formation Legend**
- Qal Alluvial Deposits (Stream bed deposits, Alluvial fans, etc.)
  - Tl Flagstaff Limestone
  - Tkh North Horn Formation
  - Kpr Upper Price River Formation
  - Kqg Castlegate Sandstone
  - Kbh Breakhawk Formation
  - Ksp Star Point Sandstone
  - Knm Monaca Shale (Masak Member)

- RELINQUISHED LEASES**
- U-49332
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CAD FILE NAME/DISK#: SPRING MONITORING REDUCTION MAP

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

EAST MOUNTAIN/TRAIL MOUNTAIN  
SPRING MAP W/LEASE RELINQUISHMENT  
& MONITORING PROGRAM REDUCTION

DRAWN BY: KJL & DCO

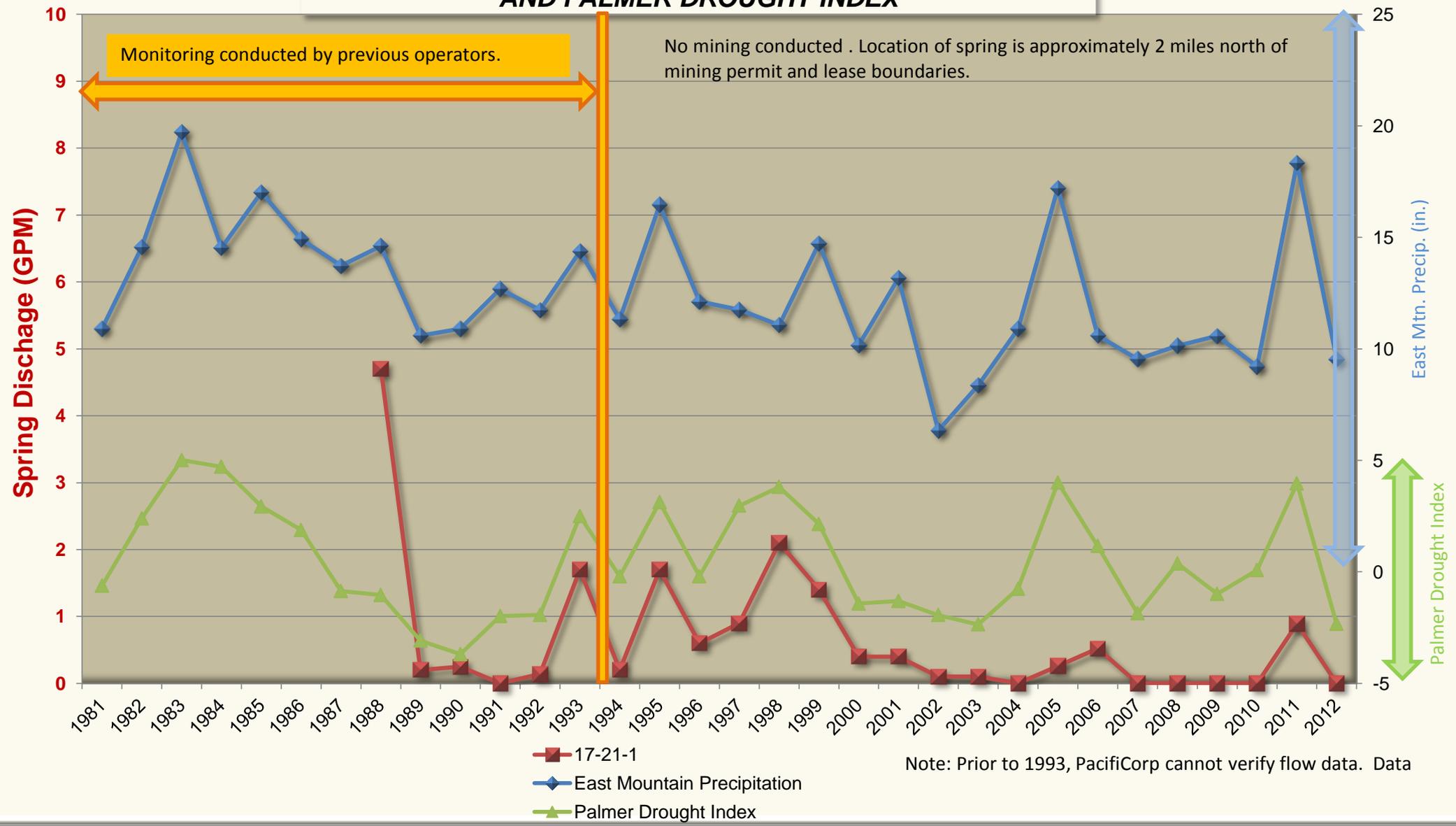
SCALE: 1" = 2000'

DATE: APRIL 22, 2013 SHEET 1 OF 1 REV. \_\_\_\_\_

# TRAIL MOUNTAIN SPRINGS

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

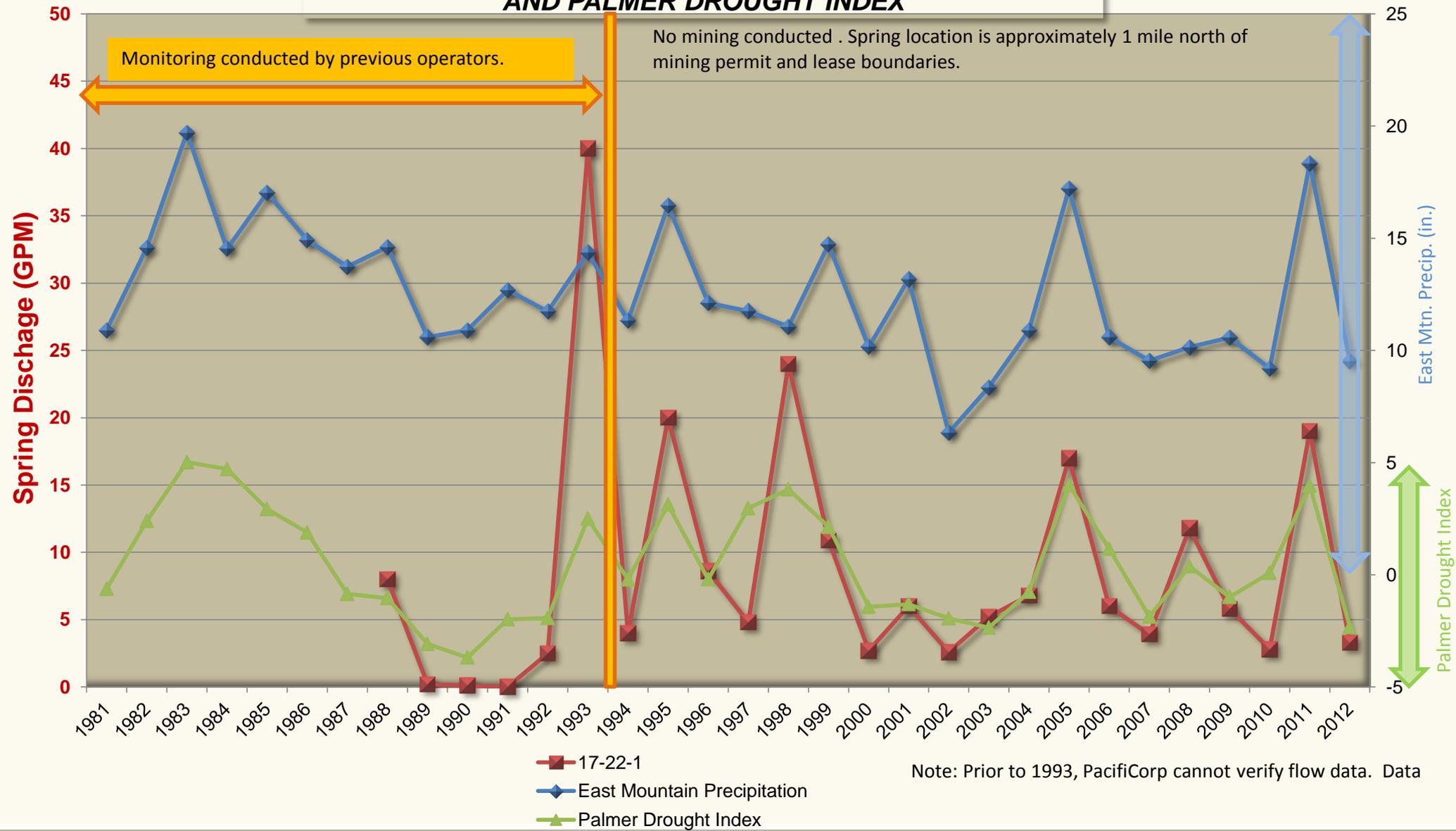
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX



# TRAIL MOUNTAIN SPRINGS

## SPRING: 17-22-1 vs. PRECIPITATION

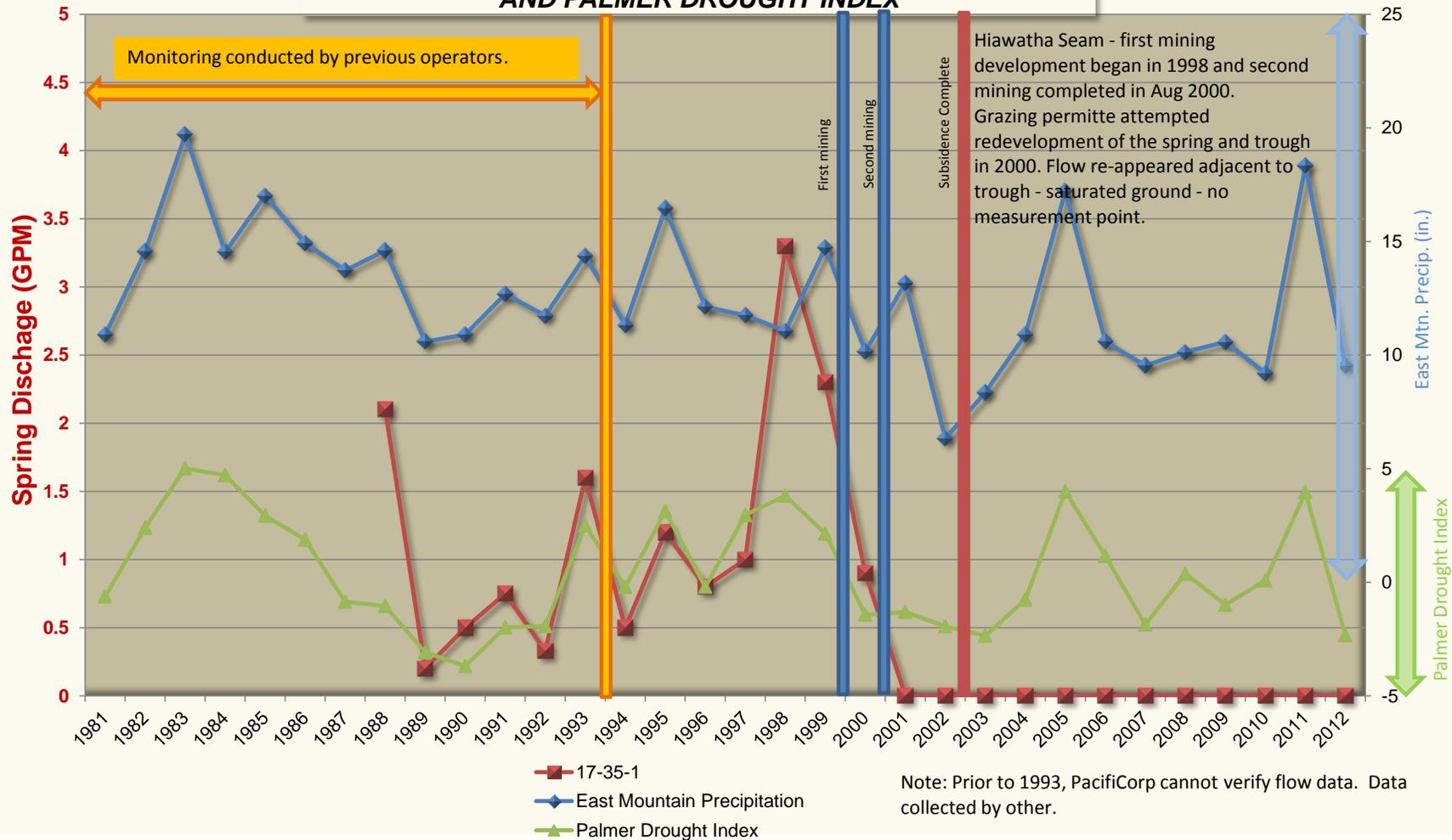
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX



# TRAIL MOUNTAIN SPRINGS

## SPRING: 17-35-1 vs. PRECIPITATION

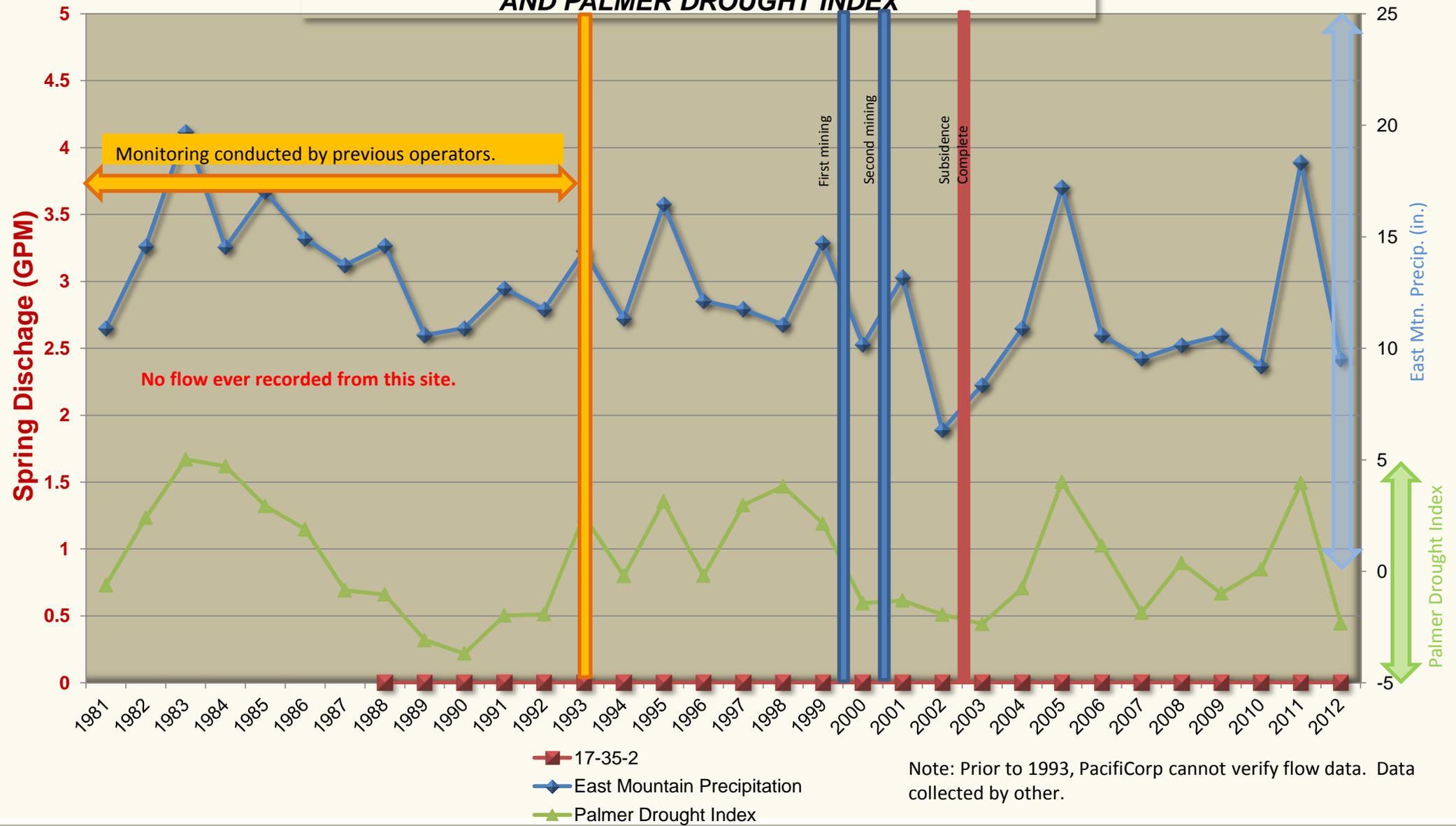
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX



# TRAIL MOUNTAIN SPRINGS

## SPRING: 17-35-2 vs. PRECIPITATION

PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION  
AND PALMER DROUGHT INDEX

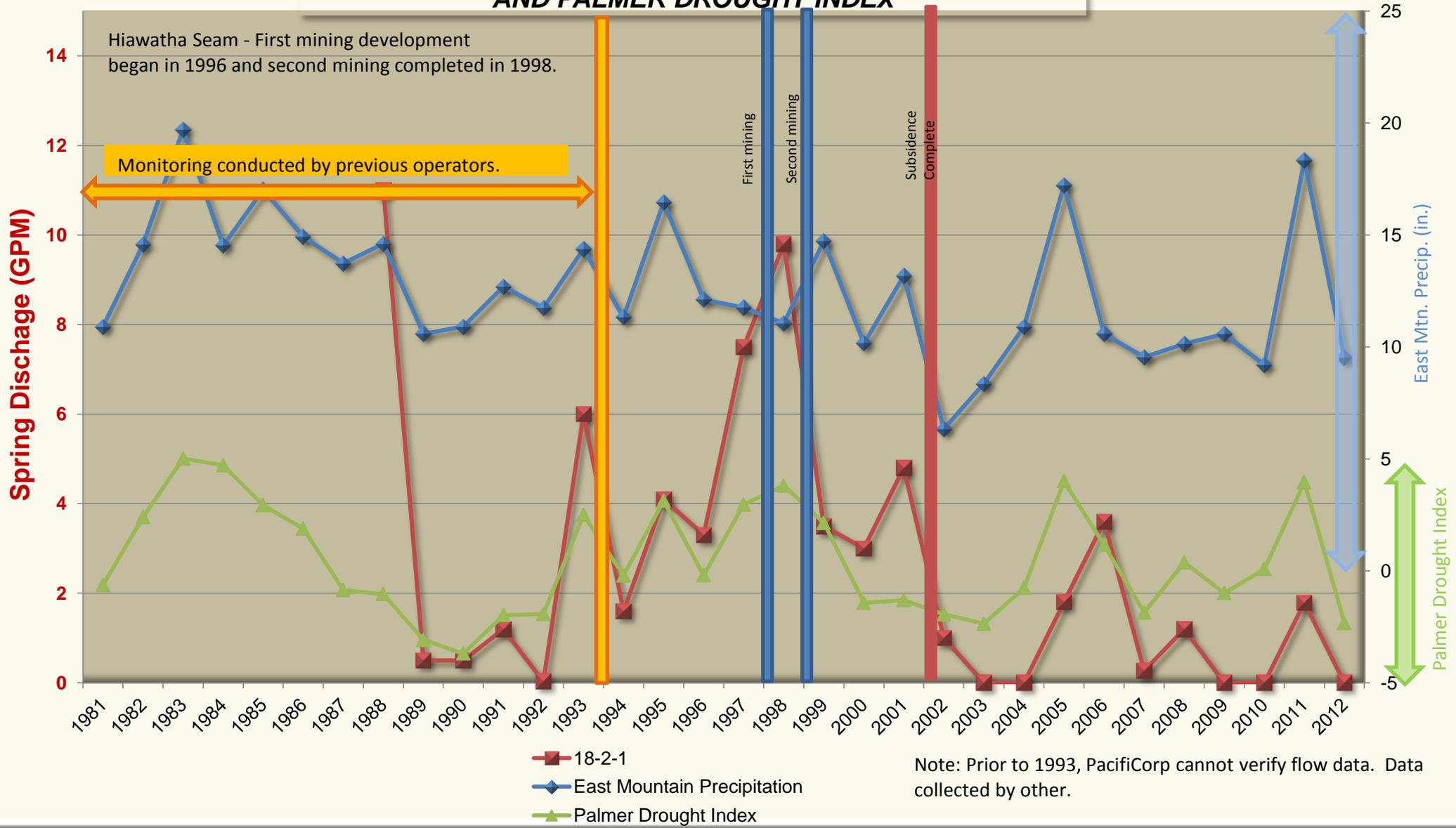


Note: Prior to 1993, PacifiCorp cannot verify flow data. Data collected by other.

# TRAIL MOUNTAIN SPRINGS

## SPRING: 18-2-1 vs. PRECIPITATION

### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX

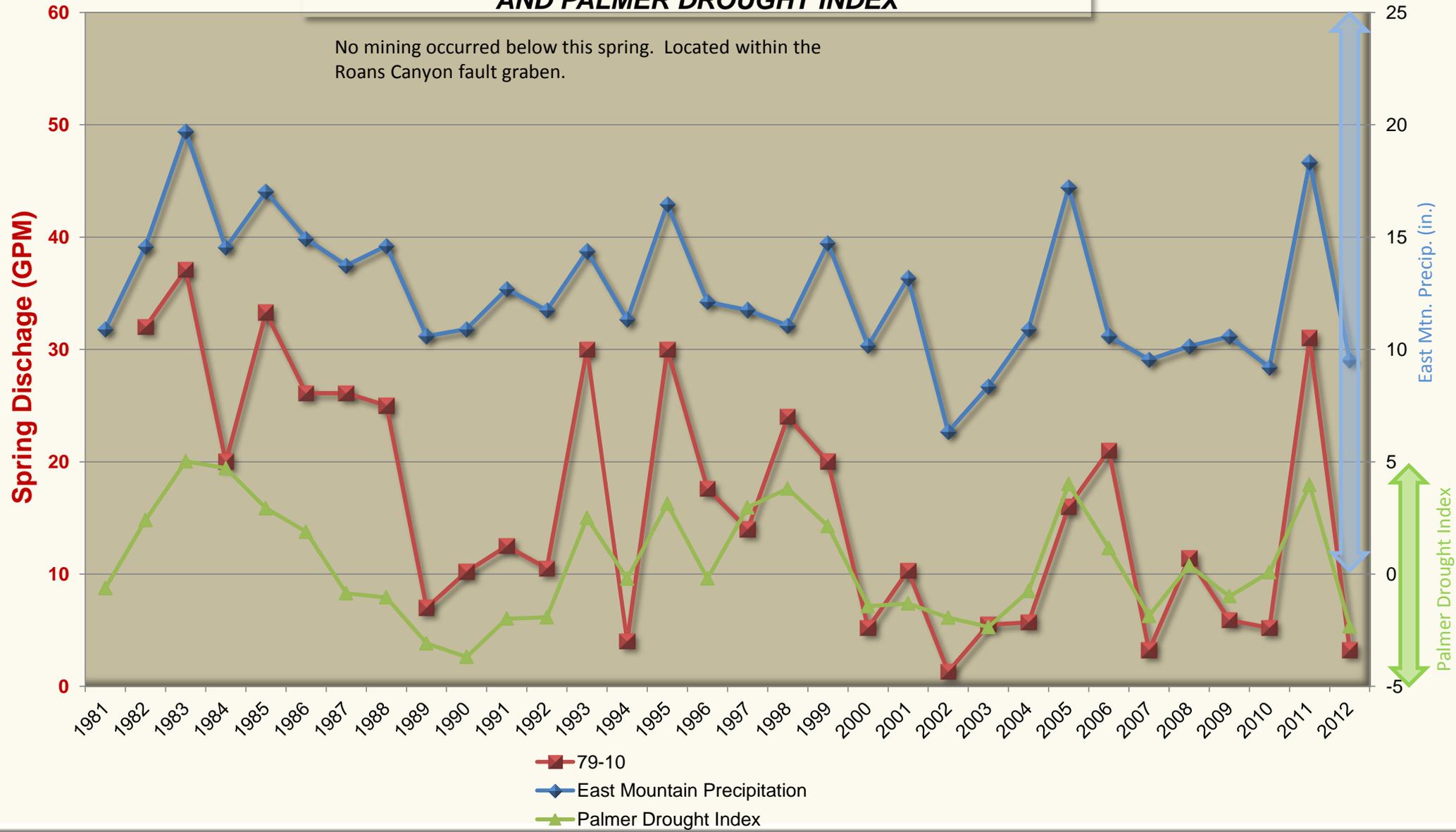


# EAST MOUNTAIN SPRINGS

## SPRING: 79-10 vs. PRECIPITATION

### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX

No mining occurred below this spring. Located within the Roans Canyon fault graben.

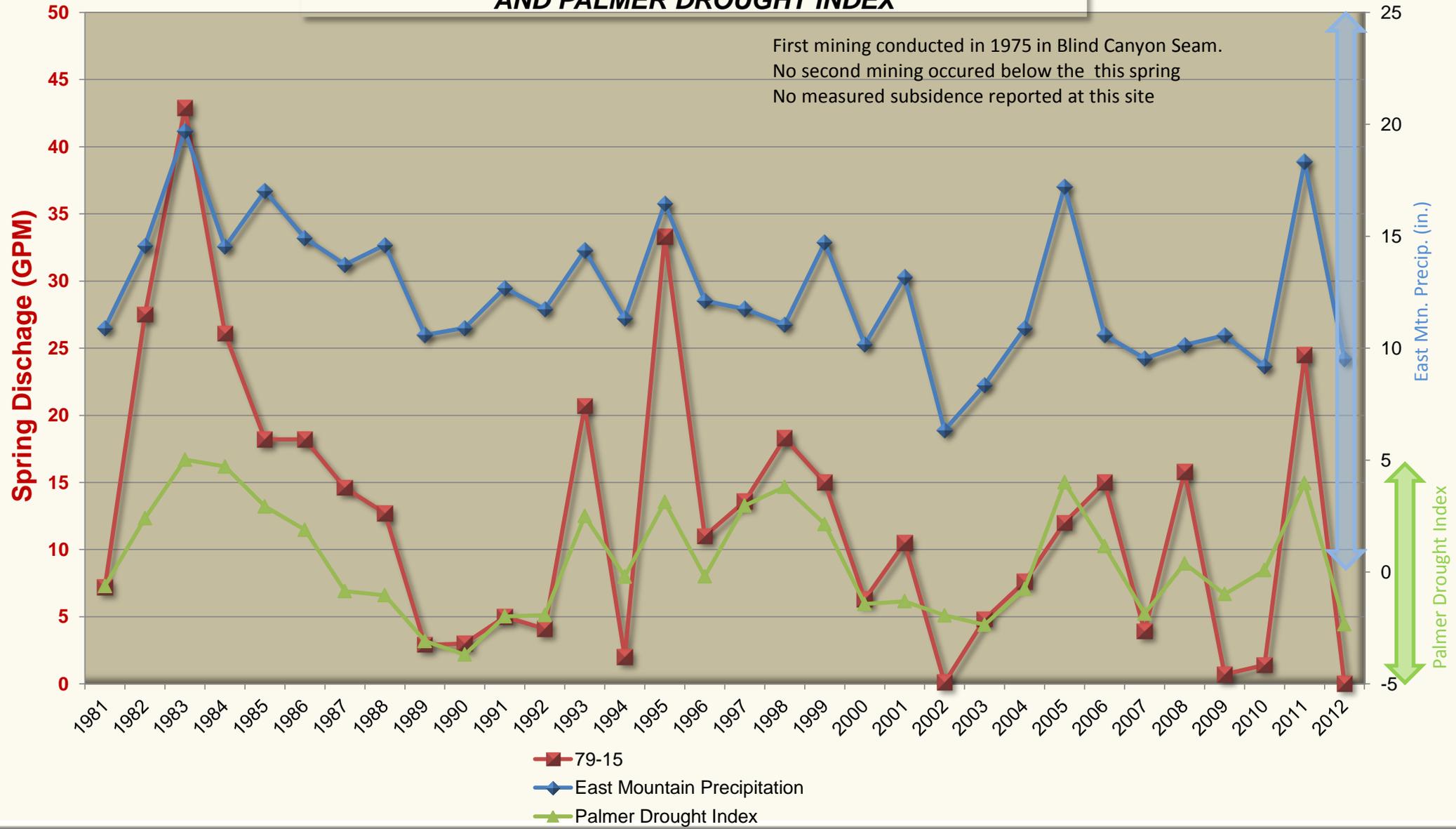


# EAST MOUNTAIN SPRINGS

## SPRING: 79-15 vs. PRECIPITATION

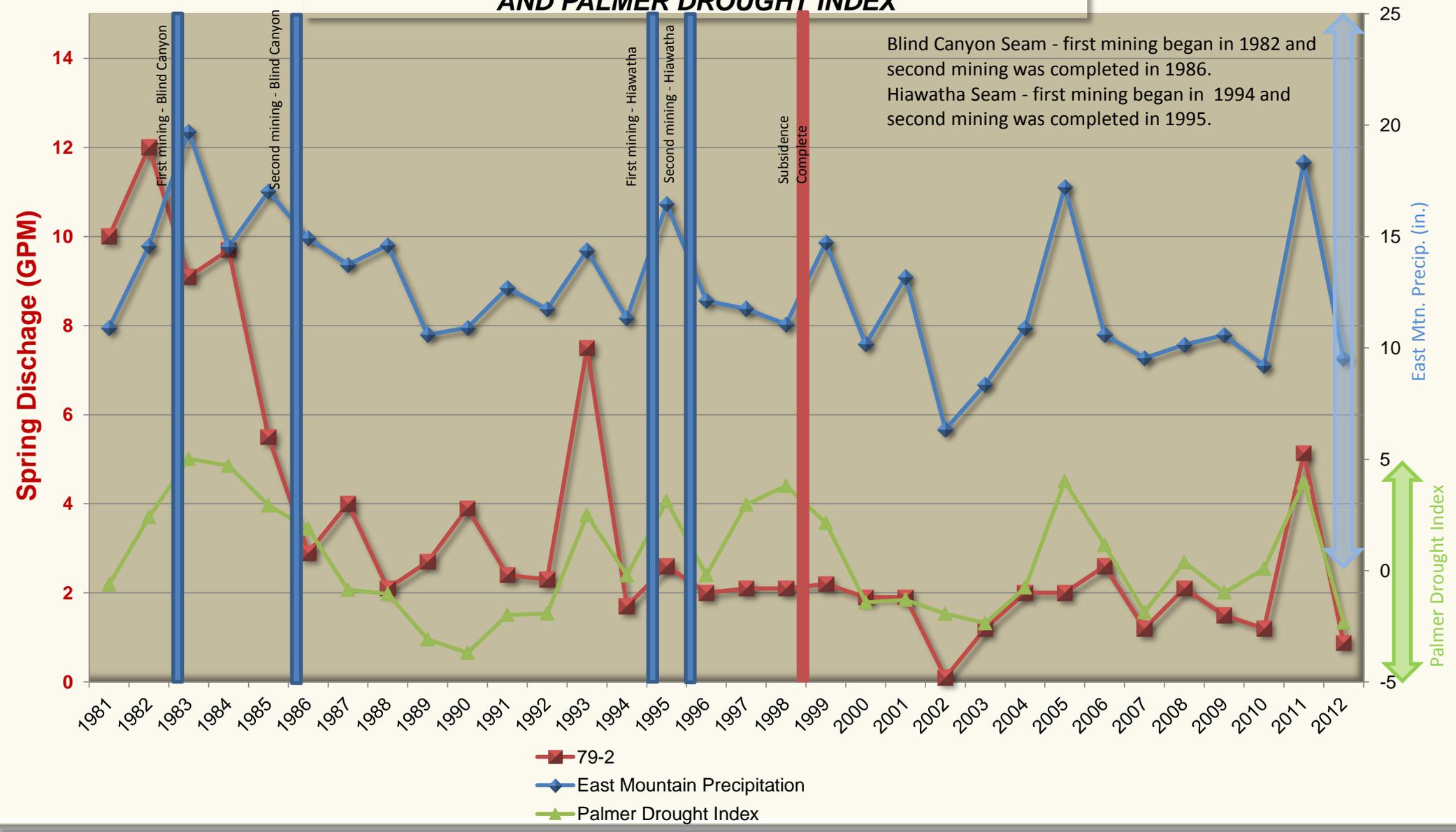
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX

First mining conducted in 1975 in Blind Canyon Seam.  
No second mining occurred below this spring  
No measured subsidence reported at this site

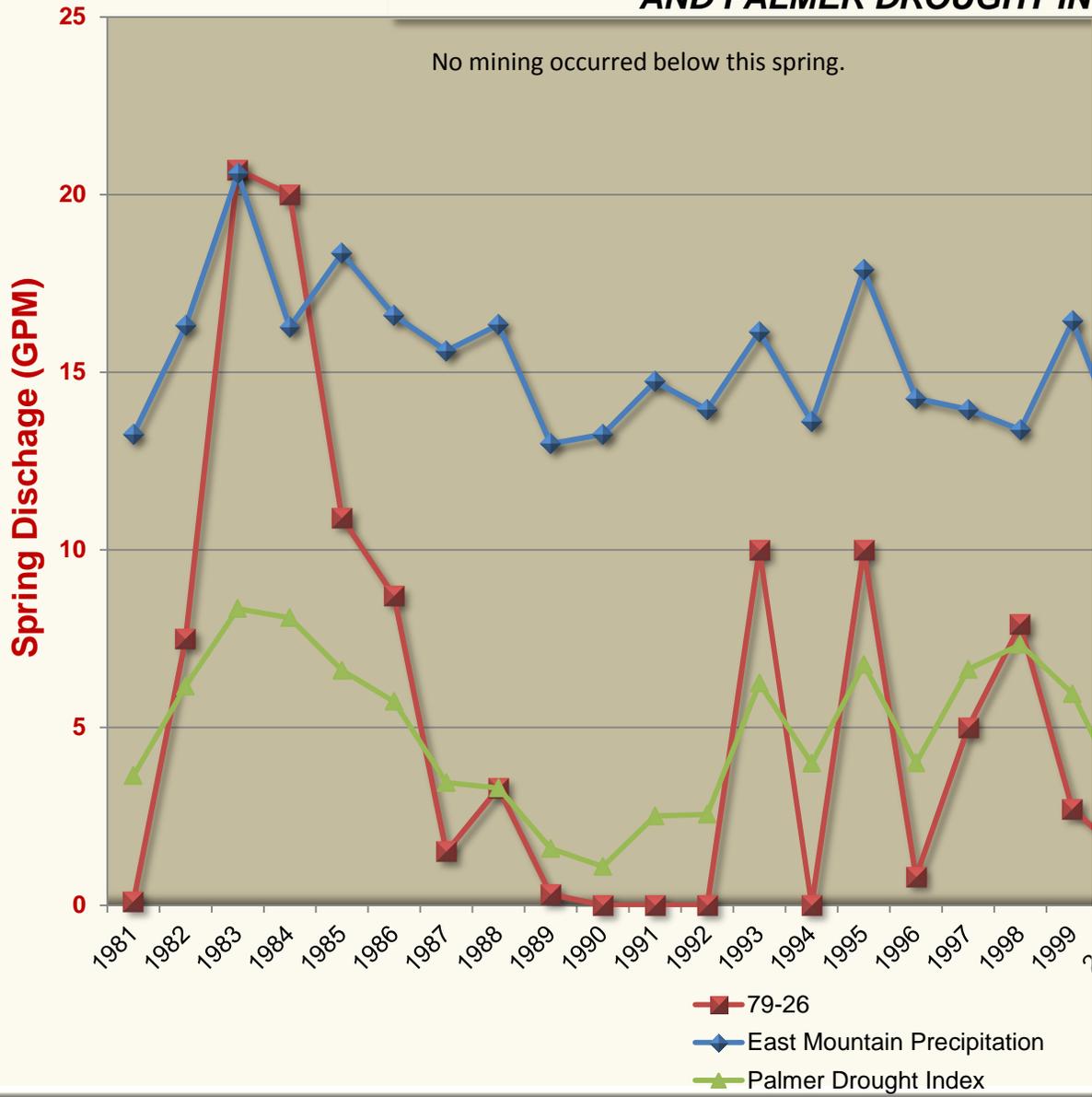


# EAST MOUNTAIN SPRINGS SPRING: 79-2 vs. PRECIPITATION

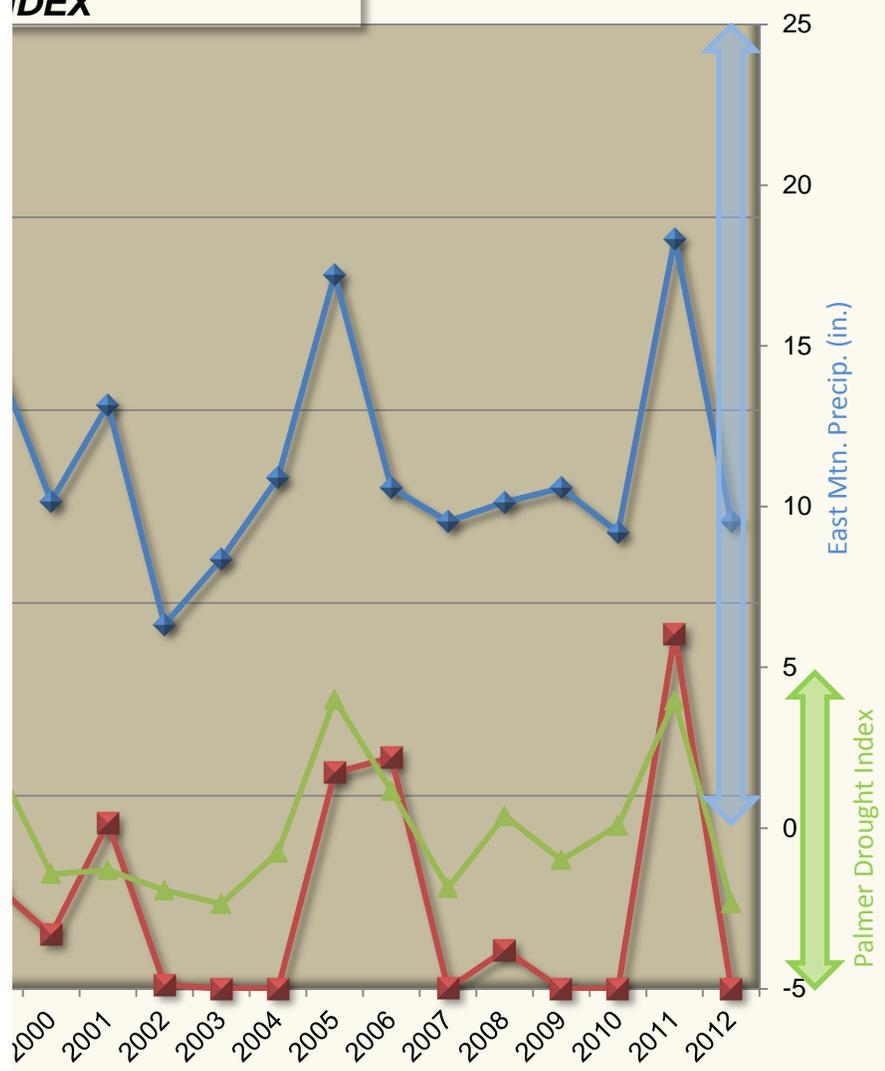
**PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION  
 AND PALMER DROUGHT INDEX**



