2013
ANNUAL HYDROLOGY REPORT
ANNUAL SUBSIDENCE REPORT
ANNUAL MINE INFLOW REPORT

BRL
BOWIE RESOURCES, LLC

BOWIE RESOURCES, LLC
BOWIE NO. 1 MINE
P.O. BOX 483
PAONIA, COLORADO 81428
PERMIT C-81-038

PREPARED BY:

Bowie Resources, LLC
Bowie No. 1 Mine
2013 Annual Report
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Annual Mine Inflow Report

Annual Subsidence Report

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Introduction

Bowie Resources Limited acquired the Orchard Valley Mine from the Cyprus Orchard Valley Coal Corporation in December 1994. Bowie Resources Limited was acquired by Bowie Resources, LLC in December 2003. The underground coal mine (renamed the Bowie No. 1 Mine) is approximately two miles north of Paonia, Colorado. The Bowie No. 1 East Mine has not operated since it was sealed in June 1986, following a mine fire. The areal extent of the East Mine workings was 1,156 acres at that time. During July 1993, rehabilitation efforts at the portal area of the East mine were completed and the mine workings of the East and West mines were connected. Only the first fifteen crosscuts of the East mine were reopened with the rest of the mine remaining sealed and inactive. Mining ceased at the Bowie No. 1 Mine on December 4, 1997.

The coal mined from both the East and West mine is in the "**B**" seam of the Mesaverde Coal Member. Hydrologic monitoring began at the mine in 1983. The area affected by mining was reduced to 2,714 acres with the approval of permit revision no. 4 since some of the East mine workings are incorporated into the Bowie No. 2 Mine permit boundary. This report presents monitoring results from the 2013 monitoring season.

The Bowie No. 1 Mine has been idle for more than 16 complete monitoring seasons (1998 - 2016). Several monitoring points are no longer available for monitoring due to a mechanical collapse of drill holes. Bowie No. 1 received permission through a revision to the permit document (TR-34) to eliminate these holes from the monitoring schedule.

The approval of permit revision no. 4 transferred a number of monitoring points from the Bowie No. 1 Mine to the Bowie No. 2 Mine. Terror Creek Monitoring stations SW-1, SW-2, SW-4 and SW-10 were transferred. Stevens Gulch ponds 81, 7-2, 7-7, 7-11, 12-1, 12-2, 12-9, 12-10, 12-11, 18-4, 82, 1-4 and 1-6 were transferred. Terror Creek ponds 1-11, 6-2, 6-5, and 8-4 were transferred. Coal Gulch ponds 17-1, 18-1 and 83 were transferred. Stevens Gulch Springs 19, 23, 7-4, 7-5 and 12-4 were transferred. Terror Creek Springs 16, 17, 18, 20, 21, 22, 1-3, 1-5, 5-1, 6-1, 6-4, 6-6, 7-1, 7-9, 7-10 and 8-5 were transferred. Groundwater monitoring wells CWI DH-58 and DH-60 were also transferred. All of the stations transferred except SW-10 and spring 20 were inactive monitoring points for the Bowie No. 1 mine.

The following 2013 Annual Hydrology Report narrative is divided into ten parts. Discussion is presented by each monitoring category identified in Table 1 - Summary of Hydrologic Monitoring Stations - Required Monitoring for Annual Hydrology Report.

Table 1 (immediately following this narrative) defines the monitoring points by type and sample frequency, field parameter sampling schedule and laboratory parameter sampling schedule. Several monitoring points have been removed from the surveillance schedule and are noted on this table as such. This table also lists the NPDES monitoring points. Discharge monitoring reports, submitted to the DRMS quarterly, are incorporated into this report by reference.

Table 2 contains a listing of the laboratory parameters for surface and ground water to be tested in accordance with the mining permit application. Laboratory analyses are performed by ACZ Laboratories, Inc., 2773 Downhill Drive, Steamboat Springs, CO 80487 or by Enviro-Chem Analytical, Inc., 685 West Gunnison Ave., Suite 108, Grand Junction, CO 81501.

Table 3 contains local precipitation data for the year. Precipitation was well below normal during the year.

Table 4 contains a listing of all monitoring points that have been undermined by the Bowie No. 1 Mine, the date of mining, and the panel or section that undermined them.

Table 5 contains a listing of all monitoring points that are potentially impacted by the angle of draw of the underground workings of the Bowie No. 1 Mine. Since the mine has been reclaimed, no prediction of potential monitoring point impacts is presented.

Table 6 contains a listing of all actively monitored points, with descriptions of their locations and a reference to the Monitoring Point Figure that contains this year's monitoring data.

Ponds were sampled for water quality when discharging or inflows/outflows were occurring. Ponds in the permit area are typically spring-fed or seep-fed and exhibit diffuse non-concentrated areas of inflow. Often the pond outlets present the only point of concentrated flow at which flow measurements and field parameters can be obtained. Where possible, quality measurements are obtained at the pond inlet. Stagnant water in ponds is not sampled since water quality results would show the effects of evaporation and stock use and could not be used to evaluate potential mine affects.

This report includes data collected specifically to meet requirements of the Division of Reclamation, Mining and Safety (DRMS). At the request of the DRMS, minimum, maximum and average baseline data are now presented on each monitoring point listing as well as minimum, maximum and average values for the operational period of the monitoring point and baseline periods where applicable. The baseline values are taken from all recorded sampling events until affected by the mining operation, with operational values reflecting the period following the baseline period.

OVEM Groundwater Monitoring Wells:
Groundwater monitoring wells B01, B02, and B04 through B08 are near the East Mine facilities (see Map No. 8-1). Well B01 was destroyed by a dozer doing maintenance work during 2002 so it is no longer monitored. Well B02 was destroyed by a dozer doing reclamation work during 2008 so it is no longer monitored. Well B03 is blocked and can no longer be monitored for field parameters or water quality. It was removed from the sampling regime by TR-34. Well B04 was destroyed by construction activities late in 2012. Well B04 was removed from the monitoring schedule by TR-55. Wells B05, B06 and B08 are monitored semi-annually for water levels to assess slope stability in and around the East mine facilities. Borehole B-7, also referred to as Node 22, is located below sedimentation pond #4 and is periodically monitored for water quality to ascertain potential groundwater contamination attributable to the East Mine facilities area.

Patterns typically associated with these wells in the past were again evident during the 2013 monitoring year. Wells B05, B06 and B08 remained dry throughout the year. Water level in B07 was lower than normal range so there was not enough water to obtain a quality sample.

OVWM Groundwater Monitoring Wells:
One piezometer (OVWM) was installed in the fill at the Orchard Valley West Mine. This well was destroyed during mine reclamation so it is no longer monitored.

North Fork Alluvium Groundwater Monitoring Wells:
Three (3) wells, MW-1, MW-2 and MW-3 (see Map No. 8-3) are completed in the North Fork of the Gunnison alluvium. During the year the wells were monitored quarterly for water levels and showed typical seasonal fluctuations within previously established ranges. MW-1 and MW-3 were monitored quarterly for quality during the year, if water was available, to monitor potential groundwater effects stemming from the coal stockpile and load out facilities in the North Fork Valley. Well MW-3 is southwest of the coal stockpile area in a location that should see the full impact of any potential groundwater degradation. The 2013 data continues to show that the stockpile and load-out are not degrading the water in the alluvium.

East Roatcap Creek Colluvium Groundwater Monitoring Wells:
Shallow groundwater monitoring wells, SM-5, SM-6, SM-7, SM-10 and SM-11 (see Map No. 4-1) are in the East Roatcap Creek drainage. The wells were monitored for water quality parameters, water levels, and field parameters to detect impacts associated with mining in the west pod. All of the wells were monitored semi-annually for water levels, field parameters and water quality. SM-7 is within the projected angle-of-draw of mine workings. Water levels from the five Roatcap Creek colluvial wells continued to show typical seasonal variability with water levels elevated in the spring and lower at the end of the year. No anomalies or impacts on water levels were observed in 2013 at these wells.

Steven's Gulch Colluvium Groundwater Monitoring Wells:
Shallow groundwater monitoring wells, SM-1 and SM-9 (see Map No. 4-1) are in the Steven's Gulch drainage. The wells are monitored for water quality parameters, water levels, and field parameters to detect impacts associated with mining in the central pod. Required monitoring for wells SM-1 and SM-9 was semi-annually during 2013 for water levels and field parameters when water is available. Well SM-1 is next to areas mined in 1991 and 1992 but has showed no apparent impacts the data collected since that time. Well SM-9 was undermined by Panel C during 1993 but has showed no apparent impacts in the data collected since that time. No anomalous water quality observations were apparent during 2013 at the Stevens Gulch shallow groundwater monitoring wells.

Surface Water Monitoring Stations - SPRINGS
East Roatcap Creek - Two springs were monitored in the East Roatcap Creek drainage (refer to Table 1 and Map No. 4-1) during the year. Spring 30 was a seep in April and dry the remainder of the year. Spring 30 was first undermined in April 1983. Spring 10-10 was dry during the reporting period. Spring 10-10 was encompassed by the angle-of-draw of Panel Y during October 1993. Subsidence impacts were not apparent at either of these locations during 2013.

West Roatcap Creek - Two springs were monitored in the West Roatcap Creek drainage (refer to Table 1 and Map No. 4-1) during the year. Spring 32 was monitored monthly during the year. Spring 32 exhibited flows that were near average. Water quality parameters were consistent with prior years sampling. Spring 14-4 was monitored quarterly. Flows were lower than normal. No mining occurred during the year in the Spring14-4 watershed.

Stevens Gulch - One spring was monitored within the Stevens Gulch drainage (refer to Table 1 and Map No. 4-1) during the year. Spring 25 lies below an area of the East mine inactive since 1982. This site had no measurable flows during the year. Spring 25 has been identified as an adjudicated water right within the permit area.

Two springs with ponds in the Stevens Gulch drainage, Spring and Pond 13-5, Spring and Pond 13-6 were monitored quarterly during the year. Spring and Pond 13-5 was undermined during the last half of 1992. Spring and Pond 13-6 was undermined during the end of 1988. Spring 13-5 was reported to have a seep in April and dry the remainder of the year. Spring 13-6 had measurable flow during April and was reported as a dry during the remainder of the year.

Surface Water Monitoring Stations: STREAMS AND DITCHES
Overall, adverse impacts attributable to mining were not evident at any of the monitored surface water stations (refer to Table 1 and Map No. 4-1). Stations SW-5 (Stevens Gulch) was dry during the last half of the year which is below normal flows. SW-6 (East Roatcap Creek) also had below normal flows and was dry during the last half of the year. No evidence of subsidence impacts in these drainages was apparent. Mining occurred in the Stevens Gulch drainage upstream of site SW-5 during 1993 in Panel C. Panel C mining was designed and conducted to prevent the development of subsidence to protect the waterway and certain structures in the vicinity. Data collected during the year shows these protective measures were successful.

Surface Water Monitoring Stations: SMALL AREA EXEMPTIONS
The west side of the east mine fan level is defined as a small area exemption since drainage from this area is not conveyed to a sediment pond. One sample point is defined at this location and sampled for conformance with the NPDES discharge alternative limitations requirements associated with discharges occurring because of precipitation events of less than the 10-year and 24-hour magnitude. In these instances, settable solids and pH limitation must be met. No samples were collected during 2013 from this SAE point.

Coal Member of Mesaverde:
All previously monitored drill holes have now collapsed and are no longer monitored. The removal of these monitoring points is explained in TR-34.

Surface Water Monitoring Stations: PONDS

East Roatcap Creek - Eleven ponds in the East Roatcap Creek drainage were monitored during the year (refer to Table 1 and Map No. 4-1). Ponds were monitored quarterly for water levels and field parameters if they were discharging. No evidence of mine impacts was noted. During 1994 retreat mining was done under Ponds 10-1, 10-2, 10-3, 10-4 and 10-11. Advance mining occurred under pond 88 during 1997. The East Roatcap Creek Ponds were physically intact throughout the year and showed no subsidence effects.

Stevens Gulch - Two ponds were monitored within the Stevens Gulch drainage (refer to Table 5 and Map No. 4-1). Ponds 85 and 13-7 were monitored quarterly for water levels and field parameters. Pond 85 was undermined by Panel B in 1992. Pond 13-7 was also undermined during 1992. No subsidence impacts or other irregularities were evident at either of these locations during the year.

CDPS Monitoring Points

DMRs are submitted quarterly to the Colorado Department of Public Health and Environment with copies to the Division of Reclamation, Mining and Safety and are included herein by reference.

Conclusion

Hydrologic monitoring was extended into the northern portion of the East Roatcap Creek drainage during 1993 to fit newly acquired lease areas and revised mine plans. Mining operations were suspended during December 1997 and have not resumed. Hydrologic monitoring conducted during 2013 did not show mine related impacts to the local hydrology were occurring. Water quality remains good overall and no physical impacts have been noted at any of the monitored locations that would suggest adverse effects associated with the historical mining operations of the Bowie No. 1 Mine.

Summary of Hydrology Monitoring Stations

Station Number	Station Name	Elevation (ft.)	Depth (ft.)	Frequency of Measurements		Report Frequency	Report Format		Comments
				Field Par.	Lab. Par.		AHR	DMR	
OVEM Groundwater Monitoring Wells									
B04	Borehole 4	6833	54.9	N/A	N/A	Annually	Yes	No	Monitored for water level semi-annually
B05	Borehole 5	6883	32.5	N/A	N/A	Annually	Yes	No	Monitored for water level semi-annually
B06	Borehole 6	6781	93.8	N/A	N/A	Annually	Yes	No	Monitored for water level semi-annually
B07	Borehole 7	6602	95.3	Semi-Annually	Annually	Annually	Yes	No	Monitored for water level, field and Lab parameters
B08	Borehole 8	6790	38.8	N/A	N/A	Annually	Yes	No	Monitored for water level semi-annually
North Fork Alluvium Groundwater Monitoring Wells									
MW01	Monitoring Well 1	5716	25	Quarterly	Quarterly	Annually	Yes	No	Monitored for water level quarterly (Volume 7, pg 2.04-41)
MW02	Monitoring Well 2	5737	41.8	Quarterly	N/A	Annually	Yes	No	Monitored for water level quarterly (Volume 7, pg 2.04-41)
MW03	Monitoring Well 3	5727	31.9	Quarterly	Quarterly	Annually	Yes	No	Monitored for water level quarterly (Volume 7, pg 2.04-41)
Steven's Gulch Colluvium Groundwater Monitoring Wells									
SM01	Monitoring Well SM-1	7590	55	Semi-Annually	Semi-Annually	Annually	Yes	No	No winter monitoring/access
SM05	Monitoring Well SM-5	7520	40	Semi-Annually	Semi-Annually	Annually	Yes	No	No winter monitoring/access
SM06	Monitoring Well SM-6	7480	50	Semi-Annually	Semi-Annually	Annually	Yes	No	No winter monitoring/access
SM07	Monitoring Well SM-7	7800	55	Semi-Annually	Semi-Annually	Annually	Yes	No	No winter monitoring/access
SM09	Monitoring Well SM-9	7520	40	Semi-Annually	Semi-Annually	Annually	Yes	No	No winter monitoring/access
SM10	Monitoring Well SM-10	7250	48.7	Semi-Annually	Semi-Annually	Annually	Yes	No	No winter monitoring/access
SM11	Monitoring Well SM-11	7243	46.5	Semi-Annually	Semi-Annually	Annually	Yes	No	No winter monitoring/access
Surface Water Monitoring Stations - SPRINGS									
S1010	East Roatcap Creek-Spring 10-10	8650	N/A	Quarterly	Annually	Annually	Yes	No	No winter monitoring/access
S1404	West Roatcap Creek-Spring 14-4	7480	N/A	Quarterly	Annually	Annually	Yes	No	No winter monitoring/access
S2500	Steven's Gulch-Spring 25	7160	N/A	Quarterly	Annually	Annually	Yes	No	No winter monitoring/access
S3000	East Roatcap Creek-Spring 30	7840	N/A	Quarterly	Annually	Annually	Yes	No	No winter monitoring/access
S3200	West Roatcap Creek-Spring 32	7900	N/A	Monthly	Quarterly	Annually	Yes	No	No winter monitoring/access

Summary of Hydrology Monitoring Stations (Continued)

Station Number	Station Name	Elevation (ft.)	Depth (ft.)	Frequency of Measurements		Report Frequency	Report Format		Comments
				Field Par.	Lab. Par.		AHR	DMR	
Surface Water Monitoring Stations - STREAMS AND DITCHES									
SW05	Steven's Gulch	6600	N/A	Monthly	Quarterly	Annually	Yes	No	No winter monitoring/access
SW06	East Roatcap Creek-Downstream	6740	N/A	Monthly	Quarterly	Annually	Yes	No	No winter monitoring/access
Surface Water Monitoring Stations - PONDS									
P1001	East Roatcap Creek-Pond 10-1	8520	5	Quarterly	Annually	Annually	Yes	No	Monitor if pond discharging. No winter monitoring/access
P1002	East Roatcap Creek-Pond 10-2	8630	3	Quarterly	Annually	Annually	Yes	No	Monitor if pond discharging. No winter monitoring/access
P1003	East Roatcap Creek-Pond 10-3	8680	3	Quarterly	Annually	Annually	Yes	No	Monitor if pond discharging. No winter monitoring/access
P1004	East Roatcap Creek-Pond 10-4	8780	3	Quarterly	Annually	Annually	Yes	No	Monitor if pond discharging. No winter monitoring/access
P1007	East Roatcap Creek-Pond 10-7	8350	4	Quarterly	Annually	Annually	Yes	No	Monitor if pond discharging. No winter monitoring/access
P1009	East Roatcap Creek-Pond 10-9	8395	3	Quarterly	Annually	Annually	Yes	No	Monitor if pond discharging. No winter monitoring/access
P1014	East Roatcap Creek-Pond 10-14	8795	3	Quarterly	Annually	Annually	Yes	No	Monitor if pond discharging. No winter monitoring/access
P1307	Steven's Gulch-Pond 13-7	8875	5	Quarterly	Annually	Annually	Yes	No	Monitor if pond discharging. No winter monitoring/access
P1501	East Roatcap Creek-Pond 15-1	8055	4	Quarterly	Annually	Annually	Yes	No	Monitor if pond discharging. No winter monitoring/access
P8500	Steven's Gulch-Pond 85	7580	4	Quarterly	Annually	Annually	Yes	No	Monitor if pond discharging. No winter monitoring/access
P8700	East Roatcap Creek-Pond 87	7990	4	Quarterly	Annually	Annually	Yes	No	Monitor if pond discharging. No winter monitoring/access
P8800	East Roatcap Creek-Pond 88	7790	5	Quarterly	Annually	Annually	Yes	No	Monitor if pond discharging. No winter monitoring/access
P8900	East Roatcap Creek-Pond 89	7490	4.5	Quarterly	Annually	Annually	Yes	No	Monitor if pond discharging. No winter monitoring/access
Surface Water Monitoring Stations - SPRINGS WITH PONDS									
SP1305	Steven's Gulch-Spring & Pond 13-5	7860	4	Quarterly	Annually	Annually	Yes	No	Monitor if spring is discharging. No winter monitoring/access
SP1306	Steven's Gulch-Spring & Pond 13-6	7590	4	Quarterly	Annually	Annually	Yes	No	Monitor if spring is discharging. No winter monitoring/access

PARAMETER LISTS

LAB PARAMETERS

Wet Chemistry
Alkalinity as CaCO (mg/l)
Bicarbonate as CaCO (mg/l)
Carbonate as CaCO (mg/l)
Chloride (mg/l)
Conductivity (umhos/cm)
pH (Lab Units)
Hardness as CaCO (mg/l)
Residue, Filterable (TDS) @ 180 C (mg/l)
Residue, NonFilterable (TSS) (mg/l)
TDS Ratio (grav./calc.)
Sodium Absorption Ratio in Water
Sulfate (mg/l)
Acidity (mg/l)

Metals
Calcium, dissolved (mg/l)
Magnesium, dissolved (mg/l)
Sodium, dissolved (mg/l)
Iron, dissolved (mg/l)
Iron, total (mg/l)
Manganese, total (mg/l)

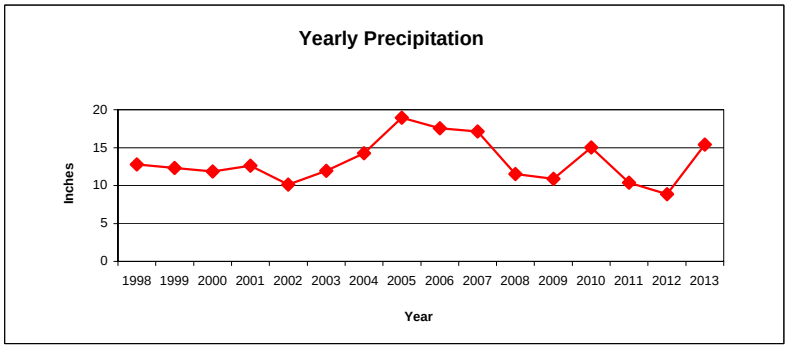
FIELD PARAMETERS

Parameter	Unit	Wells	Ponds	Streams	Springs
Conductivity	umhos/cm	Yes	Yes	Yes	Yes
Flow Rate	CFS	No	No	Yes	Yes
pH	Standard	Yes	Yes	Yes	Yes
Temperature	C	Yes	Yes	Yes	Yes
Water Level	Feet	Yes	Yes	No	No