# EAST MOUNTAIN SP SPRING: 79-26 vs. PREC PEAK FLOW (JULY) vs. EAST MOUNTAIN V AND PALMER DROUGHT IN



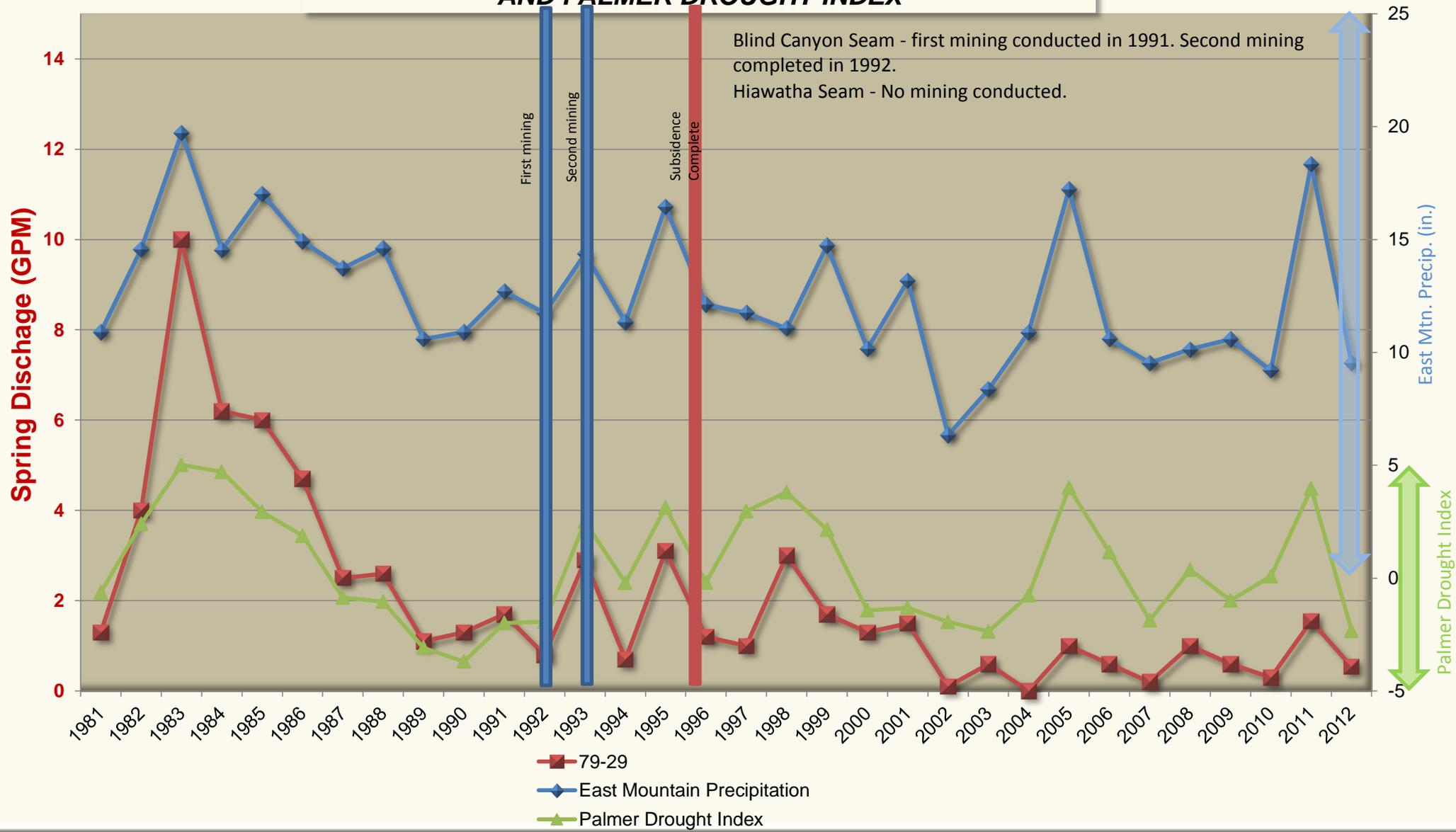
# SPRINGS PRECIPITATION WEATHER STATION INDEX



# EAST MOUNTAIN SPRINGS

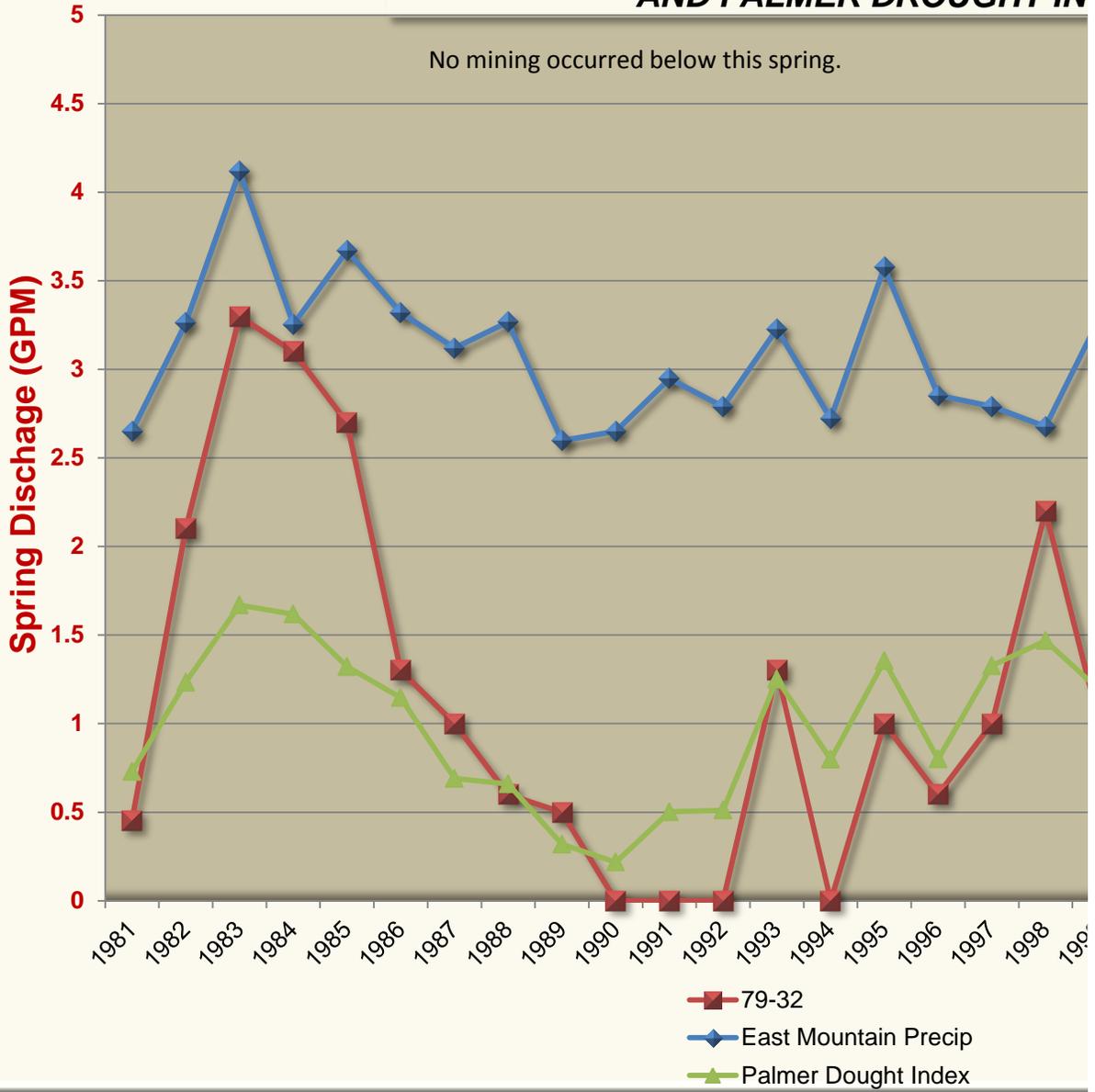
## SPRING: 79-29 vs. PRECIPITATION

### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX

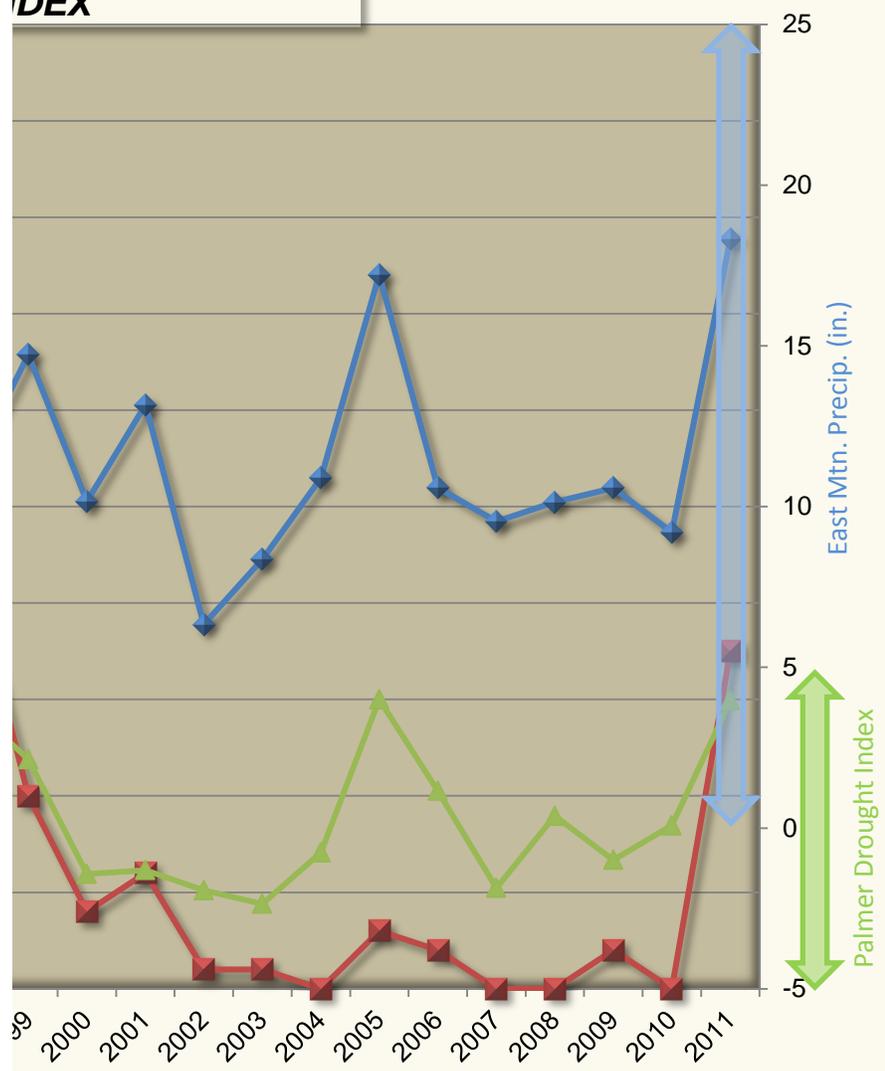


# **EAST MOUNTAIN SP SPRING: 79-32 vs. PREC**

**PEAK FLOW (JULY) vs. EAST MOUNTAIN V  
AND PALMER DROUGHT IN**



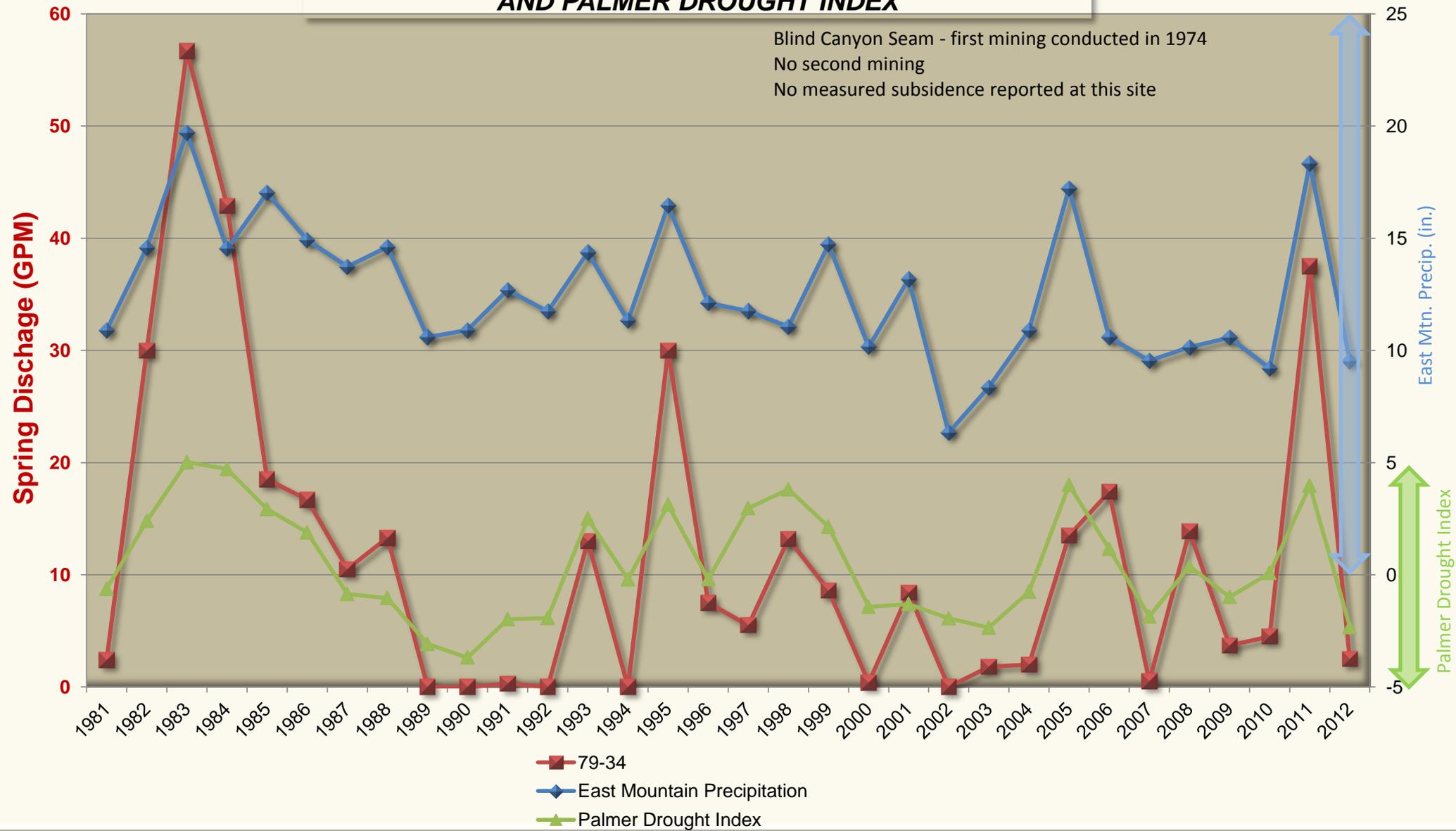
# SPRINGS PRECIPITATION WEATHER STATION INDEX



# EAST MOUNTAIN SPRINGS

## SPRING: 79-34 vs. PRECIPITATION

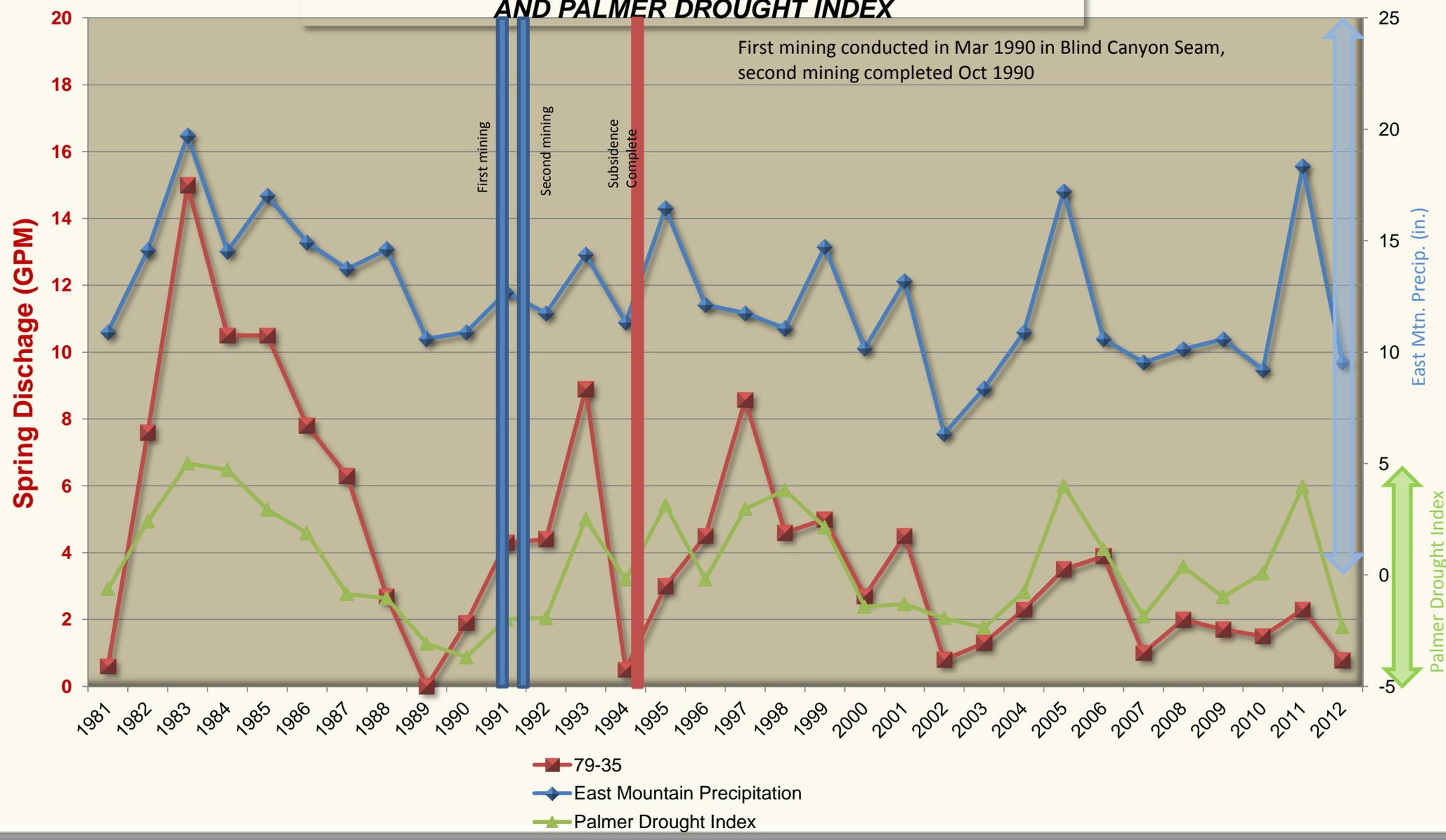
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX



# EAST MOUNTAIN SPRINGS

## SPRING: 79-35 vs. PRECIPITATION

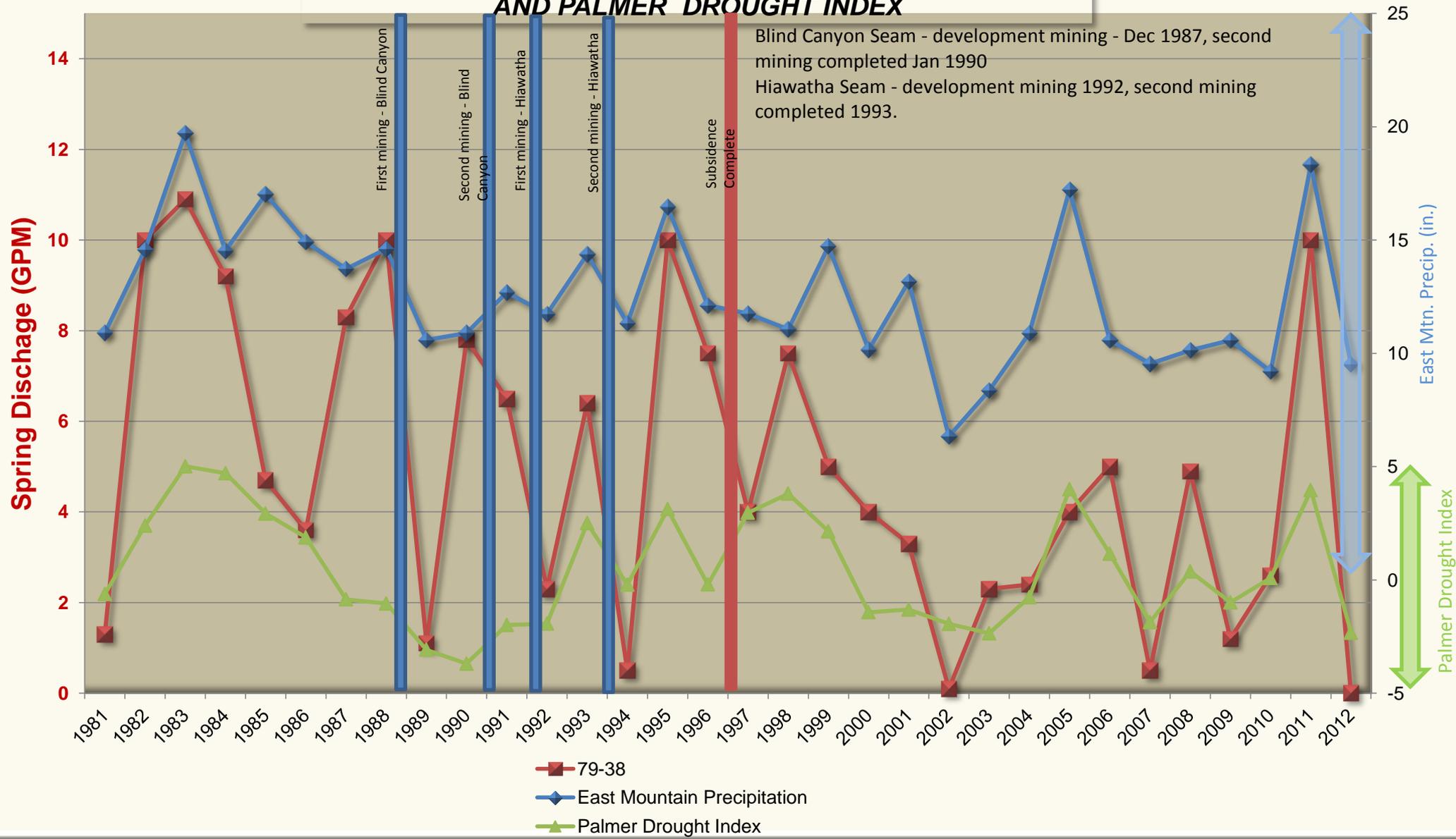
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX



# EAST MOUNTAIN SPRINGS

## SPRING: 79-38 vs. PRECIPITATION

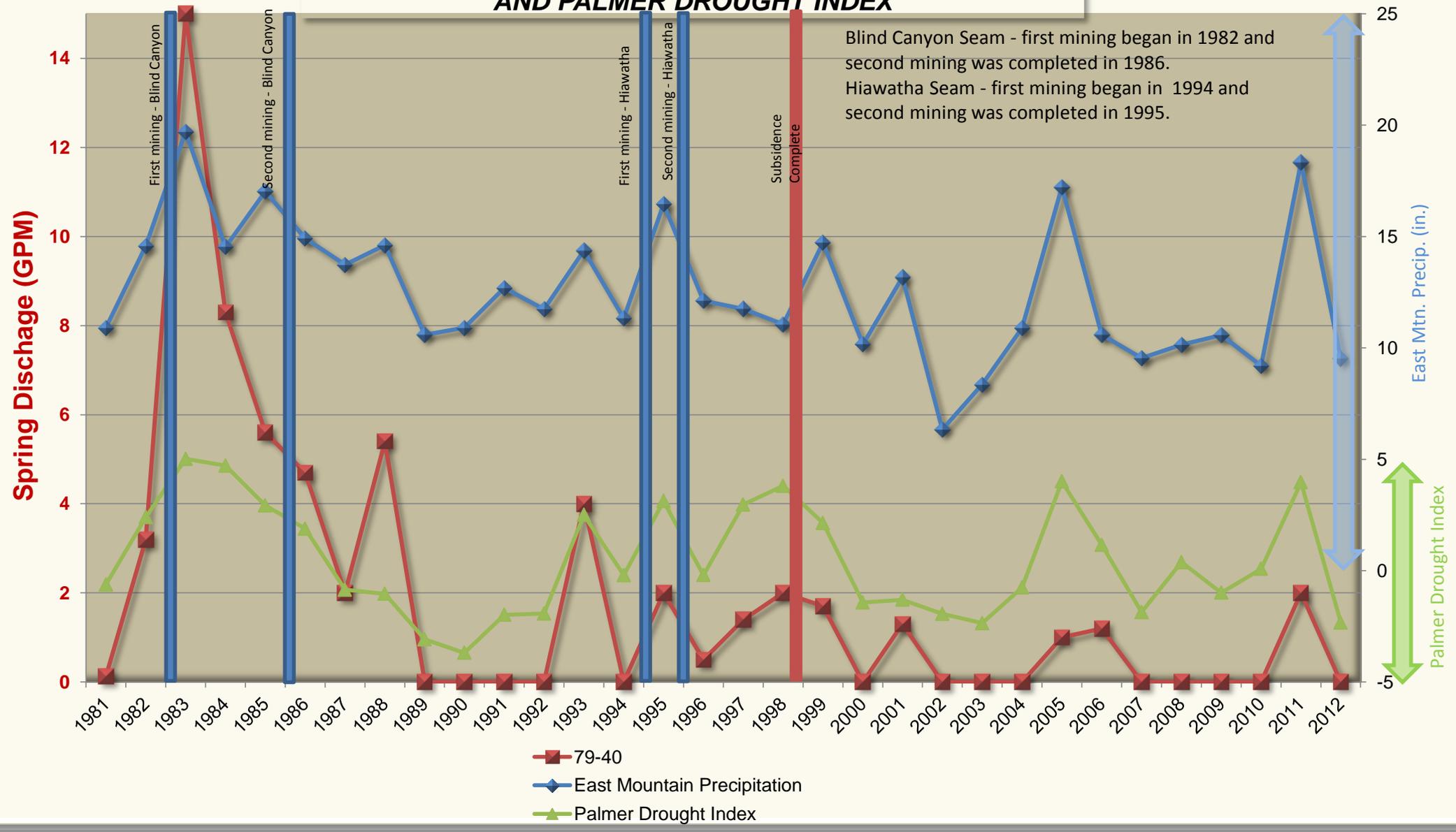
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX



# EAST MOUNTAIN SPRINGS

## SPRING: 79-40 vs. PRECIPITATION

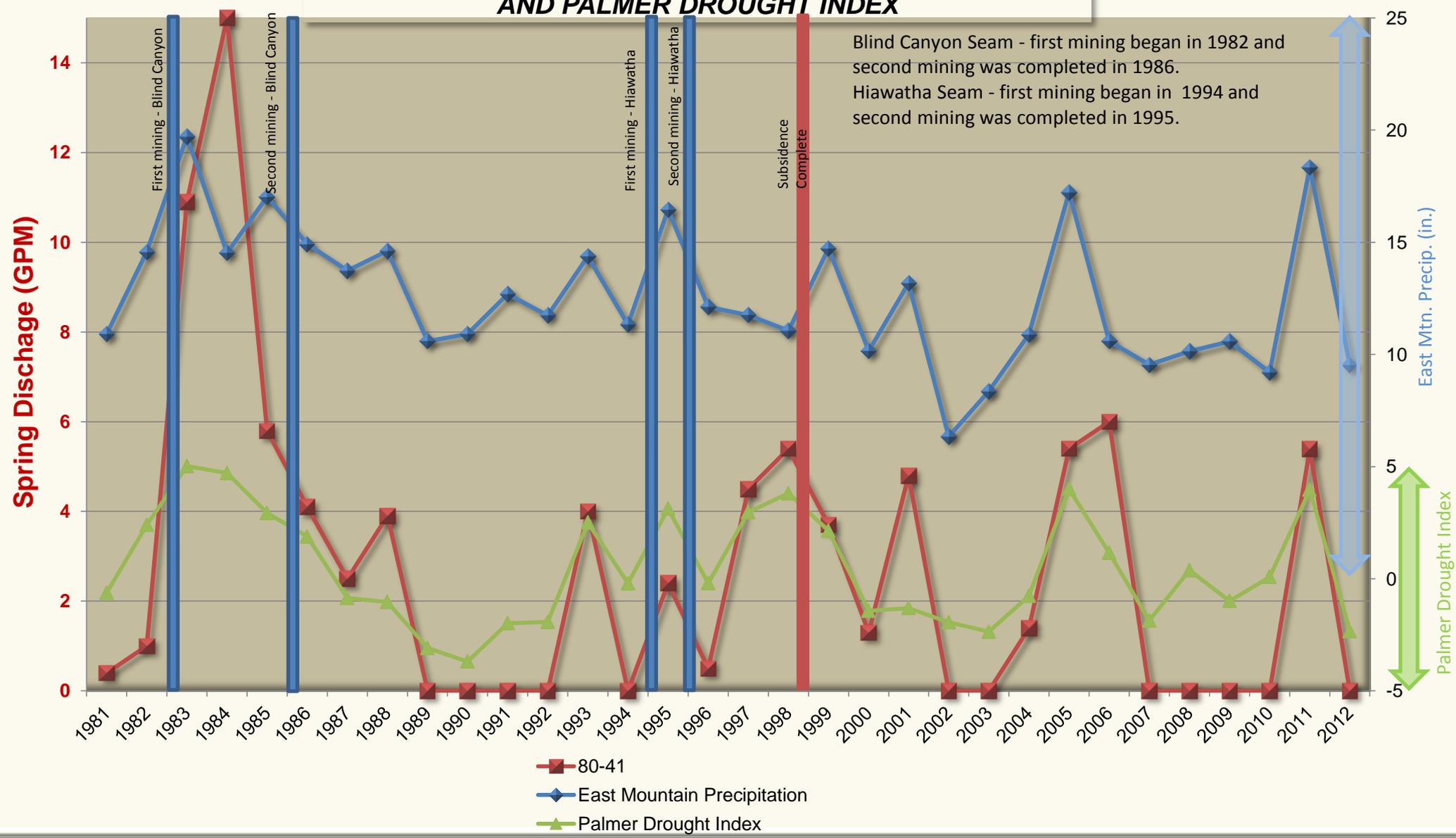
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX



# EAST MOUNTAIN SPRINGS

## SPRING: 80-41 vs. PRECIPITATION

### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX

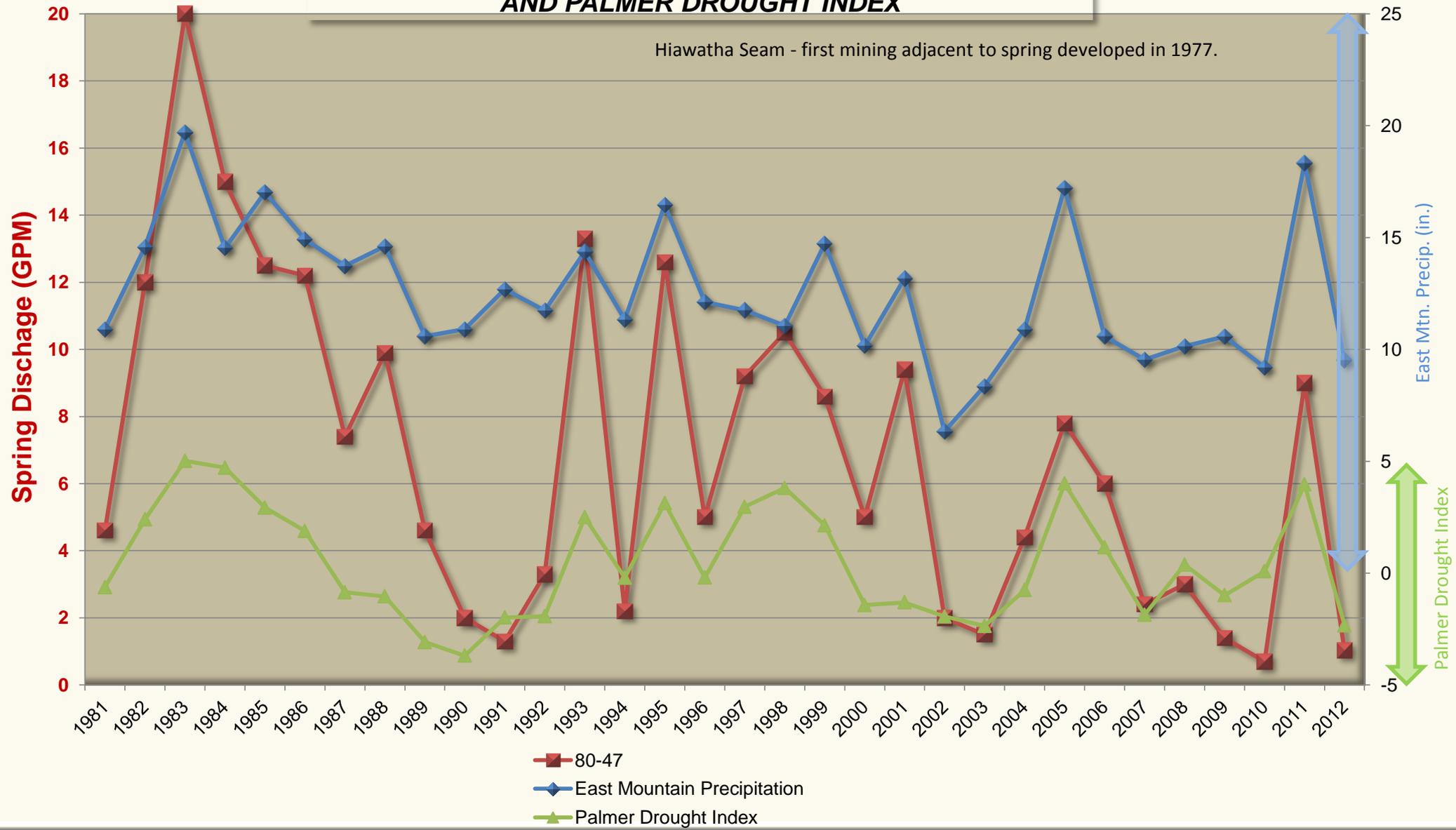


# EAST MOUNTAIN SPRINGS

## SPRING: 80-47 vs. PRECIPITATION

**PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION  
AND PALMER DROUGHT INDEX**

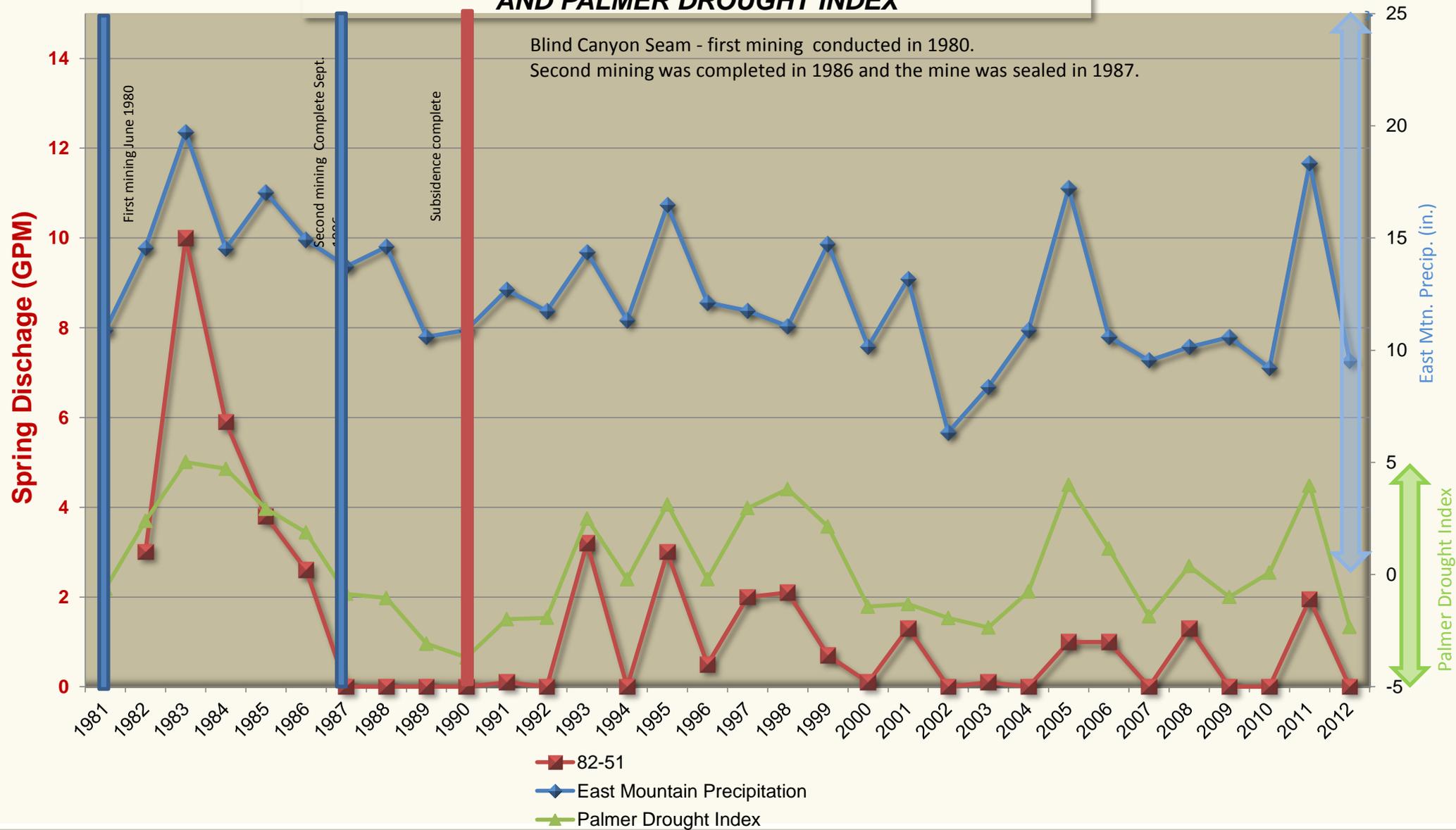
Hiawatha Seam - first mining adjacent to spring developed in 1977.



# EAST MOUNTAIN SPRINGS

## SPRING: 82-51 vs. PRECIPITATION

### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX

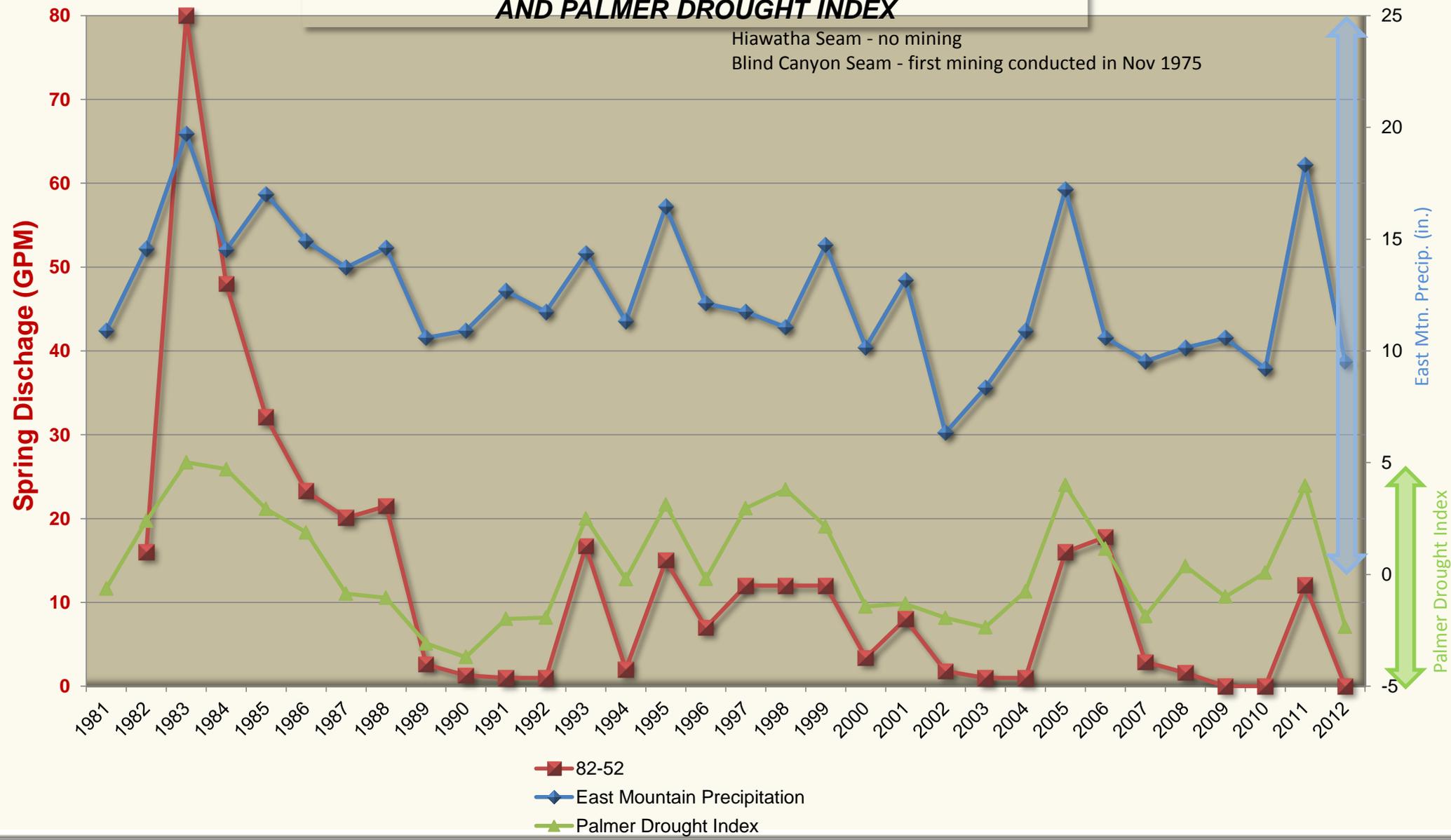


# **EAST MOUNTAIN SPRINGS**

## **SPRING: 82-52 vs. PRECIPITATION**

### **PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX**

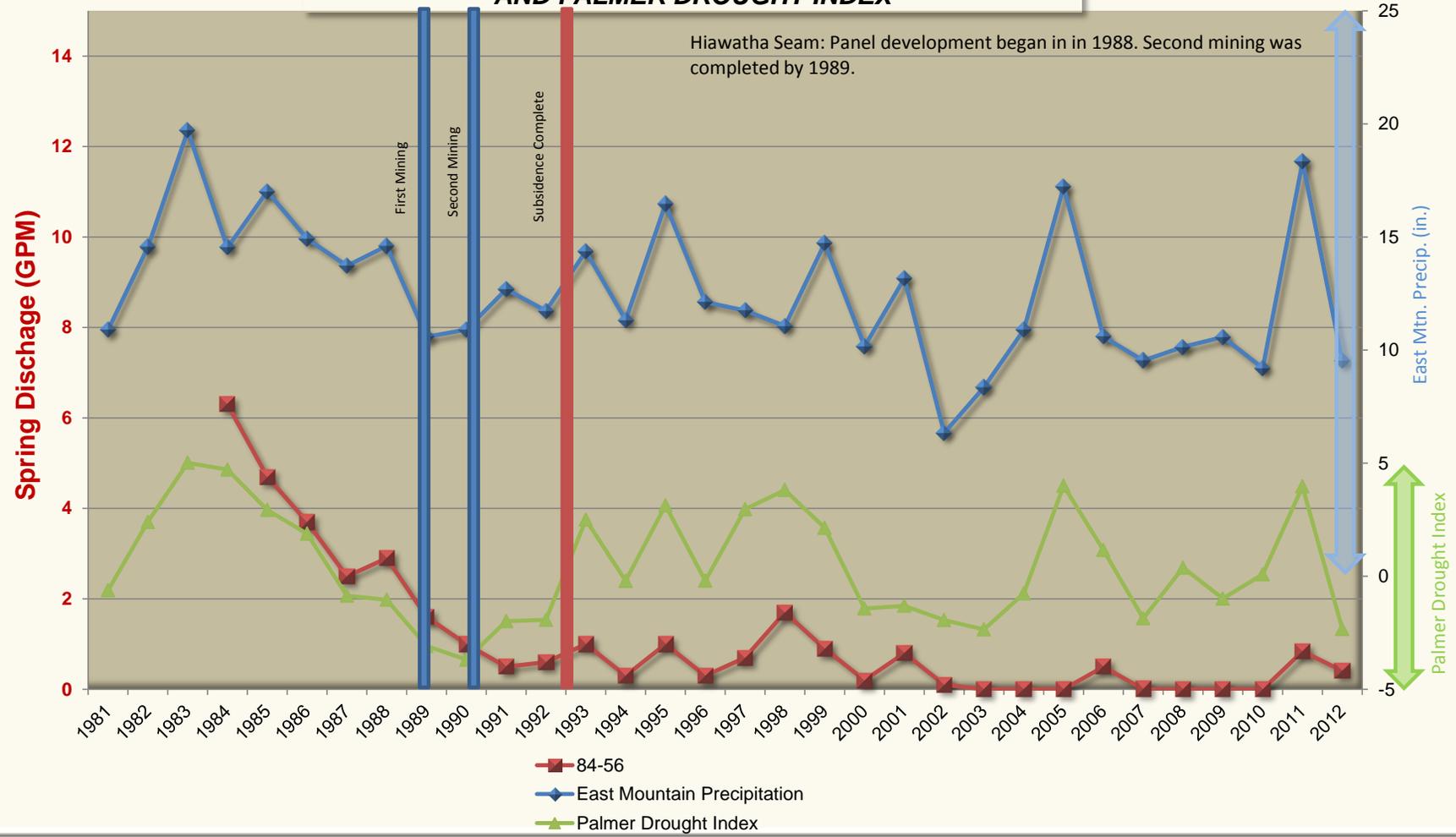
Hiawatha Seam - no mining  
Blind Canyon Seam - first mining conducted in Nov 1975



# EAST MOUNTAIN SPRINGS

## SPRING: 84-56 vs. PRECIPITATION

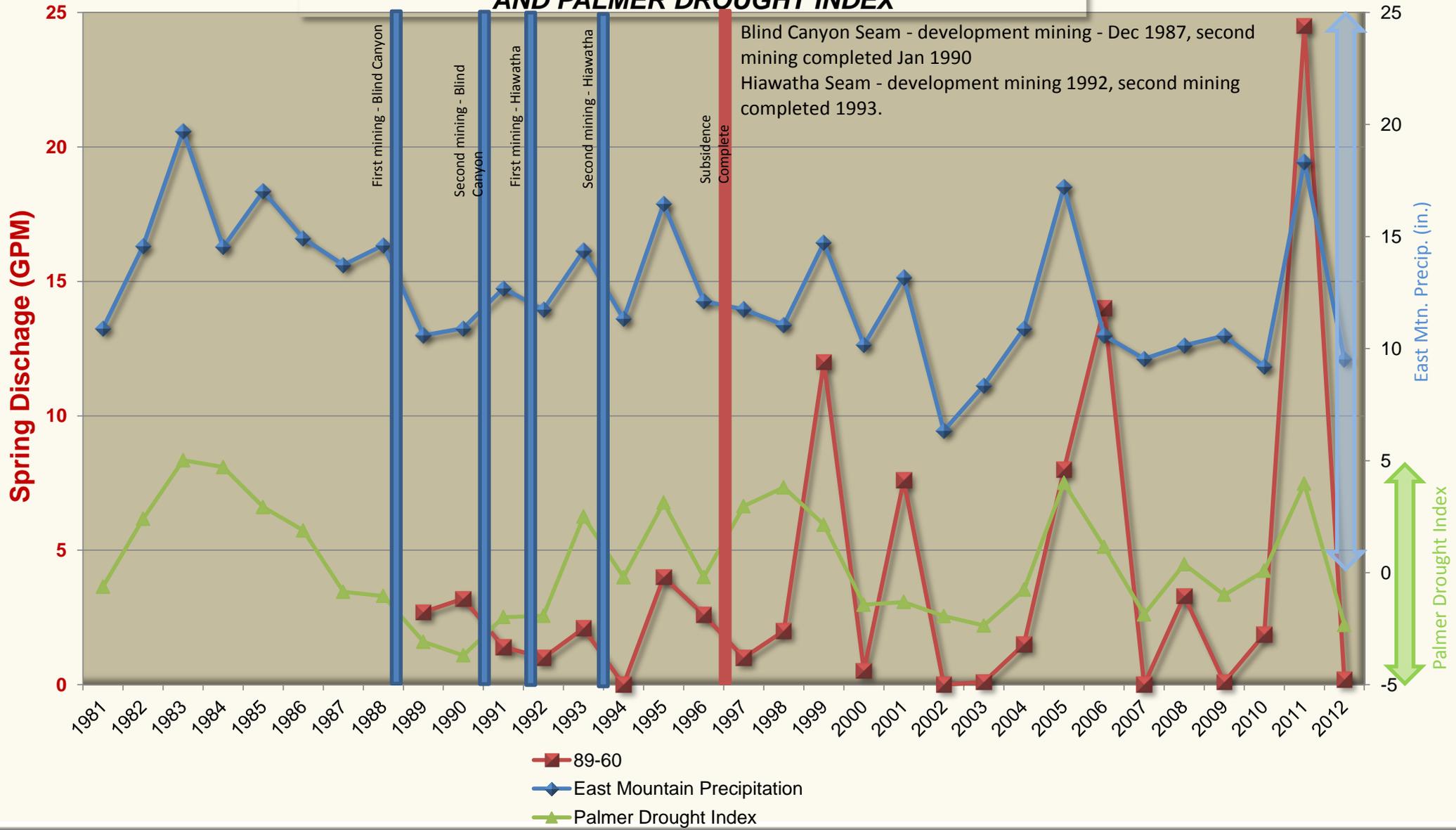
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX



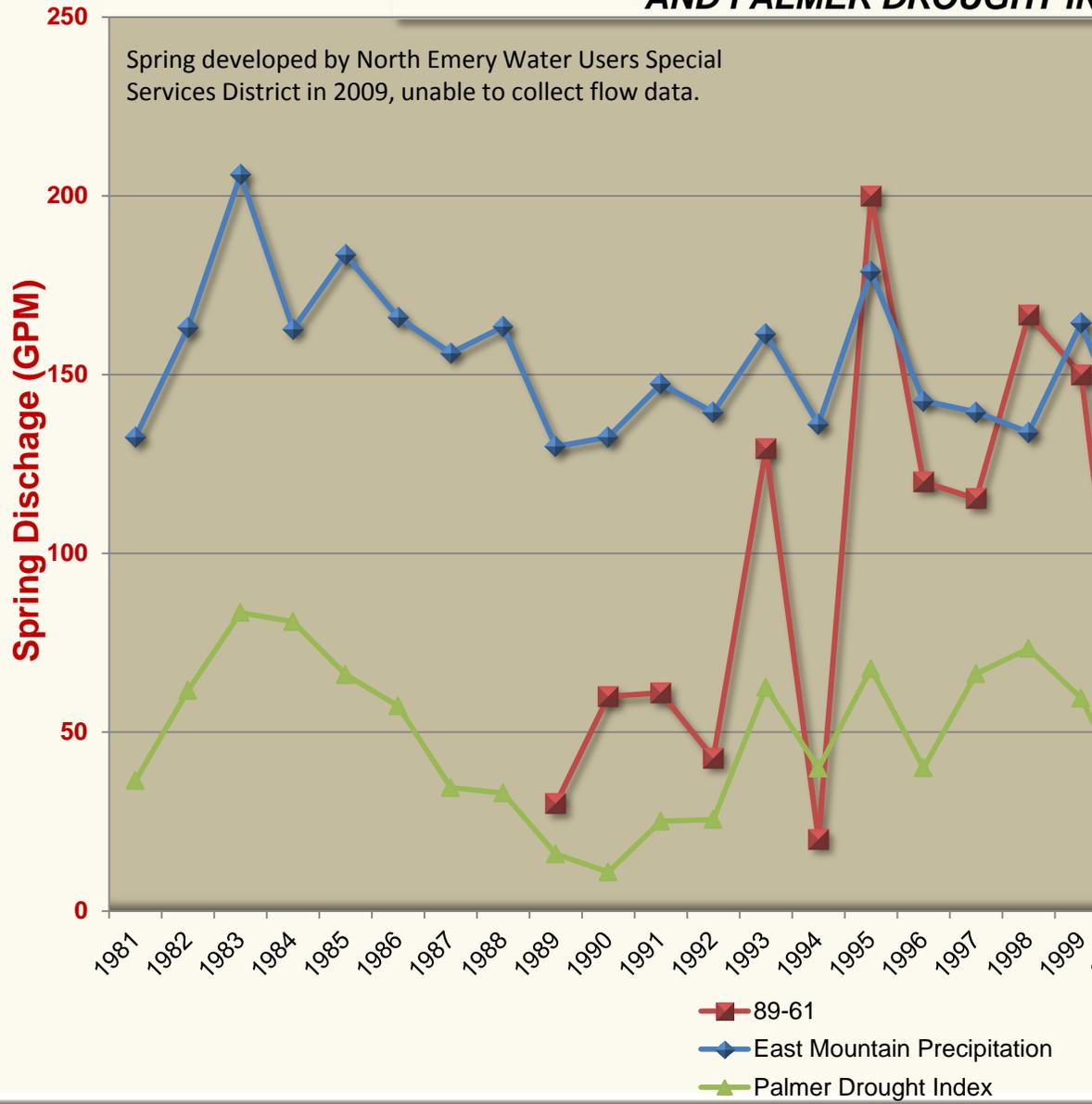
# EAST MOUNTAIN SPRINGS

## SPRING: 89-60 vs. PRECIPITATION

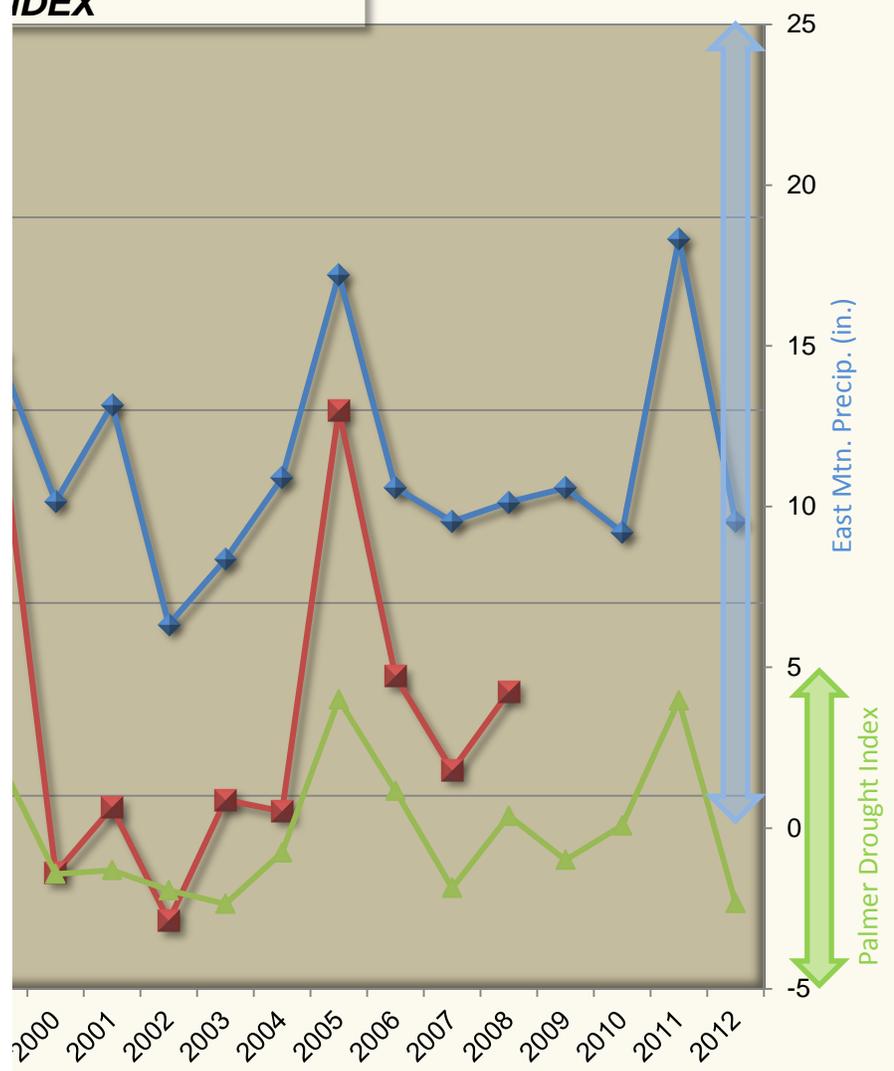
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX



# EAST MOUNTAIN SP SPRING: 89-61 vs. PREC PEAK FLOW (JULY) vs. EAST MOUNTAIN I AND PALMER DROUGHT IN



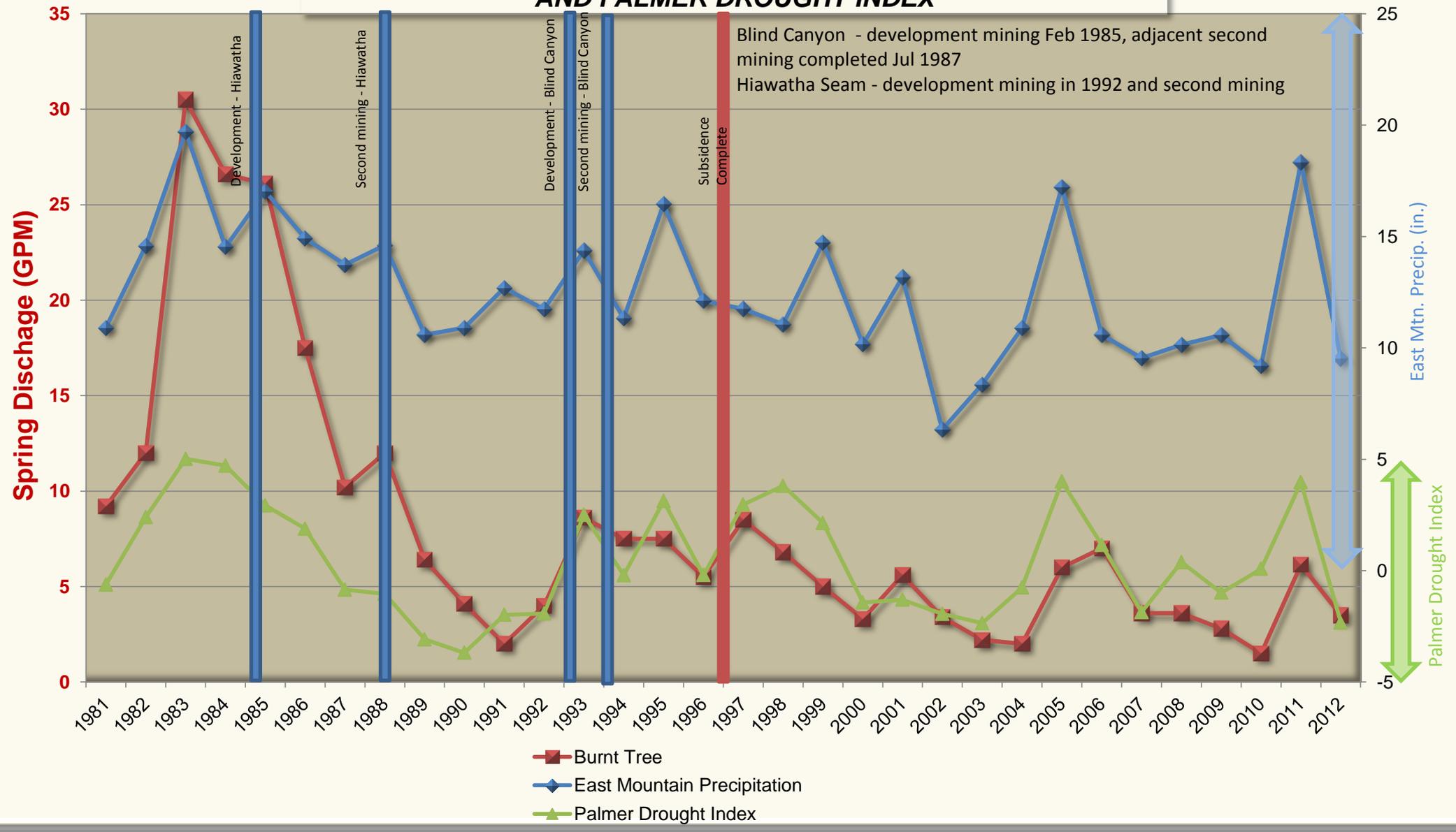
# SPRINGS PRECIPITATION WEATHER STATION INDEX



# EAST MOUNTAIN SPRINGS

## SPRING: Burnt Tree vs. PRECIPITATION

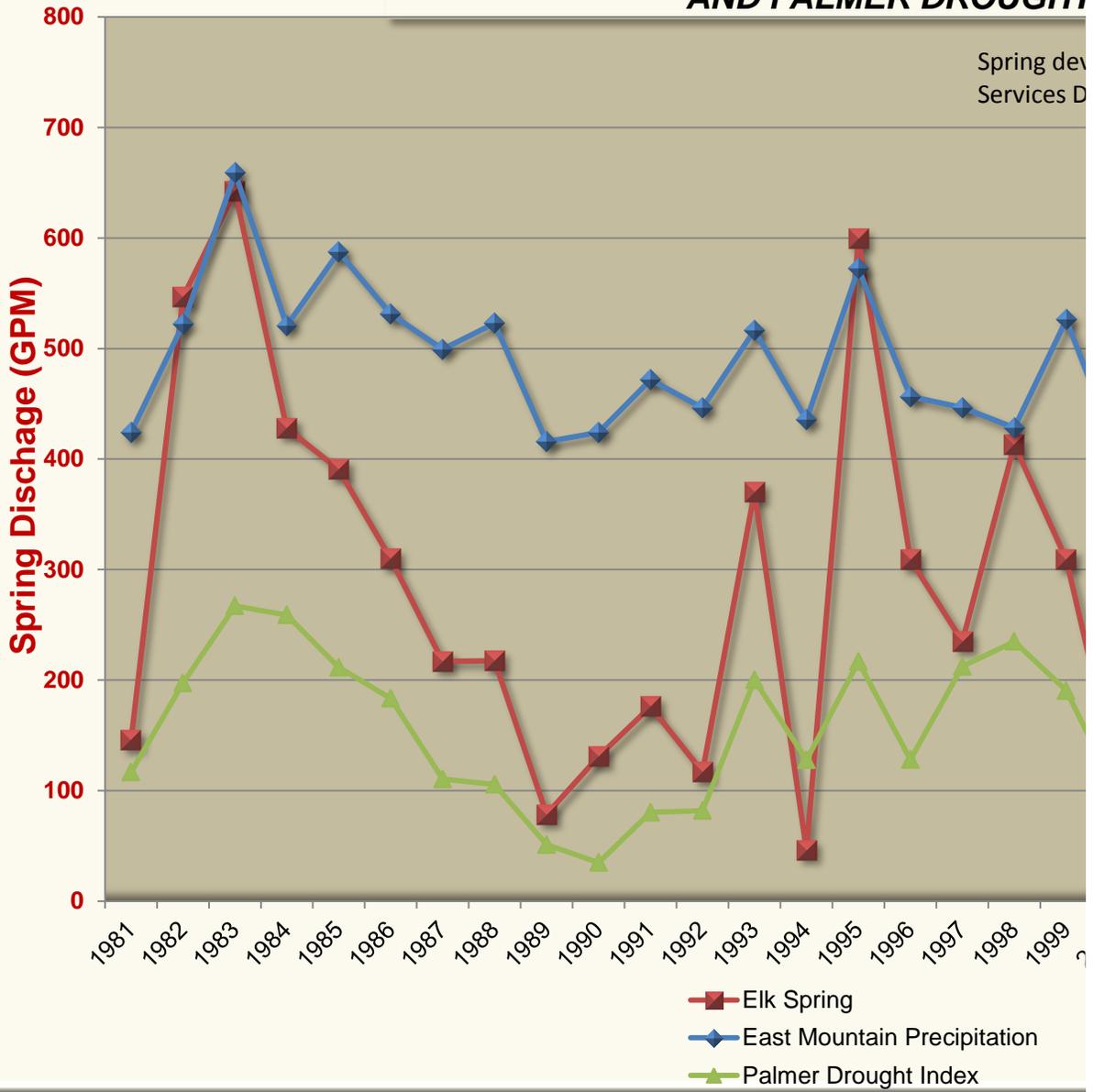
### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX



# EAST MOUNTAIN SPRING

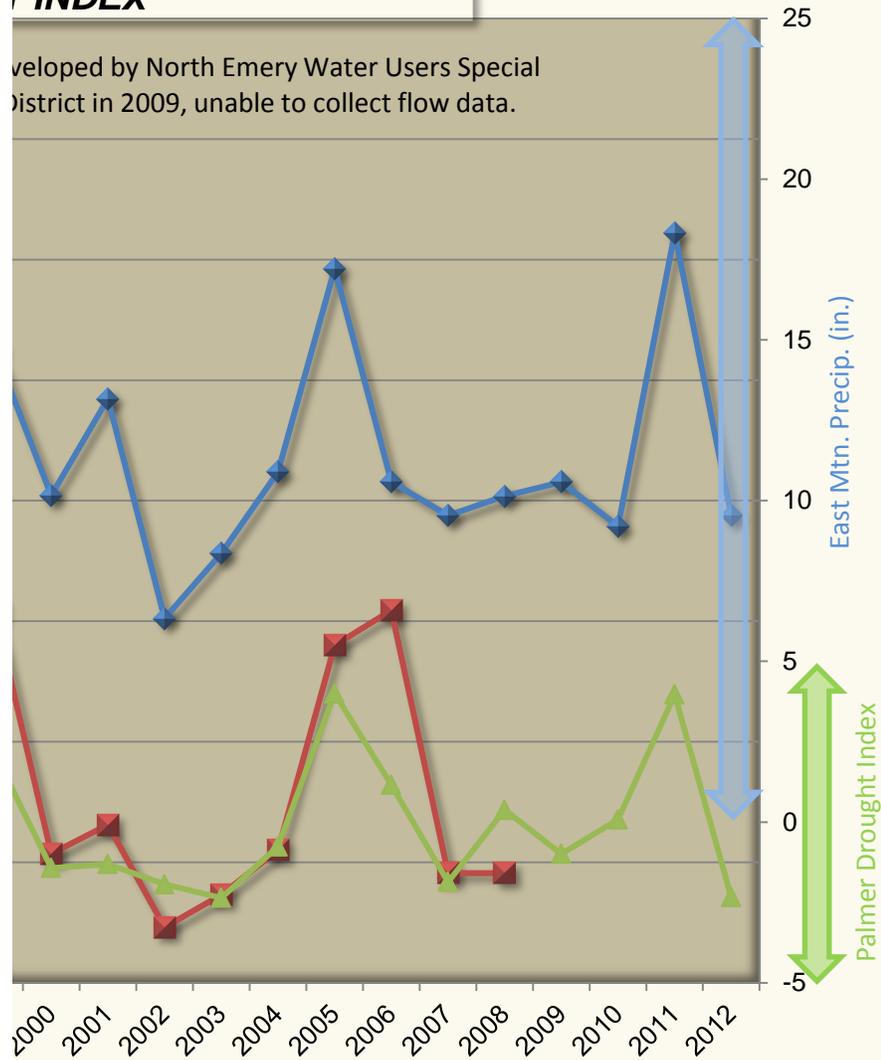
## SPRING: Elk Spring vs. F

PEAK FLOW (JULY) vs. EAST MOUNTAIN  
AND PALMER DROUGHT



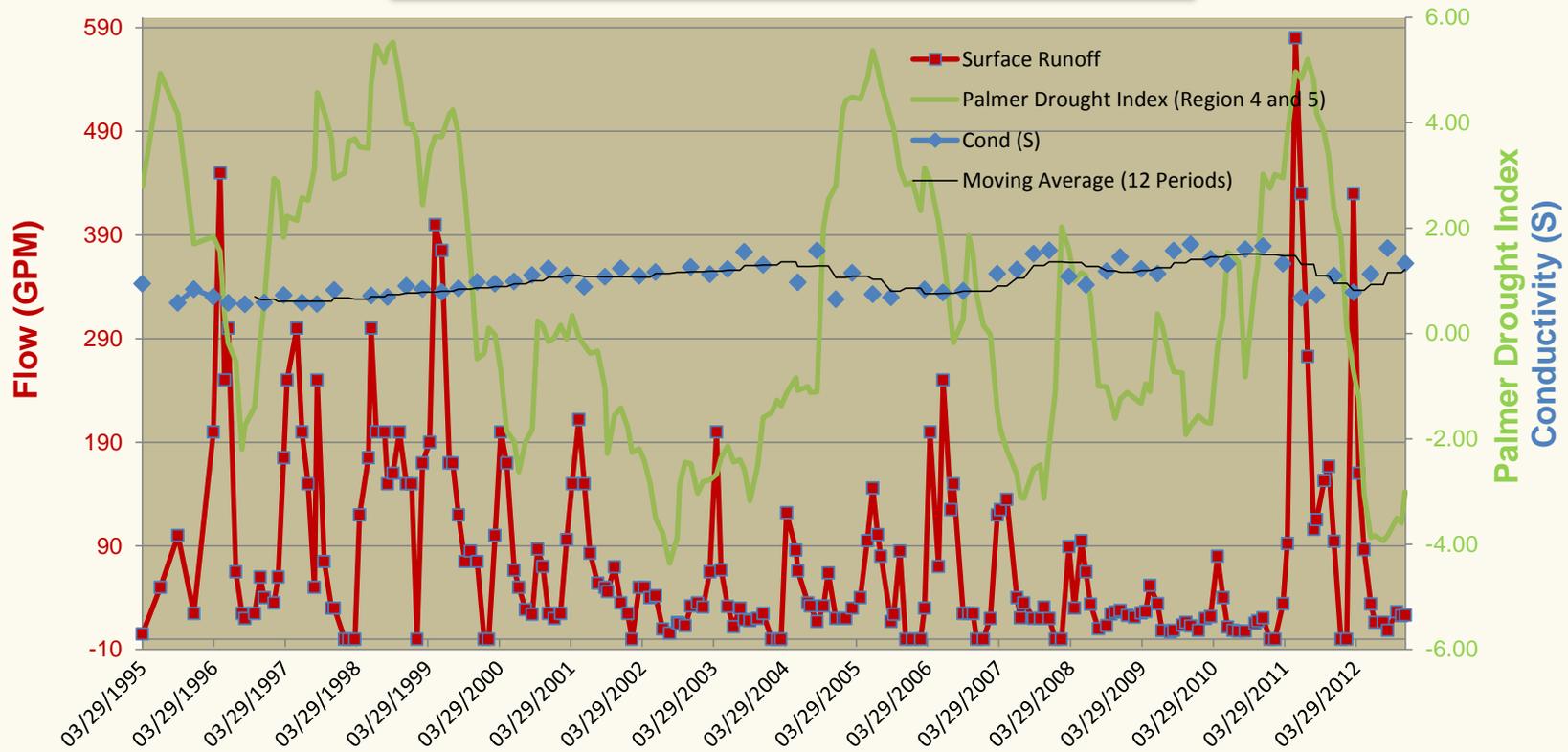
# SPRINGS PRECIPITATION IN WEATHER STATION INDEX

Developed by North Emery Water Users Special District in 2009, unable to collect flow data.