Monthly Precipitation Values

Month	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
January	1.13	1.08	1.93	0.73	0.55	0.26	1.31	2.05	0.81	0.68	1.67	0.91	0.42	0.49	1.22	1.73
February	0.83	0.38	1.27	1.06	0.11	1.35	1.46	1.38	0.28	0.92	1.1	1.00	1.66	0.87	1.41	0.89
March	1.43	0.42	1.03	0.42	1.03	1.17	0.14	1.93	1.58	1.39	0.54	0.89	1.2	1.22	0.3	1.14
April	1.43	2.54	0.42	0.57	0.61	0.49	3.3	1.37	0.83	1.2	0.77	1.09	0.51	1.68	0.62	1.3
May	0.16	1.00	0.67	1.75	0.28	1.81	0	1.22	0.17	1.18	0.64	2.73	1.68	0.83	0.09	1.24
June	0.47	0.94	0.86	0.39	0.04	0.48	0.34	1.64	0.5	0.99	0.67	0.63	0.55	0.32	0.05	0
July	0.66	2.7	0.89	1.31	0.28	0.76	0.02	0.4	3.06	0.85	0.24	0.27	1.44	1.74	1.26	1.32
August	1.18	1.42	1.27	2.35	0.66	0.46	0.48	1.71	0.87	1.16	2.07	0.33	2.09	0.46	2.35	0.78
September	0.75	1.16	1.27	0.34	2.43	1.93	2.85	2.84	2.32	3.2	0.62	0.32	1.15	1.2	0.92	3.28
October	1.88	0.05	0.75	0.84	2.53	0.46	1.37	2.11	5.08	1.37	0.74	0.58	1.84	1.55	0.64	2.12
November	1.87	0.07	0.73	1.85	0.9	1.74	1.72	0.84	1.39	0	0.91	0.77	0.58	0.96	0.00	0.90
December	1.00	0.57	0.78	0.99	0.71	1.03	1.26	1.47	0.65	4.20	1.55	1.36	1.91	1.01	0.00	0.69

Minimum	0.16	0.05	0.42	0.34	0.04	0.26	0	0.4	0.17	0	0.24	0.27	0.42	0.32	0	0.00
Average	1.07	1.03	0.99	1.05	0.84	1.00	1.19	1.58	1.46	1.43	0.96	0.91	1.25	1.03	0.74	1.28
Maximum	1.88	2.7	1.93	2.35	2.53	1.93	3.3	2.84	5.08	4.2	2.07	2.73	2.09	1.74	2.35	3.28
Total	12.79	12.33	11.87	12.6	10.13	11.94	14.25	18.96	17.54	17.14	11.52	10.88	15.03	12.33	8.86	15.39



Information for 2013 obtained from internet site:
US Climate data, http://www.usclimatedata.com/climate/colorado/united-states/usco0303/2013/1

Undermined Monitoring Points
Previously Mined Areas

ID	Panel	Advance	Advance Date	Retreat	Retreat Date	Overburden	Begin Monitoring Date	End Monitoring Date
DH580	1 West	X	12/1/95	X	1/1/86	1600	1/1/83	4/1/92
DH600	Panel H	X	1/1/90	X	1/1/90	1100	7/1/83	11/1/98
DH700	8 North	X	2/1/84			700	1/1/83	
P0707	1 North	X	10/1/83	X	2/1/85	1500	7/1/83	4/1/92
P0711	1 North	X	10/1/83	X	2/1/85	1500	10/1/83	4/1/92
P1004	1 West	X	11/1/93			2050	10/1/91	
P1014	1 West	X	1/1/94			2200	10/1/91	
P1202	N. Mains	X	1/1/84			1300	7/1/83	10/1/97
P1401	III West Mains	X	10/1/97	X	10/1/97	950	6/1/92	11/10/06
P1404	II South	X	6/1/87			400	6/1/92	
P1701	8 North	X	1/1/84			350	8/1/83	5/4/90
P1804	N. Mains	X	9/1/82			1450	7/1/83	
P1901	2 South	X	12/1/82	X	1/1/83	100	7/1/83	4/1/92
P2401	2 1/2 West	X	5/1/83	X	9/1/83	650	7/1/85	4/1/92
P8100	9E	X	5/1/83			1700	6/1/83	4/1/92
P8300	5 North	X	6/1/84			900	1/1/83	10/5/90
P8500	Panel B	X	12/1/92	X	12/1/92	650	2/1/83	
P8700	2 1/2 Right	X	10/1/95	X	10/1/95	1250	6/1/83	
S3000	Panel Y	X	4/1/83	X	10/1/97	900	5/1/83	
SP1105	1 North	X	2/1/96			1700		
SP1502	II West Submains	X	2/1/92			700	6/1/92	
SP2300	1 East Mains	X	7/1/84	X		1650	6/1/83	5/1/97
SW08	Farmer's Mine	X				0	2/1/83	

Angle of Draw Monitoring Points
Previously Mined Areas

ID	Panel	Advance	Advance Date	Retreat	Retreat Date	Overburden	Begin Monitoring Date	End Monitoring Date
DH650	1 East Mains	X	4/1/94			1350	7/1/93	8/1/96
P1001	Panel Z	X	2/1/94	X	9/1/94	1600	10/1/91	
P1002	Panel Y	X	10/1/93			1800	10/1/91	
P1003	Panel Y	X	11/1/93			1950	10/1/91	
P1007	2 Right	X	2/1/96			1500	10/1/91	
P1009	2 1/2 Right	X	9/1/95			1650	10/1/92	
P1307	Panel A+	X	4/1/92	X	4/1/92	950	7/1/83	
P1308	5 East	X	11/1/80	X	6/1/81	900	10/1/83	4/1/92
P1402	Panel I	X	10/1/97	X	10/1/97	1100	6/1/92	11/10/06
P1501	1 East Mains	X	8/1/94	X	8/1/84	1150	6/1/92	
P8800	III West Mains	X	10/1/97	X	10/1/97	850	6/1/83	
S0704	N. Mains	X	3/1/83			1400	7/1/83	5/1/97
S0705	N. Mains	X	2/1/83			1500	7/1/83	
S1010	Panel Y	X	10/1/93			1950	6/1/92	
S1805	7 East	X	12/1/81	X	12/1/81	250		
SM07	III West Mains	X	10/1/97	X	10/1/97	900	8/1/85	
SM09	Panel C	X	2/1/93	X	3/1/93	600	8/1/85	
SP1305	Panel B	X	12/1/92	X	12/1/92	750	7/1/83	
SP1306	II West Submains	X	1/1/88			600	1/1/83	

Bowie Resources, LLC
Bowie No. 1 Mine
2013 Annual Hydrology Report

Table 6

Monitoring Point Reports
Table of Contents

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Figure No. 1

B05
Borehole 5
Depth - 32.5'
Elevation - 6883.2'

Initiated	9/1/81	9/1/81
Activated	9/1/81	9/1/81
Date	10/28/13	6/28/13

		Summary Information							
		Baseline			Operation				
Field Parameters	UNITS	Min	Ave	Max	Min	Ave	Max		
Static Water Level	Feet				32.05	32.48	32.94	32.14	32.42
Water Elevation	Feet				6850.3	6850.7	6851.2	6851.06	6850.78
Temperature	Celsius								
Conductivity	umhos/cm								
pH	su								
Field Comments								Dry	Dry
Lab Parameters	UNITS								
Bicarbonate	mg/L								
Carbonate	mg/L								
Chloride	mg/L								
Conductivity	umhos/cm								
Hardness	mg/L								
pH	su								
ResidueFilterable-TDS	mg/L								
ResidueNonFilterable-TSS	mg/L								
SAR									
Sulfate	mg/L								
Calcium (Dissolved)	mg/L								
Magnesium (Dissolved)	mg/L								
Sodium (Dissolved)	mg/L								
Potassium	mg/L								
TDS Ratio (grav./calc.)	%								

The area of concern for monitoring point B05 was affected by the mining operation before its establishment. Therefore, all recorded monitoring events are considered Operational.

Boreholes B-4 and B-5 are located below the crushing and screening fill and were installed to detect possible seepage in the original grade material.

There is no baseline collection possible for points initiated after the influence of mining.

B06
Borehole 6
Depth - 93.8'
Elevation - 6780.5'

Initiated	9/1/1981	9/1/1981
Activated	9/1/1981	9/1/1981
Date	10/28/2013	6/28/2013

		Summary Information							
		Baseline			Operation				
Field Parameters	UNITS	Min	Ave	Max	Min	Ave	Max		
Static Water Level	Feet				93.58	93.81	94.03	93.92	93.82
Water Elevation	Feet				6686.5	6686.7	6686.9	6686.58	6686.68
Temperature	Celsius								
Conductivity	umhos/cm								
pH	su								
Field Comments								Dry	Dry
Lab Parameters	UNITS								
Bicarbonate	mg/L								
Carbonate	mg/L								
Chloride	mg/L								
Conductivity	umhos/cm								
Hardness	mg/L								
pH	su								
ResidueFilterable-TDS	mg/L								
ResidueNonFilterable-TSS	mg/L								
SAR									
Sulfate	mg/L								
Calcium (Dissolved)	mg/L								
Magnesium (Dissolved)	mg/L								
Sodium (Dissolved)	mg/L								
Potassium	mg/L								
TDS Ratio (grav./calc.)	%								

The area of concern for monitoring point B06 was affected by the mining operation before its establishment. Therefore, all recorded monitoring events are considered Operational.

Borehole B-6 is located upslope of the reclaimed waste disposal pile and is monitored for interface seepage in connection with slope and waste pile stability. Borehole B-6 is dry.

There is no baseline collection possible for points initiated after the influence of mining.

B07
Borehole 7
Depth - 95.3'
Elevation - 6602'

Initiated	9/1/1981	9/1/1981
Activated	9/1/1981	9/1/1981
Date	10/28/2013	6/28/2013

Field Parameters	UNITS	Summary Information Baseline Min	Baseline Ave	Baseline Max	Operation Min	Operation Ave	Operation Max		
Static Water Level	Feet				69.40	86.52	94.84	93.98	94.41
Water Elevation	Feet				6507	6515	6533	6508.02	6507.59
Temperature	Celsius				7.0	13.7	19.6		18.5
Conductivity	umhos/cm				152	1345	2190		1650
pH	su				5.8	7.5	8.9		7.5
Field Comments								*	
Lab Parameters	**UNITS**								
Bicarbonate	mg/L				226.00	423.3	601.0		
Carbonate	mg/L				<MDL	0.3	7		
Chloride	mg/L				21.80	80.36	420.00		
Conductivity	umhos/cm				600	1390	2190		
Hardness	mg/L				237.0	670.4	1170.5		
Acidity	mg/L				20.0	23.7	27.0		
pH	su				6.9	7.6	8.4		
ResidueFilterable-TDS	mg/L				244	977	1900		
ResidueNonFilterable-TSS	mg/L				<MDL	219	824		
SAR					0.62	1.33	2.96		
Sulfate	mg/L				2.41	325.14	731.00		
Calcium (Dissolved)	mg/L				1.9	141.3	269.0		
Iron (Dissolved)	mg/L				0.02	0.06	0.12		
Iron (Total)	mg/L				1.02	10.19	18.64		
Magnesium (Dissolved)	mg/L				23.0	73.5	171.0		
Manganese (Total)	mg/L				<MDL	0.574	0.763		
Sodium (Dissolved)	mg/L				22.0	86.7	408.0		
TDS Ratio (grav./calc.)	%				0.56	0.98	1.15		

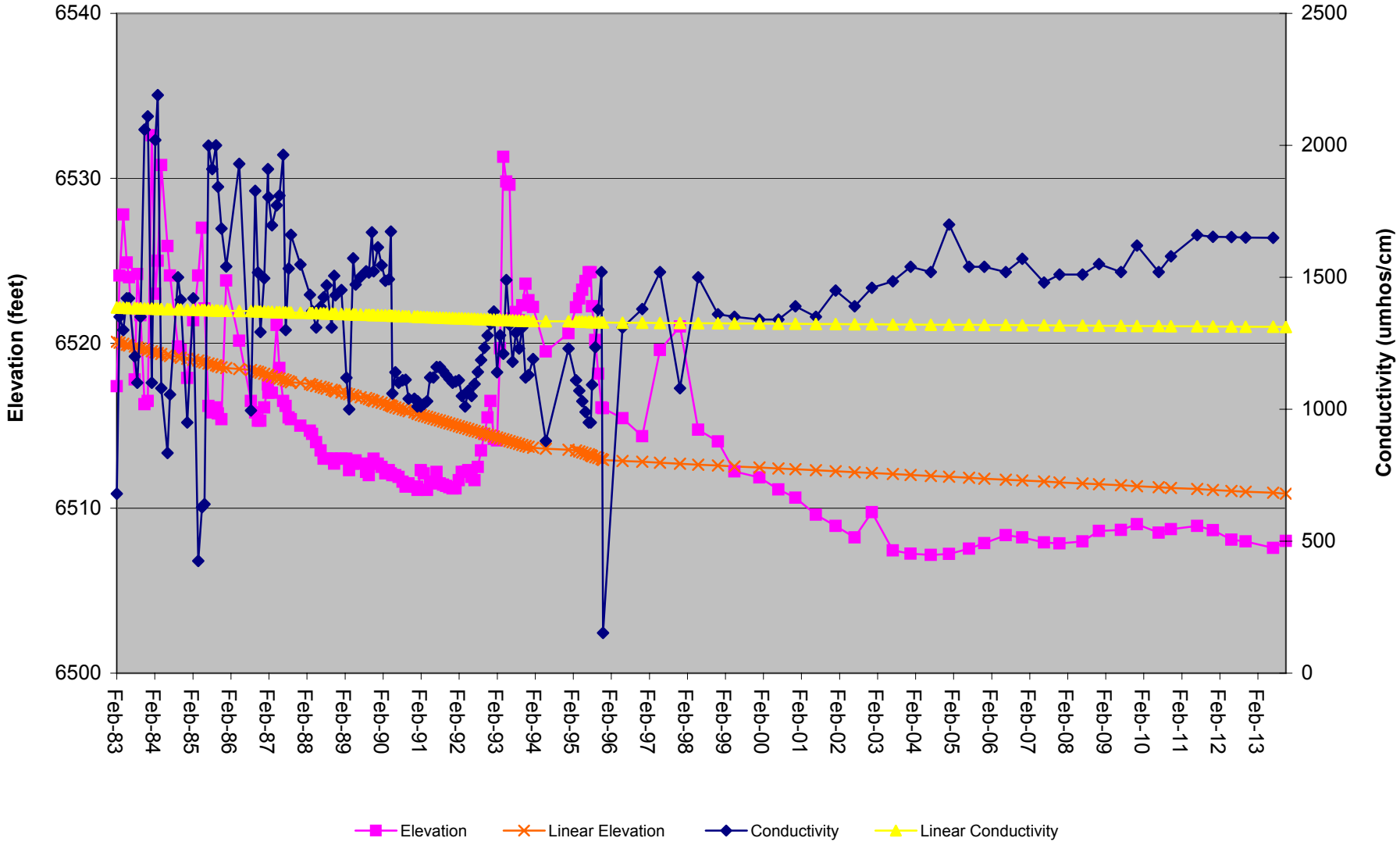
The area of concern for monitoring point B07 was affected by the mining operation before its establishment. Therefore, all recorded monitoring events are considered Operational.

**Not Enough Water for Parameters*

Borehole B-7, also referred to as Node 22, is located below sedimentation pond #4 and is periodically monitored for water quality to ascertain potential groundwater contamination attributable to the East Mine facilities area.

There is no baseline collection possible for points initiated after the influence of mining.

Plot of Conductivity and Water Level



B07 - Borehole 7

B08
Borehole 8
Depth - 38.8'
Elevation - 6790'

Initiated	9/1/1981	9/1/1981
Activated	9/1/1981	9/1/1981
Date	10/28/2013	6/28/2013

		Summary Information							
		Baseline			Operation				
Field Parameters	UNITS	Min	Ave	Max	Min	Ave	Max		
Static Water Level	Feet				38.45	38.79	39.07	38.62	38.8
Water Elevation	Feet				6750.9	6751.2	6751.6	6751.38	6751.2
Temperature	Celsius								
Conductivity	umhos/cm								
pH	su								
Field Comments								Dry	Dry
Lab Parameters	UNITS								
Bicarbonate	mg/L								
Carbonate	mg/L								
Chloride	mg/L								
Conductivity	umhos/cm								
Hardness	mg/L								
pH	su								
ResidueFilterable-TDS	mg/L								
ResidueNonFilterable-TSS	mg/L								
SAR									
Sulfate	mg/L								
Calcium (Dissolved)	mg/L								
Magnesium (Dissolved)	mg/L								
Sodium (Dissolved)	mg/L								
Potassium	mg/L								
TDS Ratio (grav./calc.)	%								

The area of concern for monitoring point B08 was affected by the mining operation before its establishment. Therefore, all recorded monitoring events are considered Operational.

Borehole B-8 is located below the West Ridge Waste Pile sedimentation pond and monitors subsurface groundwater flow from the sedimentation pond. Borehole B-8 is dry.

There is no baseline collection possible for points initiated after the influence of mining.

MW01
Monitoring Well 1
Depth - 25'
Elevation - 5716.15'

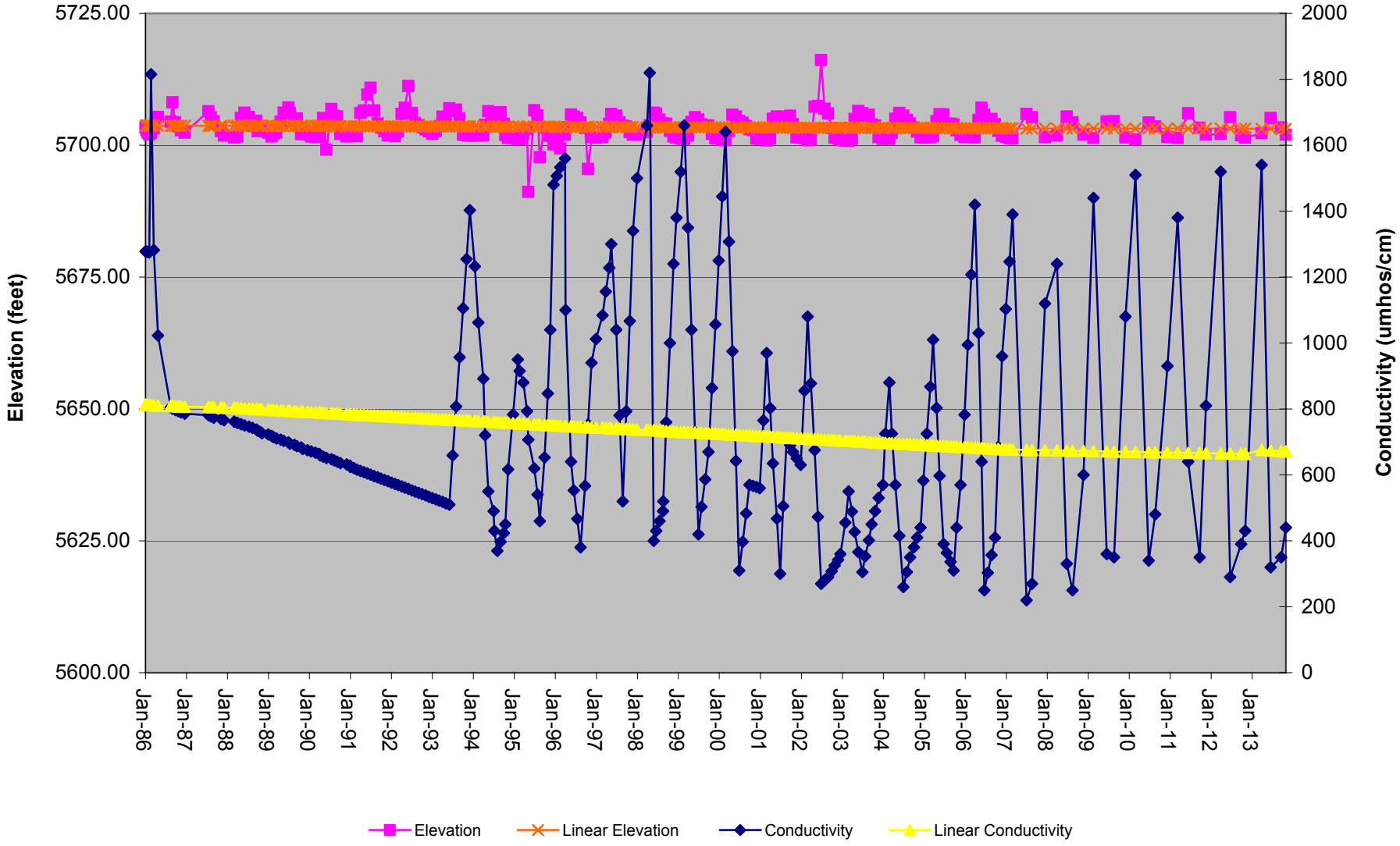
Initiated								9/1/82	9/1/82	9/1/82	9/1/82
Activated								9/1/82	9/1/82	9/1/82	9/1/82
Date								10/28/13	9/17/13	6/14/13	3/27/13
		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Static Water Level	Feet				4.95	12.75	25.00	14.18	12.79	11.01	13.86
Water Elevation	Feet				5691.1	5703.4	5711.2	5701.97	5703.36	5705.14	5702.29
Temperature	Celsius				7.4	13.0	18.5	15.3	16.2	13.5	9.7
Conductivity	umhos/cm				220	778	1820	440	350	320	1540
pH	su				6.3	7.6	8.2	7.8	7.8	7.8	7.4
Field Comments											**
Lab Parameters	UNITS										
Bicarbonate	mg/L				98.5	185.9	329.4	108.23	176.66	104.29	
Carbonate	mg/L				<MDL	0.3	1.9	<MDL	<MDL	<MDL	
Chloride	mg/L				<MDL	20.6	233.0	150.98	196	148.89	
Conductivity	umhos/cm				222	731	1850	684	584	708	
Hardness	mg/L				107	377	1054	294.38	275.27	286.6	
Acidity	mg/L				4.00	12.15	49.84	6	18	6	
pH	su				6.70	7.63	8.41	7.28	7.58	7.22	
ResidueFilterable-TDS	mg/L				160	619	5122	467	537	453	
ResidueNonFilterable-TSS	mg/L				<MDL	43	256	10	36	9	
SAR					0.25	0.63	1.97	1.329	1.639	1.31	
Sulfate	mg/L				5.8	217.9	880.0	28.05	21.76	27.17	
Calcium (Dissolved)	mg/L				1.9	96.8	273.0	67.1	73.3	66.8	
Iron (Dissolved)	mg/L				0.01	0.05	0.35	0.01	0.05	0.01	
Iron (Total)	mg/L				0.02	0.39	1.51	0.44	0.29	0.49	
Magnesium (Dissolved)	mg/L				7.20	29.44	137.10	30.8	22.4	29.1	
Manganese (Total)	mg/L				<MDL	0.034	0.050	0.05	0.01	0.05	
Sodium (Dissolved)	mg/L				0.5	26.6	102.0	52.4	62.5	51	
TDS Ratio (grav./calc.)	%				<MDL	0.95	1.33	1.07	0.97	1.06	

The area of concern for monitoring point MW01 was affected by the mining operation before its establishment. Therefore, all recorded monitoring events are considered Operational.

*** No sample taken by the Contractor*

Monitoring Wells MW-1, MW-2 and MW-3 are located at the coal stockpile/truck dump/train loadout area and were drilled during September 1982 to determine the essential hydrologic functions of the North Fork alluvial valley floor. Two of the wells, MW-2 and MW-3, have since been determined to be installed in areas which are no longer classified as alluvial valley floor. (TR-13)

Plot of Conductivity and Water Level



MW01 - Monitoring Well 1

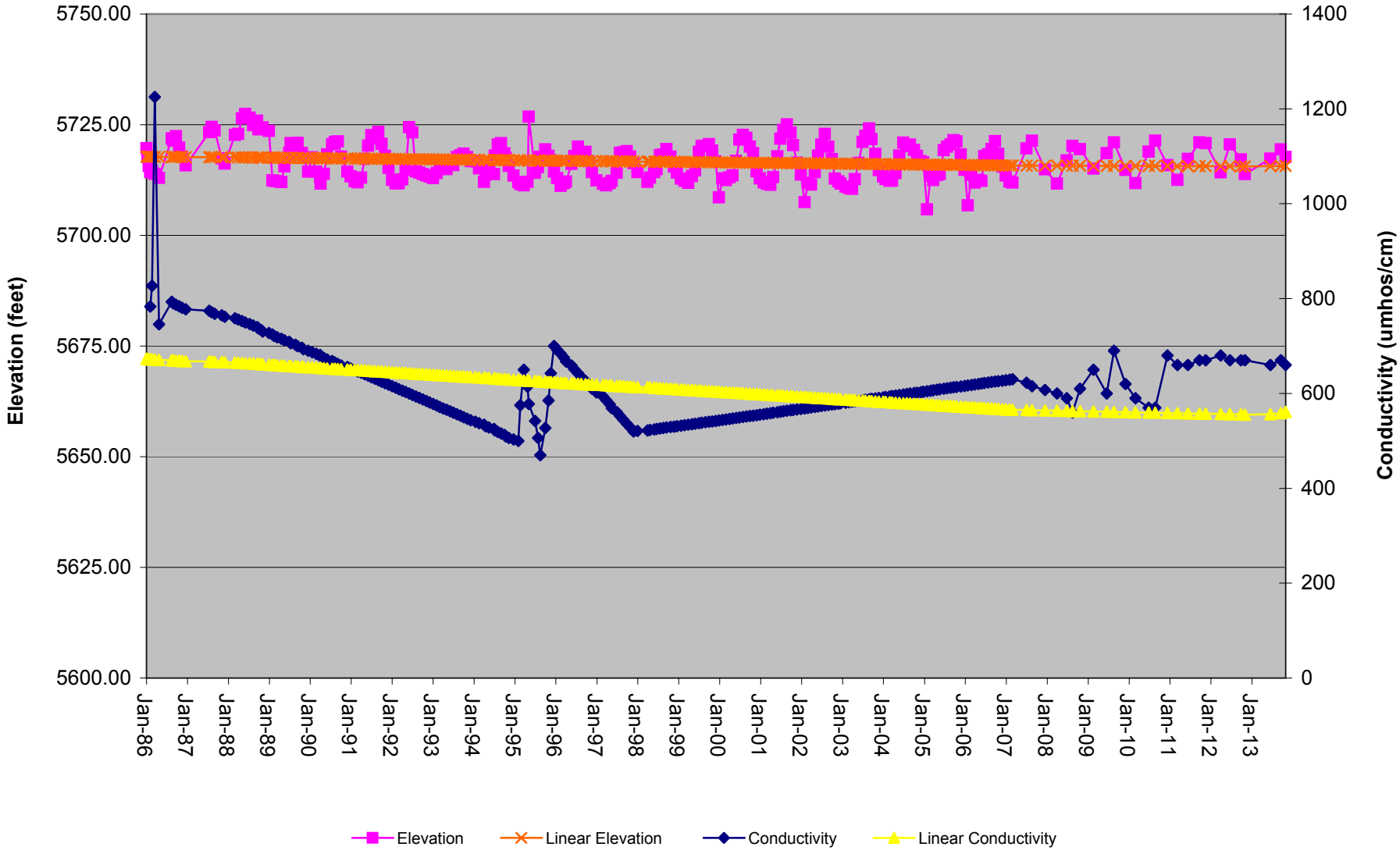
MW02
Monitoring Well 2
Depth - 41.8'
Elevation - 5737.4'

Initiated								9/1/1982	9/1/1982	9/1/1982	9/1/1982
Activated								9/1/1982	9/1/1982	9/1/1982	9/1/1982
Date								10/28/2013	9/17/2013	6/14/2013	10/31/2012
		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Static Water Level	Feet				10.00	21	31.55	19.66	17.98	20.08	23.58
Water Elevation	Feet				5705.9	5716.7	5727.4	5717.74	5719.42	5717.32	5713.82
Temperature	Celsius				10.6	13.5	17.0	14.6	14.8	14.3	14.7
Conductivity	umhos/cm				470	662	1225	660	670	660	670
pH	su				6.7	7.6	8.3	7.6	7.5	7.5	7.6
Field Comments											
Lab Parameters	UNITS										
Bicarbonate	mg/L										
Carbonate	mg/L										
Chloride	mg/L										
Conductivity	umhos/cm										
Hardness	mg/L										
pH	su										
ResidueFilterable-TDS	mg/L										
ResidueNonFilterable-TSS	mg/L										
SAR											
Sulfate	mg/L										
Calcium (Dissolved)	mg/L										
Magnesium (Dissolved)	mg/L										
Sodium (Dissolved)	mg/L										
TDS Ratio (grav./calc.)	%										

The area of concern for monitoring point MW02 was affected by the mining operation before its establishment. Therefore, all recorded monitoring events are considered Operational.

Monitoring Wells MW-1, MW-2 and MW-3 are located at the coal stockpile/truck dump/train loadout area and were drilled during September 1982 to determine the essential hydrologic functions of the North Fork alluvial valley floor. Two of the wells, MW-2 and MW-3, have since been determined to be installed in areas which are no longer classified as alluvial valley floor. (TR-13)

Plot of Conductivity and Water Level



MW02 - Monitoring Well 2

MW03
Monitoring Well 3
Depth - 31.9'
Elevation - 5726.94'

Initiated								9/1/1982	9/1/1982	9/1/1982	9/1/1982
Activated								9/1/1982	9/1/1982	9/1/1982	9/1/1982
Date								10/28/2013	9/17/2013	6/14/2013	3/27/2013
		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Static Water Level	Feet				4.60	22.57	32.58	22.84	16.9	30.18	32.31
Water Elevation	Feet				5694.4	5704.8	5726.9	5704.10	5710.04	5696.76	5694.63
Temperature	Celsius				8.8	14.4	19.8	14.1	16.1	14.7	
Conductivity	umhos/cm				340	587	750	630	610	750	
pH	su				6.7	7.8	8.4	7.9	7.8	7.7	
Field Comments											*
Lab Parameters	UNITS										
Bicarbonate	mg/L				88.8	309.6	421.0	318.66	88.83	322.61	
Carbonate	mg/L				<MDL	1.3	14.0	<MDL	<MDL	<MDL	
Chloride	mg/L				<MDL	34.9	303.1	303.14	212	297.78	
Conductivity	umhos/cm				366	627	1440	1440	474	1410	
Hardness	mg/L				159.68	293.02	550.46	394.32	228.31	382.06	
Acidity	mg/L				4	12	39	8	18	8	
pH	su				6.9	7.8	8.6	7.03	6.93	7.07	
ResidueFilterable-TDS	mg/L				200	422	1046	1046	455	971	
ResidueNonFilterable-TSS	mg/L				<MDL	32	280	10	17	11	
SAR					<MDL	0.61	1.90	1.219	1.9	1.19	
Sulfate	mg/L				<MDL	31.15	181.43	181.43	8.44	167.43	
Calcium (Dissolved)	mg/L				1.9	42.3	200.0	67.1	56.8	65.6	
Iron (Dissolved)	mg/L				0.01	0.08	0.66	0.01	0.02	0.01	
Iron (Total)	mg/L				0.01	0.30	1.07	0.34	0.6	0.39	
Magnesium (Dissolved)	mg/L				12.4	44.9	72.4	54.1	21	53	
Manganese (Total)	mg/L				<MDL	0.082	0.226	0.08	0.05	0.09	
Sodium (Dissolved)	mg/L				9.0	25.3	92.0	55.6	66	53.5	
TDS Ratio (grav./calc.)	%				<MDL	0.95	1.45	1.06	1	1.01	

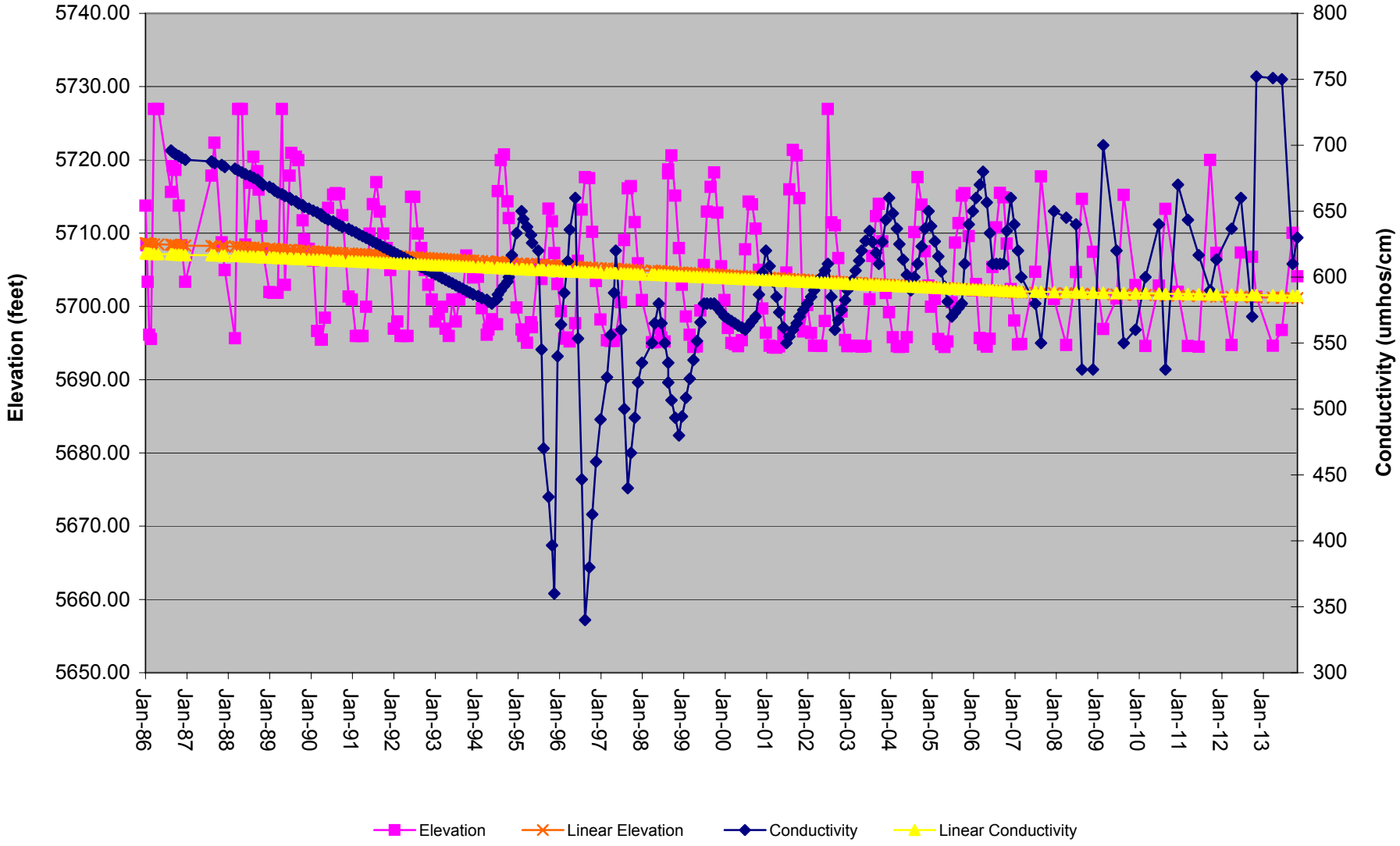
The area of concern for monitoring point MW03 was affected by the mining operation before its establishment. Therefore, all recorded monitoring events are considered Operational.

**Not enough water for parameters - no sample.*

Monitoring Wells MW-1, MW-2 and MW-3 are located at the coal stockpile/truck dump/train loadout area and were drilled during September 1982 to determine the essential hydrologic functions of the North Fork alluvial valley floor. Two of the wells, MW-2 and MW-3, have since been determined to be installed in areas which are no longer classified as alluvial valley floor. (TR-13)

There is no baseline collection possible for points initiated after the influence of mining.

Plot of Conductivity and Water Level



MW03 - Monitoring Well 3

SM01
Monitoring Well SM-1
Depth - 55'
Top of Pipe Elevation - 7590'
Pipe 2.7' Above Ground

Initiated	8/2/1985	8/2/1985
Activated		
Date	10/24/2013	6/21/2013

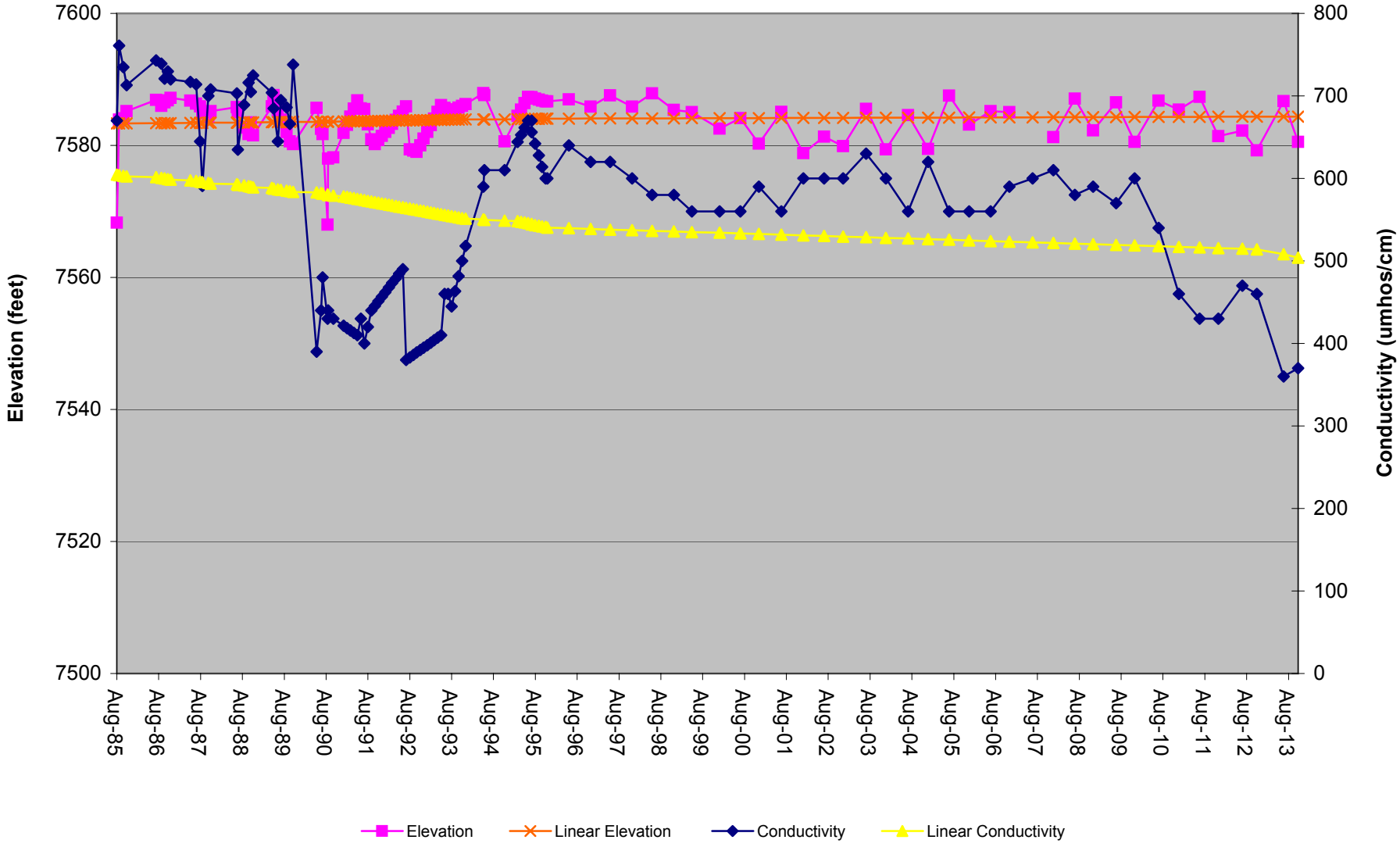
Field Parameters	UNITS	Summary Information Baseline Min	Baseline Ave	Baseline Max	Operation Min	Operation Ave	Operation Max		
Static Water Level	Feet	2.1	6.2	22.0				9.48	3.31
Water Elevation	Feet	7568.0	7583.8	7587.9				7580.52	7586.69
Temperature	Celsius	4.8	9.4	14.7				8.6	8.3
Conductivity	umhos/cm	360	554	761				370	360
pH	su	7.0	7.7	8.3				7.6	7.5
Field Comments									
Lab Parameters	UNITS								
Bicarbonate	mg/L	167	298	380				222.9	216.74
Carbonate	mg/L	<MDL	0.3	7				<MDL	<MDL
Chloride	mg/L	<MDL	25.53	223.34				208.73	210.93
Conductivity	umhos/cm	315	622	790				724	790
Hardness	mg/L	<MDL	244	1113				200.49	176.44
Acidity	mg/L	4	9	16				4	4
pH	su	7.2	7.8	8.4				7.74	7.78
ResidueFilterable-TDS	mg/L	215	396	598				598	556
ResidueNonFilterable-TSS	mg/L	<MDL	24	96				48	45
SAR		0.81	1.98	12.40				0.808	0.83
Sulfate	mg/L	0.3	40.7	84.0				28.66	24.12
Calcium (Dissolved)	mg/L	13.7	63.0	186.0				48.3	41.8
Iron (Dissolved)	mg/L	<MDL	0.08	0.38				0.03	0.04
Iron (Total)	mg/L	<MDL	0.34	0.85				0.31	0.37
Magnesium (Dissolved)	mg/L	9.0	20.8	158.0				19.4	17.5
Manganese (Total)	mg/L	<MDL	0.062	0.250				0.05	0.07
Sodium (Dissolved)	mg/L	25.4	62.2	267.0				26.3	25.4
TDS Ratio (grav./calc.)	%	0.85	1.00	1.17				1.08	1.04

The area of concern for monitoring point SM01 has not been affected by the mining operation. Therefore, all recorded monitoring events are considered Baseline.

Shallow monitoring wells SM-1 through SM-11 were constructed in 1985 in order to gather additional information on alluvial/colluvial deposits within the permit boundary. They are depicted on Map 4-1.

Baseline Information Collection initiated on 8/2/85 and not yet considered complete.
Point SM01 has not been influenced by mining.