# Trail Mountain Surface Runoff T-19

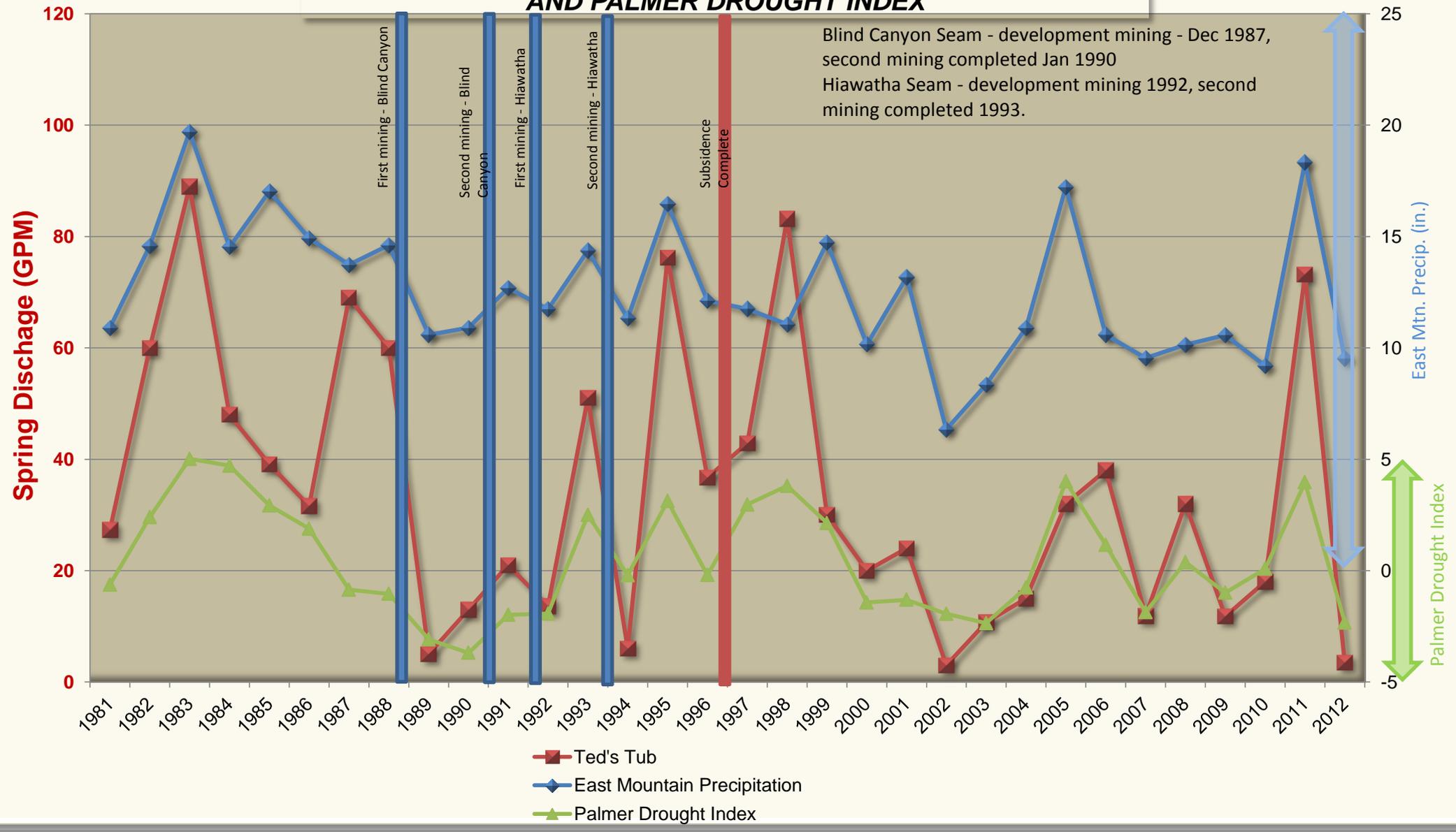
Flow vs. Palmer Drought Index



# EAST MOUNTAIN SPRINGS

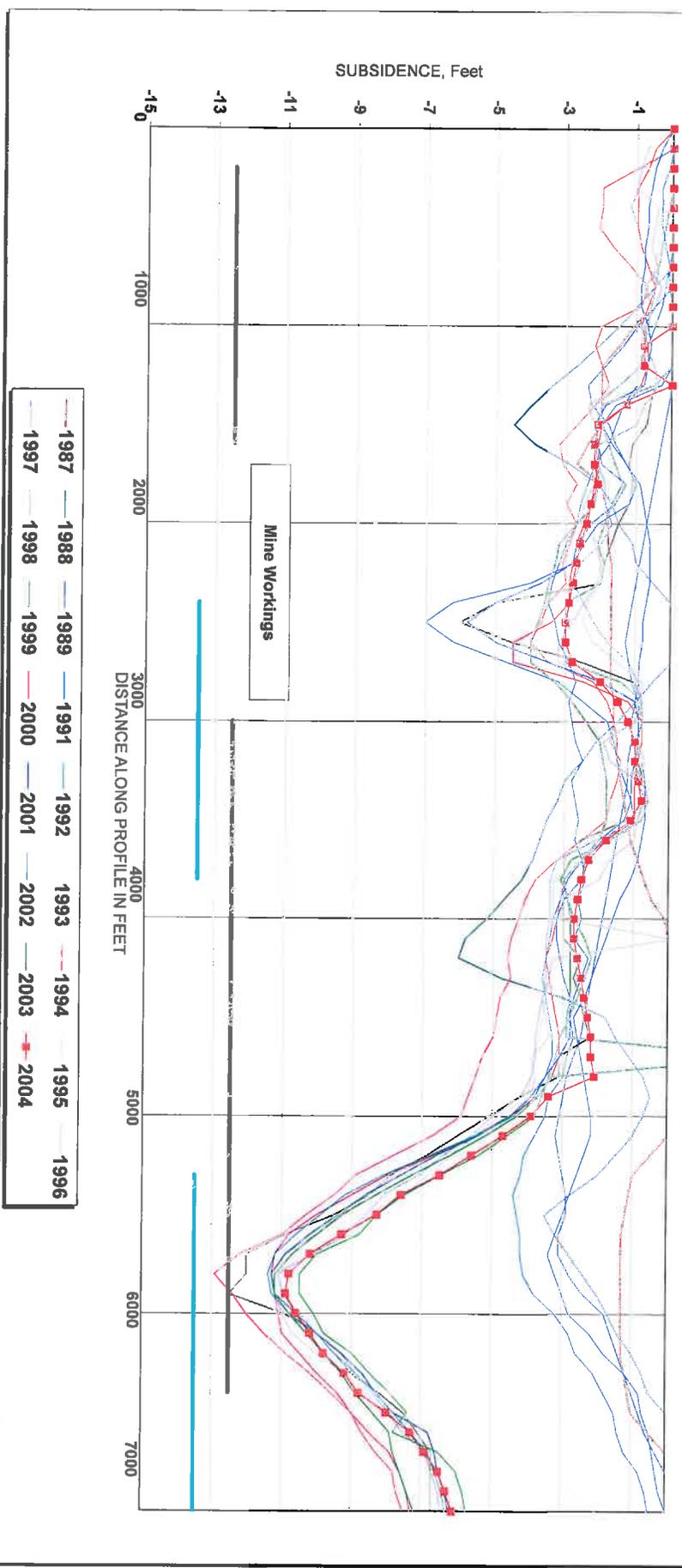
## SPRING: Ted's Tub vs. PRECIPITATION

**PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION  
AND PALMER DROUGHT INDEX**



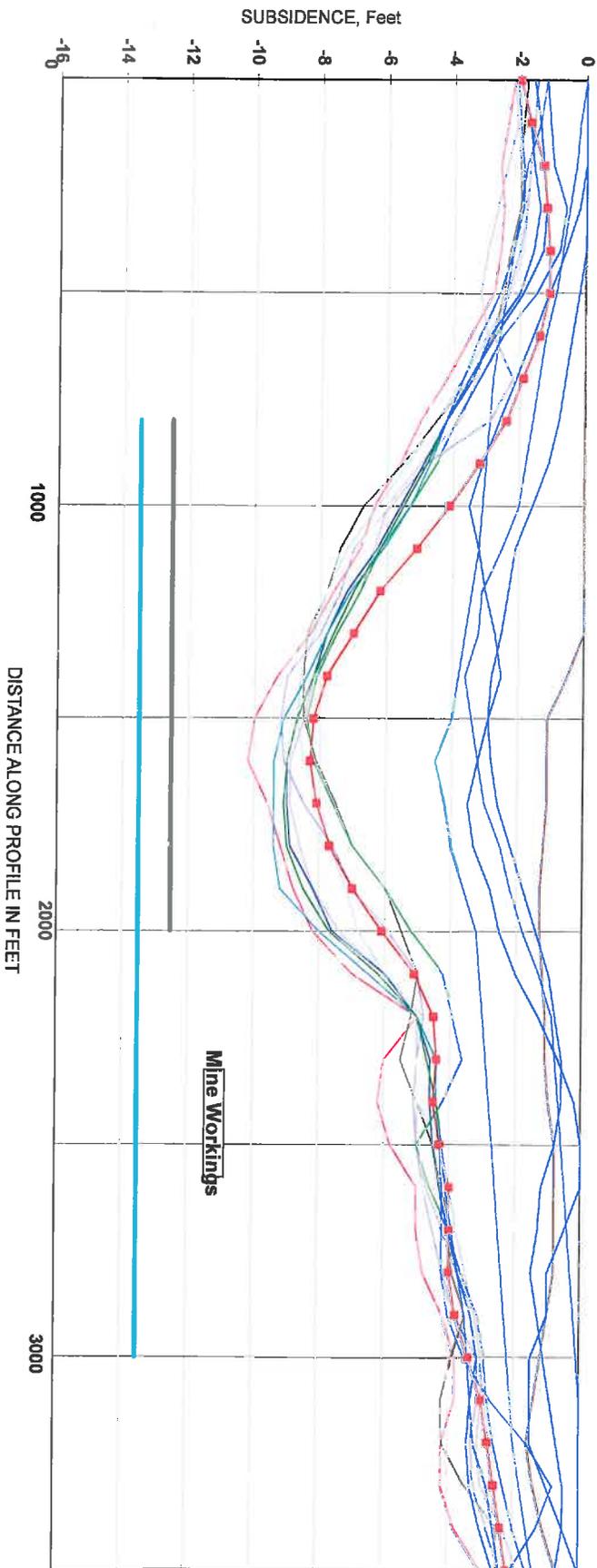
# Energy West 2004 Subsidence Report Area 11 Subsidence Profile North - South

Chart 8



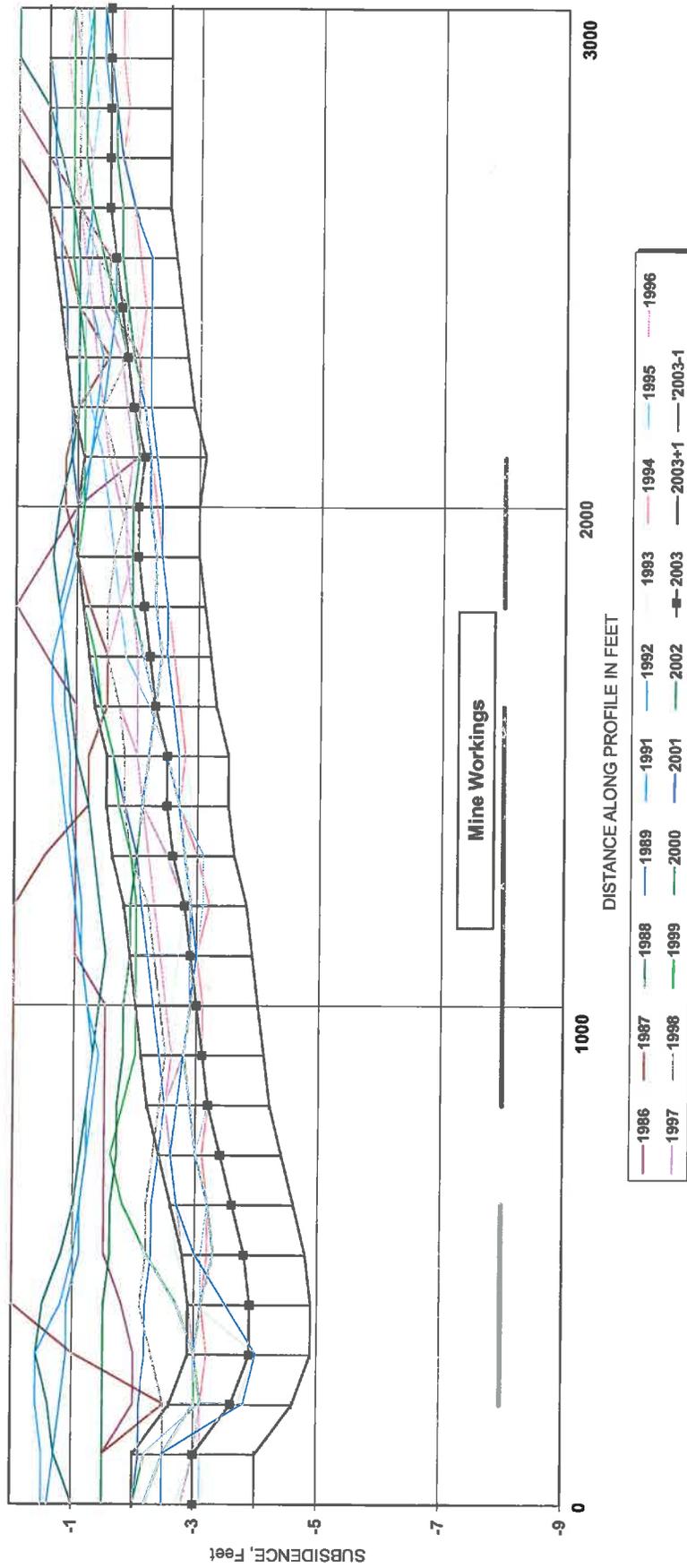
**Energy West 2004 Subsidence Report  
Area 11 Subsidence Profile  
West - East**

Chart 9

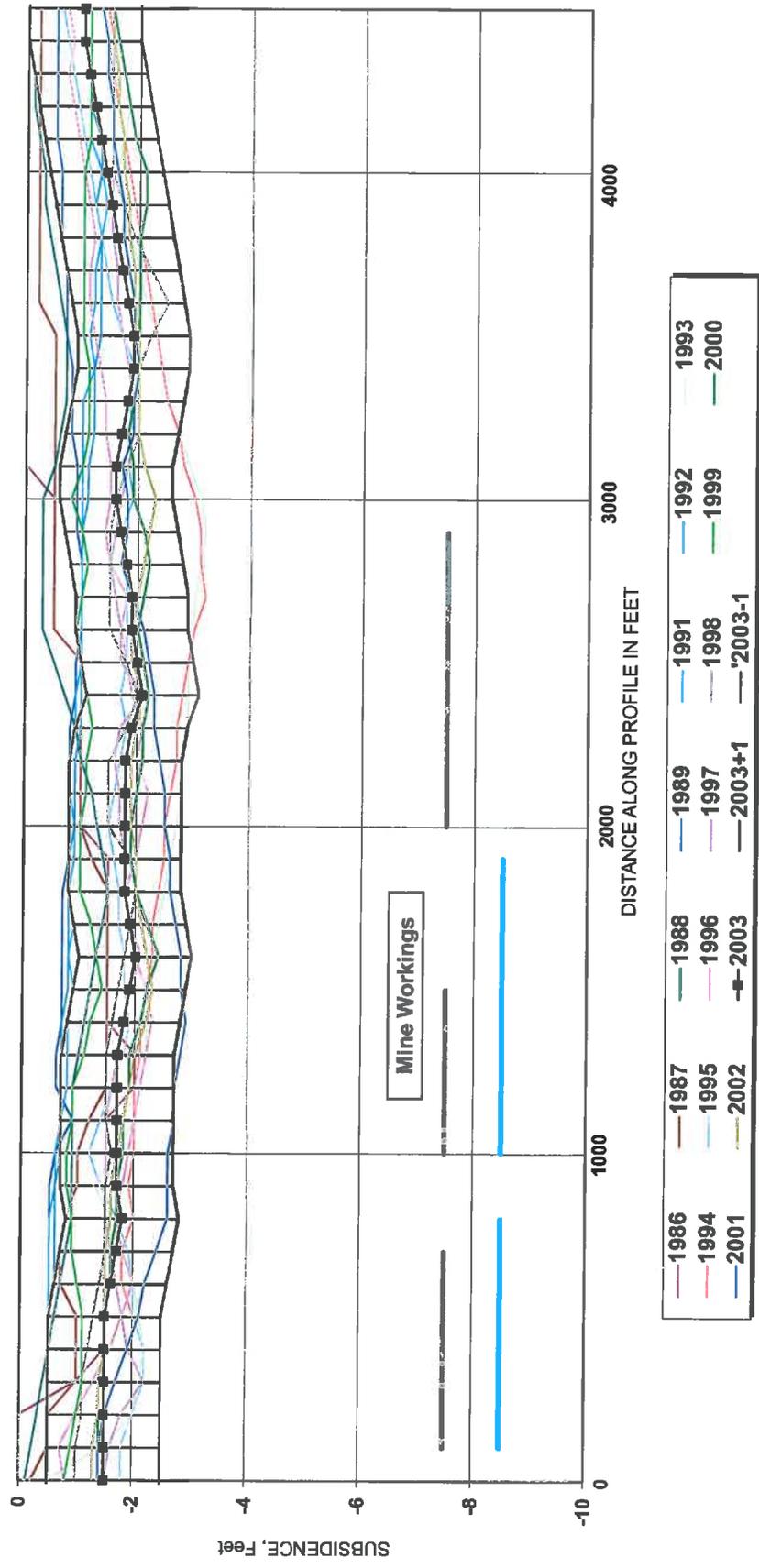


- |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|
| 1987 | 1988 | 1989 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
| 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |      |

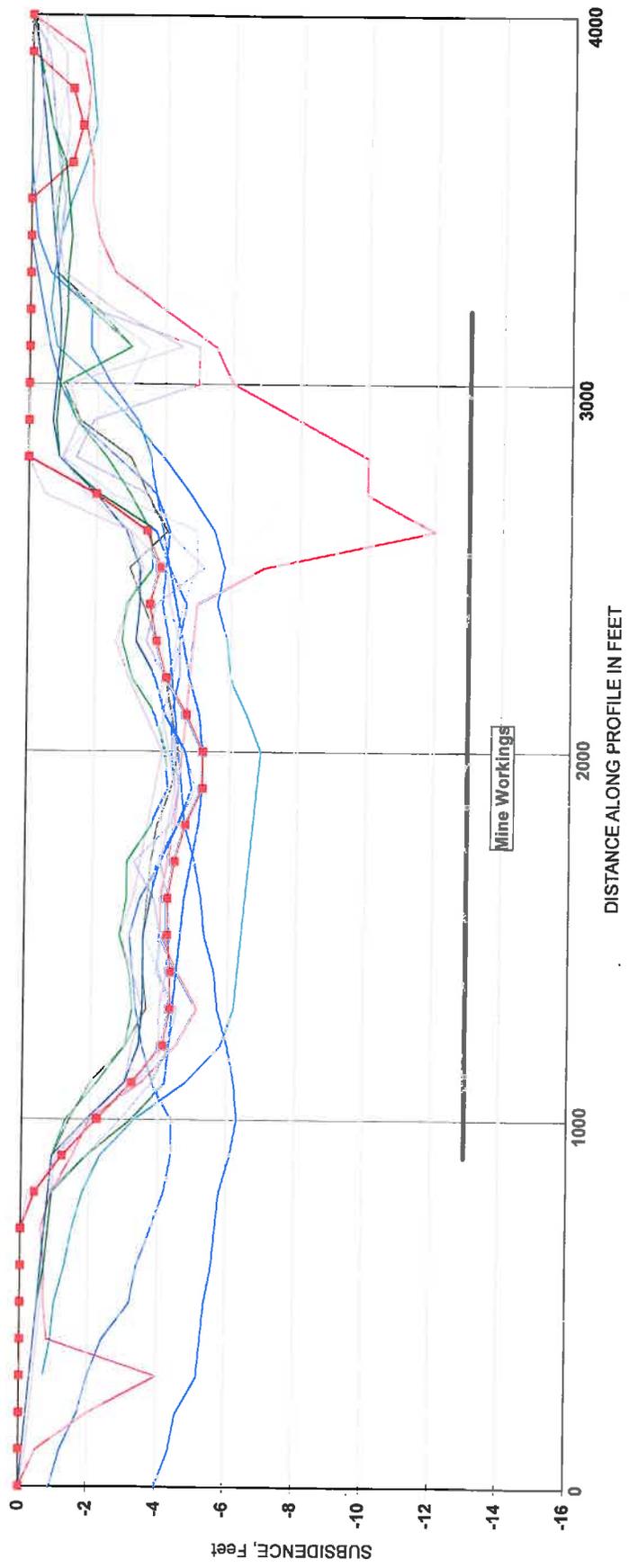
**Energy West 2004 Subsidence Report  
Area 13 Subsidence Profile w/+- 1' Variance in 2003 Data  
West - East**



**Energy West 2004 Subsidence Report  
Area 13 Subsidence Profile w/+- 1' Variance in 2003 Data  
North - South**

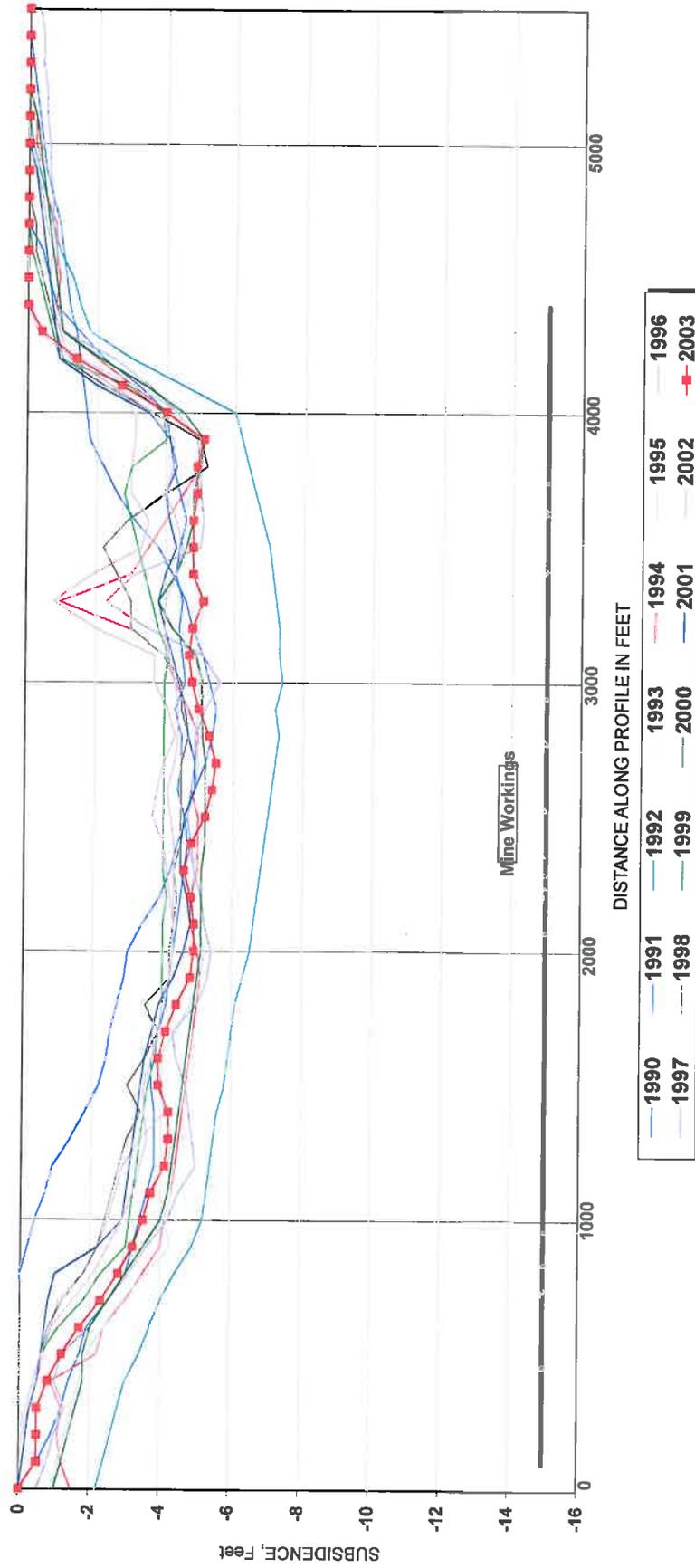


**Energy West 2004 Subsidence Report**  
**Area 16 Subsidence Profile**  
**North - South**



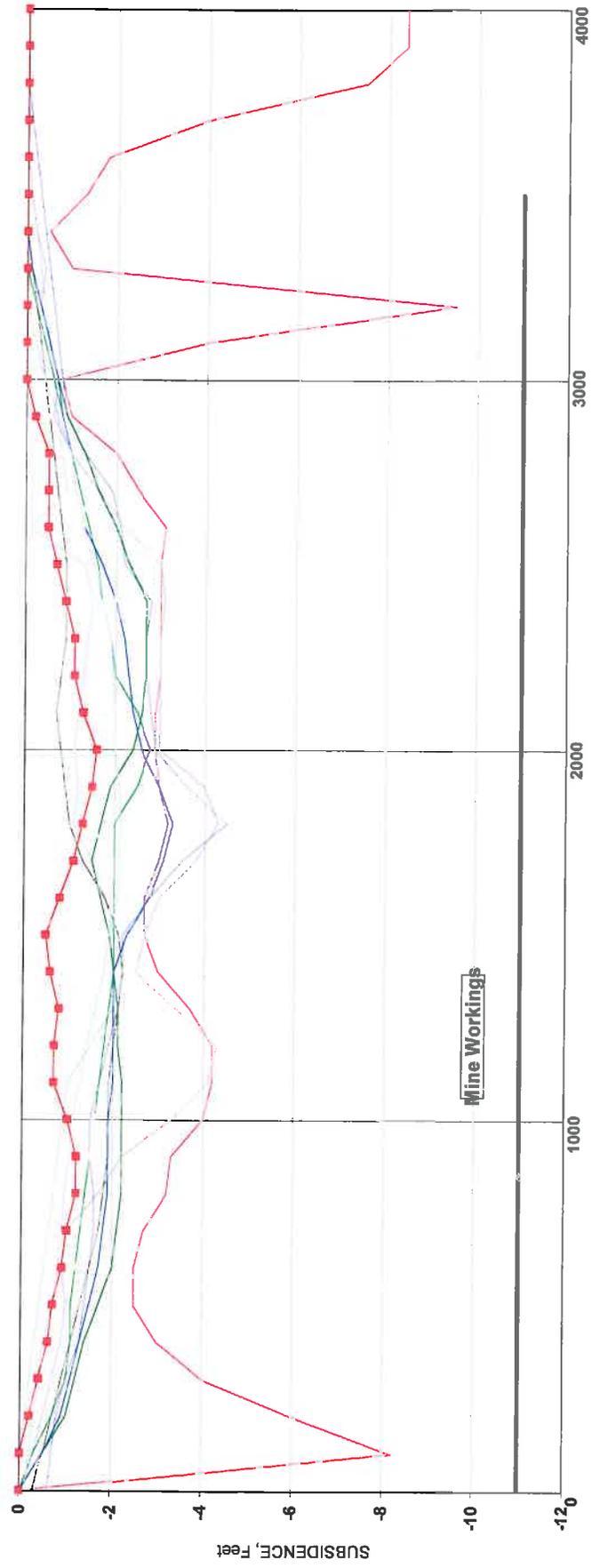
1990	1991	1992	1993	1994	1995	1996
1997	1998	1999	2000	2001	2002	2003

**Energy West 2004 Subsidence Report**  
**Area 16 Subsidence Profile**  
**West - East**



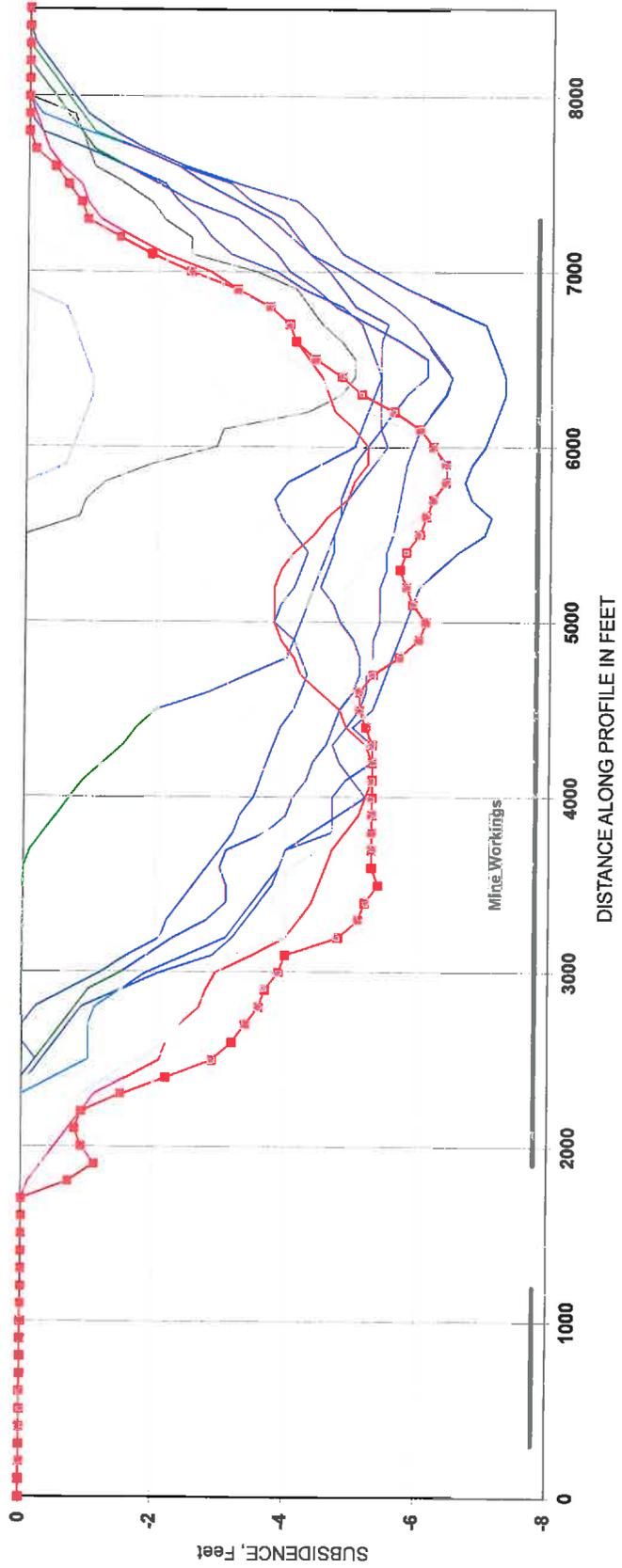
Energy West 2004 Subsidence Report  
 Area 20 Subsidence Profile  
 West - East

Chart 15



**Energy West 2008 Subsidence Report**  
**Area 24 Subsidence Profile**  
**North - South - Trail Mtn. West Side**

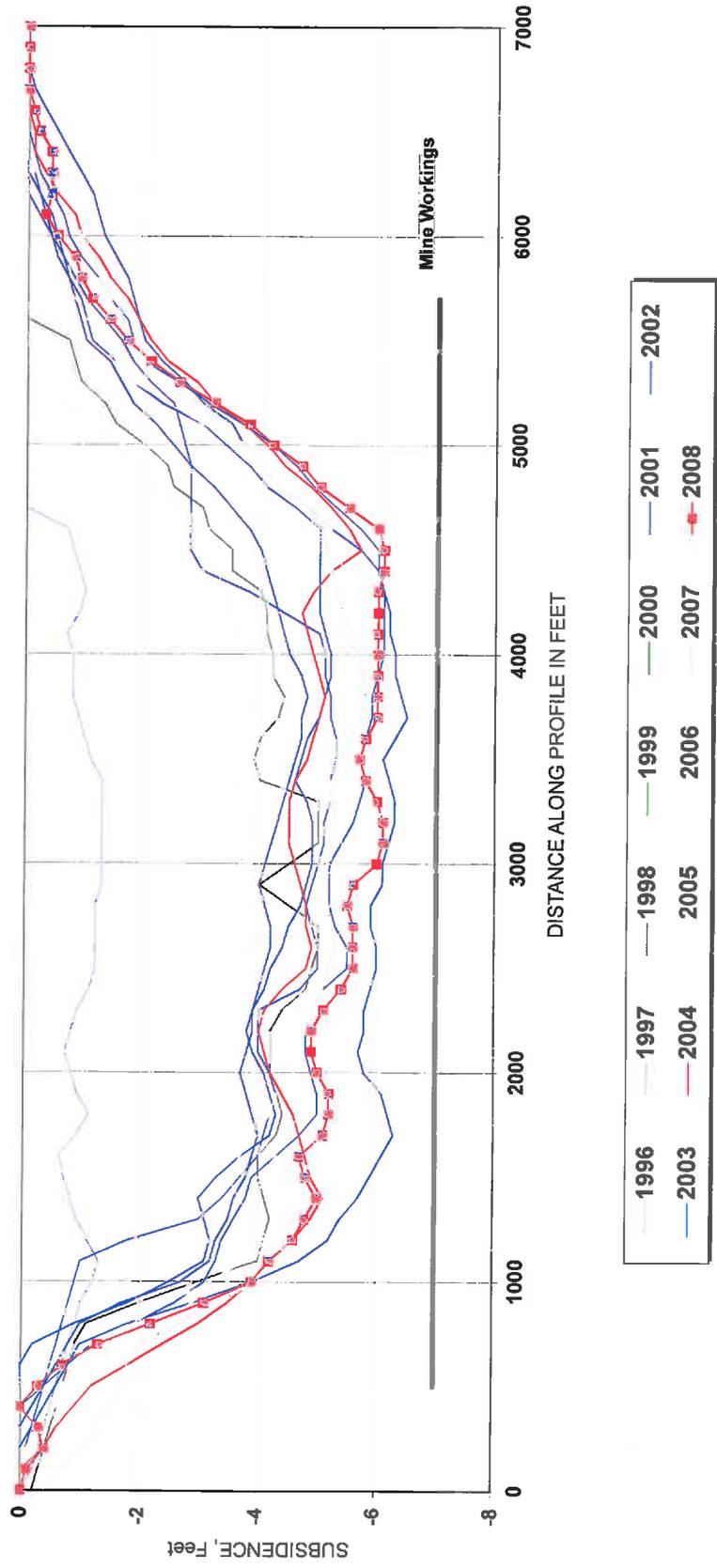
Chart 22



- |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|
| 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
| 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |      |

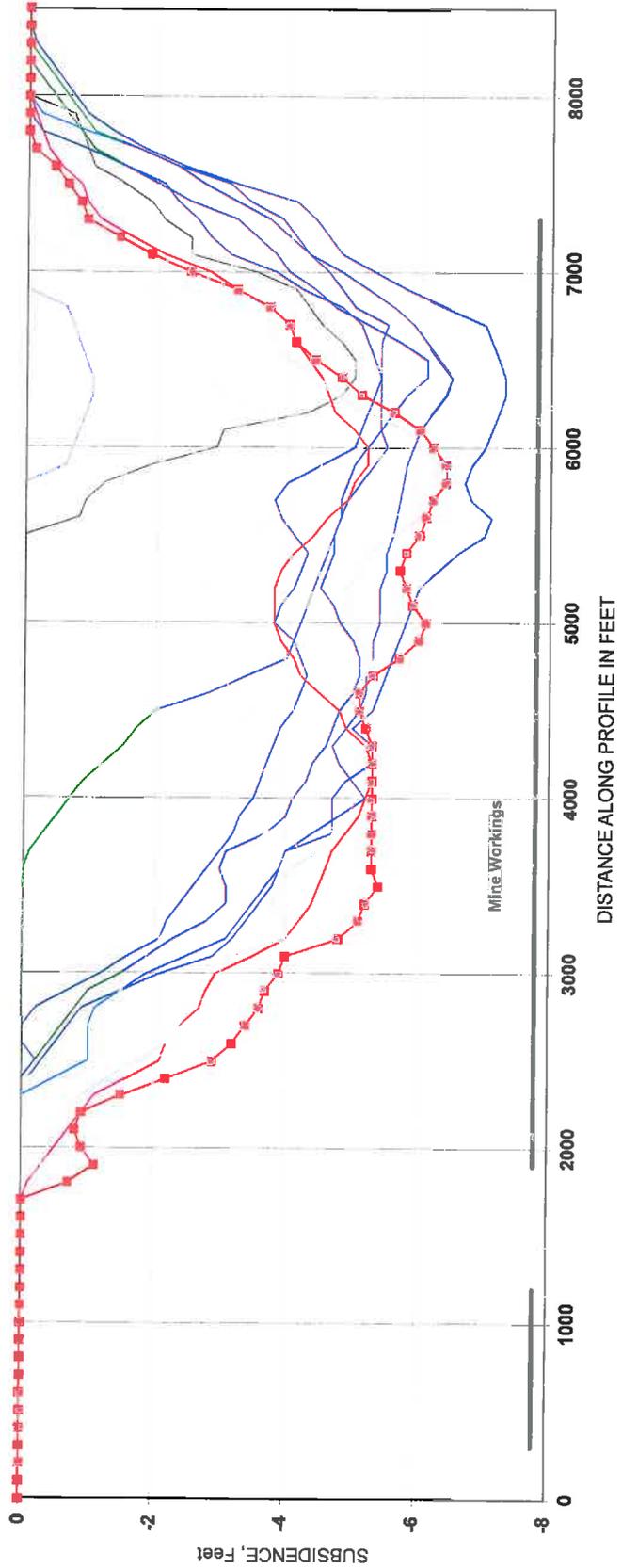
**Energy West 2008 Subsidence Report**  
**Area 24 Subsidence Profile**  
**West - East - Trail Mtn. West Side**