Plot of Conductivity and Water Level



SM01 - Monitoring Well SM-1

SM05
Monitoring Well SM-5
Depth - 40'
Top of Pipe Elevation - 7520'
Pipe 2.5' Above Ground

Initiated	8/3/1985	8/3/1985
Activated		
Date	10/24/2013	6/21/2013

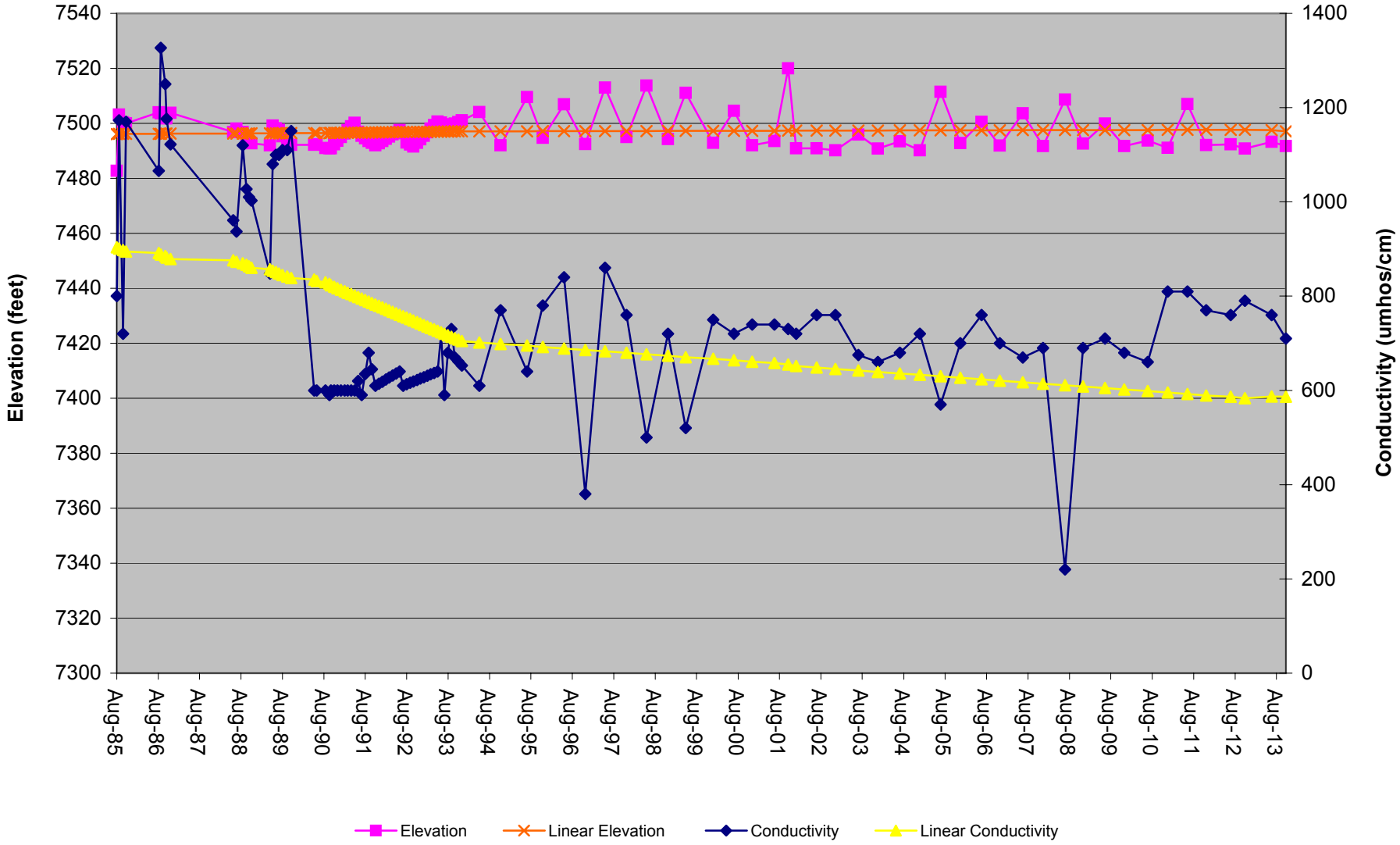
Field Parameters	UNITS	Summary Information Baseline Min	Baseline Ave	Baseline Max	Operation Min	Operation Ave	Operation Max		
Static Water Level	Feet	6.2	23.4	37.3				28.26	26.71
Water Elevation	Feet	7482.7	7496.8	7520.0				7491.74	7493.29
Temperature	Celsius	6.0	8.8	19.4				9	10
Conductivity	umhos/cm	220	743	1327				710	760
pH	su	6.9	7.4	8.2				7.4	7.3
Field Comments									
Lab Parameters	**UNITS**								
Bicarbonate	mg/L	127	342	522				277.16	288.53
Carbonate	mg/L	<MDL	1.3	18				<MDL	<MDL
Chloride	mg/L	1.4	32.9	308.0				208.13	222.61
Conductivity	umhos/cm	279	776	1020				799	1010
Hardness	mg/L	<MDL	387	826				199.61	189.41
Acidity	mg/L	2	15	40				2	2
pH	su	6.7	7.5	8.6				7.03	6.93
ResidueFilterable-TDS	mg/L	190	517	720				661	632
ResidueNonFilterable-TSS	mg/L	<MDL	257	3485				78	90
SAR		0.15	0.91	8.57				1.056	1.14
Sulfate	mg/L	10	89	206				44.55	41.16
Calcium (Dissolved)	mg/L	1.9	89.8	239.0				30.3	27.7
Iron (Dissolved)	mg/L	0.01	0.04	0.22				0.01	0.01
Iron (Total)	mg/L	0.04	4.23	16.80				0.58	0.64
Magnesium (Dissolved)	mg/L	11.4	37.2	58.0				30.1	29.2
Manganese (Total)	mg/L	<MDL	0.775	4.690				0.08	0.09
Sodium (Dissolved)	mg/L	7.8	33.0	86.0				34.3	36
TDS Ratio (grav./calc.)	%	0.60	1.00	1.11				1.06	0.978

The area of concern for monitoring point SM05 has not been affected by the mining operation. Therefore, all recorded monitoring events are considered Baseline.

Shallow monitoring wells SM-1 through SM-11 were constructed in 1985 in order to gather additional information on alluvial/colluvial deposits within the permit boundary. They are depicted on Map 4-1.

Baseline Information Collection initiated on 8/3/85 and not yet considered complete.
Point SM05 has not been influenced by mining.

Plot of Conductivity and Water Level



SM05 - Monitoring Well SM-5

SM06
Monitoring Well SM-6
Depth - 50'
Top of Pipe Elevation - 7480'
Pipe 2.5' Above Ground

Initiated	8/3/1985	8/3/1985
Activated		
Date	10/24/2013	6/21/2013

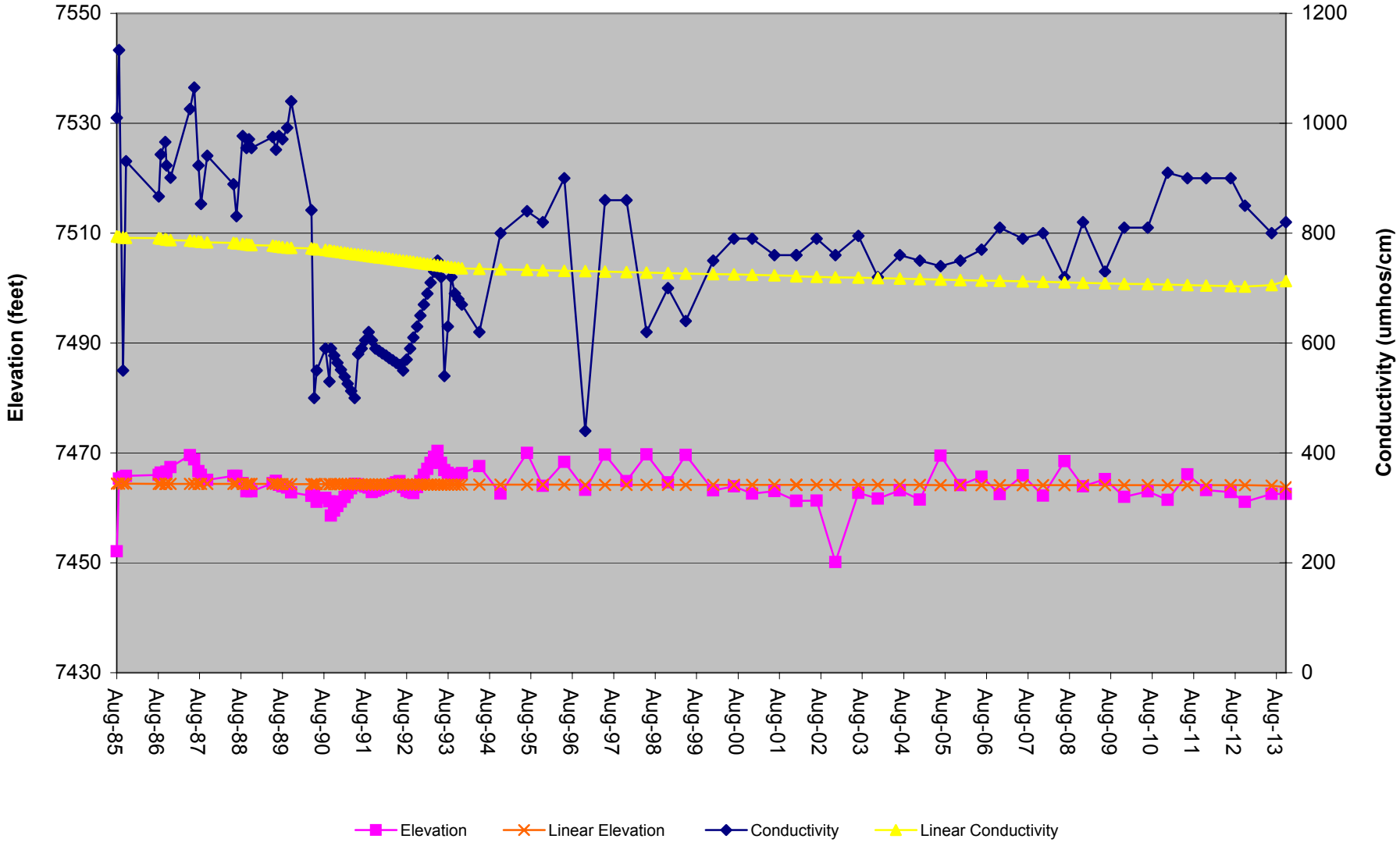
Field Parameters	UNITS	Summary Information Baseline Min	Baseline Ave	Baseline Max	Operation Min	Operation Ave	Operation Max		
Static Water Level	Feet	9.6	15.8	29.9				17.45	17.47
Water Elevation	Feet	7450.1	7464.2	7470.4				7462.55	7462.53
Temperature	Celsius	6.0	9.4	20.0				9.9	10.1
Conductivity	umhos/cm	440	749	1133				820	800
pH	su	6.9	7.9	8.6				7.8	7.9
Field Comments									
Lab Parameters	UNITS								
Bicarbonate	mg/L	124	419	577				124.25	338.54
Carbonate	mg/L	<MDL	2.7	23.7				<MDL	<MDL
Chloride	mg/L	<MDL	20.8	260.1				13	260.06
Conductivity	umhos/cm	391	835	1240				492	920
Hardness	mg/L	<MDL	135.8	514.0				411.97	142.42
Acidity	mg/L	2	13	55				6	4
pH	su	7.2	7.9	8.8				7.66	7.71
ResidueFilterable-TDS	mg/L	256	546	779				388	744
ResidueNonFilterable-TSS	mg/L	<MDL	219	6760				17	30
SAR		0.61	6.73	18.80				1.818	3.421
Sulfate	mg/L	15.8	52.1	221.0				15.76	28.3
Calcium (Dissolved)	mg/L	1.9	30.0	131.0				60.1	22.9
Iron (Dissolved)	mg/L	<MDL	0.11	0.53				0.14	0.01
Iron (Total)	mg/L	<MDL	1.11	3.76				0.23	1.58
Magnesium (Dissolved)	mg/L	3.0	14.2	63.6				63.6	20.7
Manganese (Total)	mg/L	<MDL	0.126	0.480				0.03	0.15
Sodium (Dissolved)	mg/L	19.0	232.8	3949.4				84.8	93.8
TDS Ratio (grav./calc.)	%	0.62	0.97	1.08				1.07	0.971

The area of concern for monitoring point SM06 has not been affected by the mining operation. Therefore, all recorded monitoring events are considered Baseline.

Shallow monitoring wells SM-1 through SM-11 were constructed in 1985 in order to gather additional information on alluvial/colluvial deposits within the permit boundary. They are depicted on Map 4-1.

Baseline Information Collection initiated on 8/3/85 and not yet considered complete.
Point SM06 has not been influenced by mining.

Plot of Conductivity and Water Level



SM06 - Monitoring Well SM-6

SM07
Monitoring Well SM-7
Depth - 55'
Top of Pipe Elevation - 7800'
Pipe 2.5' Above Ground

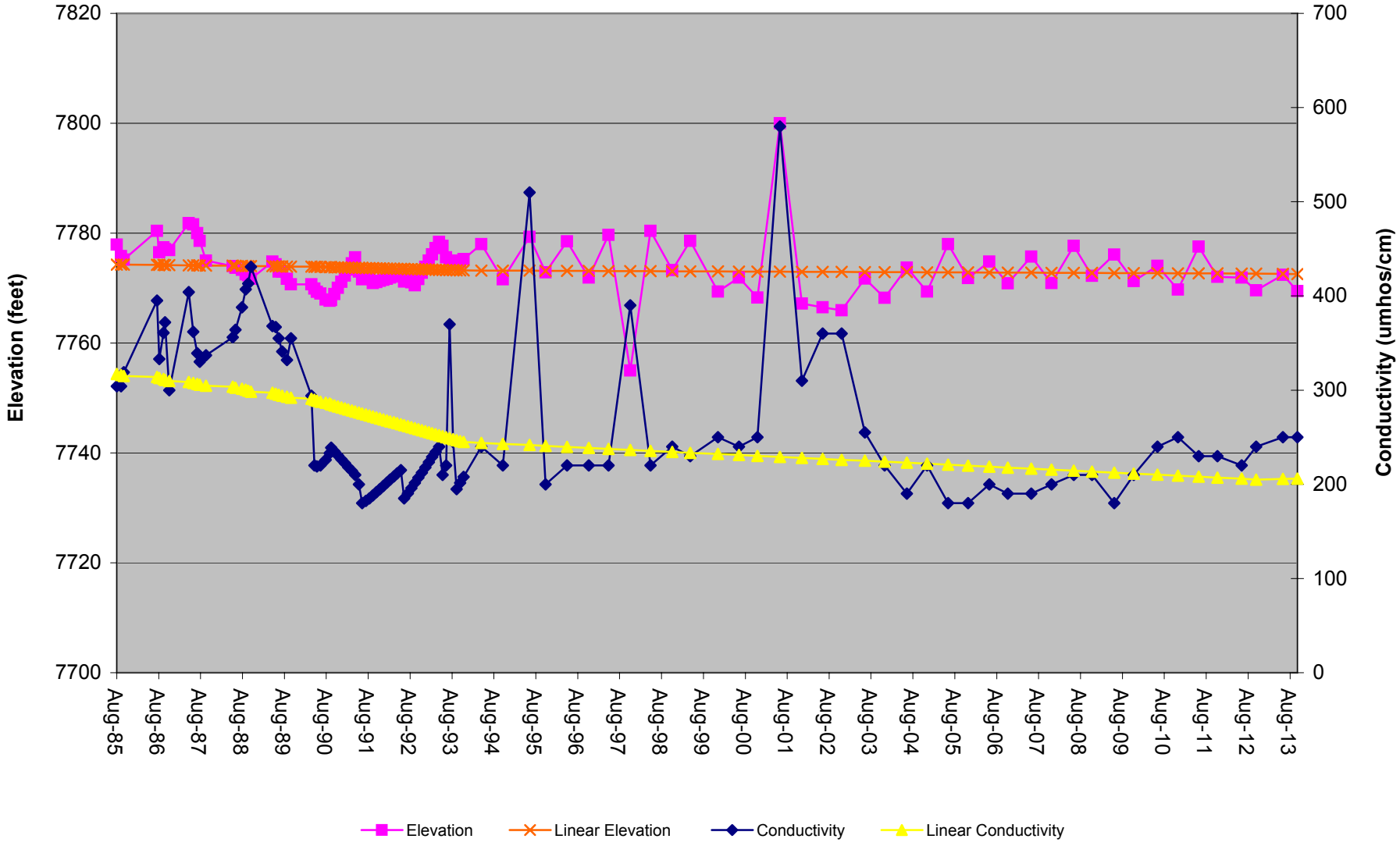
Initiated	8/22/1985	8/22/1985
Activated	10/1/1997	10/1/1997
Date	10/24/2013	6/21/2013

Field Parameters	UNITS	Summary Information Baseline Min	Baseline Ave	Baseline Max	Operation Min	Operation Ave	Operation Max		
Static Water Level	Feet	18.2	26.2	32.3	0.0	27.4	45.0	30.56	27.6
Water Elevation	Feet	7767.7	7773.8	7781.8	7755.0	7772.6	7800.0	7769.44	7772.4
Temperature	Celsius	6.0	9.2	15.8	6.4	8.1	10.3	8	9.2
Conductivity	umhos/cm	180	267	510	180	248	580	250	250
pH	su	6.8	7.6	8.5	6.8	7.4	7.8	7.3	7
Field Comments									
Lab Parameters	UNITS								
Bicarbonate	mg/L	102	165	680	64	119	198	82.41	85.23
Carbonate	mg/L	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Chloride	mg/L	2	5	13	<MDL	35.5	199	186.11	186.11
Conductivity	umhos/cm	229	280	362	218	300	506	499	506
Hardness	mg/L	103	139	193	<MDL	137	478	152.01	164.34
Acidity	mg/L				4	9	18	6	6
pH	su	6.5	7.2	8.0	6.5	7.2	8.3	6.93	6.84
ResidueFilterable-TDS	mg/L	117	164	220	110	207	377	368	344
ResidueNonFilterable-TSS	mg/L	8	257	846	<MDL	39	154	22	26
SAR		0.19	0.24	0.29	0.12	0.49	2.68	0.667	0.634
Sulfate	mg/L	<MDL	19	78	<MDL	11.7	30.0	5.43	5.16
Calcium (Dissolved)	mg/L	1.9	40.4	59.0	20.8	39.3	120.3	42.9	41.9
Iron (Dissolved)	mg/L				<MDL	0.09	0.35	0.06	0.08
Iron (Total)	mg/L				0.02	0.27	0.77	0.38	0.41
Magnesium (Dissolved)	mg/L	6.0	7.9	11.0	5.5	9.2	43.3	10.9	14.5
Manganese (Total)	mg/L				<MDL	0.021	0.060	0.02	0.02
Sodium (Dissolved)	mg/L	6.0	6.8	8.3	6.2	14.1	105.8	18.9	18.7
TDS Ratio (grav./calc.)	%	0.95	1.07	1.19	0.85	1.06	1.58	1.06	0.977

Shallow monitoring wells SM-1 through SM-11 were constructed in 1985 in order to gather additional information on alluvial/colluvial deposits within the permit boundary. They are depicted on Map 4-1.

Baseline Information for Point SM07 is derived from events beginning on 8/22/85 through 10/1/97.
Point influenced by mining on 10/1/97.

Plot of Conductivity and Water Level



SM07 - Monitoring Well SM-7

SM09
Monitoring Well SM-9
Depth - 40'
Top of Pipe Elevation - 7520'
Pipe 2.5' Above Ground

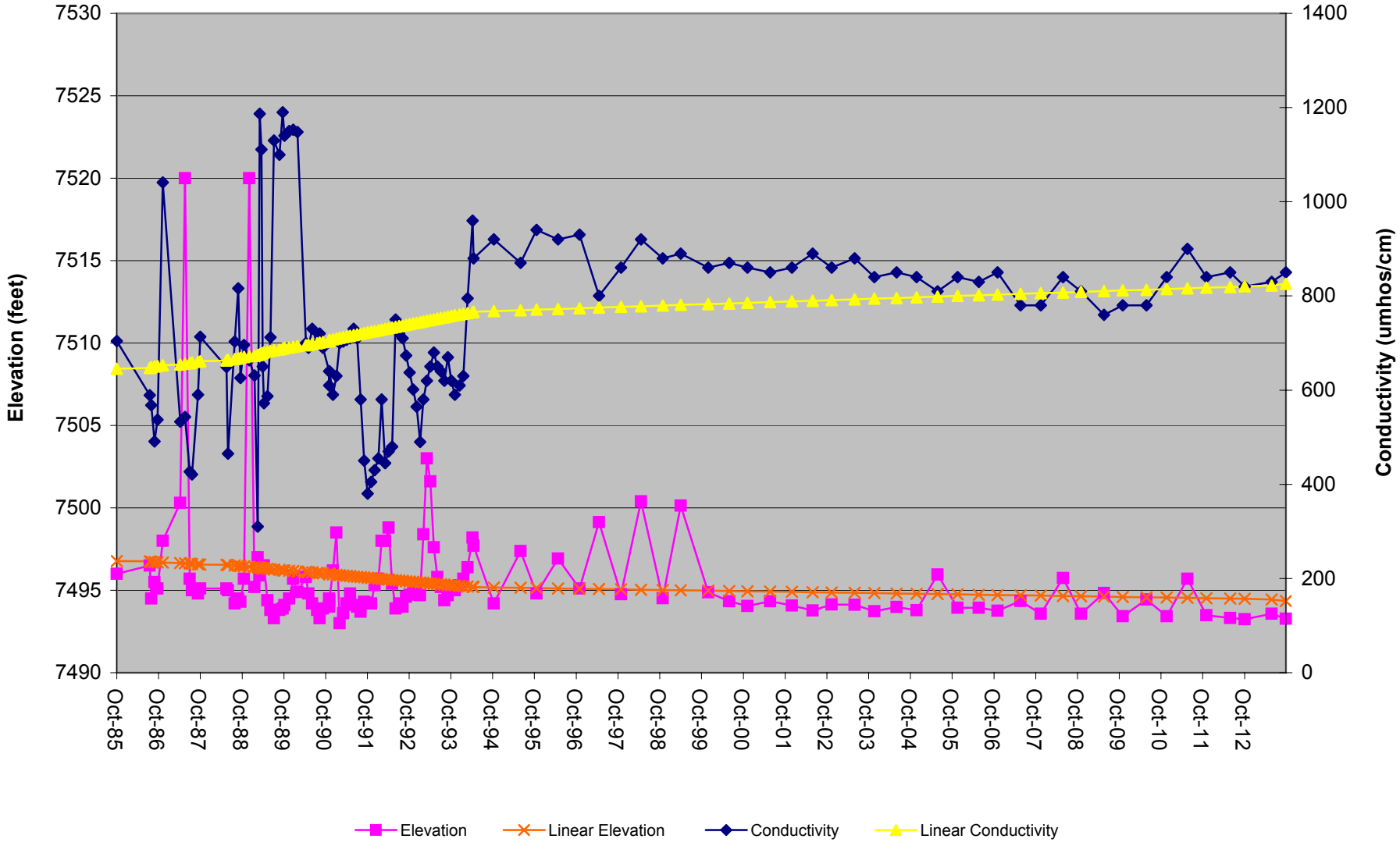
Initiated	8/26/1985	8/26/1985
Activated	2/1/1993	2/1/1993
Date	10/24/2013	6/21/2013

Field Parameters	UNITS	Summary Information Baseline Min	Baseline Ave	Baseline Max	Operation Min	Operation Ave	Operation Max		
Static Water Level	Feet	19.7	24.9	27.0	17.0	24.6	26.8	26.72	26.43
Water Elevation	Feet	7493.0	7495.8	7520.0	7493.3	7495.4	7503.0	7493.28	7493.57
Temperature	Celsius	6.7	9.3	18.1	6.0	8.4	10.4	8.7	9.3
Conductivity	umhos/cm	310	680	1190	580	803	960	850	830
pH	su	6.7	7.8	8.8	6.8	7.3	7.8	7.3	7.2
Field Comments									
Lab Parameters	**UNITS**								
Bicarbonate	mg/L	49	319	510	253	370	489	266.54	272.41
Carbonate	mg/L	<MDL	<MDL	<MDL	<MDL	1.6	21.7	<MDL	<MDL
Chloride	mg/L	2	9	16	<MDL	49.74	322.59	317	321
Conductivity	umhos/cm	438	610	1230	566	880	1020	940	1020
Hardness	mg/L	111	214	501	191	361	628	197.02	191.41
Acidity	mg/L				7	16.75	40	8	10
pH	su	7.0	7.7	8.2	6.8	7.5	8.7	7.01	7.09
ResidueFilterable-TDS	mg/L	252	384	648	402	600	837	765	726
ResidueNonFilterable-TSS	mg/L	52	571	1475	<MDL	66	211	41	37
SAR		1.33	2.76	12.33	0.77	1.59	2.30	1.656	1.63
Sulfate	mg/L	6	65	193	<MDL	104	579	40.04	38.66
Calcium (Dissolved)	mg/L	28.0	52.4	120.0	29.9	84.1	130.3	30.5	29.9
Iron (Dissolved)	mg/L				<MDL	0.25	1.32	0.12	0.17
Iron (Total)	mg/L				<MDL	2.69	8.56	1.46	1.82
Magnesium (Dissolved)	mg/L	7.0	20.2	49.0	26.0	36.5	73.6	29.35	28.35
Manganese (Total)	mg/L				<MDL	0.36	1.27	0.28	0.32
Sodium (Dissolved)	mg/L	53.0	87.5	410.0	41.6	68.2	102.0	53.44	51.75
TDS Ratio (grav./calc.)	%				0.85	1.00	1.14	1.04	0.975

Shallow monitoring wells SM-1 through SM-11 were constructed in 1985 in order to gather additional information on alluvial/colluvial deposits within the permit boundary. They are depicted on Map 4-1.

Baseline Information for Point SM09 is derived from events beginning on 8/26/85 through 2/1/93.
Point influenced by mining on 2/1/93.

Plot of Conductivity and Water Level



SM09 - Monitoring Well SM-9

SM10
Monitoring Well SM-10
Depth - 48.7'
Elevation - 7250.47

Initiated	8/8/1986	8/8/1986
Activated		
Date	10/24/2013	6/21/2013

Field Parameters	UNITS	Summary Information Baseline Min	Baseline Ave	Baseline Max	Operation Min	Operation Ave	Operation Max		
Static Water Level	Feet	36.2	43.6	50.0				46.83	45.48
Water Elevation	Feet	7200.5	7206.9	7214.2				7203.64	7204.99
Temperature	Celsius	6	10.6	22.4					11.4
Conductivity	umhos/cm	1815	2670	4370					1980
pH	su	6.4	7.2	11.1					7
Field Comments								*	
Lab Parameters	**UNITS**								
Bicarbonate	mg/L	91.54	822	1179					641.15
Carbonate	mg/L	<MDL	<MDL	<MDL					<MDL
Chloride	mg/L	21.8	85	285					284.63
Conductivity	umhos/cm	1553.9	2775	3740					2410
Hardness	mg/L	213.3	1151	2013					556.83
Acidity	mg/L	6	56	104					6
pH	su	6.8	7.3	8.4					7.69
ResidueFilterable-TDS	mg/L	1244	2239	3578					1660
ResidueNonFilterable-TSS	mg/L	30	928	4590					425
SAR		0.45	3.92	9.70					4.436
Sulfate	mg/L	349.13	900	1679					349.13
Calcium (Dissolved)	mg/L	18.5	171	341					18.5
Iron (Dissolved)	mg/L	0.02	0.06	0.16					0.16
Iron (Total)	mg/L	0.16	4.30	13.82					13.82
Magnesium (Dissolved)	mg/L	8.2	177	287					124
Manganese (Total)	mg/L	<MDL	0.23	0.58					0.33
Sodium (Dissolved)	mg/L	18	308	899					240.5
TDS Ratio (grav./calc.)	%	0.90	1.01	1.12					0.993

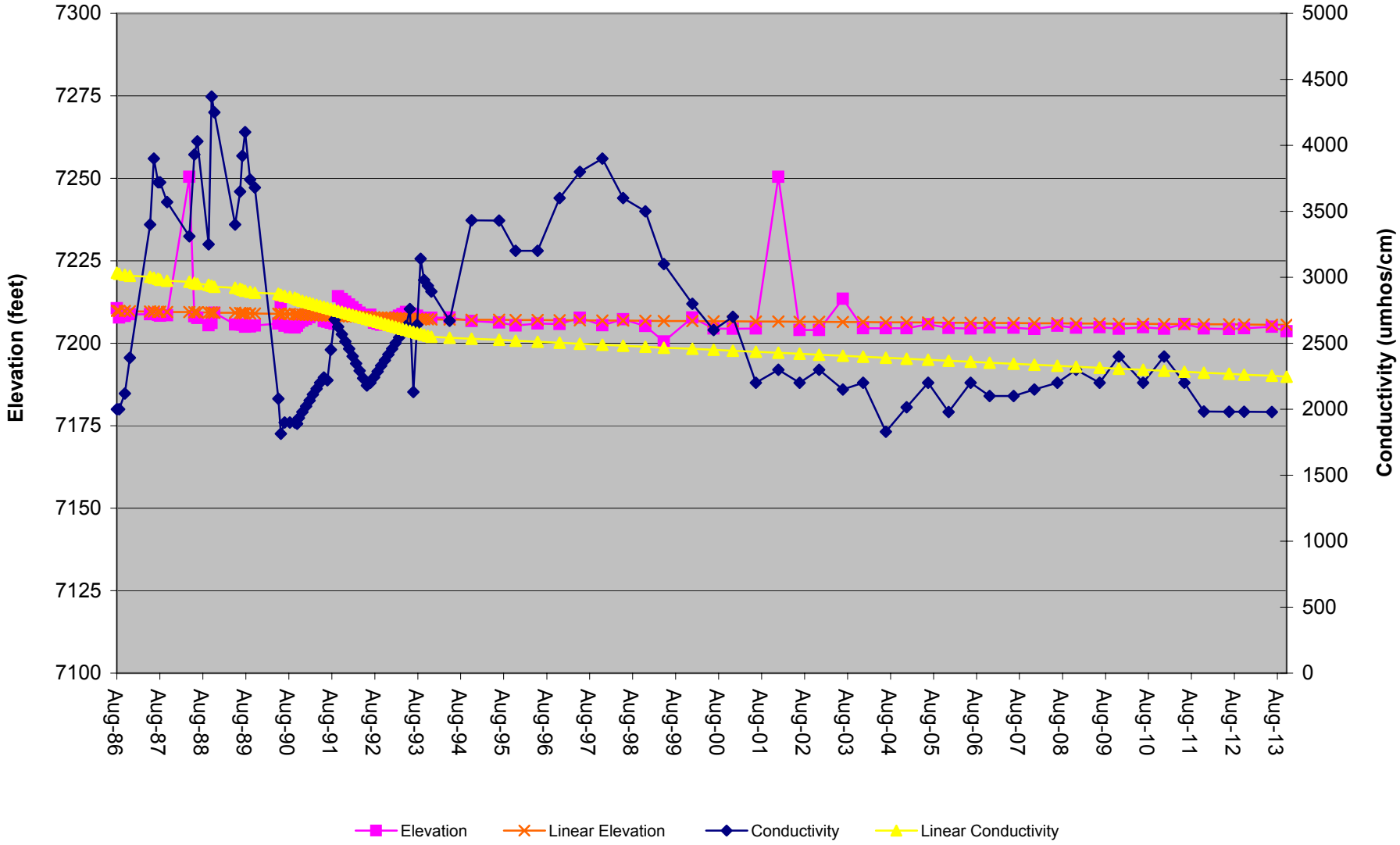
The area of concern for monitoring point SM10 has not been affected by the mining operation. Therefore, all recorded monitoring events are considered Baseline.

**Not enough water for field parameters or sample*

Shallow monitoring wells SM-1 through SM-11 were constructed in 1985 in order to gather additional information on alluvial/colluvial deposits within the permit boundary. They are depicted on Map 4-1.

Baseline Information Collection initiated on 8/8/86 and not yet considered complete.
Point SM10 has not been influenced by mining.

Plot of Conductivity and Water Level



SM10 - Monitoring Well SM-10

SM11
Monitoring Well SM-11
Depth - 46.5'
Elevation - 7242.65

Initiated	8/8/1986	8/8/1986
Activated		
Date	10/24/2013	6/21/2013

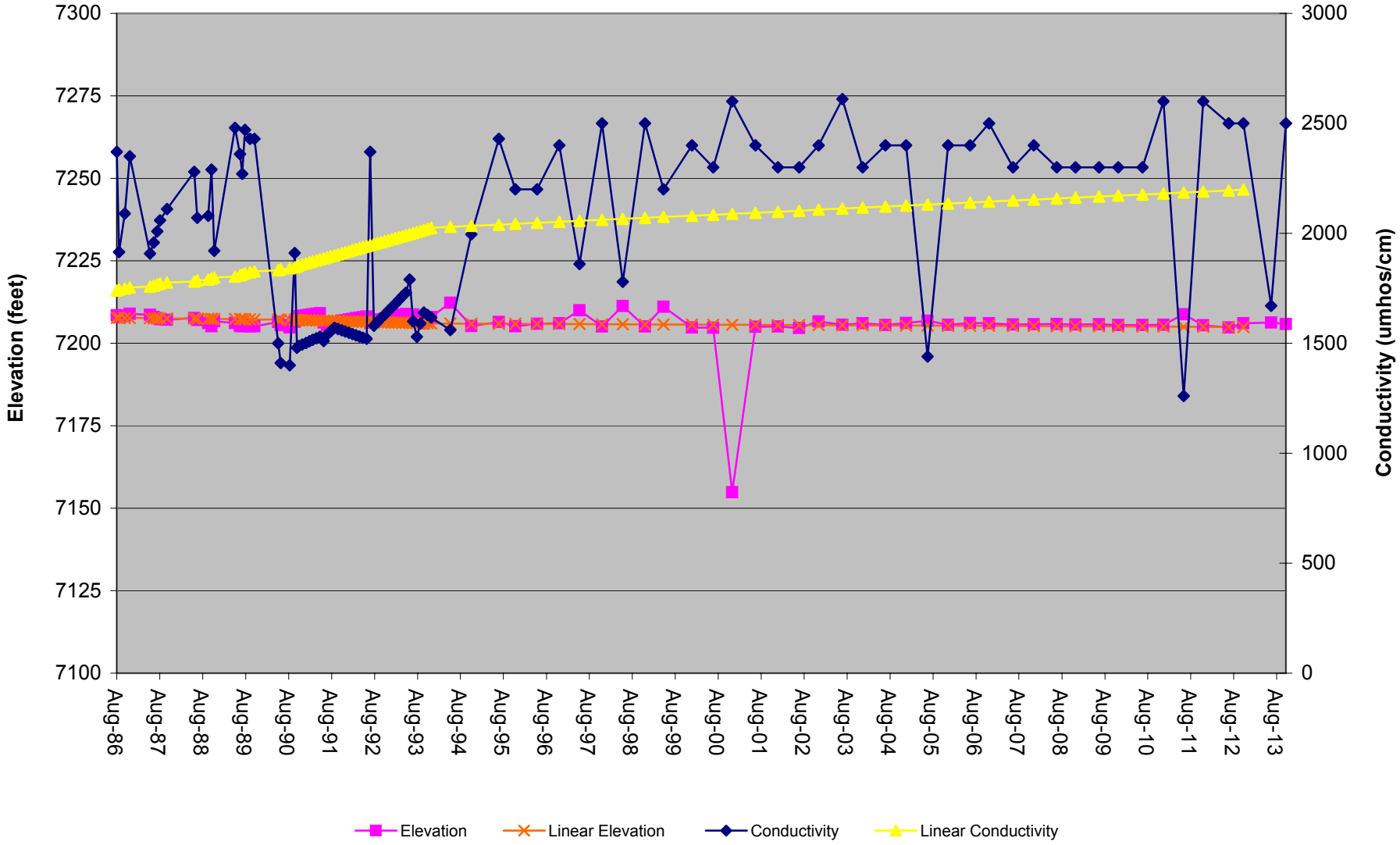
Field Parameters	UNITS	Summary Information Baseline Min	Baseline Ave	Baseline Max	Operation Min	Operation Ave	Operation Max		
Static Water Level	Feet	30.4	36.3	87.8				36.82	36.34
Water Elevation	Feet	7154.9	7206.3	7212.3				7205.83	7206.31
Temperature	Celsius	5	10.3	20.0				10	9.8
Conductivity	umhos/cm	1260	1970	2610				2500	1670
pH	su	5.8	7.6	8.5				7.9	7.4
Field Comments									
Lab Parameters	**UNITS**								
Bicarbonate	mg/L	161.21	1166	1570				998.77	1053.77
Carbonate	mg/L	<MDL	4	86				<MDL	<MDL
Chloride	mg/L	2.43	78	521				338	322
Conductivity	umhos/cm	1073	2186	2920				1803	2010
Hardness	mg/L	0.13	289	679				206.24	205.7
Acidity	mg/L	4	19	68				6	4
pH	su	6.93	7.8	8.8				7.78	7.74
ResidueFilterable-TDS	mg/L	724	1523	1977				1640	1556
ResidueNonFilterable-TSS	mg/L	0.5	76	518				33	24
SAR		0.537	11.1	19.6				4.381	4.225
Sulfate	mg/L	<MDL	80	543				22.43	21.17
Calcium (Dissolved)	mg/L	5.5	44.2	83.8				22.4	20.7
Iron (Dissolved)	mg/L	0.01	0.07	0.14				0.12	0.11
Iron (Total)	mg/L	0.02	0.95	2.23				0.98	1.1
Magnesium (Dissolved)	mg/L	6.0	44.1	133.8				36.5	37.4
Manganese (Total)	mg/L	0.01	0.04	0.10				0.04	0.04
Sodium (Dissolved)	mg/L	57	437	773				144.55	139.25
TDS Ratio (grav./calc.)	%	0.907	1.00	1.19				1.05	0.975

The area of concern for monitoring point SM11 has not been affected by the mining operation. Therefore, all recorded monitoring events are considered Baseline.

Shallow monitoring wells SM-1 through SM-11 were constructed in 1985 in order to gather additional information on alluvial/colluvial deposits within the permit boundary. They are depicted on Map 4-1.

Baseline Information Collection initiated on 8/8/86 and not yet considered complete.
Point SM11 has not been influenced by mining.

Plot of Conductivity and Water Level



SM11 - Monitoring Well SM-11

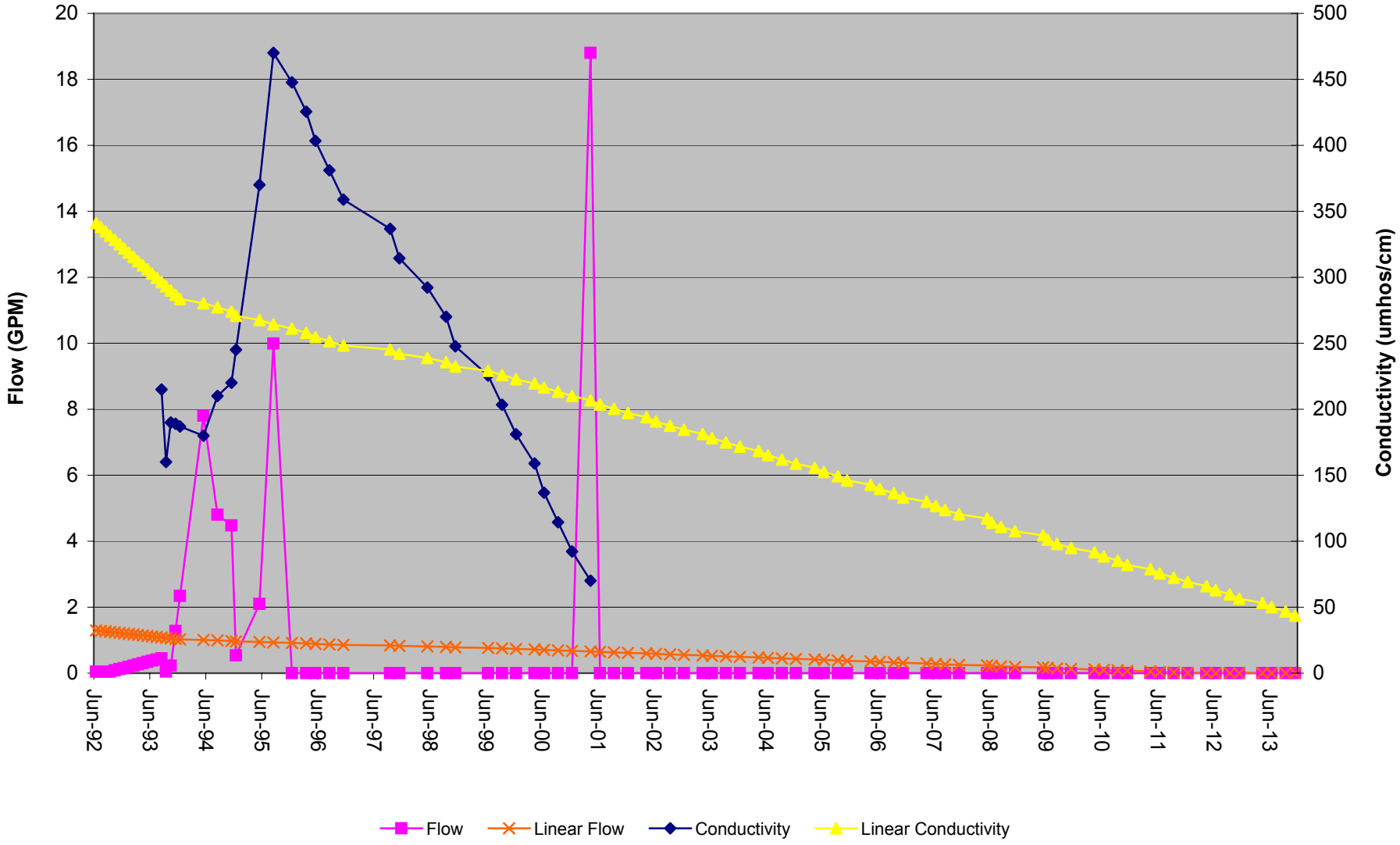
S1010
East Roatcap Creek - Spring 10-10
Elevation - 8650

Initiated								6/1/1992	6/1/1992	6/1/1992	6/1/1992
Activated								10/1/1993	10/1/1993	10/1/1993	10/1/1993
Date								11/4/2013	9/11/2013	6/24/2013	4/26/2013
		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Flow	GPM	0.0449	0.20	0.45	0	0.68	18.80	0	0	0	0
Temperature	Celsius				5.0	12.9	23.2				
Conductivity	umhos/cm	160	188	215	70	238	470				
pH	su				6.8	7.75	8.30				
Field Comments								No Flow	No Flow	No Flow	No Flow
Lab											
Parameters	UNITS										
Bicarbonate	mg/L				45	78	110				
Carbonate	mg/L				<MDL	<MDL	<MDL				
Chloride	mg/L				2	2	2				
Conductivity	umhos/cm				87	149	210				
Hardness	mg/L				43	71	99				
pH	su				7.8	7.9	8.0				
ResidueFilterable-TDS	mg/L				80	92	104				
ResidueNonFilterable-TSS	mg/L				18	18	18				
SAR					0.19	0.20	0.22				
Sulfate	mg/L				6	6	6				
Calcium (Dissolved)	mg/L				10.8	16.9	23.0				
Magnesium (Dissolved)	mg/L				3.8	6.9	10.0				
Sodium (Dissolved)	mg/L				2.9	4.0	5.0				
TDS Ratio (grav./calc.)											