**Chart 23**



**Energy West 2008 Subsidence Report**  
**Area 24 Subsidence Profile**  
**North - South - Trail Mtn. West Side**

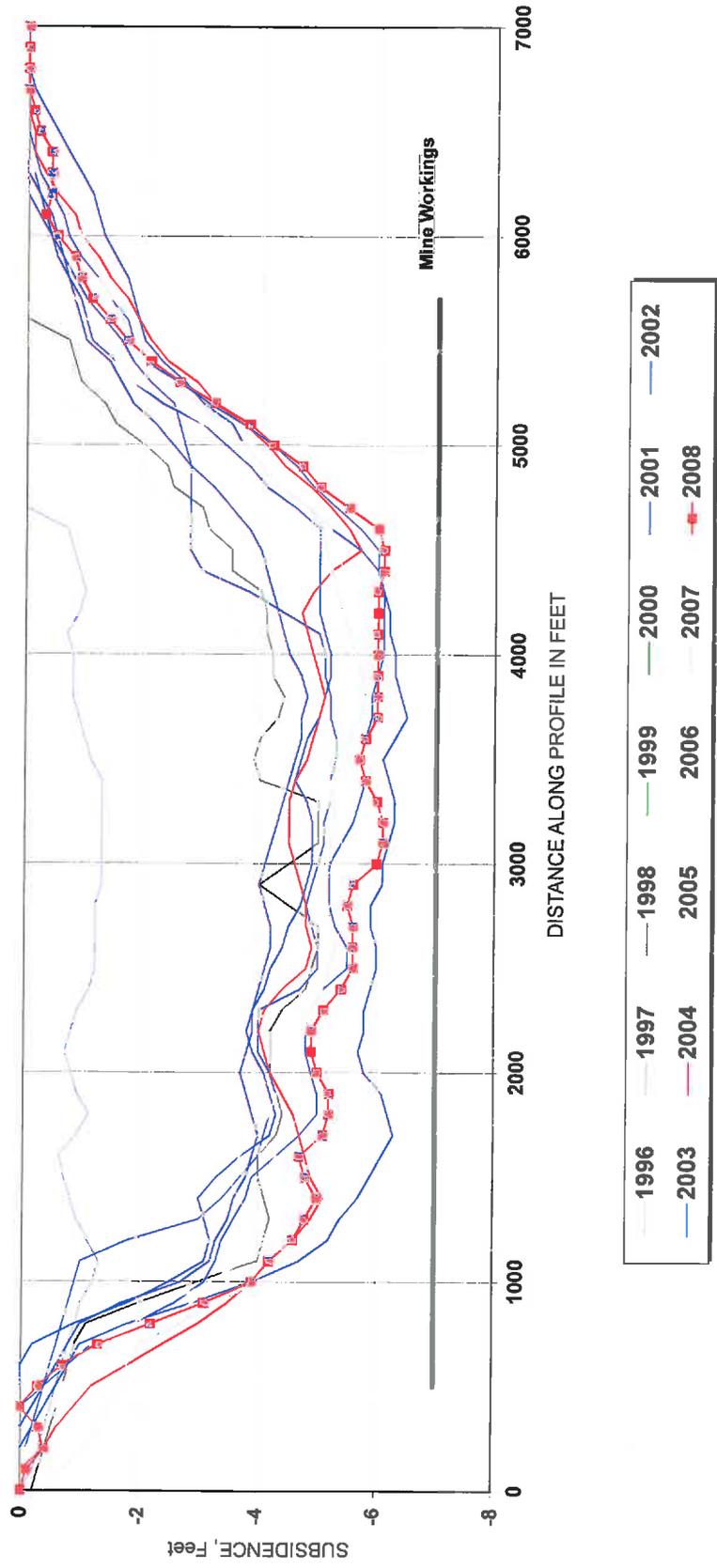
Chart 22



- 1996
- 1997
- 1998
- 1999
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2006
- 2007
- 2007
- 2008
- 2008

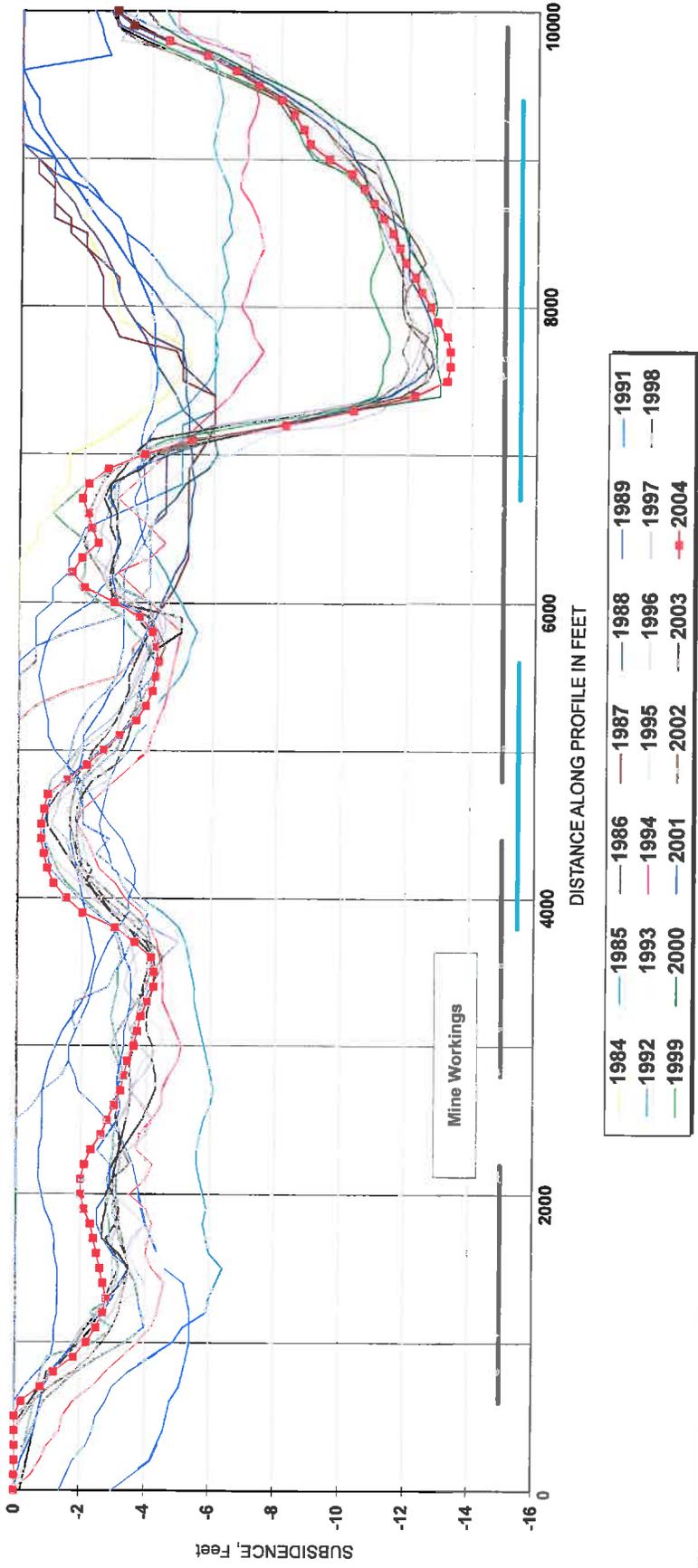
**Energy West 2008 Subsidence Report**  
**Area 24 Subsidence Profile**  
**West - East - Trail Mtn. West Side**

Chart 23



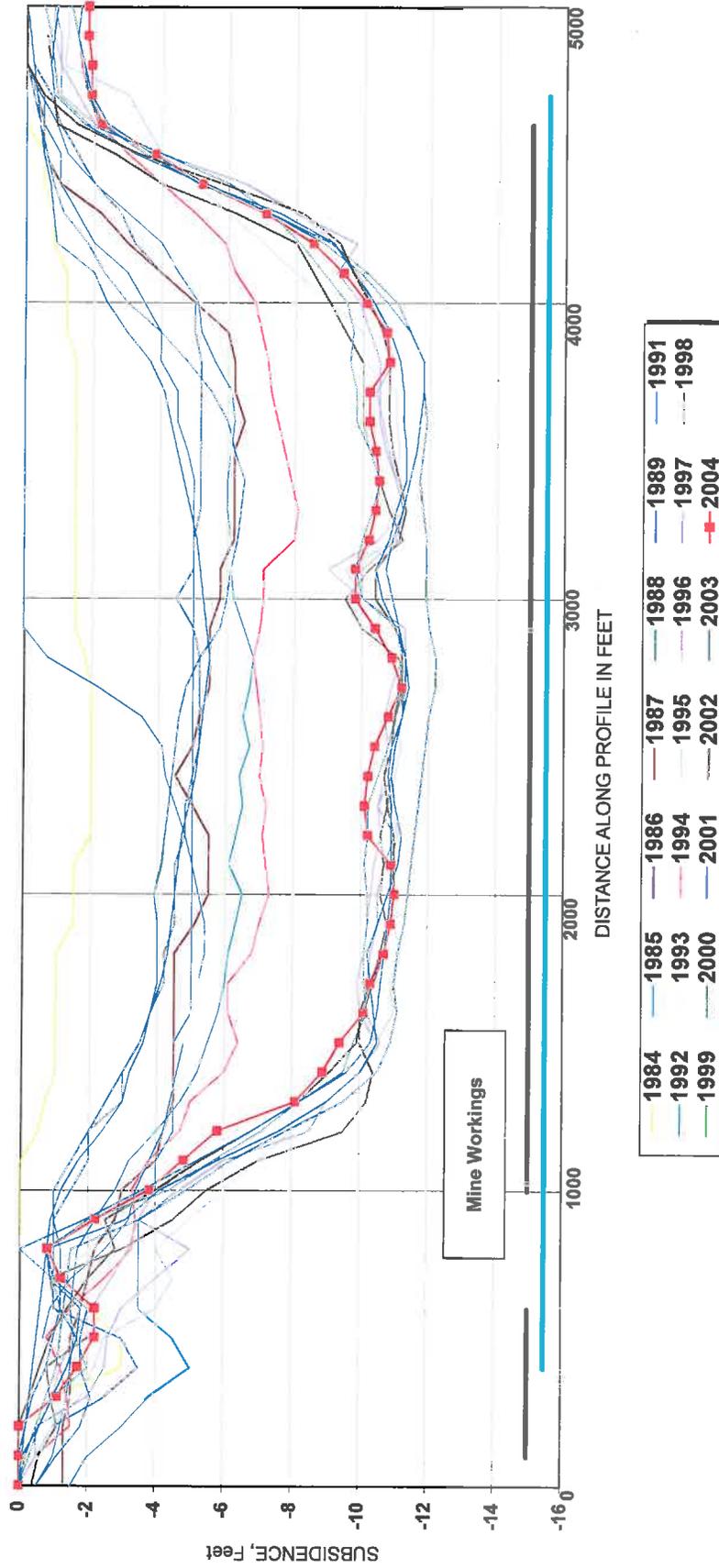
Energy West 2004 Subsidence Report  
 Area 4 Subsidence Profile  
 North - South

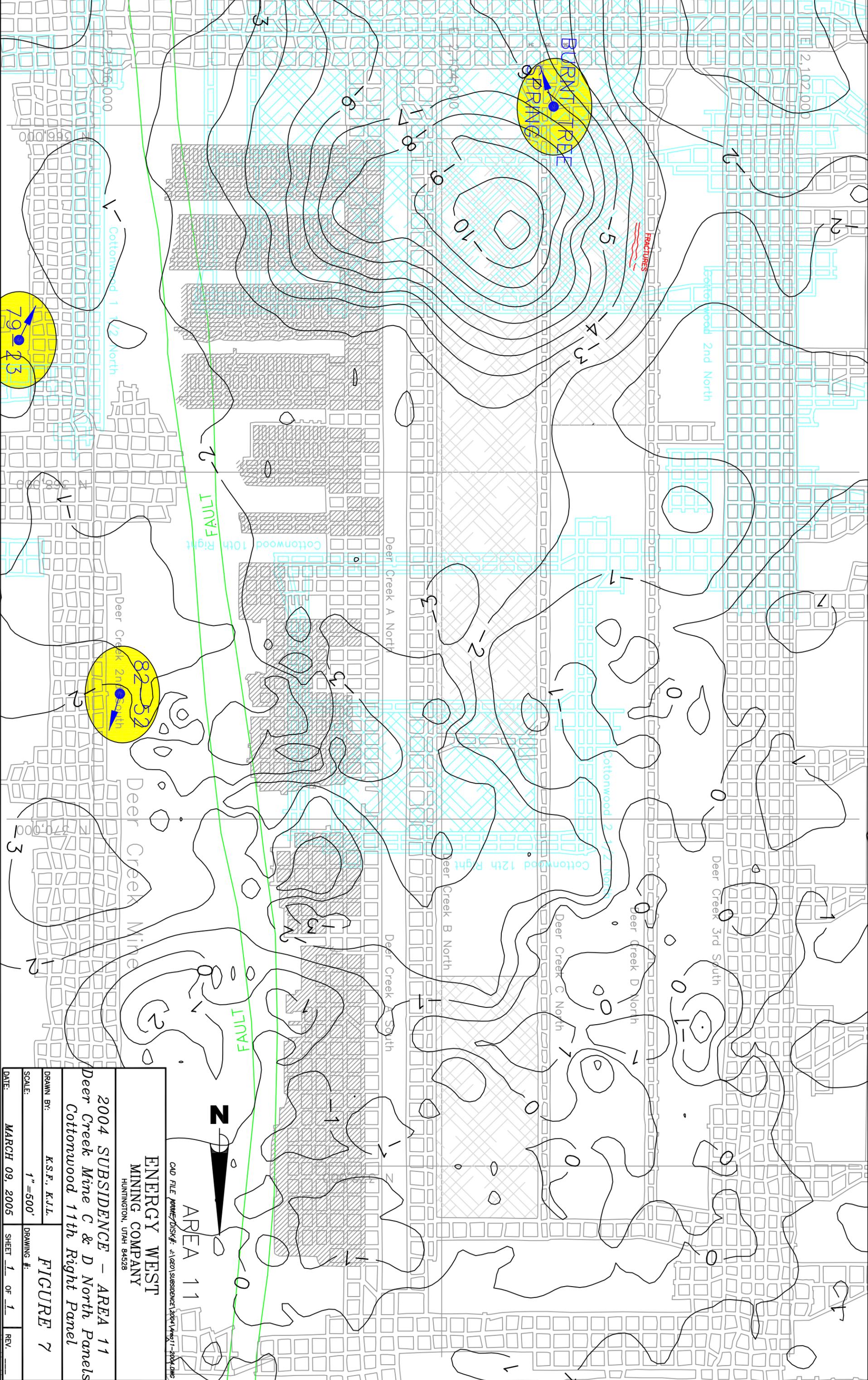
Chart 2



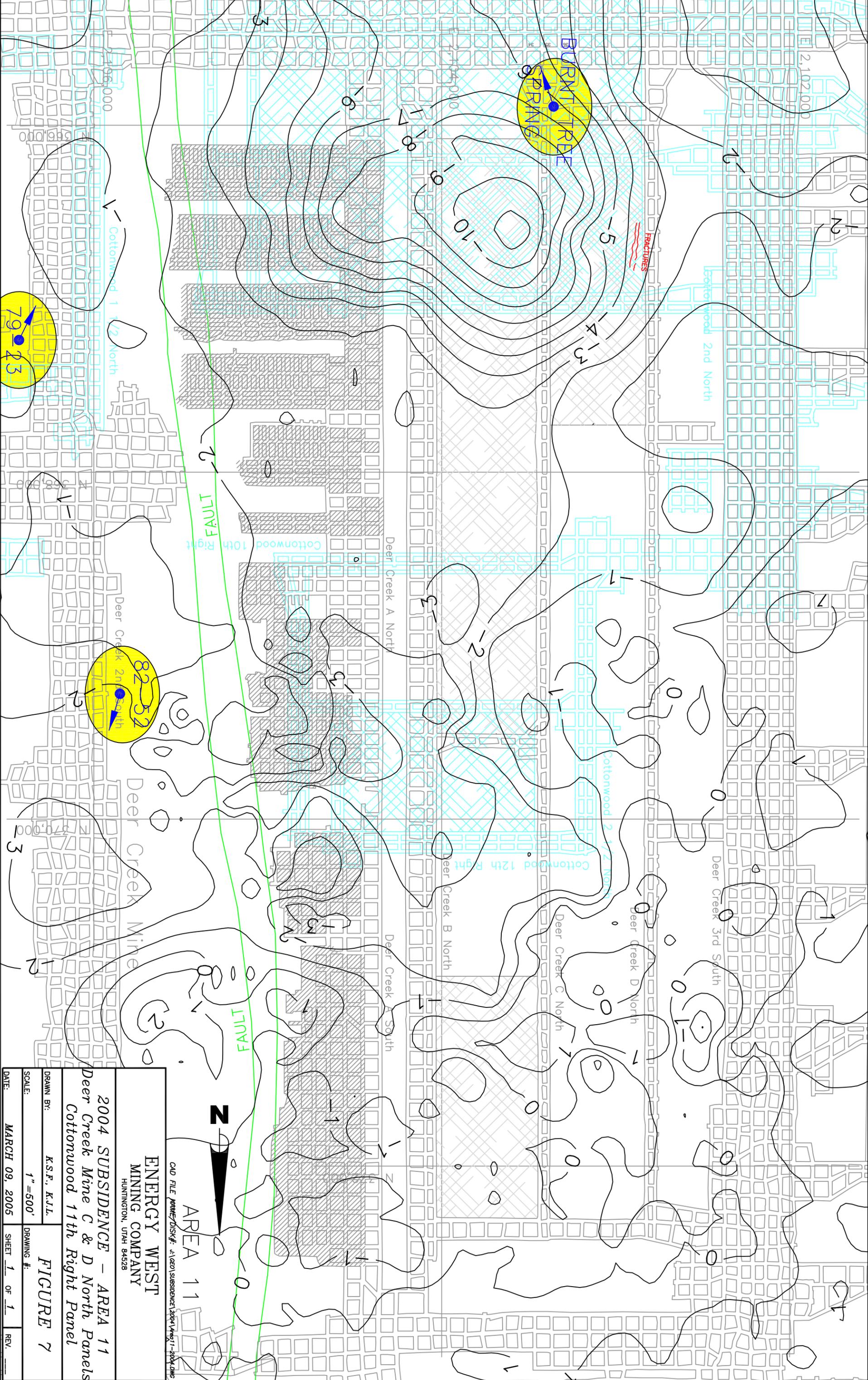
**Energy West 2004 Subsidence Report**  
**Area 4 Subsidence Profile**  
**West - East**

Chart 3

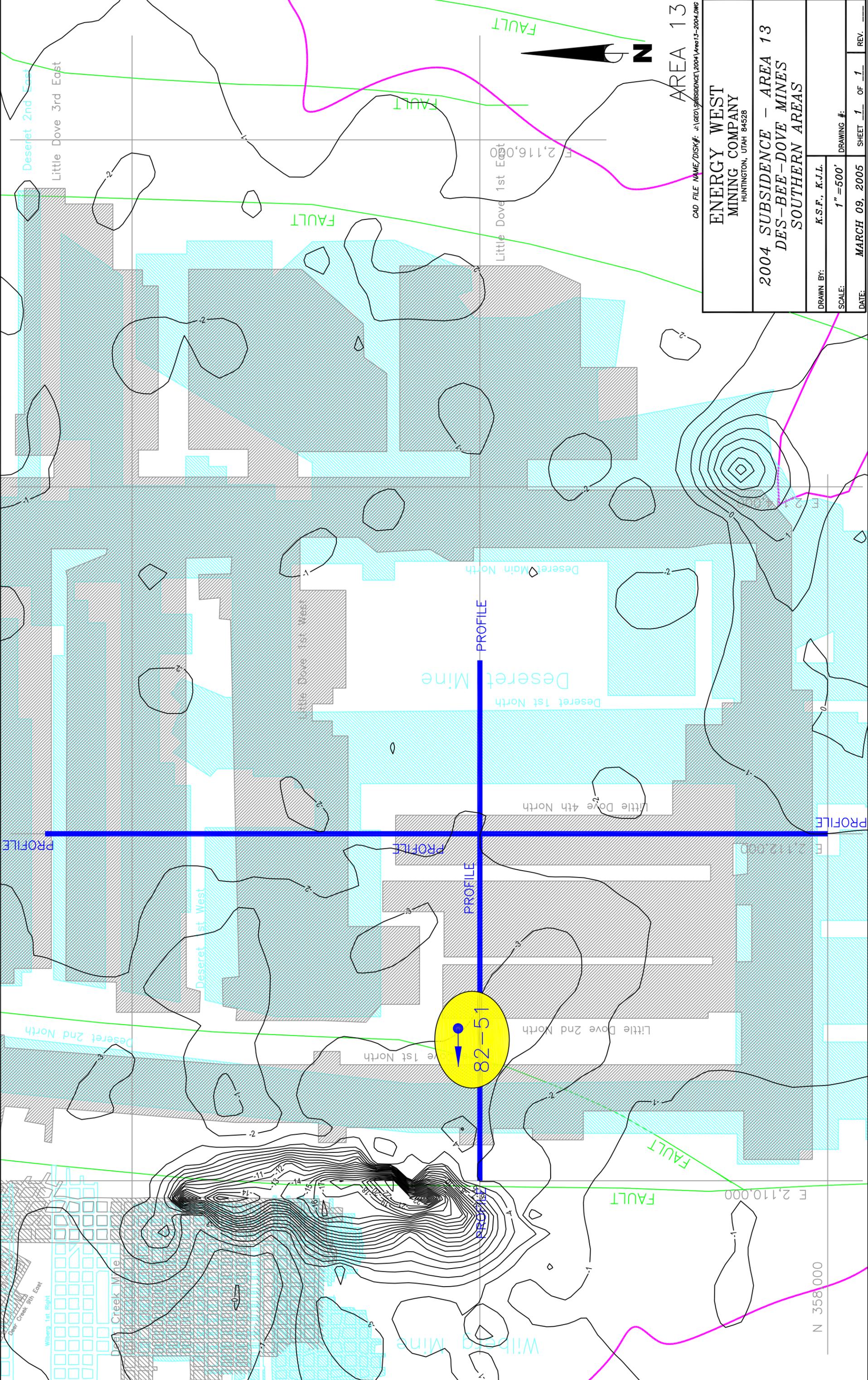




CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2004\Area11-2004.dwg	
ENERGY WEST MINING COMPANY HUNTINGTON, UTAH 84528	
2004 SUBSIDENCE - AREA 11	
Deer Creek Mine C & D North Panels Cottonwood 11th Right Panel	
DRAWN BY: K.S.F., K.J.L.	FIGURE 7
SCALE: 1" = 500'	DRAWING #:
DATE: MARCH 09, 2005	SHEET 1 OF 1 REV. _____



CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2004\Area11-2004.DWG	
ENERGY WEST MINING COMPANY HUNTINGTON, UTAH 84528	
2004 SUBSIDENCE - AREA 11	
Deer Creek Mine C & D North Panels Cottonwood 11th Right Panel	
DRAWN BY: K.S.F., K.J.L.	FIGURE 7
SCALE: 1" = 500'	DRAWING #:
DATE: MARCH 09, 2005	SHEET 1 OF 1 REV. _____



AREA 13

CAD FILE NAME/DISK#: J:\GEO\SUBSIDIENCE\2004\Area13-2004.DWG

**ENERGY WEST  
MINING COMPANY**  
HUNTINGTON, UTAH 84528

**2004 SUBSIDIENCE - AREA 13  
DES-BEE-DOVE MINES  
SOUTHERN AREAS**

DRAWN BY:	K.S.F., K.J.L.
SCALE:	1" = 500'
DATE:	MARCH 09, 2005
DRAWING #:	
SHEET	1 OF 1
REV.	

82-51

N 358,000

E 2,110,000

E 2,116,000

E 2,112,000

Deseret 2nd East  
Little Dove 3rd East

Little Dove 1st East

FAULT

FAULT

FAULT



PROFILE

PROFILE

PROFILE

PROFILE

PROFILE

Deseret Mine

Deseret 1st North

Little Dove 4th North

Little Dove 1st West

Deseret 1st West

Deseret 2nd North

Little Dove 2nd North

Deseret 1st North

FAULT

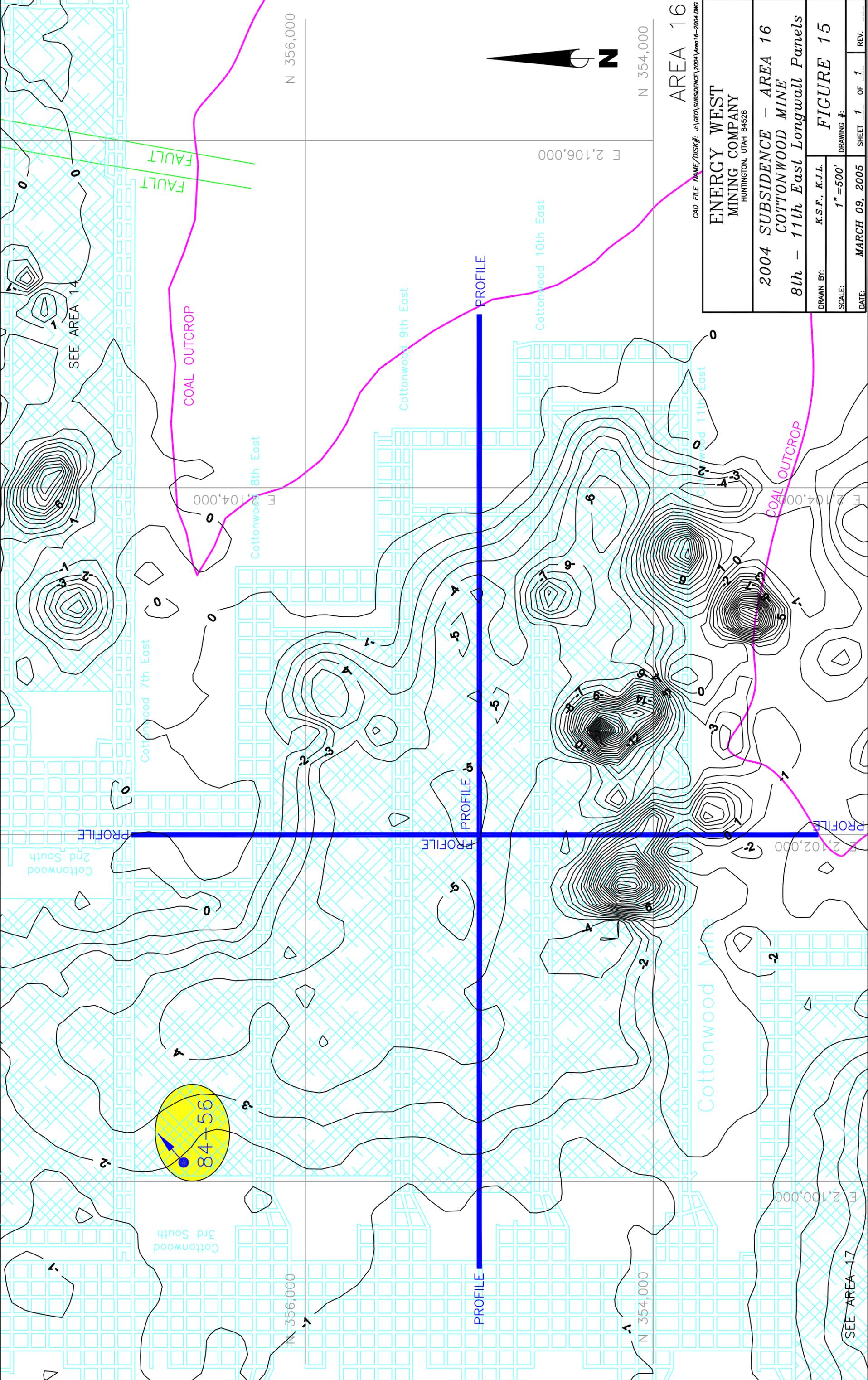
FAULT

Wilberg Mine

Dear Creek Mine

Wilberg 1st Right

Dear Creek 9th East



AREA 16

CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2004\Area16-2004.DWG	
<b>ENERGY WEST MINING COMPANY</b> HUNTINGTON, UTAH 84528	
<b>2004 SUBSIDENCE - AREA 16</b> <b>COTTONWOOD MINE</b> <b>8th - 11th East Longwall Panels</b>	
DRAWN BY: K.S.F., K.J.L.	DRAWING #: <b>FIGURE 15</b>
SCALE: 1" = 500'	SHEET 1 OF 1
DATE: MARCH 09, 2005	REV.

SEE AREA 17

SEE AREA 14

84-56

PROFILE

COAL OUTCROP

COAL OUTCROP

FAULT

FAULT

Cottonwood 7th East

Cottonwood 8th East

Cottonwood 9th East

Cottonwood 10th East

Cottonwood 11th East

Cottonwood 3rd South

Cottonwood 2nd South

Cottonwood Mine

N 356,000

N 354,000

E 2,106,000

E 2,100,000

E 2,104,000

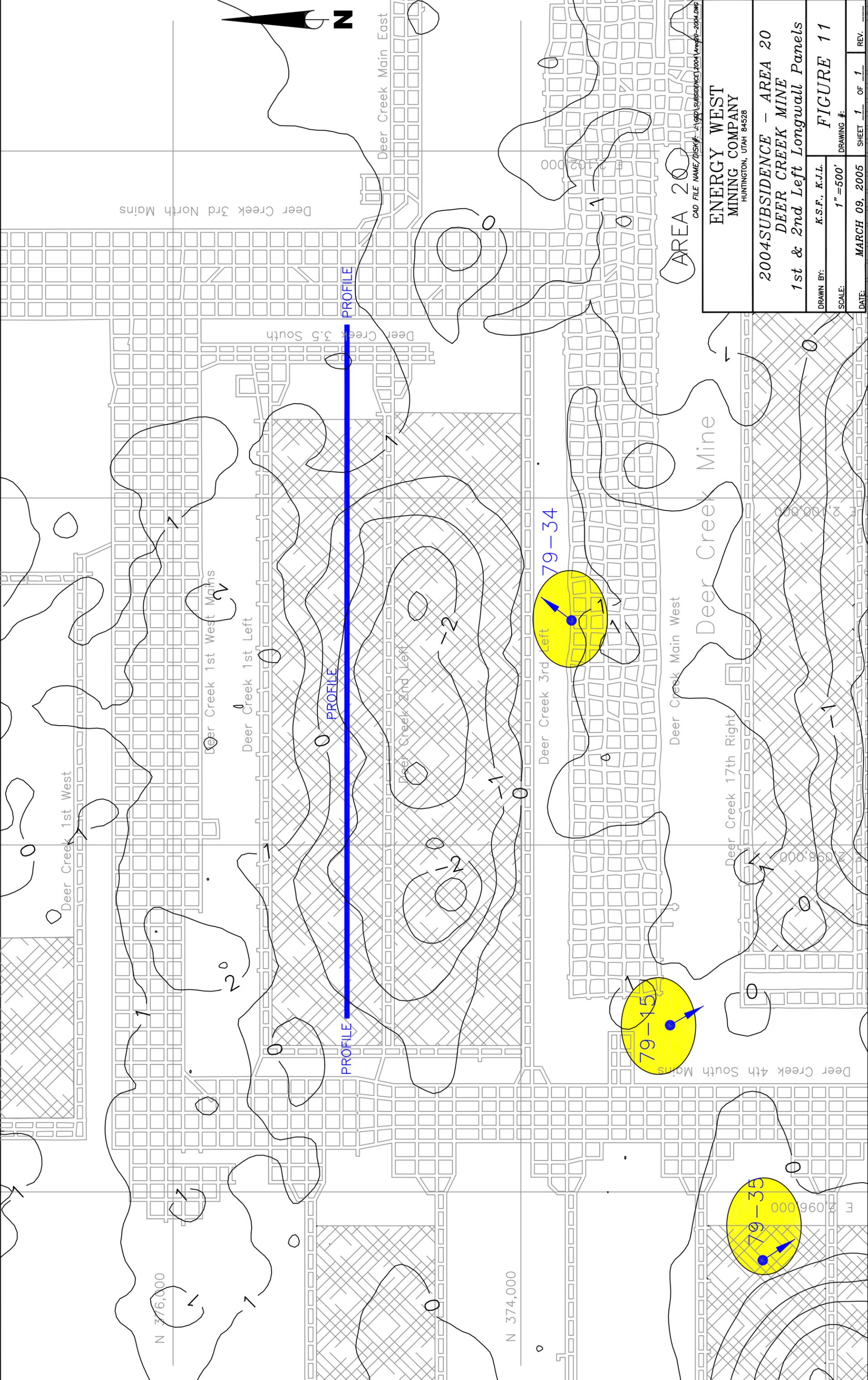
E 2,102,000

N 356,000

N 354,000

SEE AREA 14

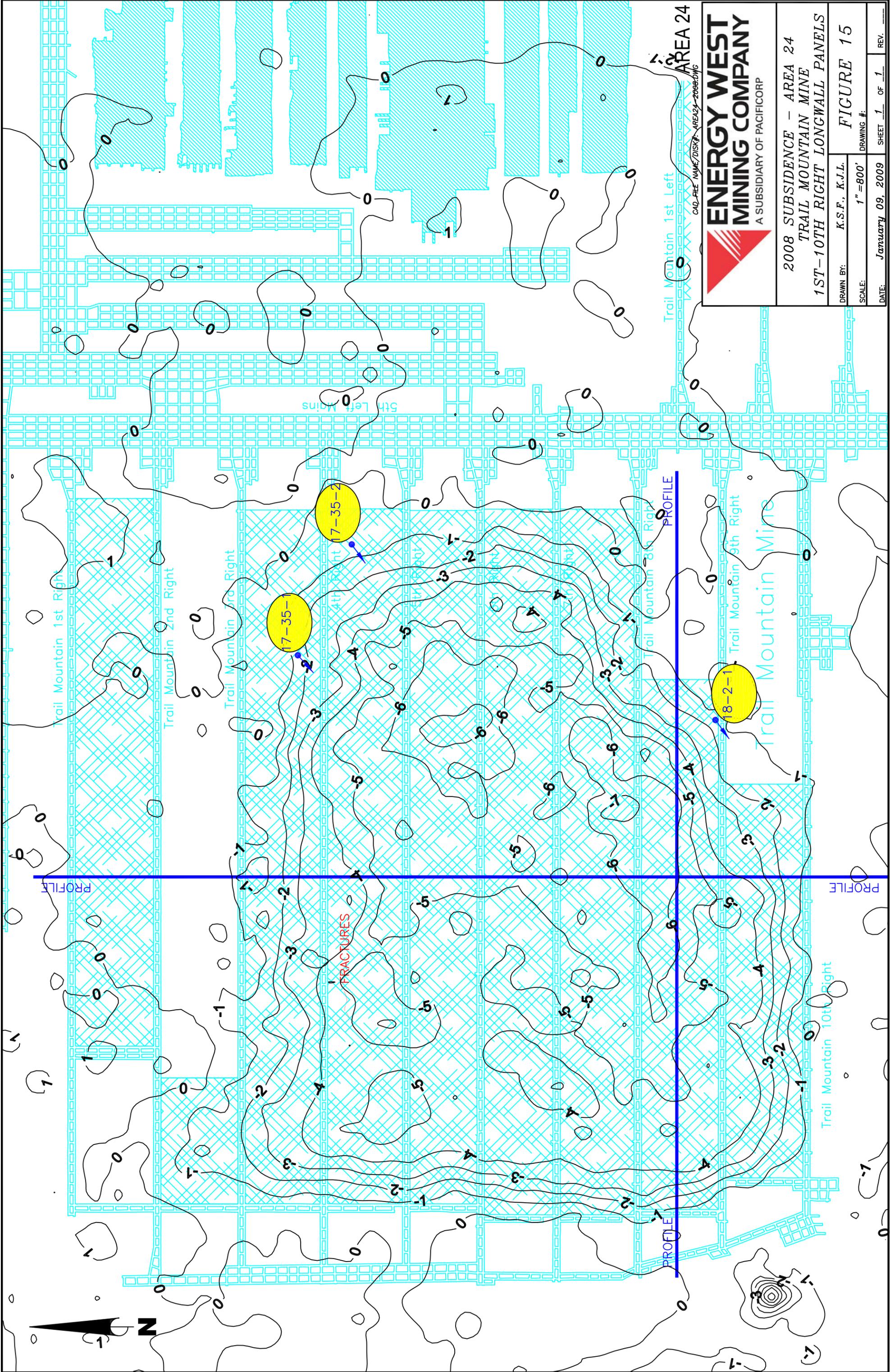
SEE AREA 17



AREA 20

CAD FILE NAME/DISK#: J:\9001 SUBSIDENCE\2004\area20-2004.dwg

<b>ENERGY WEST MINING COMPANY</b> HUNTINGTON, UTAH 84528	
2004SUBSIDENCE - AREA 20 DEER CREEK MINE 1st & 2nd Left Longwall Panels	
DRAWN BY:	K.S.F., K.J.L.
SCALE:	1" = 500'
DATE:	MARCH 09, 2005
DRAWING #:	FIGURE 11
SHEET 1	OF 1
REV.	

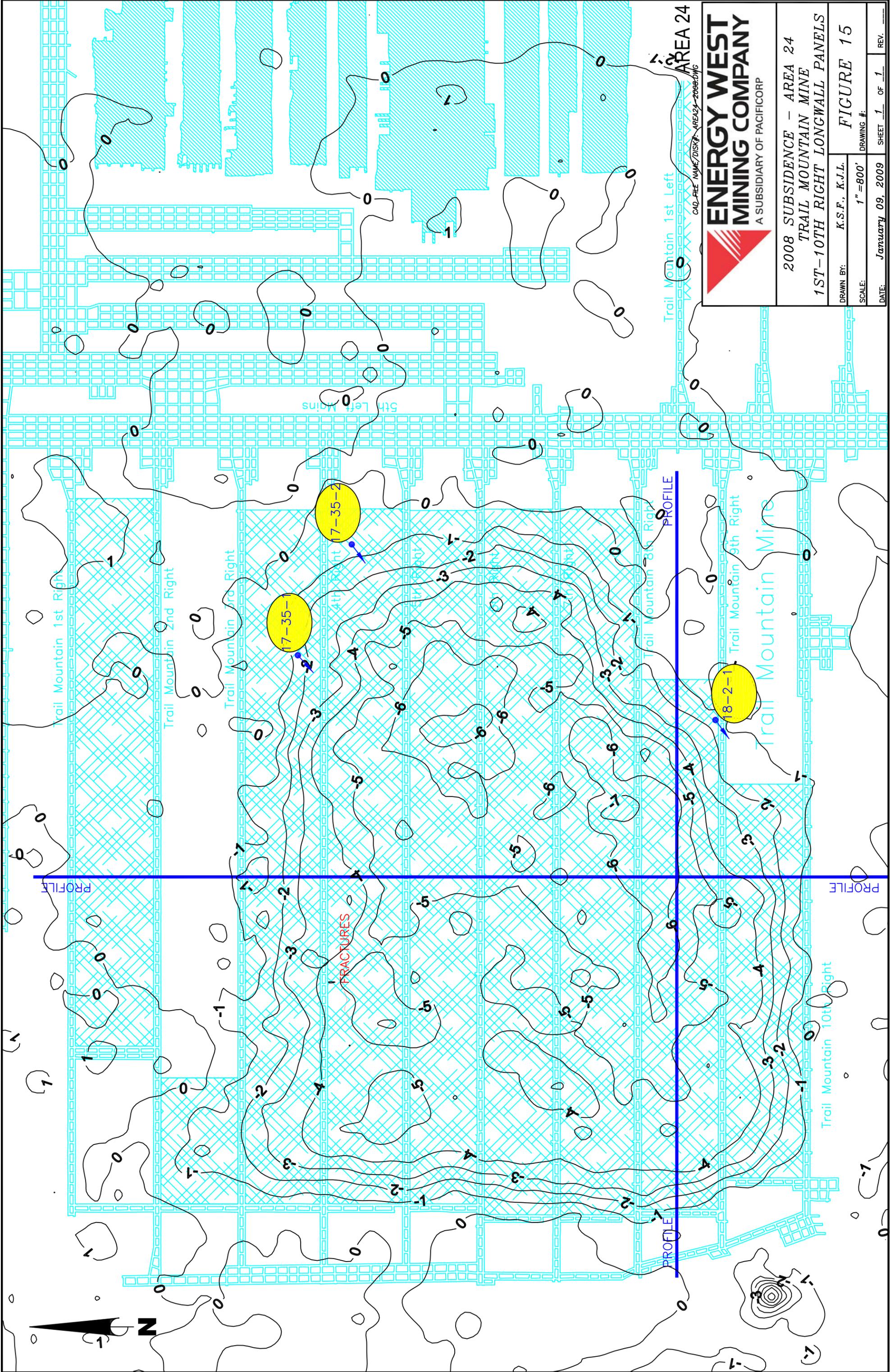


Trail Mountain 1st Left  
 AREA 24  
 CAD FILE NAME/DISK# AREA24-2008.DWG



2008 SUBSIDENCE - AREA 24  
 TRAIL MOUNTAIN MINE  
 1ST-10TH RIGHT LONGWALL PANELS

DRAWN BY:	K.S.F., K.J.L.	DRAWING #:	FIGURE 15
SCALE:	1" = 800'		
DATE:	January 09, 2009	SHEET 1	OF 1
			REV. _____



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

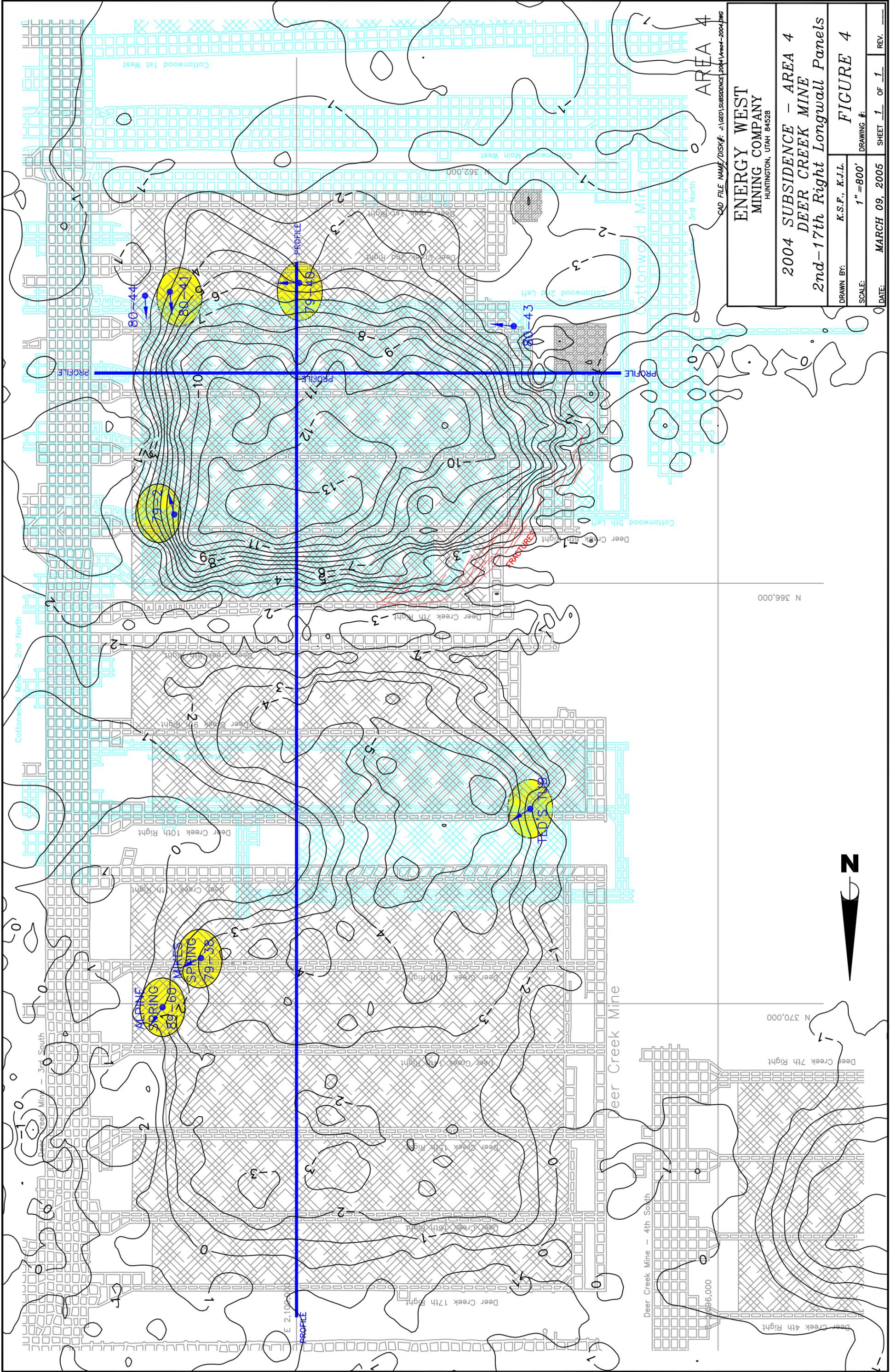
2008 SUBSIDENCE - AREA 24  
TRAIL MOUNTAIN MINE  
1ST-10TH RIGHT LONGWALL PANELS

DRAWN BY: K.S.F., K.J.L.  
SCALE: 1" = 800'  
DATE: January 09, 2009

CAD FILE NAME/DISK# AREA24-2008.DWG

AREA 24

FIGURE 15  
DRAWING #:  
SHEET 1 OF 1  
REV. \_\_\_\_\_



CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2004\Area4-2004.dwg

**ENERGY WEST  
MINING COMPANY**  
HUNTINGTON, UTAH 84528

**2004 SUBSIDENCE - AREA 4  
DEER CREEK MINE  
2nd-17th Right Longwall Panels**

DRAWN BY:	K.S.F., K.J.L.
SCALE:	1" = 800'
DATE:	MARCH 09, 2005
SHEET	1 OF 1
REV.	

FIGURE 4



AREA 4

N 366,000

N 370,000

N 366,000

E 2,100

Cottonwood Mine - 2nd North

Deer Creek Mine - 3rd South

Deer Creek Mine

Deer Creek Mine - 4th South

Deer Creek 4th Right

Deer Creek 7th Right

Deer Creek 17th Right

Deer Creek 16th Right

Deer Creek 15th Right

Deer Creek 14th Right

Deer Creek 13th Right

Deer Creek 12th Right

Deer Creek 11th Right

Deer Creek 10th Right

Deer Creek 9th Right

Deer Creek 8th Right

Deer Creek 7th Right

Deer Creek 6th Right

Deer Creek 5th Right

Deer Creek 4th Right

Deer Creek 3rd Right

Deer Creek 2nd Right

Cottonwood 2nd Left

Cottonwood 1st West

80-44

80-41

79-15

80-43

89-160

79-38

79-15

FRACTURE

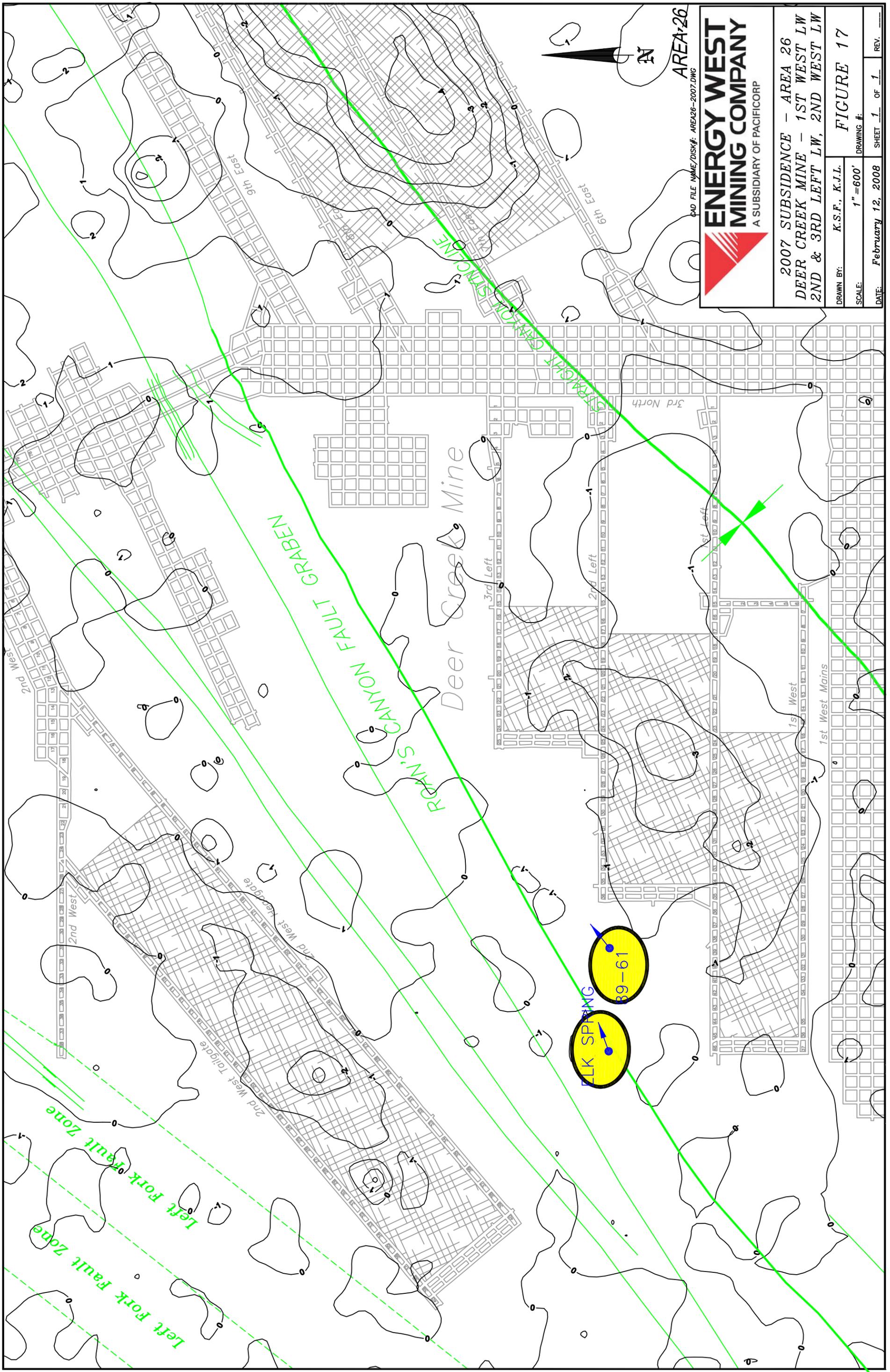
PROFILE

PROFILE

PROFILE

PROFILE

PROFILE



AREA 26

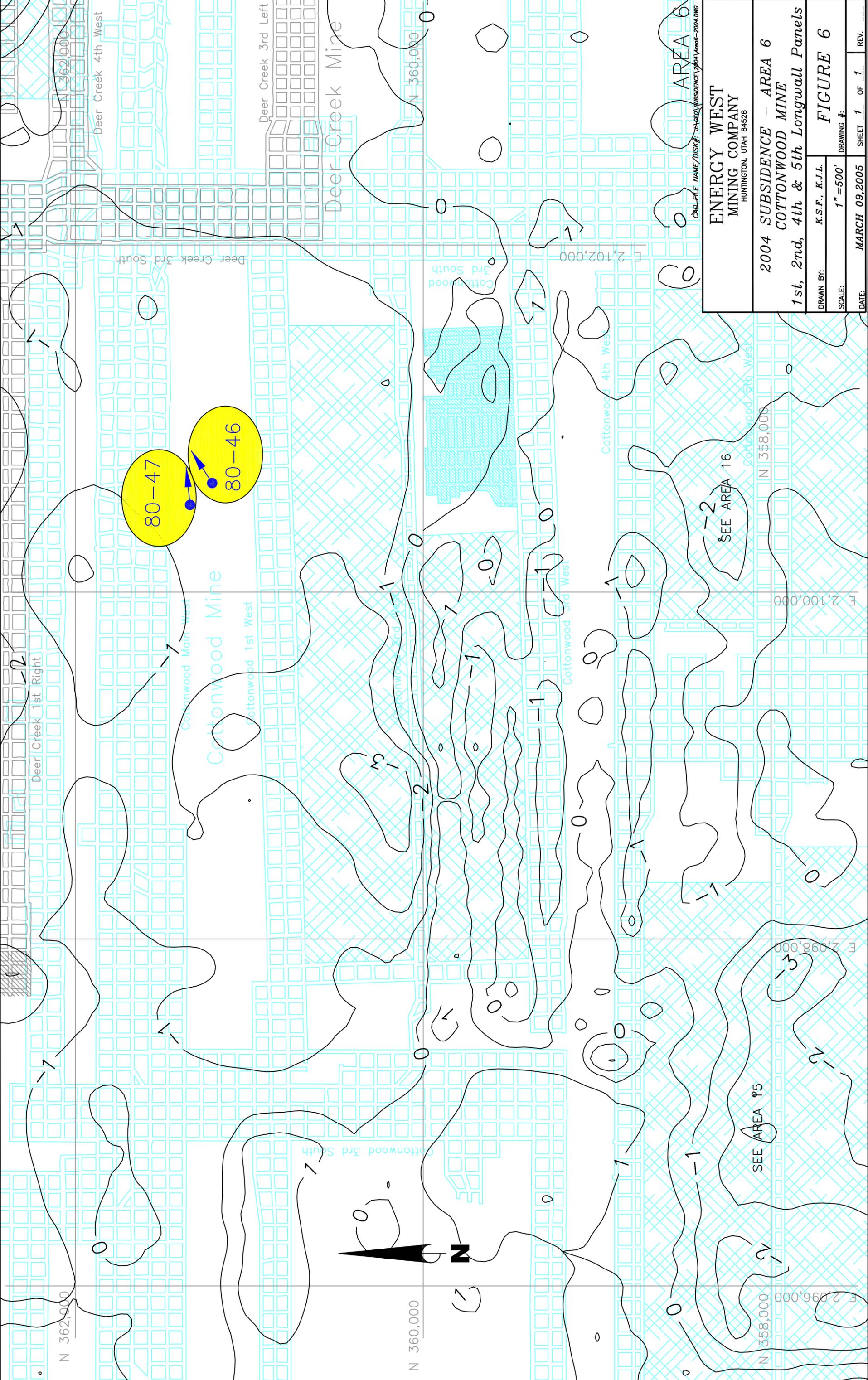
CAD FILE NAME/DISK#: AREA26-2007.DWG



2007 SUBSIDENCE - AREA 26  
DEER CREEK MINE - 1ST WEST LW  
2ND & 3RD LEFT LW, 2ND WEST LW

DRAWN BY:	K.S.F., K.J.L.	DRAWING #:	FIGURE 17
SCALE:	1" = 600'		
DATE:	February 12, 2008		





ENERGY WEST  
MINING COMPANY  
HUNTINGTON, UTAH 84528

2004 SUBSIDENCE - AREA 6  
COTTONWOOD MINE  
1st, 2nd, 4th & 5th Longwall Panels

DRAWN BY: K.S.F., K.J.L.  
SCALE: 1" = 500'  
DATE: MARCH 09, 2005

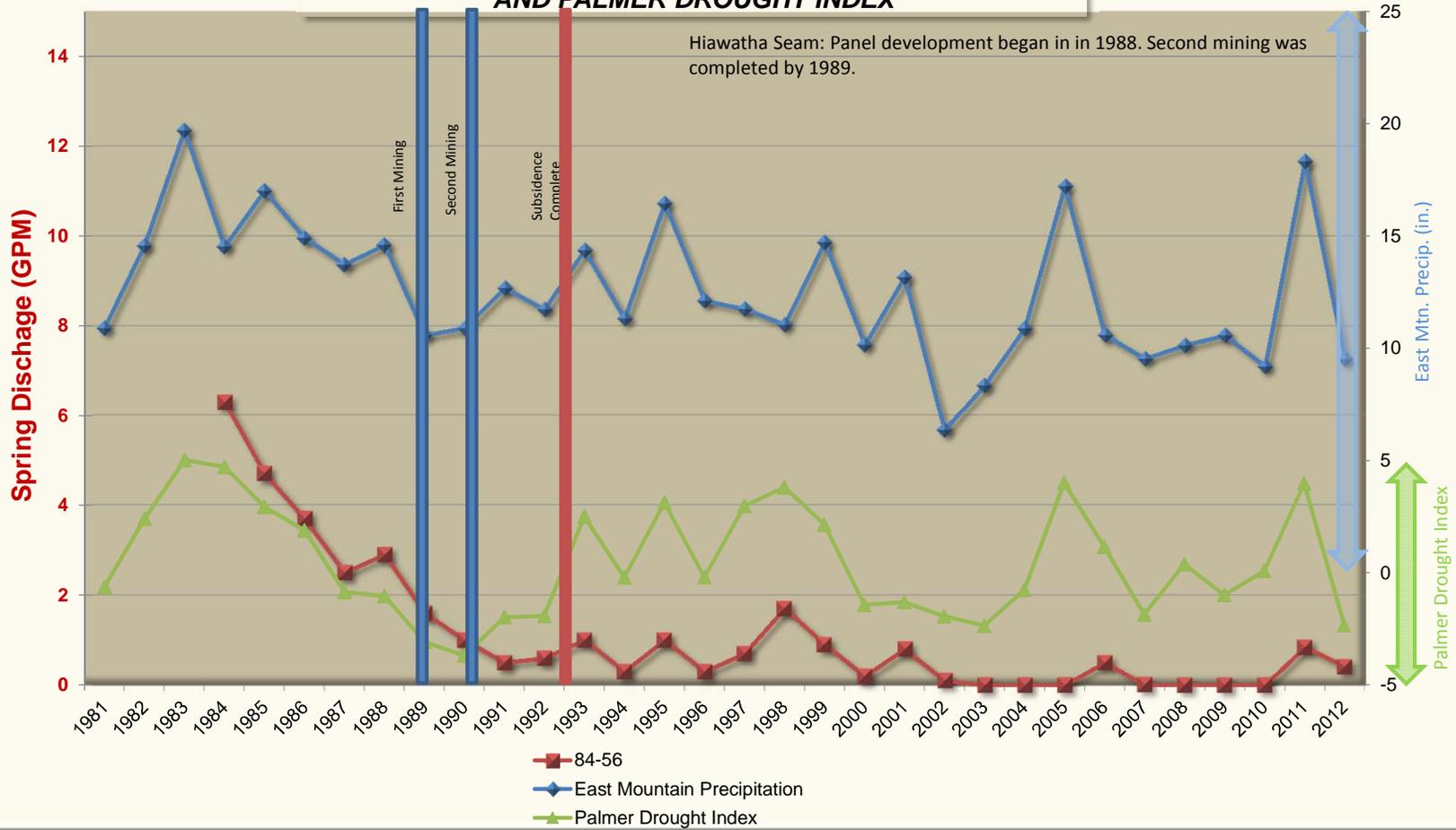
DRAWING #:  
SHEET 1 OF 1  
REV.

FIGURE 6

# EAST MOUNTAIN SPRINGS

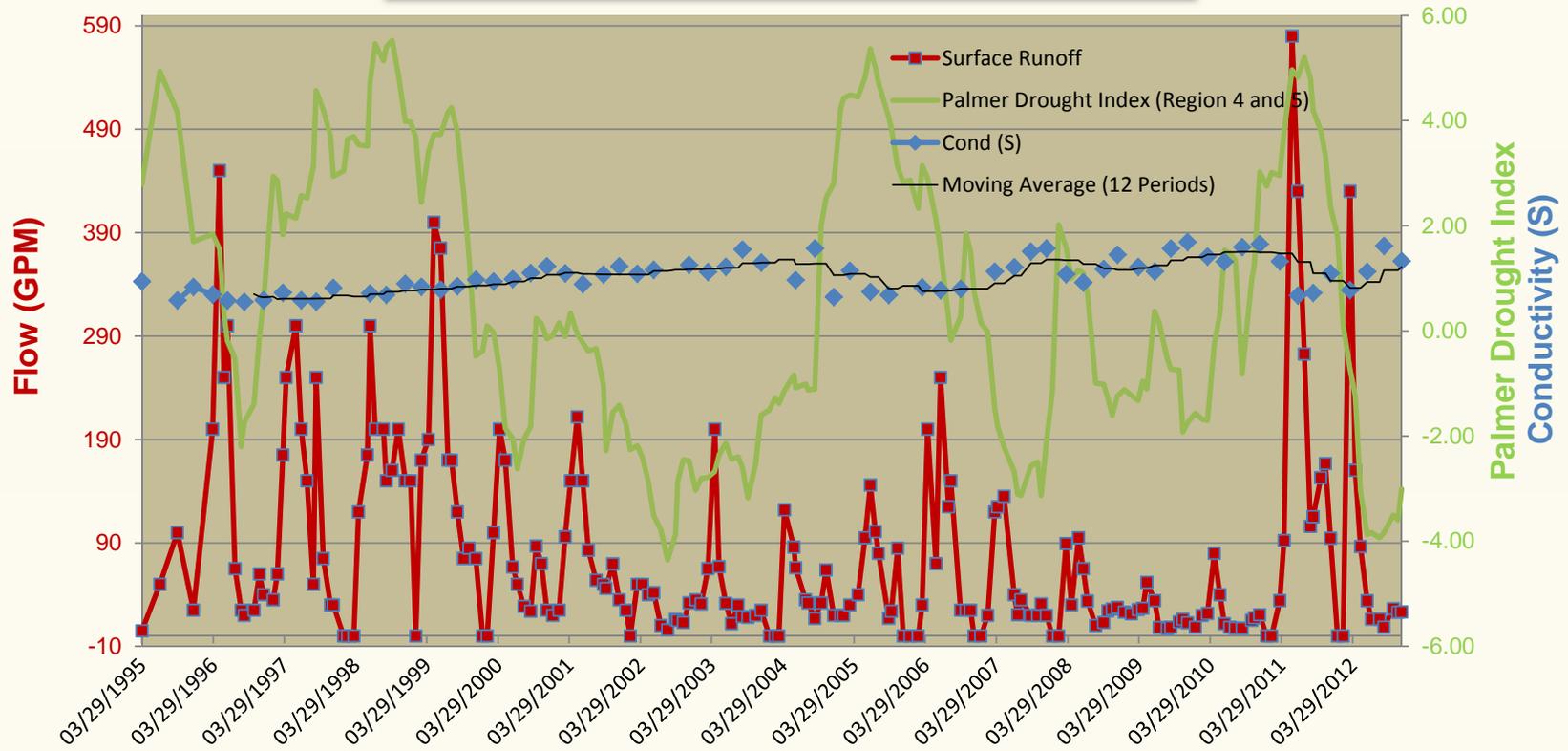
## SPRING: 84-56 vs. PRECIPITATION

### PEAK FLOW (JULY) vs. EAST MOUNTAIN WEATHER STATION AND PALMER DROUGHT INDEX



# Trail Mountain Surface Runoff T-19

Flow vs. Palmer Drought Index



**Location:** Section 21, Township 17 South, Range 6 East, SLB&M. This site is outside the Trail Mountain mine permit boundary and within the new State Lease ML-51191. The lessee of this lease is PacifiCorp's Fossil Rock Fuel.

**Lease Association:** This site is associated with State Lease ML-51191. There are currently no mining plans available for this lease.

**Subsidence:** None

**Water Data:** Water quality data is included for spring 17-21-1. Data show insignificant variances of quality throughout history. Historic flow data has been collected since 1987 and has continued through 2012. This information is found on the following page where July spring flow is plotted against precipitation of the East Mountain weather station, as well as, the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Spring flow shows a positive correlation with precipitation.

**Justification for removal from monitoring:** Site 17-21-1 has been monitored by Energy West Mining Company since 1993. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data has not indicated such impacts to the site. This site is not within 1 mile of Trail Mountain mine workings. Therefore, it is requested that the site be removed from the monitoring program.

**Location:** Section 22, Township 17 South, Range 6 East, SLB&M. This site is outside the Trail Mountain mine permit boundary and within the new State Lease ML-51191. The lessee of this lease is PacifiCorp's Fossil Rock Fuel.

**Lease Association:** This site is associated with State Lease ML-51191. There are currently no mining plans available for this lease.

**Subsidence:** None

**Water Data:** Water quality data is included for spring 17-22-1. Data show insignificant variances of quality throughout history. Historic flow data has been collected since 1987 and has continued through 2012. This information is found on the following page where July spring flow is plotted against precipitation of the East Mountain weather station, as well as, the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Spring flow shows a positive correlation with precipitation.

**Justification for removal from monitoring:** Site 17-22-1 has been monitored by Energy West Mining Company since 1993. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data has not indicated such impacts to the site. This site is not within 1/2 mile of Trail Mountain mine workings. Therefore, it is requested that the site be removed from the monitoring program.

**Location:** Section 35, Township 17 South, Range 6 East, SLB&M. This site is outside the current Trail Mountain mine permit boundary and outside any federal coal lease.

**Lease Association:** The springs 17-35-1 and 17-35-2 are located within the former Federal lease UTU-64375 which PacifiCorp was the lessee. In 2009, PacifiCorp applied for partial relinquishment of leases UTU-64375 and UTU-49332 (refer to January 5, 2009 application document “Partial Relinquishment, Federal Coal Lease, UTU-64375” and “Partial Relinquishment, Federal Coal Lease, UTU-49332”) as all reserves had been mined and subsidence was substantially complete. The BLM retroactively approved partial relinquishment as of January 9, 2009.

**Subsidence:** Mining in the 5<sup>th</sup> Left Mains occurred in 1990 and 1991 and was conducted by Atlantic Richfield Company (ARCO), Mountain Coal Company, Trail Mountain #9. After the purchase of Trail Mountain Mine by PacifiCorp in 1992, PacifiCorp completed development of the 5<sup>th</sup> Left Mains further to the south and began development of the 1<sup>st</sup> through 5<sup>th</sup> East gateroads beginning in 1995. Development of the 10<sup>th</sup> Right gateroads was started in 1997. Within the area of the springs (within a 1/2 mile diameter), panel development of the 5<sup>th</sup> Right through 2<sup>nd</sup> Right gateroads began in 1998 and 1999. Panel extraction began in 5<sup>th</sup> Right in 1999. The 5<sup>th</sup> Right, 4<sup>th</sup> Right, and 3<sup>rd</sup> Right panels were completely extracted; however, the 2<sup>nd</sup> Right panel was abandoned in 2000 after retreating only 1,200 feet due to poor mining conditions. The 1<sup>st</sup> Right panel was extracted in 2001.

At the completion of panel extraction of the 5<sup>th</sup> Right through 1<sup>st</sup> Right panels, a maximum of 6 feet of subsidence had occurred. However, only approximately 2 feet of subsidence has been reported in the area of the springs.

**Water Data:** As mentioned above, PacifiCorp purchased the Trail Mountain Mine in 1992. Its staff began monitoring the surface and groundwater sites in 1993. PacifiCorp could not verify any quantity or quality data prior to the time of purchase. Therefore, for the purposes of this document, data for Trail Mountain Mine monitoring sites begins in 1993 and extends through 2012. Water quality and quantity data is included for spring 17-35-1. Spring 17-35-2 has never reported flow (refer to flow charts).

Water quality shows little variation between pre-mining and post-mining operations. Flow data however, show a significant reduction in flow from 1997 to 2001. Two explanations are needed

here. First, as illustrated on the Flow vs. Precipitation chart, spring discharge from 17-35-1 closely mimics the Palmer Drought Index between the years 1992 and 2000. Beginning in 1999, the region started experiencing drought conditions. These drought conditions persisted until 2004. Flow had peaked (3.3 gpm) from spring 17-35-1 in 1997. However, flow steadily decreased until it discontinued its flow in 2000. The flow at 17-35-1 never recovered even though the indices indicated a wet cycle beginning again in 2004.

Secondly, during the occurrence of drought conditions between the years 1999 and 2004, the grazing permittee attempted to redevelop this spring and associated trough. Redevelopment activities were conducted in 2000. These activities included installation of a pipeline and refurbishment of the trough. After redevelopment of the spring, there has been no report of discharge from 17-35-1, however, the erosion control contour ditches adjacent to the trough were saturated but allowed no point for measurement. Spring 17-35-2 is located above a small man made pond. This site has no evidence of flow.

**Justification for removal from monitoring:** Sites 17-35-1 and 17-35-2 has been monitored by Energy West Mining Company since 1992. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data has not indicated such impacts to the site. This site is not within the Trail Mountain Mine permit area or federal coal lease. Therefore, it is requested that the site be removed from the monitoring program.

**Location:** Section 2, Township 18 South, Range 6 East, SLB&M. This site is outside the Trail Mountain mine permit boundary and outside any Federal coal lease.

**Lease Association:** The spring 18-2-1 is located within the former federal coal lease UTU-64375. PacifiCorp was the lessee. In 2009, PacifiCorp applied for partial relinquishment of lease UTU-64375 and UTU-49332 (refer to January 5, 2009 application document “Partial Relinquishment, Federal Coal Lease, UTU-64375” and “Partial Relinquishment, Federal Coal Lease, UTU-49332”) as all reserves had been mined and subsidence was substantially complete. The BLM retroactively approved partial relinquishment as of January 9, 2009.

**Subsidence:** Panel development began with the advancement of the 8<sup>th</sup> and 9<sup>th</sup> Right gateroads in 1996. Panel extraction began in the 9<sup>th</sup> Right panel in 1997. Extraction of the 8<sup>th</sup> Right panel followed and was completed in 1998. Subsidence within this vicinity shows a maximum of approximately 6 feet. All subsidence is directly west of the spring. Extraction of both panels stopped short (1600 feet in 8<sup>th</sup> Right and 2600 feet in 9<sup>th</sup> Right) because of poor coal quality found in these two panels.

**Water Data:** Water quality data is included for site 18-2-1. Data show insignificant variances of quality throughout history. Pre- and Post-mining quality is included and shows no significant changes in quality. Historic flow data has been collected since 1988 and has continued through 2012. PacifiCorp cannot verify the flow data prior to its purchase of the Trail Mountain Mine in 1992. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Spring flow shows a positive correlation with precipitation.

**Justification for removal from monitoring:** Site 18-2-1 has been monitored by Energy West Mining Company since 1992. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data has not indicated such impacts to the site. This site is not within PacifiCorp’s logical mining unit, nor its permit boundary. Therefore, it is requested that the site be removed from the monitoring program.

**Location:** Section 12, Township 17 South, Range 7 East, SLB&M. The site is located within the Deer Creek Mine permit boundary and situated within the confines of the Roans Canyon Fault Graben.

**Lease Association:** This site has been associated with federal coal lease U-084924. The lease was acquired by Utah Power & Light in 1977 from Peabody Coal Company. Because the spring is located within the confines of the Roans Canyon Fault Graben no mining has not been conducted in the immediate vicinity of the spring.

**Subsidence:** No subsidence has occurred in the area of Spring 79-10.

**Water Data:** The spring was originally chosen as a monitoring site because of its location within the fault graben and down dip from mine workings. Its location allowed the permittee to monitor quantity and quality parameters as related to its mining in the general area. Historic water quality data is included for spring 79-10. Data show no abnormalities in the water quality parameter for this area of East Mountain. Historic flow data has been collected since 1979 and has continued through 2012. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as, the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Spring flow shows a positive correlation with precipitation. The mode of occurrence as indicated above for this site is the Roans Canyon Fault Graben. The stratigraphic location is within the North Horn Formation.

**Justification for removal from monitoring:** Site 79-10 has been monitored by Energy West Mining Company since 1979. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data has not indicated such impacts to the site.

Although this site is within a current federal coal Lease and within the mine permit boundary, its location is in the southern extents of the permit boundary where no future mining is planned. Sheba Spring, located 1900 feet north and 1300 feet east of Spring 79-10, will be retained as part of the water monitoring program of the permittee. Therefore, it is requested that the site be removed from the monitoring program.

**[PROPOSAL TO REMOVE SITE FROM WATER  
MONITORING PROGRAM]**

**East Mountain  
Spring 79-15, 79-34,  
79-35**

**Location:** Section 8, Township 17 South, Range 7 East, SLB&M. These sites are located outside the Deer Creek Mine permit boundary and outside of a current Federal Coal Lease.

**Lease Association:** Sites 79-15, 79-34, and 79-35 have been associated with federal coal lease SL-070645/U-02292. The lease was acquired by Utah Power & Light in 1977 from Peabody Coal Company. Room and pillar mining was started in 1975 in the Blind Canyon Seam below Spring 79-34. Longwall mining in the surrounding area includes the 2<sup>nd</sup> Left panels (completed in 1993) to the north, 1<sup>st</sup> thru 7<sup>th</sup> Right panels (completed in 1992) to the west and in the location of spring 79-35, and 17<sup>th</sup> Right panels (completed in 1991) to the south. There has been no second mining below springs 79-15 and 79-34.

The permittee submitted an application for the relinquishment of 1,240 acres in April 1997. In March 2006, The BLM approved (with USFS and DOGM concurrence) relinquishment of this acreage. This approval was retroactive as of the date of the submittal. There are no remaining economical recoverable coal reserves in the relinquished area.

**Subsidence:** Refer to the Supplemental Volume 1, Lease Relinquishment, tab Phase III, tab Data Report Summary for additional subsidence information. Additional data from the 2004 Annual Subsidence Report is included herein.

Subsidence in the vicinity of spring 79-35 and west of the area of springs 79-15 and 79-34 reached a maximum of less than 1 foot. The subsided areas to the north and south were of lesser extent. Subsidence was determined complete in 1994. There is no subsidence in the vicinity of springs 79-15 and 79-34 and there has been no evidence to show any impacts to quality or quantity of the spring's discharge.

**Water Data:** Since the area underlying springs 79-15 and 79-34 was mined prior to spring monitoring, no pre-mining data is available. Historic data show no abnormalities in the water quality parameters for this area of East Mountain.

Pre- and Post- water quality data is included for spring 79-35. Data show insignificant variances between pre- and post- mining quality results. Historic flow data has been collected for these springs since 1983 and has continued through 2012. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Spring flow shows a positive correlation with precipitation. The mode of occurrence for these springs are permeable fluvial channels that intersect the land surface within the stratigraphic location of the North Horn Formation.

**[PROPOSAL TO REMOVE SITE FROM WATER  
MONITORING PROGRAM]**

**East Mountain  
Spring 79-15, 79-34,  
79-35**

**Justification for removal from monitoring:** Sites 79-15, 79-34, and 79-35 have been monitored by Energy West Mining Company since 1979. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data has not indicated such impacts to the site.

Since the federal coal lease has been relinquished (with DOGM concurrence) and the sites are no longer within the boundaries of a mine permit, Energy West Mining Company retains no legal right of entry to the site, nor control of the site. Therefore, it is requested that the sites be removed from the monitoring program.

**[PROPOSAL TO REMOVE SITE FROM WATER  
MONITORING PROGRAM]**

**East Mountain  
Springs 79-2, 79-40,  
80-41**

**Location:** Sections 20 and 21, Township 17 South, Range 7 East, SLB&M. These sites are located within the Deer Creek and Wilberg/Cottonwood Mine permit boundaries.

**Lease Association:** Springs 79-2, 79-40, and 80-41 are associated with federal coal lease U-040151. PacifiCorp is the leaseholder of U-040151. Panel development off of the 3<sup>rd</sup> South Mains was started in 1982 in the Blind Canyon Seam (DC) for the 1<sup>st</sup> thru 7<sup>th</sup> Right longwall panels. These panels undermine all the above stated springs. Extraction of these panels was completed in 1986.

For development in the Hiawatha Seam (Wilberg/Cottonwood Mine) near the vicinity of the springs, the 2<sup>nd</sup> thru 6<sup>th</sup> Left longwall panel began in 1993 and was completed in 1996.

**Subsidence:** Maximum subsidence in the mined area stated above reached approximately 13 feet. This was in areas where double seam extraction took place (3<sup>rd</sup> thru 5<sup>th</sup> Right longwall panel (DC) and the 2<sup>nd</sup> thru 5<sup>th</sup> Left panel (WIL/CTW)). The attached map (2004 Annual Subsidence Report) shows the springs location relative to the maximum subsidence. Fractures were discovered in 1995 along the western extent of the 5<sup>th</sup>, 6<sup>th</sup>, and 7<sup>th</sup> Right longwall panels. The subsidence was virtually unchanged between 1995 and 2004 as shown in the subsidence profile charts attached herein. Refer to Supplemental Volume 1, Lease Relinquishment, tab Phase III, tab Data Summary Report for more detailed information.

Additional data from the 2004 Annual Subsidence Report is included herein.

**Water Data:** There are no pre-mining quality data for spring 79-2 since mining was completed prior to the development of the water monitoring program. However, historic flow data has been collected for this spring since 1981 and has continued through 2012. This information is found on the following page where July spring flow is plotted against precipitation of the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Historical water quality data is included herein.