Spring 10-10 is located in the NW1/4SE1/4 of Section 10, T13S, R92W. This spring was not observed to be developed.
"A small seep occurs along the jeep trail between Ponds 10-2 and Pond 10-3 at an elevation of approximately 8560 feet. Flow was observed but too low to measure or sample. Vegetation consisted of green mosses and grasses." (Simon Hydro Search, 92)

Baseline Information for Point S1010 is derived from events beginning on 6/1/92 through 11/1/93.
Point influenced by mining on 10/1/93.

Plot of Flow and Conductivity



S1010 - East Roatcap Creek Spring 10-10

S1404
West Roatcap Creek - Spring 14-4
Elevation - 7480

Initiated								12/2/1996	12/2/1996	12/2/1996	12/2/1996
Activated								11/22/1998	11/22/1998	11/22/1998	11/22/1998
Date								11/4/2013	9/11/2013	6/24/2013	4/26/2013
		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Flow	GPM	0	1.51	5.00	0	0.26	3.00	0	0	0.42	0
Temperature	Celsius	4.4	8.7	12.4	0.5	9.6	21.2			7.5	
Conductivity	umhos/cm	760	883	1000	670	845	960			860	
pH	su	6.8	7.3	7.6	7.0	7.3	7.7			7.5	
Field Comments								Seep	Large Seep		Large Seep
Lab											
Parameters	UNITS										
Bicarbonate	mg/L	352	354	355	289.1	360	402			303.41	
Carbonate	mg/L	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL			<MDL	
Chloride	mg/L	19	20	21	3.66	44	136.48			96.15	
Conductivity	umhos/cm	780	800	819	311	818	999			740	
Hardness	mg/L	398	401	404	31.73	320	455			155.19	
Acidity	mg/L				6	15	30			6	
pH	su	8.0	8.0	8.0	6.77	7.7	8.9			7.38	
ResidueFilterable-TDS	mg/L	480	490	500	190	565	688			573	
ResidueNonFilterable-TSS	mg/L	6	7	8	<MDL	26	66			27	
SAR		0.93	0.96	0.98	0.396	1.08	1.677			1.163	
Sulfate	mg/L	80	80	80	30	77	130			55.14	
Calcium (Dissolved)	mg/L	101	104.0	107	7	77.6	114			24.3	
Iron (Dissolved)	mg/L				0.02	0.04	0.08			0.05	
Iron (Total)	mg/L				0.12	0.43	0.79			0.12	
Magnesium (Dissolved)	mg/L	33.3	34.4	35.4	3.46	30.7	44.5			22.95	
Manganese (Total)	mg/L				0.01	0.11	0.37			0.01	
Sodium (Dissolved)	mg/L	42.5	43.6	44.7	5.2	44.7	71.4			33.3	
TDS Ratio (grav./calc.)	%	1.01	1.01	1.01	0.95	1.02	1.13			1.07	

This spring is a marshlike area of about 20' x 20'. (Hanna, 99)

Baseline Information for Point S1404 is derived from events beginning on 12/2/96 through 11/22/98.
Point influenced by mining on 11/22/98.

S2500
Steven's Gulch - Spring 25
Elevation - 7160

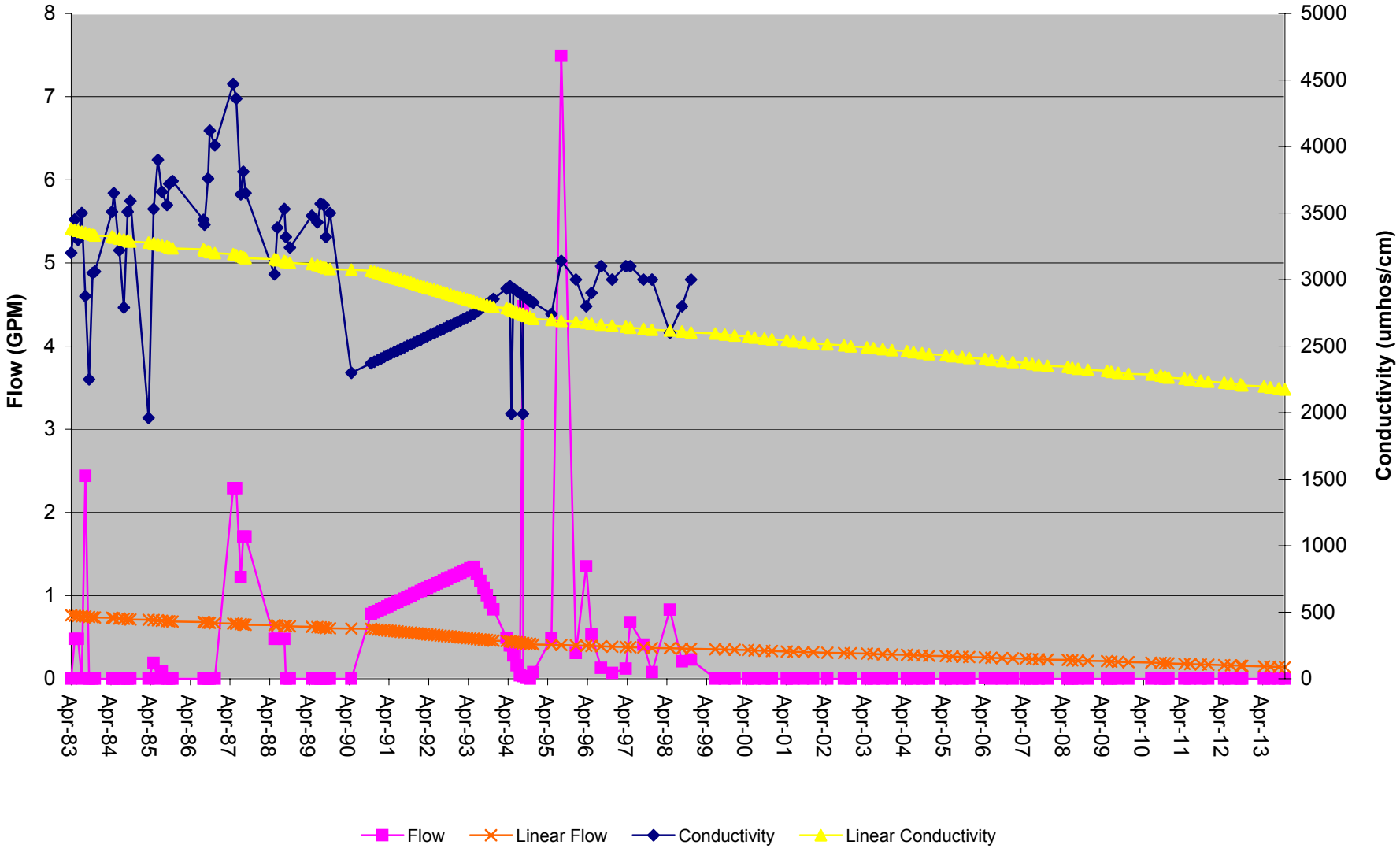
Initiated								4/14/83	4/14/83	4/14/83	4/14/83
Activated											
Date								11/4/13	9/11/13	6/24/13	4/26/13
		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Flow	GPM	0	0.45	7.49				0	0	0	0
Temperature	Celsius	5.0	14.1	27.9							
Conductivity	umhos/cm	1960	2992	4470							
pH	su	6.9	7.9	9.1							
Field Comments								Dry	Dry	Dry	Dry
Lab											
Parameters	UNITS										
Bicarbonate	mg/L	483	846	1040							
Carbonate	mg/L	<MDL	<MDL	<MDL							
Chloride	mg/L	22	43	58							
Conductivity	umhos/cm	1650	3062	3780							
Hardness	mg/L	679	1387	1894							
pH	su	7.4	8.02	8.4							
ResidueFilterable-TDS	mg/L	1036	2450	3398							
ResidueNonFilterable-TSS	mg/L	8	92	492							
SAR		0.98	3.84	4.76							
Sulfate	mg/L	811	1311	1827							
Calcium (Dissolved)	mg/L	73	140	208							
Magnesium (Dissolved)	mg/L	121	252	346							
Sodium (Dissolved)	mg/L	192	339	396							
Potassium	mg/L	<MDL	3.07	9.2							
TDS Ratio (grav./calc.)		1.01	1.01	1.01							

The area of concern for monitoring point S2500 has not been affected by the mining operation. Therefore, all recorded monitoring events are considered Baseline.

This spring consists of a 4' x 8' area where water comes from a coal lens or an old mine addit. (Hanna, 99)

Baseline Information Collection initiated on 4/14/83 and not yet considered complete.
Point S2500 has not been influenced by mining.

Plot of Flow and Conductivity



S2500 - Steven's Gulch Spring 25

S3000
East Roatcap Creek - Spring 30
Elevation - 7840

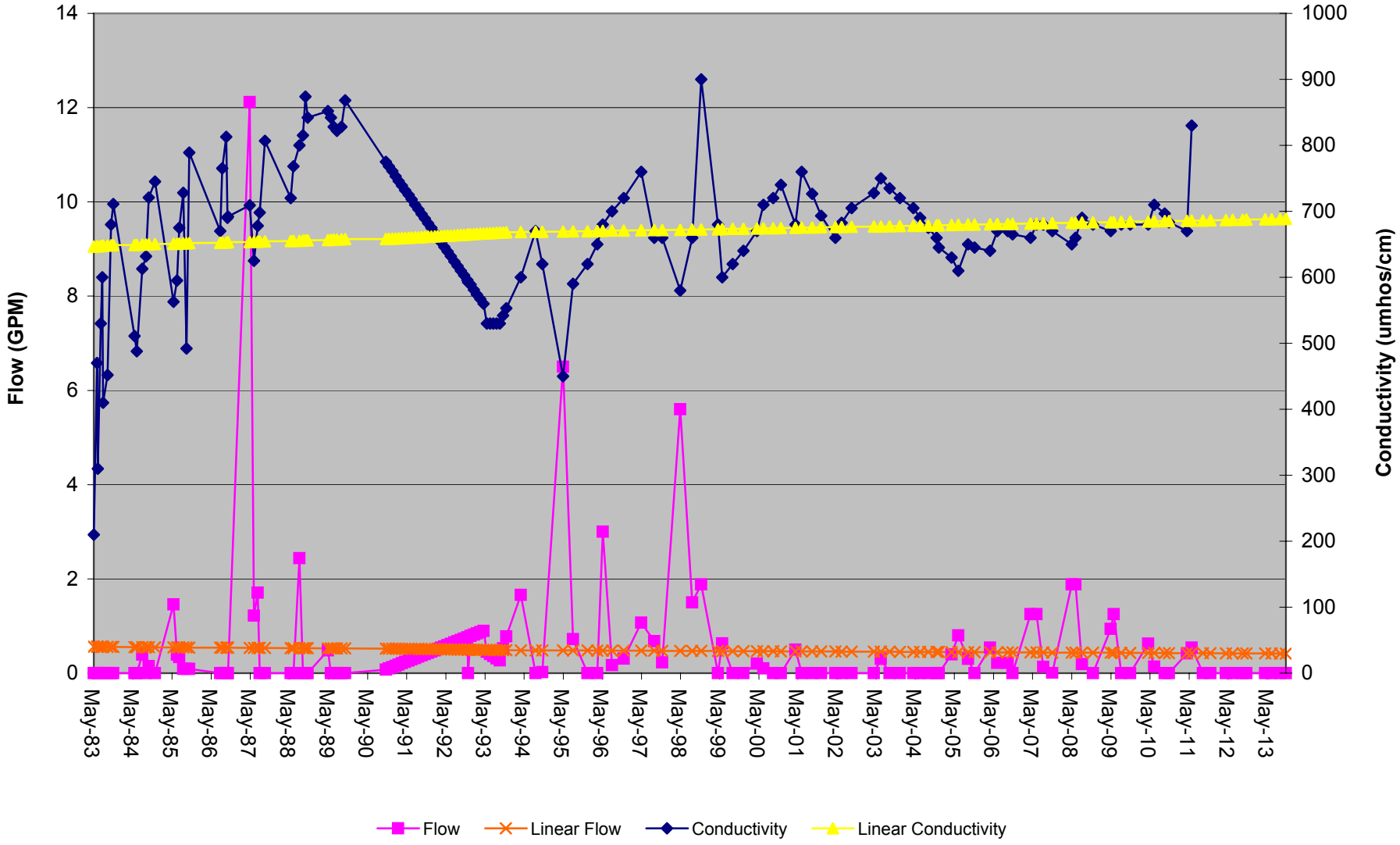
Initiated								5/16/1983	5/16/1983	5/16/1983	5/16/1983
Activated											
Date								11/4/2013	9/11/2013	6/24/2013	4/26/2013
		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Flow	GPM	0	0.49	12.1				0	0	0	0
Temperature	Celsius	0.8	9.6	22.9							
Conductivity	umhos/cm	7.6	659	900							
pH	su	6.0	15.0	650.0							
Field Comments								Dry	Dry	Dry	Seep
Lab											
Parameters	UNITS										
Bicarbonate	mg/L	107	301	381							
Carbonate	mg/L	<MDL	<MDL	<MDL							
Chloride	mg/L	1.88	9.62	31.31							
Conductivity	umhos/cm	180	646	844							
Hardness	mg/L	81.0	316.6	479.3							
Acidity	mg/L	30	56	82.26							
pH	su	7.1	7.8	8.3							
ResidueFilterable-TDS	mg/L	155	410	566							
ResidueNonFilterable-TSS	mg/L	<MDL	27	116							
SAR		0.24	0.81	7.3							
Sulfate	mg/L	8	64	120							
Calcium (Dissolved)	mg/L	21	87.2	145.6							
Iron (Dissolved)	mg/L	0.01	0.02	0.03							
Iron (Total)	mg/L	0.02	0.34	0.66							
Magnesium (Dissolved)	mg/L	7.0	23.6	35.7							
Manganese (Total)	mg/L	0.001	0.01	0.01							
Sodium (Dissolved)	mg/L	5	24.7	47							
TDS Ratio (grav./calc.)		<MDL	0.91	1.1							

The area of concern for monitoring point S3000 has not been affected by the mining operation. Therefore, all recorded monitoring events are considered Baseline.

This 5' x 5' spring comes out of the toe of a side gulch. (Hanna, 99)

Baseline Information Collection initiated on 5/16/83 and not yet considered complete.
Point S3000 has not been influenced by mining.

Plot of Flow and Conductivity



S3000 - East Roatcap Creek Spring 30

S3200
West Roatcap Creek - Spring 32
Elevation - 7900

								Initiated	10/1/1993	10/1/1993	10/1/1993	10/1/1993	10/1/1993	10/1/1993	10/1/1993	10/1/1993	10/1/1993	10/1/1993	10/1/1993	10/1/1993
								Activated												
								Date	12/11/2013	11/4/2013	10/16/2013	9/25/2013	8/15/2013	7/10/2013	6/24/2013	5/14/2013	4/26/2013	3/27/2013	2/1/2013	1/1/2013
		Summary Information																	
Field		Baseline			Operation														
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max												
Flow	GPM	0	4.37	34.38				1.67	2.14	2.14	3	2.15	3.75	5	7.5	3.5	3.75	1.5	*
Temperature	Celsius	4.1	8.0	13.4				5.2	9.4	9.4	11.4	11.6	12.2	10.5	7.2	5.8	5.1	5.5	6
Conductivity	umhos/cm	250	636	860				690	710	710	700	710	700	670	660	670	720	680	680
pH	su	6.7	7.4	8.4				7.6	7..5	7..5	7.4	7.5	7.4	7.3	7.4	7.5	7.4	7.6	7.6
Field Comments																			
Lab																			
Parameters	UNITS																		
Bicarbonate	mg/L	142	290	426.82				331.59			318.55			221.97				255.18	
Carbonate	mg/L	<MDL	0.3	3.9				<MDL			<MDL			<MDL				<MDL	
Chloride	mg/L	<MDL	21.2	196.7				2.43			1.91			183.41				27.22	
Conductivity	umhos/cm	365	673	985				658			597			826				520	
Hardness	mg/L	105.21	264.4	516.97				314.34			325.01			105.21				302.82	
Acidity	mg/L	4	16	42				26			21			6				4	
pH	su	6.5	7.4	8.4				7.82			7.78			7.04				7.9	
ResidueFilterable-TDS	mg/L	<MDL	442	663				518			504			568				488	
ResidueNonFilterable-TSS	mg/L	<MDL	14	73				31			28			7				4	
SAR		0.483	1.42	3.16				1.42			1.99			0.483				1.853	
Sulfate	mg/L	3.0	73.2	163.0				77.18			68.55			61.4				53.88	
Calcium (Dissolved)	mg/L	8.48	68.7	160.2				63.3			79.7			32.9				81.2	
Iron (Dissolved)	mg/L	<MDL	0.04	0.28				0.03			0.02			0.01				0.014	
Iron (Total)	mg/L	0.01	0.09	0.44				0.05			0.09			0.15				0.016	
Magnesium (Dissolved)	mg/L	5.6	22.8	48				37.95			30.6			5.6				24.3	
Manganese (Total)	mg/L	<MDL	0.024	0.1				0.03			0.01			0.1				0.031	
Sodium (Dissolved)	mg/L	11.4	52.9	105				58.2			82.5			11.4				74.1	
TDS Ratio (grav./calc.)		<MDL	0.96	1.15				0.91			0.87			1.10				0.946	

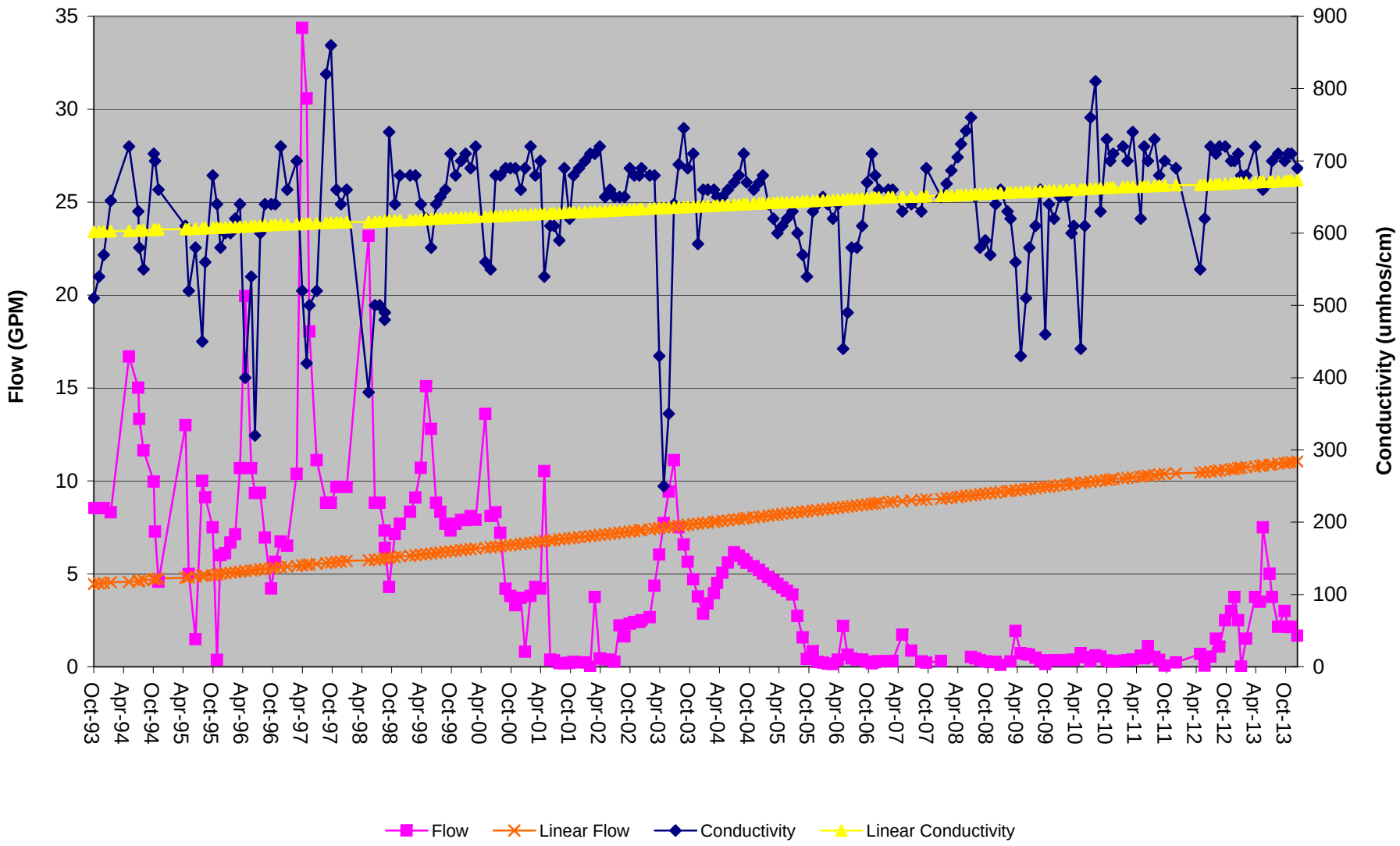
The area of concern for monitoring point S3200 has not been affected by the mining operation. Therefore, all recorded monitoring events are considered Baseline.

** Meter bypassed, covered in 2.1' of snow*

Spring 32 is monitored on a monthly basis for flow rates and field parameters and water quality samples are obtained from this location on a quarterly basis.

Baseline Information Collection initiated on 10/1/93 and not yet considered complete.
Point S3200 has not been influenced by mining.

Plot of Flow and Conductivity



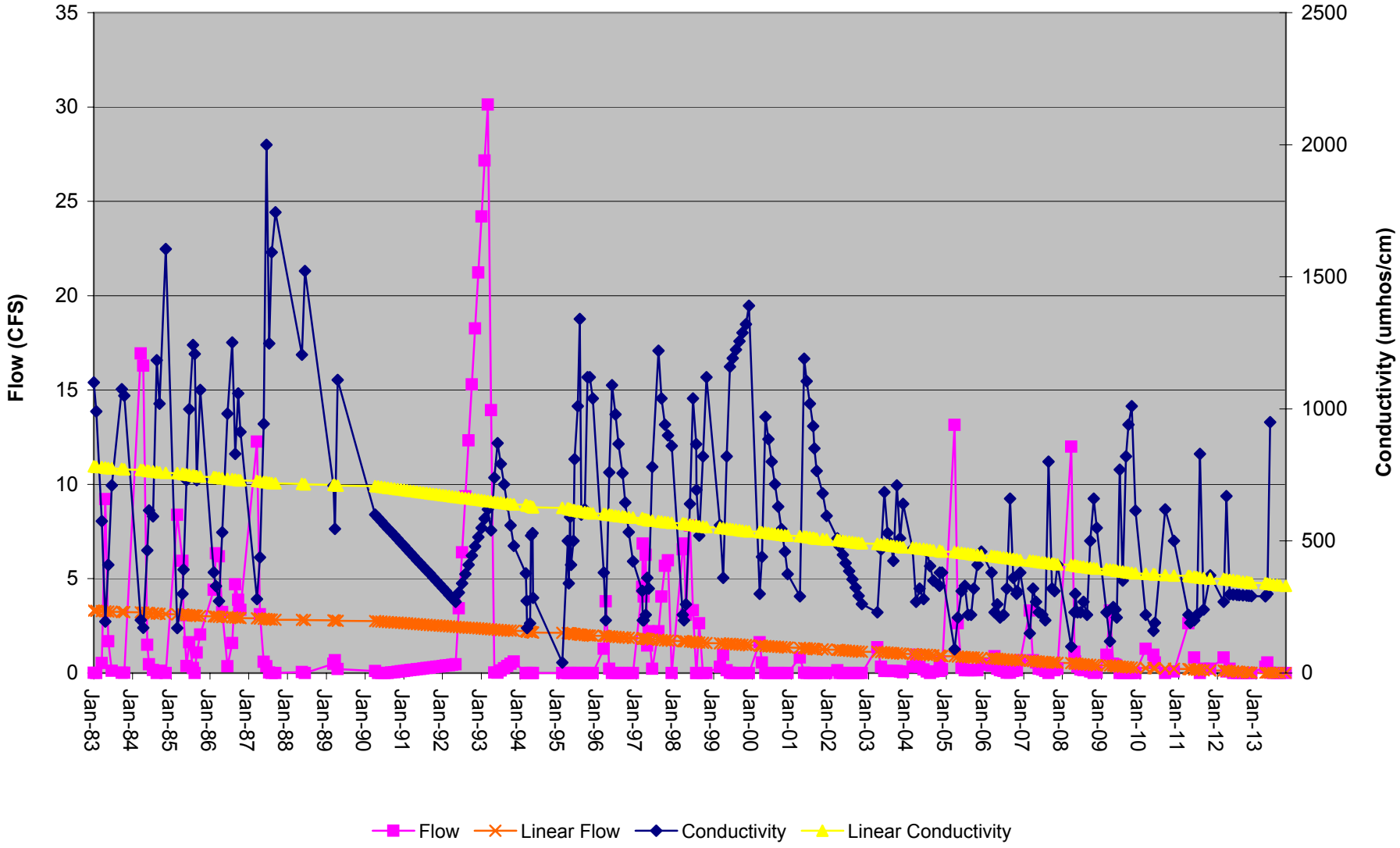
SW05
Steven's Gulch
Elevation - 6600

Initiated								1/1/1983	1/1/1983	1/1/1983	1/1/1983	1/1/1983	1/1/1983	1/1/1983
Activated								12/21/1986	12/21/1986	12/21/1986	12/21/1986	12/21/1986	12/21/1986	12/21/1986
Date								11/4/2013	9/9/2013	8/15/2013	7/10/2013	6/9/2013	5/14/2013	4/26/2013
		Summary Information												
Field		Baseline			Operation									
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max							
Flow	CFS	0	3.1	16.9	0.00	1.43	30.13	0.00000	0.00000	0.00000	0.00000	0.00885	0.55199	0.32590
Water Level in Flume	Feet				0.00	0.08	1.06	0	0	0	0	0.01	0.14	0.1
Temperature	Celsius	-0.5	10.8	23.7	0.0	10.0	23.6					13.9	7.9	6.1
Conductivity	umhos/cm	170	746	1605	40	519	2000					950	300	290
pH	su	7.3	8.5	9.9	6.9	8.3	9.0					8.7	8.5	8.4
Field Comments								No flow	No flow	No flow	No flow			
Lab														
Parameters	UNITS													
Bicarbonate	mg/L	89	302	456	83	209	456					199.46		
Carbonate	mg/L	<MDL	1	7	<MDL	2.97	12.65					<MDL		
Chloride	mg/L	2	16	31	<MDL	13.63	43.00					9.95		
Conductivity	umhos/cm	170	734	1290	149	568	1560					978		
Hardness	mg/L	72	312	534	35.6	237.0	625.7					625.72		
Acidity	mg/L				2.0	10.5	24.0					5		
pH	su	6.8	8.1	8.7	7.2	8.0	8.5					7.5		
ResidueFilterable-TDS	mg/L	120	488	794	120	387	1130					662		
ResidueNonFilterable-TSS	mg/L	2	77	438	<MDL	28	268					27		
SAR		0.56	1.14	1.60	0.23	1.04	2.06					2.0		
Sulfate	mg/L	14	131.5	338.0	<MDL	97.04	450.00					103.72		
Calcium (Dissolved)	mg/L	19	71.8	110.0	6.8	53.9	132.0					108.1		
Iron (Dissolved)	mg/L				0.01	0.11	0.61					0.04		
Iron (Total)	mg/L				0.12	0.43	1.01					0.12		
Magnesium (Dissolved)	mg/L	6	32.1	66.0	4.5	26.7	86.2					86.2		
Sodium (Dissolved)	mg/L	11	47.8	85.0	5.1	41.2	115.0					115		
Manganese (Total)	mg/L				<MDL	0.04	0.12					<MDL		
TDS Ratio (grav./calc.)					0.83	1.06	1.72					1.06		

The Stevens Gulch stream gauge, SW05, is located near Bowie No. 1 mine's timber storage area in the NE1/4NW1/4, Sec 25, T13S, R92W, of the 6th P.M. A 36" Parshall flume was installed at this location.

Baseline Information for Point SW05 is derived from events beginning on 1/1/83 through 12/21/86.
Point influenced by mining on 12/21/86.

Plot of Flow and Conductivity



SW05 - Steven's Gulch

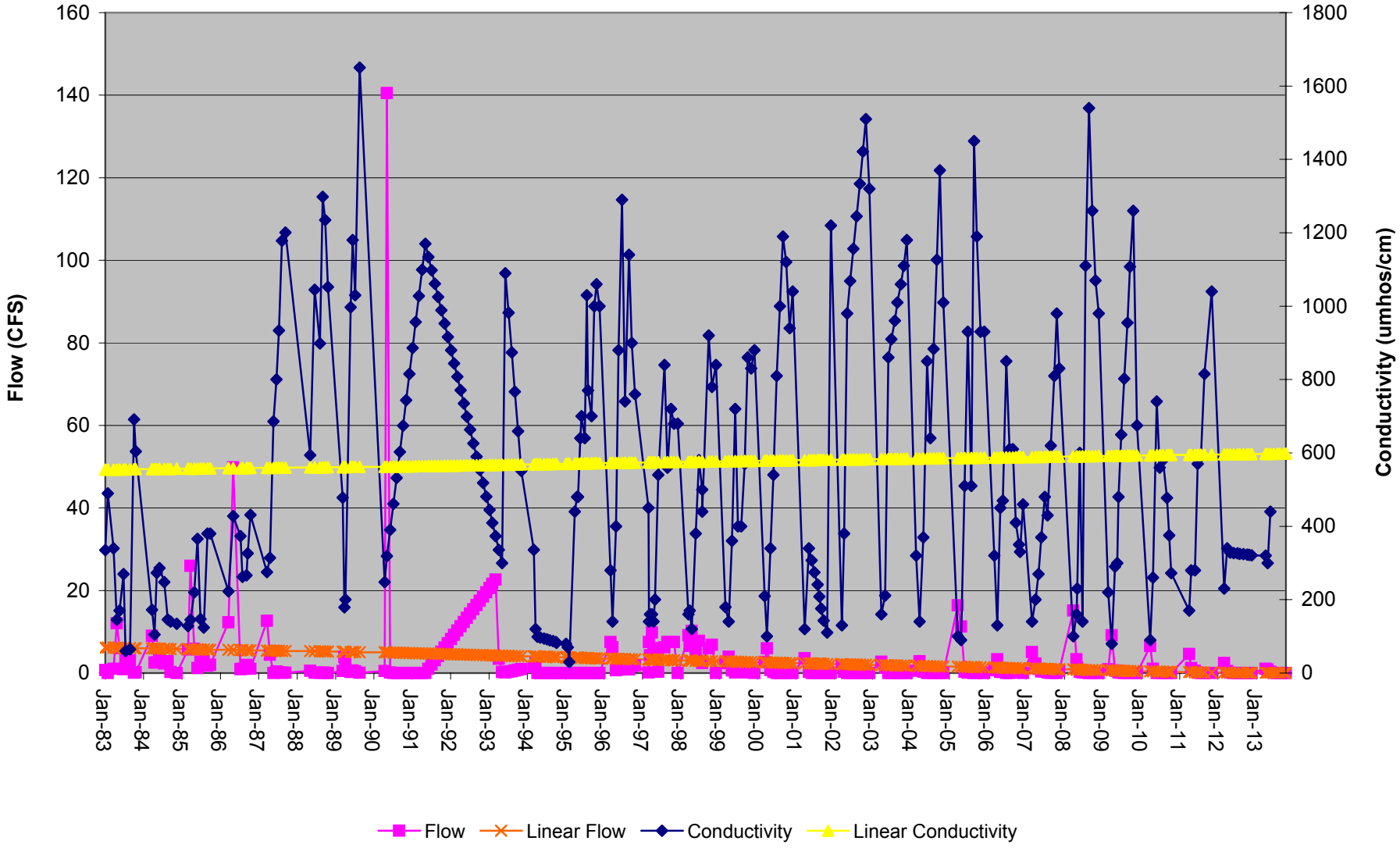
SW06
East Roatcap Creek - Downstream
Elevation - 6740

Initiated								1/1/1983	1/1/1983	1/1/1983	1/1/1983	1/1/1983	1/1/1983	1/1/1983	1/1/1983
Activated								12/21/1986	12/21/1986	12/21/1986	12/21/1986	12/21/1986	12/21/1986	12/21/1986	12/21/1986
Date								11/4/2013	10/16/2013	9/9/2013	8/15/2013	7/10/2013	6/9/2013	5/14/2013	4/26/2013
		Summary Information													
Field		Baseline			Operation										
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max								
Flow	CFS	0.00	4.65	45.75	0.00	1.14	16.38	0.000	0.000	0.000	0.000	0.000	0.326	0.818	1.042
Water Level in Flume	Feet				0.00	0.21	1.22	0	0	0	0	0	0.1	0.18	0.21
Temperature	Celsius	0.5	10.0	21.1	0.03	9.73	25.50						10.7	7.9	7.2
Conductivity	umhos/cm	60	277	691	30	626	1650						440	300	320
pH	su	6.5	8.3	9.2	6.7	8.3	9.0						8.7	8.6	8.6
Field Comments								Dry	Dry	Dry	Dry	Dry			
Lab Parameters	UNITS														
Bicarbonate	mg/L	60	155	289	61	242	440						102.97		
Carbonate	mg/L	<MDL	1	7.1	<MDL	6.40	52.00						<MDL		
Chloride	mg/L	1	5	10	<MDL	15.16	68.00						11.45		
Conductivity	umhos/cm	110	275	670	124.0	639.2	1430.0						530		
Hardness	mg/L	58	158	291	54.00	286.81	697.00						380.07		
Acidity	mg/L				4	18	62						6		
pH	su	6.8	7.9	8.4	6.50	8.07	8.60						7.62		
ResidueFilterable-TDS	mg/L	40	180	380	50	440	1130						310		
ResidueNonFilterable-TSS	mg/L	18	104	524	<MDL	18	138						20		
SAR		0.11	0.46	0.72	0.28	1.06	5.93						1.67		
Sulfate	mg/L	10	32	80	5.76	103.71	410.00						5.76		
Calcium (Dissolved)	mg/L	15	37	69	10.5	57.6	125.0						46.5		
Iron (Dissolved)	mg/L				0.02	0.13	0.45						0.17		
Iron (Total)	mg/L				0.07	0.43	0.78						0.27		
Magnesium (Dissolved)	mg/L	4	14	29	4.7	34.8	99.2						64.1		
Manganese (Total)	mg/L				<MDL	0.031	0.095						0.03		
Sodium (Dissolved)	mg/L	2	14	28	5.00	44.45	196.00						75		
TDS Ratio (grav./calc.)	%				<MDL	0.98	1.50						1.01		

SW06 is located on East Roatcap Creek in the NE1/4SW1/4 Sec 23, T13S, R92W of the 6th P.M. A 36" Parshall flume was also installed at this location.

Baseline Information for Point SW06 is derived from events beginning on 1/1/83 through 12/21/86.
Point influenced by mining on 12/21/86.

Plot of Flow and Conductivity



SW06 - East Roatcap Creek - Downstream

P1001
East Roatcap Creek - Pond 10-1
Depth - 5'
Elevation -8520

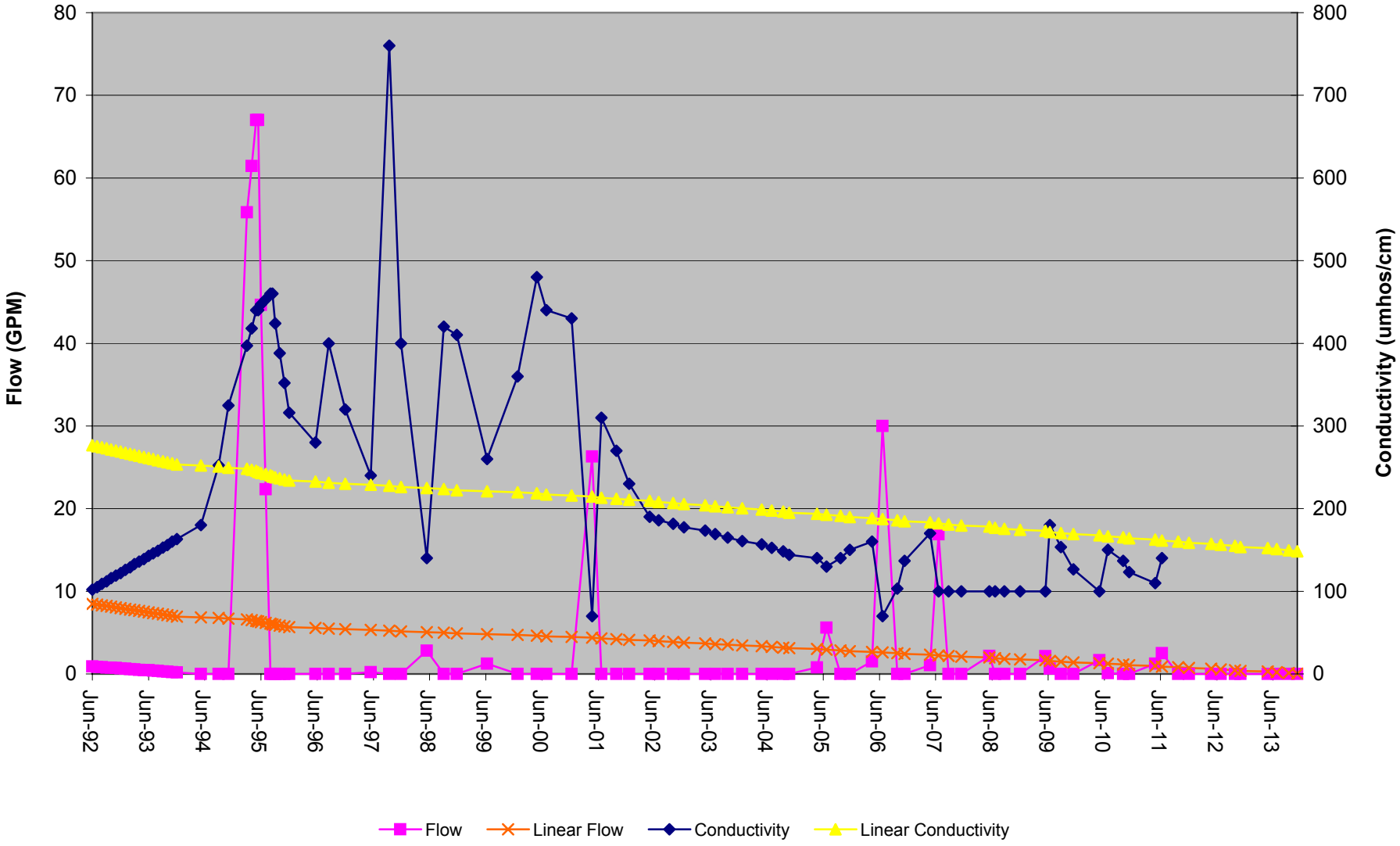
Initiated	6/1/1992	6/1/1992	6/1/1992	6/1/1992
Activated	2/1/1994	2/1/1994	2/1/1994	2/1/1994
Date	11/4/2013	9/11/2013	6/24/2013	4/26/2013

		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Flow	GPM	0.2	0.5	0.8977	0.0	5.1	67.01	0	0	0	0
Freeboard	Feet	0.0	0.0	0	0.0	1.5	5	2.79	2.67	1.12	0.95
Temperature	Celsius				0.8	14.2	28.4				
Conductivity	umhos/cm	102	133	163	70	289	760				
pH	su				7.0	8.0	8.9				
Field Comments								No Inflow	No Inflow	No Inflow	Seep Inflow
Lab Parameters	UNITS										
Bicarbonate	mg/L				36	90	163				
Carbonate	mg/L				<MDL	<MDL	<MDL				
Chloride	mg/L				<MDL	13	73				
Conductivity	umhos/cm				43	183	307				
Hardness	mg/L				31	82	157				
Acidity	mg/L				14	16	18.4				
pH	su				6.9	7.6	8.2				
ResidueFilterable-TDS	mg/L				70	121	200				
ResidueNonFilterable-TSS	mg/L				7	40	96				
SAR					0.129	0.239	0.489				
Sulfate	mg/L				<MDL	10	15.64				
Calcium (Dissolved)	mg/L				5.9	19.2	39.1				
Iron (Dissolved)	mg/L				0.07	0.32	0.57				
Iron (Total)	mg/L				1.66	1.70	1.73				
Magnesium (Dissolved)	mg/L				3.5	7.4	14.5				
Manganese (Total)	mg/L				<MDL	0.042	0.042				
Sodium (Dissolved)	mg/L				2.0	4.9	9.87				
TDS Ratio (grav./calc.)					0.77	1.00	1.13				

Pond 10-1 is a man made pond (approximately 20' x 20') with an earthen berm located on the south side. The pond is located in the SW1/4SE1/4 of Section 10, T13S, R92W. Source of surface water is from the Overalnd Ditch via a man made drainage. (Simon Hydro Search, 92)

Baseline Information for Point P1001 is derived from events beginning on 6/1/92 through 2/1/94.
Point influenced by mining on 2/1/94.