Pre- and Post-water quality data is included for springs 79-40, and 80-41. Data show insignificant variances between pre- and post-quality results. Historic flow data has been collected since 1981 for these springs and has continued through 2012. See following pages. Spring flow shows a positive correlation with precipitation. The mode of occurrence for Spring 79-2 is permeable fluvial channels that intersect land surface. The stratigraphic location for this spring is the North Horn Formation. The mode of occurrence for 79-40 and 80-41 has not been identified. The springs are stratigraphically located in the Price River Formation.

**Justification for removal from monitoring:** Sites 79-2, 79-40, and 80-41 have been monitored by Energy West Mining Company since 1981. There have been no reported occurrences in

which mining has impacted these sites. Historic quality and quantity data has not indicated such impacts to the sites.

Although these sites are within a current federal coal lease and within the mine permit boundaries, their location is in the southern extents of the Deer Creek permit boundary where no future mining is planned. The area in the vicinity of the springs has been completely mined out in both seams of both mines. Therefore, it is requested that the site be removed from the monitoring program.

**Location:** Spring 79-26 is located in Section 17, Township 17 South, Range 7 East, SLB&M. Spring 79-32 is located in Section 19, Township 17 South, Range 7 East, SLB&M. These sites are located within the Wilberg/Cottonwood Mine permit boundary and within the federal coal lease U-083066.

**Lease Association:** The springs are associated with federal coal lease U-083066. PacifiCorp is the sublessee to the Church of Jesus Christ of Latter Day Saints who is the leaseholder of U-083066.

**Subsidence:** No coal mining activities have occurred in the underground areas below the springs.

**Water Data:** Water quality data is included for springs 79-26 and 79-32. Data show no abnormalities in the water quality parameter for this area of East Mountain. Historic flow data has been collected since 1979 and has continued through 2012. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as, the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Spring flow shows a positive correlation with precipitation. The stratigraphic location for Spring 79-26 is within the North Horn Formation. The Stratigraphic location for Spring 79-32 is the base of the Flagstaff Formation.

**Justification for removal from monitoring:** Sites 79-26 and 79-32 have been monitored by Energy West Mining Company since 1979. There have been no reported occurrences in which mining has impacted these sites. Historic quality and quantity data has not indicated such impacts to the sites.

Although these sites are within a current federal coal lease and within the Wilberg/Cottonwood Mine permit boundary, its location is not in an area where future mining is planned. Therefore, it is requested that the site be removed from the monitoring program.

**[PROPOSAL TO REMOVE SITE FROM WATER  
MONITORING PROGRAM]**

**East Mountain  
Springs 79-38, 89-60,  
Ted's Tub**

**Location:** Section 16 and 17, Township 17 South, Range 7 East, SLB&M. Historically, these sites were located within the Deer Creek Mine permit boundary; however, since relinquishment of lease SL-070645/U-02292 and U-083066, (see below) the sites now lie outside any federal coal lease or mine permit boundary.

**Lease Association:** Springs 79-38 and 89-60 were associated with federal coal lease SL-070645/U-02292. Ted's Tub was associated with Federal Coal lease U-083066. The former was acquired in 1977 by Utah Power & Light from Peabody Coal Company. The latter, PacifiCorp was the sublessee to the Church of Jesus Christ of Latter Day Saints who was leaseholder of U-083066. Panel development off of the 3<sup>rd</sup> South Mains was started in 1988 in the Blind Canyon Seam for the 12<sup>th</sup> Right through 17<sup>th</sup> Right longwall panels. Extraction of these panels was completed in 1991.

For development in the Hiawatha Seam (Wilberg/Cottonwood Mine) near the vicinity of the springs, the 9<sup>th</sup> Left longwall panel was completed in 1992

The permittee submitted an application for the relinquishment of 1,240 acres in April 1997. In March 2006, The BLM approved (with USFS and DOGM concurrence) relinquishment of this acreage. This approval was retroactive as of the date of the submittal. There are no remaining economical recoverable coal reserves in the relinquished area.

**Subsidence:** Maximum subsidence in the mined area stated above reached approximately 13 feet. However, this was in the areas where double seam extraction took place (3<sup>rd</sup> thru 5<sup>th</sup> Right longwall panel (DC) and the 2<sup>nd</sup> thru 5<sup>th</sup> Left panel (WIL/CTW)); south of springs. The attached North/South Profile (2004 Annual Subsidence Report) shows only approximately 4 feet of subsidence occurred near 79-38/89-60, and Ted's Tub. A comparison of the subsidence shown on the 1996 subsidence map to equivalent maps for years 1993, 1994, and 1995 shows subsidence was stable and complete for this area. Refer to Supplemental Volume 1, Lease Relinquishment, tab Phase III, tab Data Summary Report.

Additional data from the 2004 Annual Subsidence Report is included herein.

**Water Data:** Pre- and Post-water quality data is included for springs 79-38, 89-60, and Ted's Tub. Data show insignificant variances between pre- and post-quality results. Historic flow data has been collected since 1983 (spings 79-38, Ted's Tub) and 1989 (spring 89-60) and has continued through 2012. This information is found on the following page where July spring flow is plotted against precipitation of the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Spring flow shows a positive correlation with precipitation. The mode of occurrence for Spring 79-38 is flow along permeable strata underlain by impermeable mudstone which intersect the land surface. The stratigraphic location for 79-38 is the base of the

**[PROPOSAL TO REMOVE SITE FROM WATER  
MONITORING PROGRAM]**

**East Mountain  
Springs 79-38, 89-60,  
Ted's Tub**

North Horn Formation. No mode of occurrence has been identified for Spring 89-60. This spring is stratigraphically located in the Price River Formation. Mode of occurrence for Ted's Tub is permeable fluvial channels that intersect land surface. The stratigraphic location for this spring is the North Horn Formation.

**Justification for removal from monitoring:** Sites 79-38, 89-60, and Ted's Tub have been monitored by Energy West Mining Company since 1979. There have been no reported occurrences in which mining has impacted these sites. Historic quality and quantity data has not indicated such impacts to the sites.

Since the federal coal lease has been relinquished (with DOGM concurrence) and the sites are no longer within the boundaries of a mine permit, Energy West Mining Company retains no legal right of entry to the sites, nor control of the sites. Therefore, it is requested that these sites be removed from the monitoring program.

**Location:** Section 21, Township 17 South, Range 7 East, SLB&M. This site is located within the Deer Creek and Wilberg/Cottonwood mine permit boundaries.

**Lease Association:** Spring 80-47 is associated with federal coal lease U-040151. PacifiCorp is the sublessee to the Church of Jesus Christ of Latter Day Saints which is the leaseholder of the Federal Coal Lease. The spring is located above the coal barrier separating the Main West and 1<sup>st</sup> West Mains in the Wilberg/Cottonwood Mine. These mains were developed in 1977. Two panels south of the springs (2<sup>nd</sup> and 3<sup>rd</sup> West longwall panels) have been completely extracted from the Hiawatha Seam.

**Subsidence:** Maximum subsidence within the area of the longwall panels reached approximately 3 to 4 feet. No subsidence is reported in the vicinity of the springs. Refer to the 2004 Annual Subsidence Report data which are included herein.

**Water Data:** Pre- and Post-water quality data is included for spring 80-47. Historical data show insignificant variances between pre- and post-quality results. Historic flow data has been collected since 1981 and has continued through 2012. This information is found on the following page where July spring flow is plotted against precipitation of the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Spring flow shows a positive correlation with precipitation. The mode of occurrence for spring 80-47 is permeable fluvial channels that intersect land surface. The stratigraphic location for this spring is the North Horn Formation.

**Justification for removal from monitoring:** Site 80-47 has been monitored by Energy West Mining Company since 1980. There have been no reported occurrences in which mining has impacted these sites. Historic quality and quantity data has not indicated such impacts to the sites. Flow data shows a positive correlation with precipitation and the PHDI.

Although this site is within a current federal coal lease and within the mine permit boundaries, its location is in the southern extents of the Deer Creek and Wilberg/Cottonwood permit boundaries where no future mining is planned. Therefore, it is requested that the site be removed from the monitoring program.

**Location:** Section 26, Township 17 South, Range 7 East, SLB&M. Historically, the site was located within the Des Bee Dove Mine permit boundary; however, since relinquishment of the federal coal lease, U-02664, and reduction of the permit boundary after final reclamation of the mine site in 2001, this site now lies outside a federal coal lease, as well as the mine permit boundary.

**Lease Association:** This site was associated with federal coal lease U-02664. The lease was acquired from the Church of Jesus Christ of Latter Day Saints in 1972. Room and pillar mining began in the Little Dove Mine in 1980 in the 2<sup>nd</sup> North Mains of the Blind Canyon Seam. Retreat mining (pillaring) was completed in this area in 1986.

In the Hiawatha Seam or Deseret Mine, room and pillar mining began in 1973 in the 1<sup>st</sup> North Mains and 1981 in the 2<sup>nd</sup> North Mains. No retreat mining was conducted in this area of the Deseret Mine.

In December 1995, the BLM approved (with concurrence by USFS and DOGM) a partial relinquishment of 240 acres for U-02664. In February, 2004, the BLM accepted an additional 250 acres. Both approvals were retroactive as of April 24, 1992 (date of application). In September 2011, The BLM accepted relinquishment of the remaining 430 acres of U-02664. The final relinquishment of the remaining acreage was retroactive as of December 15, 2006.

**Subsidence:** As stated in the 2004 Subsidence Report, submitted May 2005, Area 13 of the Des Bee Dove mine site (and the area of spring 82-51) subsidence is substantially complete. Figures 41, 42, and 43 show a maximum subsidence in Area 13 of approximately 3 feet (refer to Supplemental Volume 1, Lease Relinquishment, tab Phase I&II, tab Profiles and Isograms and also included herein). There is no indication that subsidence has affected the flow quantity of spring 82-51.

**Water Data:** Historical water quality data is included for spring 82-51. Data show no abnormalities in the water quality parameters for this area of East Mountain. Historic flow data has been collected since 1983 and has continued through 2012. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Spring flow shows a positive correlation with precipitation. The mode of occurrence for this site is permeable fluvial channels that intersect the land surface within the stratigraphic location of the Price River Formation.

**Justification for removal from monitoring:** Site 82-51 has been monitored by Energy West Mining Company since 1980. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data has not indicated such impacts to the site.

Since the federal coal lease has been relinquished (with concurrence by DOGM) and the site is no longer within the boundaries of a mine permit, Energy West Mining Company retains no legal right of entry to the site, nor control of the site. Therefore, it is requested that the site be removed from the monitoring program.

**Location:** Section 15, Township 17 South, Range 7 East, SLB&M. This site is located within the Deer Creek Mine permit boundary and within the federal coal lease SL-070645/U-02292. The site was originally located within the Wilberg/Cottonwood and Deer Creek mine permit boundary. The Wilberg/Cottonwood mine permit boundary was reduced which excluded the area of spring 82-52 from its permit boundary. DOGM approved this permit boundary reduction in 2002.

**Lease Association:** This site is associated with Federal Coal lease SL-070645/U-02292. The lease was acquired by Utah Power & Light in 1977 from Peabody Coal Company. Both the Hiawatha and Blind Canyon seams have been mined in this lease. For mining areas near the spring, room and pillar mining began the Blind Canyon Seam in 1975 from Deer Creek's 2nd South Mains.

**Subsidence:** Spring 82-52 lies nearly directly over the 2<sup>nd</sup> South Mains of the Deer Creek Mine. Approximately 2 feet subsidence has been noted at this location. Refer to Supplemental Volume 1, Lease Relinquishment, tab Phase III, tab Data Summary Report for more detail.

Additional data from the 2004 Annual Subsidence Report is included herein.

**Water Data:** Pre- and Post- water quality data is included for spring 82-52. Data show insignificant variances between pre- and post- quality results. Historic flow data has been collected since 1983 and has continued through 2012. This information is found on the following page where July spring flow is plotted against precipitation of the East Mountain weather station, as well as, the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Spring flow shows a positive correlation with precipitation. The mode of occurrence for this site has not been identified. The stratigraphic location is within the Price River Formation.

**Justification for removal from monitoring:** Site 82-52 has been monitored by Energy West Mining Company since 1982. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data has not indicated such impacts to the site.

Although this site is within a current Federal Coal Lease and within the mine permit boundary, its location is in the southern extents of the permit boundary where no future mining is planned. Therefore, it is opined that the site should be removed from the monitoring program.

**Location:** Section 28, Township 17 South, Range 7 East, SLB&M. Historically, the site was located within the Wilberg/Cottonwood Mine permit; however, since relinquishment of lease U-47978, (see below) this site now lies outside any federal coal lease and mine permit boundary.

**Lease Association:** This site has been associated with federal coal lease U-47978. The lease was acquired in 1981. Mining began in 1984 and was completed in 1992. Both the development and extraction mining were conducted in this lease and within the Hiawatha Seam only. The spring has been undermined by mining operations.

In December 1995, the BLM approved (with concurrence by USFS and DOGM) a partial relinquishment of 1,347.31 acres for U-47978. The relinquishment was retroactive as of April 24, 1992 (date of application). In March 2004, the BLM again approved a partial relinquishment of 1,820.00 acres. Only 180 acres has been retained for this lease and is part of the Wilberg/Cottonwood Mine permit boundary. The second relinquishment was retroactive as of October 16, 1992.

**Subsidence:** Refer to the Supplemental Volume 1, Lease Relinquishment, tab Phase I & II, tab Data Summary Report. Monitoring shows that the area subsided up to 7 feet, but generally only 5 to 6 feet in most monitored areas, and directly beneath the spring, 2 feet. Data from the 2004 Annual Subsidence Report is included herein. There is no indication that subsidence has affected the flow quantity of Spring 84-56.

**Water Data:** Historic and Post-water quality data is included for spring 84-56. Data show insignificant variances between the historic quality and post-mining quality results. Historic flow data has been collected since 1984 and has continued through 2012. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as, the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Spring flow shows a positive correlation with precipitation. The mode of occurrence for this site is permeable fluvial channels that intersect the land surface. The stratigraphic location is within the North Horn Formation.

**Justification for removal from monitoring:** Site 84-56 has been monitored by Energy West Mining Company since 1984. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data has not indicated such impacts to the site.

Since the federal coal lease has been relinquished (with concurrence by DOGM) and the site is no longer within the boundaries of a mine permit, Energy West Mining Company retains no legal right of entry to the site, nor control of the site. Therefore, it is requested that the site be removed from the monitoring program.

[PROPOSAL TO REMOVE SITE FROM WATER  
MONITORING PROGRAM]

East Mountain  
Spring 89-61, Elk  
Spring

**Location:** Section 5, Township 17 South, Range 7 East, SLB&M. These sites are located within the Deer Creek Mine permit along the Roans Canyon Fault Graben. The two springs approximately 600 feet apart on the southern side of the graben.

**Lease Association:** This site is associated with federal coal lease U-084923. The lease (subleased by M. McKinnon) was assigned to Utah Power & Light Co. from the Peabody Coal Company in 1979.

**Subsidence:** The springs lie above an unmined area directly west of the 1<sup>st</sup> and 2<sup>nd</sup> Left longwall panels. These panels were stopped short of complete panel extraction. Monitoring shows that the area has little to no subsidence. No other subsidence data is included of these sites.

**Water Data:** Historic and post-water quality data is included for spring 89-61 and Elk Spring. Data show insignificant variances between the historic quality and post-quality results. Historic flow data has been collected since 1984 and has continued through 2012. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Spring flow shows a positive correlation with precipitation. The mode of occurrence for this site is fault controlled. The stratigraphic location is within the North Horn Formation.

**Justification for removal from monitoring:** Sites 89-61 and Elk Spring were developed for culinary use starting in 2009 by North Emery Water Users Special Services District. The spring water is diverted into a collection line and directed down canyon through a 6" waterline and to the slow sand water treatment plant in Huntington Canyon. The springs give NEWUSSD additional source capacity to meet their yearly culinary demands. Although Energy West Mining Company has monitored these sites since 1984, the data since development of the springs is irrelevant to the mining operations. Prior to development, there have been no reported occurrences in which mining has impacted these sites. Historic quality and quantity data has not indicated such impacts to the site.

Since the springs have been developed for culinary use by NEWUSSD, Energy West Mining Company retains no legal right of entry to the site, nor control of the site. Therefore, it is requested that the site be removed from the monitoring program.

**Location:** Section 16, Township 17 South, Range 7 East, SLB&M. Historically, this site was located within the Deer Creek and Wilberg/Cottonwood mine permit boundaries; however, since relinquishment of lease U-040151, (see below) the sites now lie outside any federal coal lease or mine permit boundary.

**Lease Association:** Burnt Tree spring was associated with federal coal lease U-040151. PacifiCorp was sublessee to the Church of Jesus Christ of Latter Day Saints which held the Federal Coal Lease. In April 1997, PacifiCorp applied for partial relinquishment of 700 acres from the lease as the area had been mined out or was unmineable due to adverse geologic, engineering, or safety conditions.

Two seams were mined within the vicinity of the Burnt Tree spring; the Blind Canyon Seam from Deer Creek Mine, and the Hiawatha Seam from the Wilberg/Cottonwood Mine. The spring lies directly over the 7<sup>th</sup> Right mined out longwall panel of the Hiawatha Seam (Wil/Cot) and on the southern edge of the C and D North mined out panels in the Blind Canyon Seam (DC). Refer to the profile attached herein called 2004 Subsidence – Area 11. The stated panel in the Hiawatha Seam was completed in 1993. The stated panel in the Blind Canyon Seam was completed in in 1987.

**Subsidence:** Maximum subsidence in the mined area stated above reached approximately 11 feet. However, this was in the areas where double seam extraction took place; north of the spring. The attached North/South Profile (2004 Annual Subsidence Report) shows approximately 11 feet of subsidence occurred. The West/East Profile shows approximately 10 of subsidence. Surface fractures were discovered in 1995 approximately 800 feet southeast of Burnt Tree spring. Measurements of the spring discharge throughout the summer of 1993 and 1994 indicated that the fracturing had no effect on the spring. Yearly subsidence reconnaissance indicated that subsidence was substantially complete by 1995. Refer to Supplemental Volume 1, Lease Relinquishment, tab Phase III, tab Data Summary Report.

Additional data from the 2004 Annual Subsidence Report is included herein.

**Water Data:** Pre- and Post-water quality data is included for Burnt Tree spring. Data show insignificant variances between pre- and post-quality results. Historic flow data has been collected since 1983 and has continued through 2012. This information is found on the following page where July spring flow is plotted against precipitation of the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Spring flow shows a positive correlation with precipitation. The mode of occurrence for the Burnt Tree spring is permeable fluvial channels that intersect the land surface. The stratigraphic location for Burnt Tree spring is the North Horn Formation.

**Justification for removal from monitoring:** The Burnt Tree spring has been monitored by Energy West Mining Company since 1979. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data has not indicated such impacts to the site.

Since the federal coal lease has been relinquished (with DOGM concurrence) and the site is no longer within the boundaries of a mine permit, Energy West Mining Company retains no legal right of entry, nor control of the site. Therefore, it is requested that this site be removed from the monitoring program.

**[PROPOSAL TO REMOVE SITE FROM WATER  
MONITORING PROGRAM]**

**Trail Mountain  
Surface  
Flow: T-19**

**Location:** Section 3, Township 18 South, Range 6 East, SLB&M. This site is outside the Trail Mountain mine permit boundary in Straight Canyon.

**Lease Association:** N/A.

**Subsidence:** None

**Water Data:** Water quality data is included for site T-19. Data show insignificant variances of quality throughout history. Historic flow data has been collected since 1988 and has continued through 2012. This information is found on the following page where flow is plotted against precipitation of the East Mountain weather station. The East Mountain weather station is located on the southern tip of East Mountain. The surface flow shows a positive correlation with precipitation.

**Justification for removal from monitoring:** Site T-19 has been monitored by Energy West Mining Company since 1988. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data has not indicated such impacts to the site. This site is not within PacifiCorp's logical mining unit or its permit boundary. Therefore, it is requested that the site be removed from the monitoring program.

East Mountain Spring: 84-56  
 Water Quality Data: Operational  
 Mine Association: Wilberg/Cottonwood  
 Date of Development: Hiawatha Seam: 1988  
 Date of Second Mining: Hiawatha Seam: 1999

Historical Data: 1984 - 2012					Pre-Mining Data: 1984-1986				Post-Mining Data: 1993-2012				
	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	406	266	339.02	43	No Pre-Mining Quality Data				370	268	334.23	26	BICARBONATE
CALCIUM	86.9	39.7	61.146	53					69	39.7	57.184	29	CALCIUM
CARBONATE	10	0	1.5	34					10	0	2.3077	13	CARBONATE
CHLORIDE	35	4	9.4585	41					10	4	7.6208	24	CHLORIDE
CONDUCTIVITY	680	360	554.28	53					658	505	575.69	29	CONDUCTIVITY
DISSOLVED OXYGEN	9.3	4.9	6.7692	26					9.3	5.2	6.7083	12	DISSOLVED OXYGEN
FLOW	67.1	0.08	2.3644	55					1.7	0.08	0.6407	29	FLOW
HARDNESS	387	235	290.33	52					316	235	280.5	28	HARDNESS
TOTAL IRON	3.8	0	0.4364	11					3.8	0	0.4364	11	TOTAL IRON
DISSOLVED IRON	0.2	0	0.0625	24					0.2	0	0.0955	11	DISSOLVED IRON
MAGNESIUM	42	19.8	32.822	53					35	30	33.112	29	MAGNESIUM
DISSOLVED MANGANESE	0	0	0	4					0	0	0	4	DISSOLVED MANGANESE
MANGANESE	0.2	0	0.0457	35					0.2	0	0.0869	16	MANGANESE
OIL AND GREASE				0								0	OIL AND GREASE
PH	8.42	6.7	7.478	56					7.67	7.16	7.4721	29	PH
POTASSIUM	5	0.03	1.3737	27					5	0.1	1.88	13	POTASSIUM
SET SOLIDS				0								0	SET SOLIDS
SODIUM	20.8	11.7	17.133	41					20.55	13.8	17.245	24	SODIUM
SULFATE	100	7	28.168	41					33	19	26.829	24	SULFATE
SUSPENDED SOLIDS	59	0.5	6.4348	23					24	4	8	7	SUSPENDED SOLIDS
TEMPERATURE	49.82	3.6	28.263	49					49.82	3.6	21.923	29	TEMPERATURE
TOTAL DISSOLVED SOLIDS	445	179	322.02	41					370	290	320.58	24	TOTAL DISSOLVED SOLIDS

**Trail Mountain Spring: 17-21-1 (T-8)**  
**Water Quality Data: Operational**  
**Mine Association: Trail Mountain Mine**  
**Date of Development: No mining below spring**

**Notes:**

- Out of Lease Boundary
- Out of Permit Boundary
- Not influence by mining (refer to map)

<b>Historical Data: 1987 - 2011</b>				
	<b>MAXIMUM</b>	<b>MINIMUM</b>	<b>AVERAGE</b>	<b># ANALYSIS</b>
<b>BICARBONATE</b>	438	302	387.53	51
<b>CALCIUM</b>	70	7	52.936	51
<b>CARBONATE</b>	5	0	1.1769	13
<b>CHLORIDE</b>	43.1	23	30.696	51
<b>CONDUCTIVITY</b>	882	627	717.9	48
<b>DISSOLVED OXYGEN</b>	10.3	2.1	4.7857	14
<b>FLOW</b>	5	0.06	0.7666	46
<b>HARDNESS</b>	272	207	244.33	46
<b>TOTAL IRON</b>	0.34	0	0.0945	22
<b>DISSOLVED IRON</b>	0.23	0	0.0953	19
<b>MAGNESIUM</b>	59	13	27.883	51
<b>DISSOLVED MANGANESE</b>	0	0	0	3
<b>MANGANESE</b>	0.2	0	0.0506	32
<b>OIL AND GREASE</b>				0
<b>PH</b>	8.2	6.54	7.5925	51
<b>POTASSIUM</b>	5	1	2.047	50
<b>SET SOLIDS</b>				0
<b>SODIUM</b>	70.5	12	61.334	51
<b>SULFATE</b>	40	10	17.894	51
<b>SUSPENDED SOLIDS</b>	20	0.5	5.0536	28
<b>TEMPERATURE</b>	55.2	5.8	17.432	26
<b>TOTAL DISSOLVED SOLIDS</b>	496	310	393.96	51

**Trail Mountain Spring: 17-22-1 (T-9)**  
**Water Quality Data: Operational**  
**Mine Association: Trail Mountain Mine**  
**Date of Development: No mining below spring**

**Notes:**

- Out of Lease Boundary
- Out of Permit Boundary
- Not influence by mining (refer to map)

<b>Historical Data: 1987 - 2012</b>				
	<b>MAXIMUM</b>	<b>MINIMUM</b>	<b>AVERAGE</b>	<b># ANALYSIS</b>
<b>BICARBONATE</b>	406	222	307.25	65
<b>CALCIUM</b>	107	21	46.282	65
<b>CARBONATE</b>	24.6	0	2.387	23
<b>CHLORIDE</b>	30	6.9	9.7523	65
<b>CONDUCTIVITY</b>	858	435	538.11	62
<b>DISSOLVED OXYGEN</b>	12.2	3.7	7.5467	15
<b>FLOW</b>	40	0.1	6.5046	63
<b>HARDNESS</b>	338	193	255.22	63
<b>TOTAL IRON</b>	1.6	0	0.2892	36
<b>DISSOLVED IRON</b>	0.2	0	0.0721	29
<b>MAGNESIUM</b>	69	11	34.018	65
<b>DISSOLVED MANGANESE</b>	0.053	0	0.016	18
<b>MANGANESE</b>	0.2	0	0.0439	39
<b>OIL AND GREASE</b>				0
<b>PH</b>	8.8	6.92	7.7994	65
<b>POTASSIUM</b>	5	0.05	1.4642	54
<b>SET SOLIDS</b>	0.1	0.1	0.1	1
<b>SODIUM</b>	118.4	12	20.01	65
<b>SULFATE</b>	200	11	17.675	65
<b>SUSPENDED SOLIDS</b>	112	1	22.44	25
<b>TEMPERATURE</b>	46.76	5.5	12.843	43
<b>TOTAL DISSOLVED SOLIDS</b>	420	230	292.54	65

**Trail Mountain Spring: 17-35-1 (T-15)**  
**Water Quality Data: Operational**  
**Mine Association: Trail Mountain Mine**  
**Date of Development: Hiawatha Seam: 1998**  
**Date of Second Mining: Hiawatha Seam: 1999-2000**

**Notes:**

- Cattlemen permittees attempted to redevelop spring in 2000
- Spring has not produced flow since 2001
- Pre-mining data includes data collected prior to Energy West

Historical Data: 1992 - 2012					Pre-Mining Data: -1998			
	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS
BICARBONATE	438	206	384.48	23	441	206	384.63	40
CALCIUM	56.1	30.8	41.75	23	56.1	27	41.66	40
CARBONATE	5	0.1	1.53	10	18.3	0.1	5.71	18
CHLORIDE	56	20.3	41.1	23	59	20.3	42.43	40
CONDUCTIVITY	841	686	776.61	23	970	508	766.16	37
DISSOLVED OXYGEN	11.9	4.4	7.54	14	11.9	4.4	7.54	14
FLOW	5	0.33	1.37	23	5	0.16	1.02	36
HARDNESS	255	180	235.04	23	297	180	251.94	36
TOTAL IRON	1.3	0.1	0.32	9	6.5	0.04	0.67	21
DISSOLVED IRON	0.02	0.06	0.14	10	4.74	0.05	0.48	18
MAGNESIUM	36	24.4	31.69	23	55	24.4	36.49	40
DISSOLVED MANGANESE				0				0
MANGANESE	0.2	0.02	0.1	13	0.46	0.01	0.08	33
OIL AND GREASE				0				0
PH	8.24	7.24	7.82	23	8.75	7.24	7.99	40
POTASSIUM	5	0.78	1.76	17	5	0.51	1.58	34
SET SOLIDS				0				0
SODIUM	96	67	84.34	23	97.2	12	77.09	40
SULFATE	85	32	48.69	23	85	10.3	45.25	40
SUSPENDED SOLIDS	29	1	5.85	13	488	1	66.11	28
TEMPERATURE	55.6	7.6	24.19	16	55.6	8.2	27.19	13
TOTAL DISSOLVED SOLIDS	520	310	448.09	23	520	200	438.68	40

**Trail Mountain Spring: 17-35-2 (T-16)**  
**Water Quality Data: Operational\***  
**Mine Association: Trail Mountain Mine**  
**Date of Development: Hiawatha Seam: 1998**  
**Date of Second Mining: Hiawatha Seam: 2000**

Historical Data: 1978 - 2012		No Flow Reported		
	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS
BICARBONATE				
CALCIUM				
CARBONATE				
CHLORIDE				
CONDUCTIVITY				
DISSOLVED OXYGEN				
FLOW	Damp	Dry		
HARDNESS				
TOTAL IRON				
DISSOLVED IRON				
MAGNESIUM				
DISSOLVED MANGANESE				
MANGANESE				
OIL AND GREASE				
PH				
POTASSIUM				
SET SOLIDS				
SODIUM				
SULFATE				
SUSPENDED SOLIDS				
TEMPERATURE				
TOTAL DISSOLVED SOLIDS				

\* No flow ever recorded

Trail Mountain Spring: 18-2-1 (T-6)  
 Water Quality Data: Operational  
 Mine Association: Trail Mountain Mine  
 Date of Development: Hiawatha Seam: 1996  
 Date of Second Mining: Hiawatha Seam: 1998

- Historic data includes data collected prior to Energy West Mining Company.

Historical Data: 1987 - 2012					Pre-Mining Data: 1992-1995				Post-Mining Data: 1998-2012				
	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	452	326	393.49	55	452	350	397.23	13	421	326	374.67	18	BICARBONATE
CALCIUM	80.6	44	61.84	55	67.5	45.7	58.66	13	71.5	56	63.15	18	CALCIUM
CARBONATE	5	0	1.1643	14	5	0.1	1.48	11	0	0	0	3	CARBONATE
CHLORIDE	61.7	38	45.365	55	48.7	38	44.58	13	48	38	43.18	18	CHLORIDE
CONDUCTIVITY	1256	810	974.37	52	969	810	909.85	13	1256	839	1044	18	CONDUCTIVITY
DISSOLVED OXYGEN	12.3	4.6	7.55	14	12.3	4.6	7.7	10				0	DISSOLVED OXYGEN
FLOW	18.9	0.03	3.0457	49	6	0.03	2.04	12	10.2	0.27	2.91	18	FLOW
HARDNESS	461	330	391.02	50	405	330	380.31	13	461	366	404.72	18	HARDNESS
TOTAL IRON	1.28	0	0.1632	25	1.28	0.1	0.29	9	0.06	0	0.02	3	TOTAL IRON
DISSOLVED IRON	0.2	0	0.0889	19	0.2	0.05	0.14	10	0	0	0	3	DISSOLVED IRON
MAGNESIUM	76	45.5	57.368	55	65	50	56.86	13	68.5	55	60.01	18	MAGNESIUM
DISSOLVED MANGANESE	0.005	0	0.0017	3				0	0.005	0	0.0017	3	DISSOLVED MANGANESE
MANGANESE	0.02	0	0.0464	35	0.2	0.02	0.99	13	0.003	0	0.001	3	MANGANESE
OIL AND GREASE				0				0				0	OIL AND GREASE
PH	8.15	7.01	7.742	55	8.15	7.01	7.81	13	7.6	7.28	7.49	18	PH
POTASSIUM	5	0.6	1.5574	42	5	0.6	2.41	13	1.16	0.87	1.04	9	POTASSIUM
SET SOLIDS	0.1	0.1	0.1	1			0.1	0				0	SET SOLIDS
SODIUM	81	53	66.488	55	70	53	61.65	13	75	60	67.04	18	SODIUM
SULFATE	210	80	141.22	55	210	80	131.77	13	196	131	160.57	18	SULFATE
SUSPENDED SOLIDS	560	1	34.603	29	32	2	10.75	12				0	SUSPENDED SOLIDS
TEMPERATURE	56.1	6.1	17.419	28	56.1	36.1	47.36	6	13.5	6.1	9.34	18	TEMPERATURE
TOTAL DISSOLVED SOLIDS	655	480	585.78	55	594	500	564.77	13	655	567	614.22	18	TOTAL DISSOLVED SOLIDS

**East Mountain Spring: 79-10**  
**Water Quality Data: Operational**  
**Mine Association: Deer Creek Mine**  
**Date of Development: No Developmental Mining**  
**Date of Second Mining: None**

**Historical Data: 1979 - 2012**

	<b>MAXIMUM</b>	<b>MINIMUM</b>	<b>AVERAGE</b>	<b># ANALYSIS</b>
<b>BICARBONATE</b>	370	244	305	61
<b>CALCIUM</b>	112.9	41.5	71.915	71
<b>CARBONATE</b>	18	0	1.641	39
<b>CHLORIDE</b>	20	1	4.7759	58
<b>CONDUCTIVITY</b>	605	280	487.54	72
<b>DISSOLVED OXYGEN</b>	11.4	5.5	8.1962	26
<b>FLOW</b>	32	1.1	8.8458	74
<b>HARDNESS</b>	363	200	272.96	70
<b>TOTAL IRON</b>	1.1	0	0.3037	20
<b>DISSOLVED IRON</b>	0.33	0	0.0841	29
<b>MAGNESIUM</b>	25.4	12.6	22.418	71
<b>DISSOLVED MANGANESE</b>	0.042	0	0.0125	10
<b>MANGANESE</b>	0.2	0	0.0398	42
<b>OIL AND GREASE</b>	0.1	0.1	0.1	1
<b>PH</b>	8.35	7.05	7.7016	74
<b>POTASSIUM</b>	11.8	0.17	1.6134	37
<b>SET SOLIDS</b>				0
<b>SODIUM</b>	16.5	1.47	4.8231	58
<b>SULFATE</b>	144	3	10.986	59
<b>SUSPENDED SOLIDS</b>	22	0.5	4.8913	23
<b>TEMPERATURE</b>	47.1	3.3	22.79	67
<b>TOTAL DISSOLVED SOLIDS</b>	382	200	275.93	59

**East Mountain Spring: 79-15**  
**Water Quality Data: Operational**  
**Mine Association: Deer Creek Mine**  
**Date of Development: Blind Canyon Seam: 1975**  
**Date of Second Mining: None**

<b>Historical Data: 1979 - 2011</b>				
	<b>MAXIMUM</b>	<b>MINIMUM</b>	<b>AVERAGE</b>	<b># ANALYSIS</b>
<b>BICARBONATE</b>	432	252	320.88	58
<b>CALCIUM</b>	328	59.4	79.521	57
<b>CARBONATE</b>	8	0	1.6087	23
<b>CHLORIDE</b>	20	2	5.0321	56
<b>CONDUCTIVITY</b>	675	351	508.02	57
<b>DISSOLVED OXYGEN</b>	12.4	4.7	7.4824	17
<b>FLOW</b>	43	0.69	9.1943	58
<b>HARDNESS</b>	930	236	294.58	45
<b>TOTAL IRON</b>	2.4	0.076	0.4088	28
<b>DISSOLVED IRON</b>	0.36	0	0.0786	35
<b>MAGNESIUM</b>	41.12	16.3	24.141	57
<b>DISSOLVED MANGANESE</b>	0.026	0	0.0097	12
<b>MANGANESE</b>	0.2	0	0.0439	23
<b>OIL AND GREASE</b>	0.2	0.2	0.2	1
<b>PH</b>	8.77	7	7.6891	58
<b>POTASSIUM</b>	8	0.09	1.3286	40
<b>SET SOLIDS</b>				0
<b>SODIUM</b>	39	3.32	7.2279	57
<b>SULFATE</b>	591	1	29.272	57
<b>SUSPENDED SOLIDS</b>	399	0.5	21.977	31
<b>TEMPERATURE</b>	61.4	2.8	16.274	54
<b>TOTAL DISSOLVED SOLIDS</b>	430	214	289.45	58

**East Mountain Spring: 79-2**  
**Water Quality Data: Operational**  
**Mine Association: Deer Creek Mine/Wilberg/Cottonwood Mine**  
**Date of Development: Blind Canyon Seam: 1982, Hiawatha Seam: 1994**  
**Date of Second Mining: Blind Canyon Seam: 1986, Hiawatha Seam: 1995**

Historical Data: 1987 - 2012					Pre-Mining Data: NA			
	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS
BICARBONATE	422	278	334.67	51				
CALCIUM	109	55.7	66.937	51				
CARBONATE	10	0	1.28	25				
CHLORIDE	20	1.7	4.0196	51				
CONDUCTIVITY	629	331	545.18	51				
DISSOLVED OXYGEN	10.5	5.7	7.0647	17				
FLOW	7.5	0.36	1.9158	50				
HARDNESS	371	210	250.43	51				
TOTAL IRON	0.2	0	0.0533	15				
DISSOLVED IRON	0.29	0	0.0615	27				
MAGNESIUM	25.7	17	20.191	51				
DISSOLVED MANGANESE	0	0	0	10				
MANGANESE	0.2	0	0.0338	24				
OIL AND GREASE				0				
PH	8.5	6.8	7.4814	50				
POTASSIUM	7.9	0.07	1.0513	33				
SET SOLIDS				0				
SODIUM	43.31	5.2	27.556	51				
SULFATE	50	5	14.792	51				
SUSPENDED SOLIDS	44	1	6.3889	18				
TEMPERATURE	46.4	2.6	17.076	47				
TOTAL DISSOLVED SOLIDS	352	174	304.36	50				

**East Mountain Spring: 79-26**  
**Water Quality Data: Operational**  
**Mine Association: Wilberg/Cottonwood**  
**Date of Development: No Developmental Mining**  
**Date of Second Mining: None**

<b>Historical Data: 1979 - 2012</b>				
	<b>MAXIMUM</b>	<b>MINIMUM</b>	<b>AVERAGE</b>	<b># ANALYSIS</b>
<b>BICARBONATE</b>	368	249	320.46	35
<b>CALCIUM</b>	127	33.5	54.45	37
<b>CARBONATE</b>	30	0	4.65	20
<b>CHLORIDE</b>	10	4	6.44	32
<b>CONDUCTIVITY</b>	615	431	523.00	38
<b>DISSOLVED OXYGEN</b>	9.7	5.1	7.61	10
<b>FLOW</b>	10	0.33	3.34	40
<b>HARDNESS</b>	329	198	265.74	35
<b>TOTAL IRON</b>	2.7	0.05	0.46	16
<b>DISSOLVED IRON</b>	0.46	0	0.14	16
<b>MAGNESIUM</b>	37.1	9	31.16	37
<b>DISSOLVED MANGANESE</b>	0.09	0.002	0.02	8
<b>MANGANESE</b>	0.04	0	0.02	19
<b>OIL AND GREASE</b>	0.1	0.1	0.10	1
<b>PH</b>	8.6	6.9	8.10	41
<b>POTASSIUM</b>	7	0.3	1.51	21
<b>SET SOLIDS</b>				
<b>SODIUM</b>	29	11.6	15.52	32
<b>SULFATE</b>	120	8	19.59	33
<b>SUSPENDED SOLIDS</b>	39.4	2	15.42	13
<b>TEMPERATURE</b>				
<b>TOTAL DISSOLVED SOLIDS</b>	482	240	292.94	33

**East Mountain Spring: 79-32**  
**Water Quality Data: Operational**  
**Mine Association: Wilberg/Cottonwood**  
**Date of Development: No Developmental Mining**  
**Date of Second Mining: None**

<b>Historical Data: 1979 - 2012</b>				
	<b>MAXIMUM</b>	<b>MINIMUM</b>	<b>AVERAGE</b>	<b># ANALYSIS</b>
<b>BICARBONATE</b>	607	338	479.74	27
<b>CALCIUM</b>	261	39.7	90.81	26
<b>CARBONATE</b>	25	0	4.00	10
<b>CHLORIDE</b>	28.7	14	17.99	26
<b>CONDUCTIVITY</b>	1489	700	896.08	26
<b>DISSOLVED OXYGEN</b>	12.3	5.1	7.40	5
<b>FLOW</b>	3	0.23	0.98	27
<b>HARDNESS</b>	698	338	429.77	22
<b>TOTAL IRON</b>	6.87	0.2	2.05	17
<b>DISSOLVED IRON</b>	2.99	0	0.36	16
<b>MAGNESIUM</b>	66.7	14.2	52.17	26
<b>DISSOLVED MANGANESE</b>	0.341	0.018	0.09	11
<b>MANGANESE</b>	0.14	0.003	0.05	9
<b>OIL AND GREASE</b>	0.6	0.6	0.60	1
<b>PH</b>	8.29	6.95	7.83	27
<b>POTASSIUM</b>	8	0.95	2.36	26
<b>SET SOLIDS</b>				
<b>SODIUM</b>	45.55	21	35.52	26
<b>SULFATE</b>	412	24	95.93	27
<b>SUSPENDED SOLIDS</b>	168.8	0.5	22.88	10
<b>TEMPERATURE</b>	56	4.4	17.06	27
<b>TOTAL DISSOLVED SOLIDS</b>	979	327	529.11	27

**East Mountain Spring: 79-34**  
**Water Quality Data: Operational**  
**Mine Association: Deer Creek Mine**  
**Date of Development: Blind Canyon Seam: 1974**  
**Date of Second Mining: None**

<b>Historical Data: 1979 - 2012</b>				
	<b>MAXIMUM</b>	<b>MINIMUM</b>	<b>AVERAGE</b>	<b># ANALYSIS</b>
<b>BICARBONATE</b>	459	263	343.46	37
<b>CALCIUM</b>	144	37.9	77.315	36
<b>CARBONATE</b>	5	0	0.5714	14
<b>CHLORIDE</b>	10	2	6.2029	34
<b>CONDUCTIVITY</b>	763	420	595.81	36
<b>DISSOLVED OXYGEN</b>	12.3	4.5	7.62	5
<b>FLOW</b>	56.7	0.28	10.894	37
<b>HARDNESS</b>	363	216	308.14	29
<b>TOTAL IRON</b>	34.4	0	2.6168	25
<b>DISSOLVED IRON</b>	1.82	0	0.1278	25
<b>MAGNESIUM</b>	40.9	21.4	31.353	36
<b>DISSOLVED MANGANESE</b>	0.878	0	0.1026	18
<b>MANGANESE</b>	0.1	0	0.0164	17
<b>OIL AND GREASE</b>	0.7	0.7	0.7	1
<b>PH</b>	7.92	6.7	7.5627	37
<b>POTASSIUM</b>	7.5	0.5	1.4243	30
<b>SET SOLIDS</b>				0
<b>SODIUM</b>	20.3	5.44	10.538	36
<b>SULFATE</b>	251	2	28.765	37
<b>SUSPENDED SOLIDS</b>	61	0.5	18.462	13
<b>TEMPERATURE</b>	46.3	2.8	10.303	36
<b>TOTAL DISSOLVED SOLIDS</b>	472	264	339.27	37

East Mountain Spring: 79-35  
 Water Quality Data: Operational  
 Mine Association: Deer Creek Mine  
 Date of Development: Blind Canyon Seam: 1990  
 Date of Second Mining: Blind Canyon Seam: 1990

Historical Data: 1979 - 2012					Pre-Mining Data: 1979-1990				Post-Mining Data: 1992-2012				
	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	355	236	290.22	59	355	272	308.67	12	336	236	285	45	BICARBONATE
CALCIUM	192	59.8	79.94	66	192	70	95.314	14	98.8	59.8	75.262	48	CALCIUM
CARBONATE	7	0	1.125	32	1	1	1	12	7	0	1.2353	17	CARBONATE
CHLORIDE	40	0.9	3.7786	56	10	2.5	4.2091	11	15	0.9	2.6814	43	CHLORIDE
CONDUCTIVITY	580	300	457.58	67	580	312	446.33	15	547	344	470.48	48	CONDUCTIVITY
DISSOLVED OXYGEN	11.2	4.7	8.2476	21	8.1	6.7	7.5667	3	11.2	4.7	8.5857	14	DISSOLVED OXYGEN
FLOW	20	0.3	2.9712	69	20	0.33	4.6939	18	8.9	0.3	2.3025	48	FLOW
HARDNESS	421	219	264.69	62	421	228	285	11	314	219	259.55	47	HARDNESS
TOTAL IRON	1.2	0	0.3178	28				0	1.2	0	0.3178	28	TOTAL IRON
DISSOLVED IRON	0.47	0	0.0877	31	0.47	0.02	0.1508	12	0.2	0	0.0512	17	DISSOLVED IRON
MAGNESIUM	21.7	10.9	16.271	66	17.4	12.3	14.2	14	21.7	10.9	16.942	48	MAGNESIUM
DISSOLVED MANGANESE	0.076	0	0.011	17				0	0.076	0	0.011	17	DISSOLVED MANGANESE
MANGANESE	0.2	0	0.0357	37	0.03	0.01	0.014	10	0.2	0	0.0479	23	MANGANESE
OIL AND GREASE	1.8	1.8	1.8	1	1.8	1.8	1.8	1				0	OIL AND GREASE
PH	8.52	6.94	7.822	70	8.3	6.95	7.675	18	8.52	6.94	7.9165	48	PH
POTASSIUM	5	0.1	0.8666	35	4	0.1	0.8236	11	5	0.15	0.7878	23	POTASSIUM
SET SOLIDS				0				0				0	SET SOLIDS
SODIUM	36	0.17	4.2638	56	36	2.61	8.4682	11	5	0.17	3.2174	43	SODIUM
SULFATE	206	0.3	14.946	56	206	2	53.142	12	10	0.3	4.4595	42	SULFATE
SUSPENDED SOLIDS	101	0.1	13.695	21	84.5	0.1	9.2167	12	101	1	24.857	7	SUSPENDED SOLIDS
TEMPERATURE	49.8	3.9	19.493	63	44	3.9	24.193	15	49.8	4.6	18.025	48	TEMPERATURE
TOTAL DISSOLVED SOLIDS	430	210	267.46	57	430	218	273.58	12	297	210	265.91	43	TOTAL DISSOLVED SOLIDS

East Mountain Spring: 79-38  
 Water Quality Data: Operational  
 Mine Association: Deer Creek Mine  
 Date of Development: Blind Canyon Seam: 1989; Hiawatha Seam: 1992  
 Date of Second Mining: Blind Canyon Seam: 1990; Hiawtha Seam: 1993

Historical Data: 1979 - 2011					Pre-Mining Data: 1979-1988				Post-Mining Data: 1991-2012				
	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	478	313	387.9	51	478	314	391.45	11	446	313	383.25	36	BICARBONATE
CALCIUM	181	34	75.792	50	181	56	96.19	10	95.2	34	68.645	36	CALCIUM
CARBONATE	5	0	1.2222	18	1	1	1	4	5	0	1.4	10	CARBONATE
CHLORIDE	30	3.2	8.94	50	17	3.2	7.83	10	30	4	9.2694	36	CHLORIDE
CONDUCTIVITY	804	430	651.48	50	750	430	626.5	10	804	470	668.25	36	CONDUCTIVITY
DISSOLVED OXYGEN	10.4	4.1	7.0071	14				0	10.4	4.1	6.9667	12	DISSOLVED OXYGEN
FLOW	10.9	0.38	3.8694	51	10.9	1.3	6.3091	11	10	0.38	3.1872	36	FLOW
HARDNESS	351	230	278.5	44	313	265	286.5	4	315	230	272.14	36	HARDNESS
TOTAL IRON	7.64	0.09	1.5219	29				0	7.64	0.09	1.5219	29	TOTAL IRON
DISSOLVED IRON	0.83	0	0.2207	28	0.61	0.05	0.2182	11	0.32	0	0.1031	13	DISSOLVED IRON
MAGNESIUM	55.9	14.7	25.82	50	55.9	17.2	29.92	10	36	14.7	24.713	36	MAGNESIUM
DISSOLVED MANGANESE	0.343	0.002	0.0564	16				0	0.343	0.002	0.0564	16	DISSOLVED MANGANESE
MANGANESE	0.2	0.002	0.0467	24	0.02	0.01	0.015	2	0.2	0.002	0.0511	18	MANGANESE
OIL AND GREASE	2.5	2.5	2.5	1	2.5	2.5	2.5	1				0	OIL AND GREASE
PH	8.35	6.85	7.8153	51	8.1	6.85	7.5673	11	8.35	6.97	7.8872	36	PH
POTASSIUM	8.5	0.04	1.4744	35	8.5	0.7	2.4844	9	5	0.1	1.1793	22	POTASSIUM
SET SOLIDS				0				0				0	SET SOLIDS
SODIUM	73.63	3.1	42.98	50	30.4	10.5	22.5	10	73.63	40.8	49.816	36	SODIUM
SULFATE	283	2.9	37.116	51	283	2.9	60.809	11	50	20	29.417	36	SULFATE
SUSPENDED SOLIDS	358	2	41.443	23	358	2	57.473	11	75	5	29.25	8	SUSPENDED SOLIDS
TEMPERATURE	55.9	2.7	17.713	47	49	3.5	19.482	11	55.9	2.7	15.476	34	TEMPERATURE
TOTAL DISSOLVED SOLIDS	546	202	383.53	49	546	310	362.4	10	457	202	392.94	35	TOTAL DISSOLVED SOLIDS

East Mountain Spring: 79-40  
 Water Quality Data: Operational  
 Mine Association: Deer Creek Mine/Wilberg/Cottonwood Mine  
 Date of Development: Blind Canyon Seam: 1982, Hiawatha Seam: 1994  
 Date of Second Mining: Blind Canyon Seam: 1986, Hiawatha Seam: 1995

Historical Data: 1979 - 2011					Pre-Mining Data: 1979-1981				Post-Mining Data: 1996-2011				
	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	451	306	402.41	17	422	306	364	2	443	354	403	7	BICARBONATE
CALCIUM	110	41.8	77.629	16	71.6	71.6	71.6	1	87.9	67	79.837	7	CALCIUM
CARBONATE	15	0	4.25	4				0	0	0	0	1	CARBONATE
CHLORIDE	10.6	6	7.3188	16	6.2	6.2	6.2	1	9	6	7.1429	7	CHLORIDE
CONDUCTIVITY	900	523	691.88	16	590	590	590	1	794	523	710.14	7	CONDUCTIVITY
DISSOLVED OXYGEN	8.5	5.2	6.6333	3				0	6.2	6.2	6.2	1	DISSOLVED OXYGEN
FLOW	15	0.13	3.0812	17	0.4	0.13	0.265	2	2	1	1.5071	7	FLOW
HARDNESS	351	194	301.27	11				0	351	270	318.71	7	HARDNESS
TOTAL IRON	0.37	0	0.152	5				0	0.37	0	0.14	4	TOTAL IRON
DISSOLVED IRON	4.2	0	0.495	10	4.2	4.2	4.2	1	0	0	0	1	DISSOLVED IRON
MAGNESIUM	32	18.3	27.054	16	18.3	18.3	18.3	1	32	25	28.994	7	MAGNESIUM
DISSOLVED MANGANESE	0.021	0	0.0077	3				0	0.021	0	0.0077	3	DISSOLVED MANGANESE
MANGANESE	0.1	0	0.0286	5				0	0.33	0	0.0015	2	MANGANESE
OIL AND GREASE	0.1	0.1	0.1	1	0.1	0.1	0.1	1				0	OIL AND GREASE
PH	8.4	7.07	7.7582	17	8.4	8.1	8.2	2	8.02	7.6	7.8114	7	PH
POTASSIUM	7	0.5	1.8342	12	1	1	1	1	6.41	0.86	2.72	3	POTASSIUM
SET SOLIDS				0				0				0	SET SOLIDS
SODIUM	51	11.8	36.646	16	11.8	11.8	11.8	1	42	27.5	35.104	7	SODIUM
SULFATE	139	4.1	38.912	17	30.4	4.1	17.25	2	45	32	37.857	7	SULFATE
SUSPENDED SOLIDS	407.6	0.5	57.567	9	407.6	2	204.8	2				0	SUSPENDED SOLIDS
TEMPERATURE	58	3.9	15.047	17	5	3.9	4.45	2	11.7	4.2	6	7	TEMPERATURE
TOTAL DISSOLVED SOLIDS	450	320	397.12	17	385	333	359	2	450	406	421.14	7	TOTAL DISSOLVED SOLIDS

East Mountain Spring: 80-41  
 Water Quality Data: Operational  
 Mine Association: Deer Creek Mine/Wilberg/Cottonwood Mine  
 Date of Development: Blind Canyon Seam: 1982, Hiawatha Seam: 1994  
 Date of Second Mining: Blind Canyon Seam: 1986, Hiawatha Seam: 1995

Historical Data: 1980 - 2011					Pre-Mining Data: 1980				Post-Mining Data: 1995 - 2011				
	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	495	343	411.37	27	495	358	426.5	2	469	343	407.69	16	BICARBONATE
CALCIUM	190	51.5	88.471	27	89.5	63	76.25	2	97.2	77	88.414	16	CALCIUM
CARBONATE	30	0	6.4	5				0	0	0	0	2	CARBONATE
CHLORIDE	13.3	5.7	9.2556	27	13.3	5.7	9.5	2	11	7	8.9938	16	CHLORIDE
CONDUCTIVITY	1000	600	797.19	27	800	600	700	2	942	756	833.25	16	CONDUCTIVITY
DISSOLVED OXYGEN	8.1	5.4	6.4333	3				0	5.8	5.8	5.8	1	DISSOLVED OXYGEN
FLOW	15	0.3	4.0329	28	14	0.4	6.4667	3	6	0.3	2.745	16	FLOW
HARDNESS	433	323	395.25	20				0	433	349	399.69	16	HARDNESS
TOTAL IRON	0.6	0	0.2133	9				0	0.6	0	0.2275	8	TOTAL IRON
DISSOLVED IRON	3	0	0.3125	12	3	3	3	1	0	0	0	2	DISSOLVED IRON
MAGNESIUM	47.1	14	40.42	27	23.6	14	18.8	2	46.6	38	43.459	16	MAGNESIUM
DISSOLVED MANGANESE	0.021	0	0.0076	5				0	0.021	0	0.0076	5	DISSOLVED MANGANESE
MANGANESE	0.1	0	0.0325	4				0	0	0	0	2	MANGANESE
OIL AND GREASE				0				0				0	OIL AND GREASE
PH	8.18	6.9	7.769	26	8	7.4	7.7	2	8.03	7.43	7.7473	15	PH
POTASSIUM	3	0.2	0.9278	18	2	0.6	1.3	2	0.88	0.68	0.7571	7	POTASSIUM
SET SOLIDS				0				0				0	SET SOLIDS
SODIUM	32	6.5	23.707	27	17.4	14	15.7	2	32	19	25.388	16	SODIUM
SULFATE	170	20.2	86.567	27	70	20.2	45.1	2	114	74	90.819	16	SULFATE
SUSPENDED SOLIDS	35.5	0.5	10.136	11	32.5	1	16.75	2				0	SUSPENDED SOLIDS
TEMPERATURE	60.7	2.2	10.13	27	4.4	2.2	3.6667	3	9	2.3	4.3313	16	TEMPERATURE
TOTAL DISSOLVED SOLIDS	551	392	476.3	27	448	396	422	2	551	457	490.44	16	TOTAL DISSOLVED SOLIDS

East Mountain Spring: 80-47  
 Water Quality Data: Operational  
 Mine Association: Deer Creek Mine/Wilberg/Cottonwood Mine  
 Date of Development: Adjacent First Mining, 1980  
 Date of Second Mining: Adjacent Second Mining 1996

Historical Data: 1980 - 2012					Pre-Mining Data: 1980-1981				Post-Mining Data: 1997-2012				
	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	467	282	342.16	62	361	361	361	1	377	288	327.16	32	BICARBONATE
CALCIUM	125	55.2	67.291	62	110.2	110.2	110.2	1	68.7	56	63.702	32	CALCIUM
CARBONATE	20	0	1.7308	26				0	0	0	0	11	CARBONATE
CHLORIDE	25	2	5.2403	62	5.1	5.1	5.1	1	5	2	3.4938	32	CHLORIDE
CONDUCTIVITY	703	360	565.53	62	610	610	610	1	703	545	591.41	32	CONDUCTIVITY
DISSOLVED OXYGEN	12.6	4.7	7.5625	16				0	7.5	6.9	7.2	2	DISSOLVED OXYGEN
FLOW	20	0.5	6.143	64	12	12	12	3	10.5	0.59	4.4641	3	FLOW
HARDNESS	387	254	290.96	51				0	307	254	288.81	32	HARDNESS
TOTAL IRON	0.646	0	0.1855	32				0	0.646	0	0.1854	25	TOTAL IRON
DISSOLVED IRON	1.42	0	0.1327	37	0.28	0.28	0.28	1	0	0	0	10	DISSOLVED IRON
MAGNESIUM	41	26.2	31.418	62	33.5	33.5	33.5	1	34.76	27	31.524	32	MAGNESIUM
DISSOLVED MANGANESE	0.13	0	0.015	17				0	0.13	0	0.015	17	DISSOLVED MANGANESE
MANGANESE	0.2	0	0.0317	27				0	0.005	0	0.0011	14	MANGANESE
OIL AND GREASE				0				0				0	OIL AND GREASE
PH	8.26	6.7	7.65	61	7.6	7.6	7.6	1	8	7.1	7.5916	31	PH
POTASSIUM	7.5	0.32	1.562	47	7.5	7.5	7.5	1	0.831	0.585	0.7118	20	POTASSIUM
SET SOLIDS				0				0				0	SET SOLIDS
SODIUM	23	11	14.526	62	20.5	20.5	20.5	1	16	11	14.217	32	SODIUM
SULFATE	220.9	1.5	23.344	62	220.9	220.9	220.9	1	17	11	14.309	32	SULFATE
SUSPENDED SOLIDS	220	0.5	19.625	28	1.5	1.5	1.5	1				0	SUSPENDED SOLIDS
TEMPERATURE	54.2	2.6	14.766	58	3.3	3.3	3.3	1	9.6	2.6	5.85	32	TEMPERATURE
TOTAL DISSOLVED SOLIDS	1691	265	341.68	62	390	390	390	1	1691	270	353.34	32	TOTAL DISSOLVED SOLIDS

**East Mountain Spring: 82-51**  
**Water Quality Data: Operational**  
**Mine Association: Des Bee Dove Mine**  
**Date of Development: Blind Canyon Seam: 1980**  
**Date of Second Mining: Blind Canyon Seam: Completed in 1986**

**Historical Data: 1980 - 2011**

	<b>MAXIMUM</b>	<b>MINIMUM</b>	<b>AVERAGE</b>	<b># ANALYSIS</b>
<b>BICARBONATE</b>	411	275	346.29	21
<b>CALCIUM</b>	122	46	81.413	21
<b>CARBONATE</b>	20	0	6	6
<b>CHLORIDE</b>	20	7.9	15.467	21
<b>CONDUCTIVITY</b>	1000	562	842.62	21
<b>DISSOLVED OXYGEN</b>	11.9	5.6	7.48	5
<b>FLOW</b>	15	0.14	2.5945	22
<b>HARDNESS</b>	520	295	407.29	17
<b>TOTAL IRON</b>	10.57	0	1.5587	15
<b>DISSOLVED IRON</b>	0.1	0	0.042	10
<b>MAGNESIUM</b>	62.2	41	48.23	21
<b>DISSOLVED MANGANESE</b>	0.242	0	0.0713	7
<b>MANGANESE</b>	0.1	0	0.0243	6
<b>OIL AND GREASE</b>				0
<b>PH</b>	8.35	7.3	7.86	21
<b>POTASSIUM</b>	6.09	0.38	1.5244	16
<b>SET SOLIDS</b>				0
<b>SODIUM</b>	44	20.9	30.115	21
<b>SULFATE</b>	191	14	139.38	21
<b>SUSPENDED SOLIDS</b>	140	2	40.75	6
<b>TEMPERATURE</b>	52.9	3.2	13.162	21
<b>TOTAL DISSOLVED SOLIDS</b>	612	153	518	21

**East Mountain Spring: 82-52**  
**Water Quality Data: Operational**  
**Mine Association: Deer Creek Mine**  
**Date of Development: Blind Canyon Seam: 1975**  
**Date of Second Mining:**

<b>Historical Data: 1982 - 2011</b>				
	<b>MAXIMUM</b>	<b>MINIMUM</b>	<b>AVERAGE</b>	<b># ANALYSIS</b>
<b>BICARBONATE</b>	523	334	409.85	61
<b>CALCIUM</b>	160	38.4	74.401	72
<b>CARBONATE</b>	9	0	1.6061	33
<b>CHLORIDE</b>	35	2	10.067	58
<b>CONDUCTIVITY</b>	826	401	682.67	72
<b>DISSOLVED OXYGEN</b>	10.8	4.2	7.7407	27
<b>FLOW</b>	80	0.24	8.5126	73
<b>HARDNESS</b>	436	192	330.9	63
<b>TOTAL IRON</b>	0.74	0	0.1796	19
<b>DISSOLVED IRON</b>	0.33	0	0.0872	33
<b>MAGNESIUM</b>	42.15	8	35.933	72
<b>DISSOLVED MANGANESE</b>	0.02	0	0.0066	8
<b>MANGANESE</b>	0.2	0	0.0412	40
<b>OIL AND GREASE</b>				0
<b>PH</b>	8.66	6.8	7.6631	74
<b>POTASSIUM</b>	8	0.09	1.4779	44
<b>SET SOLIDS</b>				0
<b>SODIUM</b>	37.63	12	29.16	59
<b>SULFATE</b>	211	5	44.288	59
<b>SUSPENDED SOLIDS</b>	96	0.5	8.4516	31
<b>TEMPERATURE</b>	51	2.2	21.019	64
<b>TOTAL DISSOLVED SOLIDS</b>	488	262	400.42	59

**East Mountain Spring: 89-60**  
**Water Quality Data: Operational**  
**Mine Association: Deer Creek Mine**  
**Date of Development: Blind Canyon Seam: 1989; Hiawatha Seam: 1992**  
**Date of Second Mining: Blind Canyon Seam: 1990; Hiawatha Seam: 1993**

<b>Historical Data: 1989 - 2012</b>				
	<b>MAXIMUM</b>	<b>MINIMUM</b>	<b>AVERAGE</b>	<b># ANALYSIS</b>
<b>BICARBONATE</b>	498	336	404.93	27
<b>CALCIUM</b>	118.3	64.54	81.26	27
<b>CARBONATE</b>	10	0	1.3	10
<b>CHLORIDE</b>	10	4	6.2889	27
<b>CONDUCTIVITY</b>	789	480	696	27
<b>DISSOLVED OXYGEN</b>	9	4.1	6.6714	7
<b>FLOW</b>	24.5	0.14	3.9259	27
<b>HARDNESS</b>	417	263	313.93	27
<b>TOTAL IRON</b>	7.14	0.06	1.0832	19
<b>DISSOLVED IRON</b>	0.1	0	0.035	12
<b>MAGNESIUM</b>	34	0.01	25.717	27
<b>DISSOLVED MANGANESE</b>	0.552	0.003	0.0857	10
<b>MANGANESE</b>	0.1	0	0.021	13
<b>OIL AND GREASE</b>				0
<b>PH</b>	8.46	7.06	8.0326	27
<b>POTASSIUM</b>	1.35	0.3	0.9106	18
<b>SET SOLIDS</b>				0
<b>SODIUM</b>	63.14	30.4	42.111	27
<b>SULFATE</b>	80	2	34.83	27
<b>SUSPENDED SOLIDS</b>	65	6	32.333	6
<b>TEMPERATURE</b>	54.5	3.1	14.748	25
<b>TOTAL DISSOLVED SOLIDS</b>	480	347	418.15	27

**East Mountain Spring: 89-61**  
**Water Quality Data: Operational**  
**Mine Association: Deer Creek Mine**  
**Date of Development: No Mining**  
**Date of Second Mining: No Mining**  
**Spring Developed for Culinary Use by NEWUSSD in 2009**

<b>Historical Data: 1989 - 2012</b>				
	<b>MAXIMUM</b>	<b>MINIMUM</b>	<b>AVERAGE</b>	<b># ANALYSIS</b>
<b>BICARBONATE</b>	443	271	335.73	40
<b>CALCIUM</b>	110.1	59.6	71.518	41
<b>CARBONATE</b>	5	0	1.3846	13
<b>CHLORIDE</b>	15	2	4.6902	41
<b>CONDUCTIVITY</b>	624	390	545.46	41
<b>DISSOLVED OXYGEN</b>	10.1	4.6	7.3938	16
<b>FLOW</b>	200	0.45	50.985	40
<b>HARDNESS</b>	380	264	294.1	41
<b>TOTAL IRON</b>	0.2	0	0.1	8
<b>DISSOLVED IRON</b>	0.2	0	0.0794	17
<b>MAGNESIUM</b>	32.4	24.2	27.993	41
<b>DISSOLVED MANGANESE</b>	0	0	0	3
<b>MANGANESE</b>	0.2	0	0.0538	16
<b>OIL AND GREASE</b>				0
<b>PH</b>	8	6.6	7.4466	41
<b>POTASSIUM</b>	5.97	0.01	1.4112	23
<b>SET SOLIDS</b>				0
<b>SODIUM</b>	14.72	5.6	8.8712	41
<b>SULFATE</b>	27	1.5	15.28	41
<b>SUSPENDED SOLIDS</b>	13	1	5.0714	14
<b>TEMPERATURE</b>	45.6	3.4	14.584	37
<b>TOTAL DISSOLVED SOLIDS</b>	359	243	304.93	40

East Mountain Spring: Burnt Tree  
 Water Quality Data: Operational  
 Mine Association: Deer Creek Mine  
 Date of Development: Blind Canyon Seam: 1987, Hiawatha Seam: 1992  
 Date of Second Mining: Blind Canyon Seam: 1987, Hiawatha Seam: 1993

Historical Data: 1979 - 2012					Pre-Mining Data: 1979-1986				Post-Mining Data:				
	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	647	188	320.1	73	397	313	334.88	17	647	258	310.93	41	BICARBONATE
CALCIUM	110	38.5	58.571	80	11	48	69.107	15	57.9	49	53.72	42	CALCIUM
CARBONATE	10	0	1.275	40	1	1	1	1	10	0	1.6111	18	CARBONATE
CHLORIDE	25	2.9	5.3522	69	6.6	2	4.8063	16	7	2.9	3.7564	39	CHLORIDE
CONDUCTIVITY	620	330	513	82	590	410	514.94	16	596	450	528.24	42	CONDUCTIVITY
DISSOLVED OXYGEN	9.6	1	7.2	25	8.3	8.3	8.3	1	9.6	4.2	7.0875	8	DISSOLVED OXYGEN
FLOW	30.5	1.2	7.7831	84	30.5	1.9	16.447	17	12	1.2	5.1424	42	FLOW
HARDNESS	333	224	258.29	68				0	281	229	250.74	42	HARDNESS
TOTAL IRON	0.2	0	0.0869	19				0	0.2	0	0.0806	18	TOTAL IRON
DISSOLVED IRON	3	0	0.138	44	3	0.04	0.2725	16	0.2	0	0.0533	15	DISSOLVED IRON
MAGNESIUM	36.1	11.8	27.74	81	30.6	11.8	24.607	15	35	25.34	28.281	42	MAGNESIUM
DISSOLVED MANGANESE	0.05	0	0.0045	11				0	0.05	0	0.0045	11	DISSOLVED MANGANESE
MANGANESE	0.2	0	0.038	43	0.01	0.01	0.01	1	0.2	0	0.0633	19	MANGANESE
OIL AND GREASE	1.3	0.1	0.7	2	1.3	0.1	0.8	3				0	OIL AND GREASE
PH	8.24	6.8	7.5466	85	8	6.8	7.4872	18	7.99	7.04	7.5451	41	PH
POTASSIUM	8.5	0.02	1.1906	50	8.5	0.46	1.4072	15	5	0.514	1.1964	25	POTASSIUM
SET SOLIDS	0							0				0	SET SOLIDS
SODIUM	25	10	16.33	69	25	10	14.34	15	21.49	15	18.015	39	SODIUM
SULFATE	110	0.2	18.215	71	110	7.4	35.539	18	14	7	11.113	39	SULFATE
SUSPENDED SOLIDS	27	0.1	3.95	36	7	0.1	1.9	18	15	4	7	5	SUSPENDED SOLIDS
TEMPERATURE	60.8	3.4	20.381	78	12.8	3.4	6.5	17	60.8	5.1	14.94	42	TEMPERATURE
TOTAL DISSOLVED SOLIDS	367	164	286.04	71	344	258	292.18	17	350	250	282.97	39	TOTAL DISSOLVED SOLIDS

**East Mountain Spring: Elk Spring**  
**Water Quality Data: Operational**  
**Mine Association: Deer Creek Mine**  
**Date of Development: No Mining**  
**Date of Second Mining: No Mining**  
**Spring Developed for Culinary Use by NEWUSSD in 2009**

<b>Historical Data: 1979 - 2012</b>				
	<b>MAXIMUM</b>	<b>MINIMUM</b>	<b>AVERAGE</b>	<b># ANALYSIS</b>
<b>BICARBONATE</b>	347	236	279.72	68
<b>CALCIUM</b>	112	35.5	62.25	78
<b>CARBONATE</b>	10	0	1.2973	37
<b>CHLORIDE</b>	20	1.6	4.3708	65
<b>CONDUCTIVITY</b>	545	262	449.94	79
<b>DISSOLVED OXYGEN</b>	11.1	4.9	8.0259	27
<b>FLOW</b>	599.3	0.1	122.06	79
<b>HARDNESS</b>	376	192	247.09	69
<b>TOTAL IRON</b>	0.2	0	0.0667	18
<b>DISSOLVED IRON</b>	0.5	0	0.089	41
<b>MAGNESIUM</b>	35.7	10	22.915	78
<b>DISSOLVED MANGANESE</b>	0.007	0	0.0006	11
<b>MANGANESE</b>	0.2	0	0.041	42
<b>OIL AND GREASE</b>	1.1	0.1	0.6	2
<b>PH</b>	8.55	6.8	7.8311	82
<b>POTASSIUM</b>	10	0.1	1.6366	44
<b>SET SOLIDS</b>				0
<b>SODIUM</b>	29	2.78	7.3865	65
<b>SULFATE</b>	196.9	0.7	15.817	66
<b>SUSPENDED SOLIDS</b>	30	0.2	4.1387	31
<b>TEMPERATURE</b>	45.5	3.3	18.348	73
<b>TOTAL DISSOLVED SOLIDS</b>	351	178	253.55	67

**Trail Mountain Spring: T-19**  
**Water Quality Data: Operational**  
**Mine Association: Trail Mountain Mine**  
**Date of Development: Off lease, off permit**  
**Date of Second Mining: NA**

Notes:

- Trail Mountain Mine was placed into temporary cessation in May, 2001. The portals were sealed as part of closure.

	Pre-Closure Data: 1988 - 2001			Post-Closure Data: 2001-2012		
	MAXIMUM	MINIMUM	AVERAGE	MAXIMUM	MINIMUM	AVERAGE
BICARBONATE	437	190	355.50	500	255	360.60
CALCIUM	92	14.3	46.11	98.9	42.1	65.95
CARBONATE	78	1	16.75	49	0	12.67
CHLORIDE	67.9	20	38.38	43	19	33.13
CONDUCTIVITY	1380	581	926.36	1840	650	1249.84
DISSOLVED OXYGEN	11.7	5.4	8.30	8.1	8.1	8.10
FLOW	375	5	94.51	430	7.67	65.72
HARDNESS	993	178	379.54	906	301	566.96
TOTAL IRON	5.1	0.05	0.77	2.7	0	0.43
DISSOLVED IRON	0.38	0.03	0.16	0.039	0	0.00
MAGNESIUM	92	24	59.04	162	46.93	98.19
DISSOLVED MANGANESE				0.1	0	0.01
MANGANESE	0.2	0.01	0.06	0.053	0	0.00
OIL AND GREASE	5	1	3.99	2	0	0.11
PH	8.87	7.44	8.41	8.68	8.07	8.45
POTASSIUM	30.2	0.7	3.42	10.39	1.75	5.46
SET SOLIDS	0.5	0.5	0.50			
SODIUM	125.2	12	72.82	91.5	33.29	73.37
SULFATE	340	39	155.46	609	63	317.19
SUSPENDED SOLIDS	420	1	83.67	338	0	49.15
TEMPERATURE	71	-1.5	28.91	18.5	0.2	7.73
TOTAL DISSOLVED SOLIDS	910	340	572.13	1256	387	827.73

East Mountain Spring: Ted's Tub  
 Water Quality Data: Operational  
 Mine Association: Deer Creek Mine  
 Date of Development: Blind Canyon Seam: 1988, Hiawatha Seam: 1992  
 Date of Second Mining: Blind Canyon Seam: 1988, Hiawatha Seam 1993

Historical Data: 1979 - 2012					Pre-Mining Data: 1979-1987				Post-Mining Data: 1994-2012				
	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	375	254	313.67	63	375	283	322.69	16	370	254	305.63	38	BICARBONATE
CALCIUM	143	58	74.406	61	143	64	91.286	14	72.4	58	67.006	38	CALCIUM
CARBONATE	15	0	1.3636	22	1	1	1	2	15	0	1.5714	14	CARBONATE
CHLORIDE	20	1.7	4.3098	61	5.6	2.4	3.9286	14	6	1.7	3.2421	38	CHLORIDE
CONDUCTIVITY	611	315	513.97	61	600	315	494.93	14	611	453	534.74	38	CONDUCTIVITY
DISSOLVED OXYGEN	9.1	4.4	7.5385	13				0	8.5	4.4	6.9	6	DISSOLVED OXYGEN
FLOW	89	1.1	22.034	62	89	2.2	31.288	16	83.2	1.1	17.495	38	FLOW
HARDNESS	389	222	261.31	49	265	247	256	2	274	222	256.45	38	HARDNESS
TOTAL IRON	4.66	0.06	0.7666	32				0	4.66	0.06	0.7848	31	TOTAL IRON
DISSOLVED IRON	0.58	0	0.1014	37	0.41	0.04	0.126	15	0.2	0	0.0429	14	DISSOLVED IRON
MAGNESIUM	26.2	7	20.4	61	22	7	1685	14	24	18.41	21.668	38	MAGNESIUM
DISSOLVED MANGANESE	0.393	0.004	0.0575	19				0	0.393	0.004	0.0575	19	DISSOLVED MANGANESE
MANGANESE	0.2	0.002	0.0367	32				0	0.2	0.002	0.0375	23	MANGANESE
OIL AND GREASE	2.9	1.5	2.2	2	2.9	1.5	2.2	2				0	OIL AND GREASE
PH	8.52	6.95	7.7071	63	8.1	6.95	7.6119	16	8.52	7.3	7.7647	38	PH
POTASSIUM	13.15	0.2	1.5686	45	8	0.2	1.27	14	5	0.35	1.2145	26	POTASSIUM
SET SOLIDS				0				0				0	SET SOLIDS
SODIUM	25.93	4.54	12.394	61	14.5	5	7.0186	14	25.93	7	15.156	38	SODIUM
SULFATE	140	1	19.344	63	140	1	36.15	16	22	6	12.429	38	SULFATE
SUSPENDED SOLIDS	169	0.5	14.087	30	66	0.5	8.975	16	169	4	39	5	SUSPENDED SOLIDS
TEMPERATURE	59	2.8	13.666	60	47	2.8	8.8188	16	54.7	3.1	10.213	38	TEMPERATURE
TOTAL DISSOLVED SOLIDS	359	239	293.13	63	359	239	286.19	16	350	240	296.32	38	TOTAL DISSOLVED SOLIDS