Plot of Flow and Conductivity



P1001 - East Roatcap Creek Pond 10-1

P1002
East Roatcap Creek - Pond 10-2
Depth - 3'
Elevation -8630

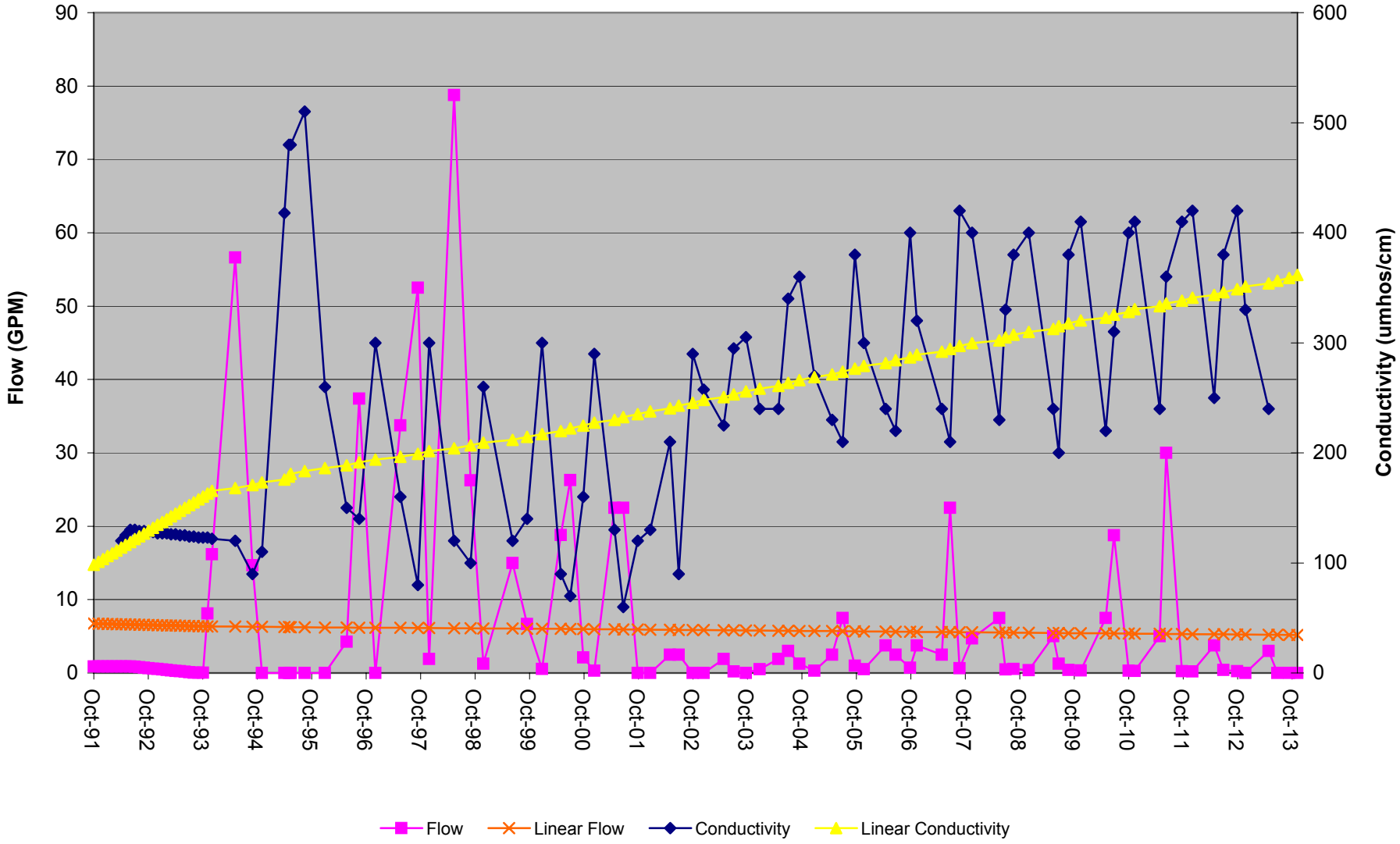
Initiated	10/1/91	10/1/91	10/1/91	10/1/91
Activated	10/1/93	10/1/93	10/1/93	10/1/93
Date	11/4/13	9/11/13	6/24/13	4/26/13

Field Parameters	UNITS	Summary Information Baseline Min	Baseline Ave	Baseline Max	Operation Min	Operation Ave	Operation Max				
Flow	GPM	0.0	0.6	0.8977	0.0	7.7	78.75	0	0	0	3
Freeboard	Feet				0.0	0.1	3.15				
Temperature	Celsius				0.6	10.7	24.5				10.2
Conductivity	umhos/cm	120	126	130	60	260	510				240
pH	su				5.8	8.0	9.8				8
Field Comments								Seep Only	Damp area	Seep Only	
Lab Parameters	**UNITS**										
Bicarbonate	mg/L				48	126	219				
Carbonate	mg/L				<MDL	1.2	12				
Chloride	mg/L				<MDL	37.03	210.93				
Conductivity	umhos/cm				91	231	465				
Hardness	mg/L				4.30	105.28	199.00				
Acidity	mg/L				4.00	12.74	22.21				
pH	su				6.8	7.8	8.4				
ResidueFilterable-TDS	mg/L				50	170	440				
ResidueNonFilterable-TSS	mg/L				0.3	49	497				
SAR					0.13	0.26	0.54				
Sulfate	mg/L				<MDL	9.44	20.00				
Calcium (Dissolved)	mg/L				11.2	24.8	44.7				
Iron (Dissolved)	mg/L				0.01	0.05	0.08				
Iron (Total)	mg/L				0.12	0.44	1.07				
Magnesium (Dissolved)	mg/L				3.5	12.7	29.4				
Manganese (Total)	mg/L				<MDL	0.005	0.005				
Sodium (Dissolved)	mg/L				2.1	6.9	15.4				
TDS Ratio (grav./calc.)	%				0.74	1.08	1.49				

Pond 10-2 is a man made pond (approximately 30' x 20') with an earthen berm on the south side. The pond is located in the NW1/4SE1/4 of Section 10, T13S, R92W. The source of the water for this point is from both runoff and the Overland Ditch via natural drainage. (Simon Hydro Search, 92)

Baseline Information for Point P1002 is derived from events beginning on 10/1/91 through 10/1/93.
Point influenced by mining on 10/1/93.

Plot of Flow and Conductivity



P1002 - East Roatcap Creek Pond 10-2

P1003
East Roatcap Creek - Pond 10-3
Depth - 3'
Elevation -8680

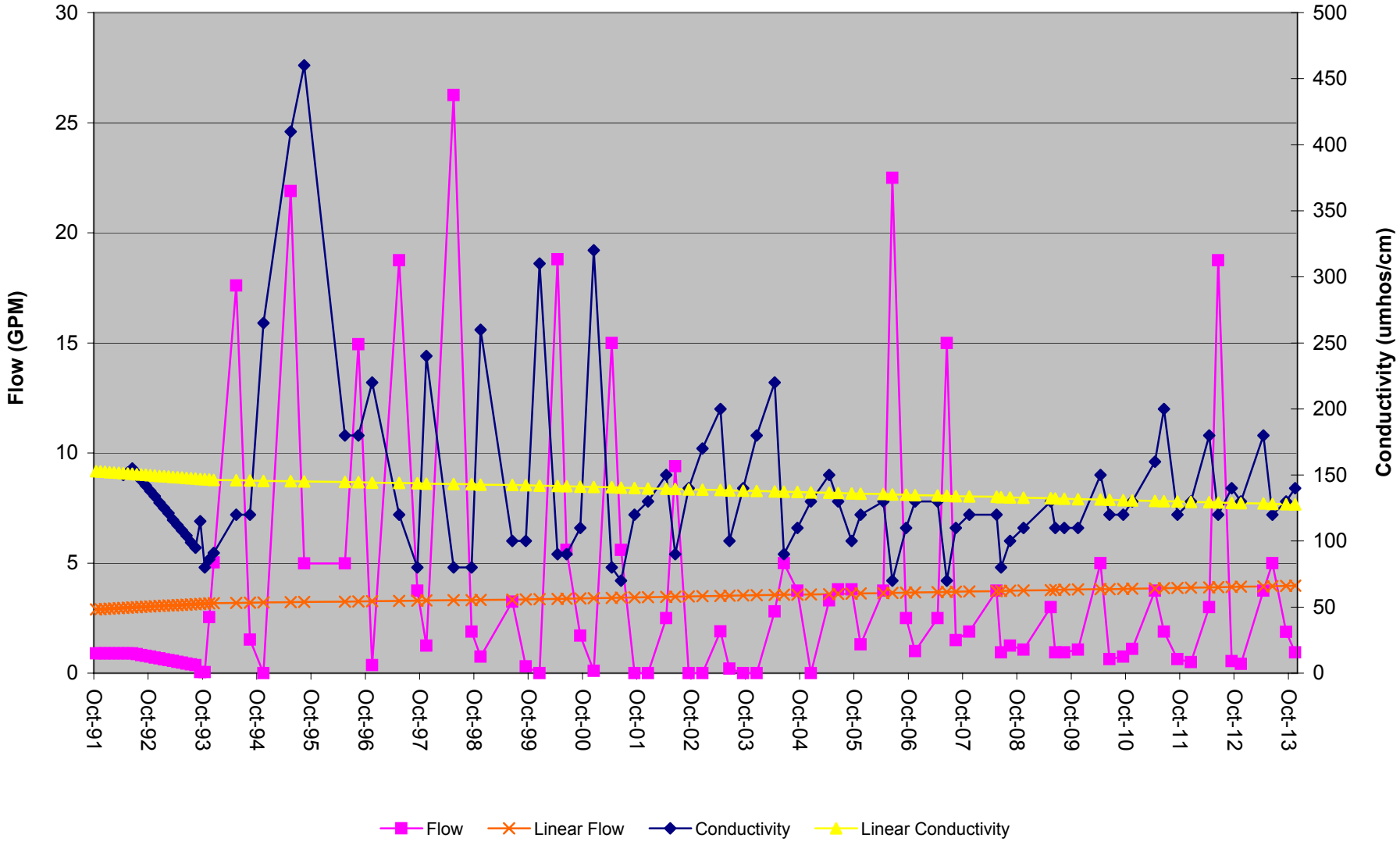
Initiated	10/1/91	10/1/91	10/1/91	10/1/91
Activated	11/1/93	11/1/93	11/1/93	11/1/93
Date	11/4/13	9/11/13	6/24/13	4/26/13

Field Parameters	UNITS	Summary Information Baseline Min	Ave	Max	Operation Min	Ave	Max				
Flow	GPM	0.0	0.7	2.5391	0.0	4.4	26.25	0.94	1.875	5	3.75
Freeboard	Feet				0.0	0.1	2.68			0	
Temperature	Celsius				0.5	10.7	24.3	7.9	8.5	16.7	11
Conductivity	umhos/cm	80	123	155	70	142	460	140	130	120	180
pH	su				7.2	7.9	8.7	7.9	7.9	7.9	8
Field Comments											
Lab Parameters	UNITS										
Bicarbonate	mg/L				42.2	68.5	129.44			49.61	
Carbonate	mg/L				<MDL	<MDL	<MDL			<MDL	
Chloride	mg/L				<MDL	29.61	173.71			139.65	
Conductivity	umhos/cm				76	153	373			373	
Hardness	mg/L				0.52	59.69	111.00			95.04	
Acidity	mg/L				2.00	7.17	20.69			2	
pH	su				6.6	7.5	8.2			7.49	
ResidueFilterable-TDS	mg/L				28	120	260			247	
ResidueNonFilterable-TSS	mg/L				4	45	184			9	
SAR					0.14	0.23	0.40			0.312	
Sulfate	mg/L				<MDL	10.88	30.00			3.72	
Calcium (Dissolved)	mg/L				5.0	14.7	21.9			21.9	
Iron (Dissolved)	mg/L				0.18	0.25	0.33			0.33	
Iron (Total)	mg/L				0.56	1.30	1.93			1.93	
Magnesium (Dissolved)	mg/L				3.9	6.0	10.1			9.8	
Manganese (Total)	mg/L				<MDL	0.080	0.100			0.1	
Sodium (Dissolved)	mg/L				2.30	4.26	7.34			7	
TDS Ratio (grav./calc.)	%				0.33	1.08	1.41			1.06	

Pond 10-3 is a man made pond (approximately 50' x 30') with an earthern berm located on the south and southeast sides. The pond is located on the SW1/4NE1/4 of Section 10, T13S, R92W. Source of surface water is from the Overland Ditch via both natural and man made drainages. (Simon Hydro Search, 92)

Baseline Information for Point P1003 is derived from events beginning on 10/1/91 through 11/1/93.
Point influenced by mining on 11/1/93.

Plot of Flow and Conductivity



P1003 - East Roatcap Creek Pond 10-3

P1004
East Roatcap Creek - Pond 10-4
Depth - 3'
Elevation -8780

Initiated	10/1/91	10/1/91	10/1/91	10/1/91
Activated	11/1/93	11/1/93	11/1/93	11/1/93
Date	11/4/13	9/11/13	6/24/13	4/26/13

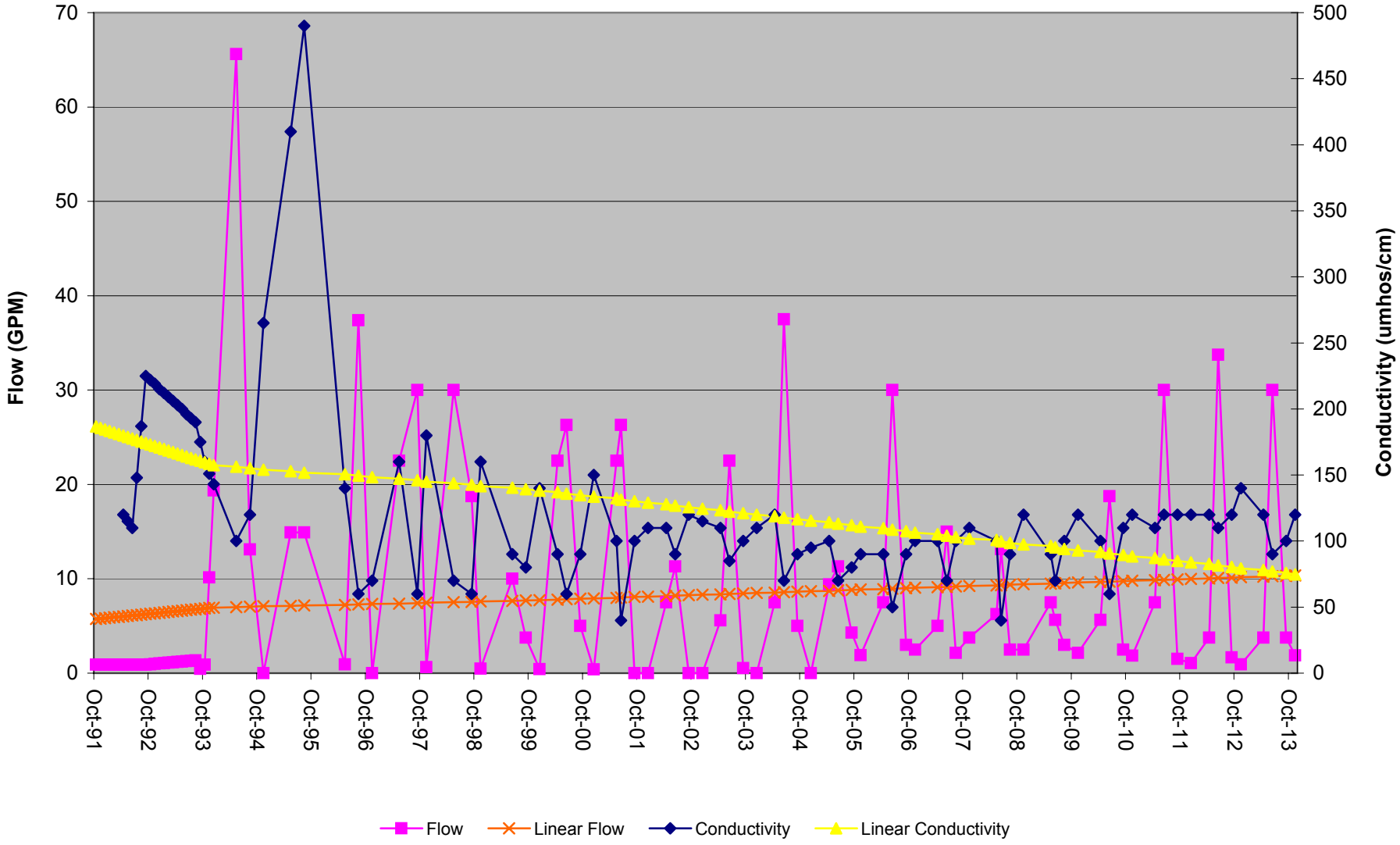
Summary Information

Field Parameters	UNITS	Baseline Min	Baseline Ave	Baseline Max	Operation Min	Operation Ave	Operation Max				
Flow	GPM	0.4	1.3	10.131	0.0	10.4	65.6	1.875	3.75	30	3.75
Freeboard	Feet				0.0	0.1	1.5			0	
Temperature	Celsius				0.4	10.8	23.9	7.9	8.2	16.6	10.8
Conductivity	umhos/cm	110.0	182.8	225	40	110	490	120	100	90	120
pH	su				6.8	8.0	8.9	8	8	7.9	7.9
Field Comments											
Lab Parameters	UNITS										
Bicarbonate	mg/L				31	54	90			71.15	
Carbonate	mg/L				<MDL	<MDL	<MDL			<MDL	
Chloride	mg/L				<MDL	41.78	260.06			243.06	
Conductivity	umhos/cm				68	137	546			546	
Hardness	mg/L				28.75	49.58	86.00			85.68	
Acidity	mg/L				4.00	11.01	29.09			4	
pH	su				6.6	7.4	8.1			7.68	
ResidueFilterable-TDS	mg/L				6	114	382			382	
ResidueNonFilterable-TSS	mg/L				2	35	96			2	
SAR					0.097	0.195	0.522			0.522	
Sulfate	mg/L				<MDL	20.8	135			8.29	
Calcium (Dissolved)	mg/L				5.1	12.3	22.0			19.8	
Iron (Dissolved)	mg/L				0.22	0.37	0.74			0.3	
Iron (Total)	mg/L				0.43	2.49	5.89			1.81	
Magnesium (Dissolved)	mg/L				2.7	4.6	8.8			8.8	
Manganese (Total)	mg/L				<MDL	0.062	0.09			0.09	
Sodium (Dissolved)	mg/L				1.39	3.22	11.10			11.1	
TDS Ratio (grav./calc.)	%				0.07	1.08	1.79			1.05	

Pond 10-4 is a man made pond (approximately 50' x 50') with an earthen dam located on the south side. The pond is located in the SE1/4NW1/4 of Section 10, T13S, R92W. Source of the surface water is from the Overland Ditch. (Simon Hydro Search, 92)

Baseline Information for Point P1004 is derived from events beginning on 10/1/91 through 11/1/93.
Point influenced by mining on 11/1/93.

Plot of Flow and Conductivity



P1004 - East Roatcap Creek Pond 10-4

P1007
East Roatcap Creek - Pond 10-7
Depth - 4'
Elevation -8350

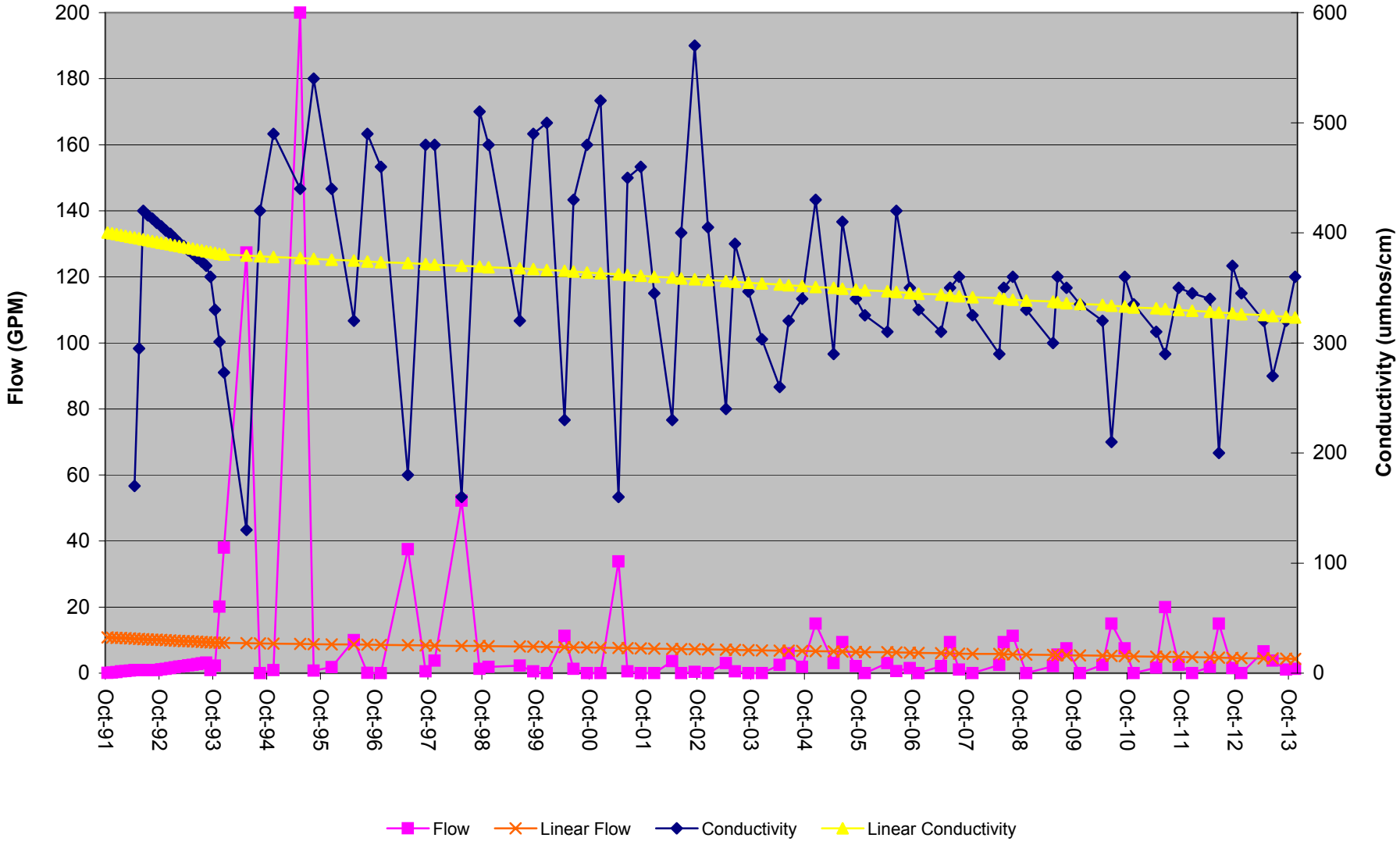
Initiated	10/1/91	10/1/91	10/1/91	10/1/91
Activated	2/1/96	2/1/96	2/1/96	2/1/96
Date	11/4/13	9/11/13	6/24/13	4/26/13

		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Flow	GPM	0.0	12.8	200	0.0	5.0	52.2	1.25	1.07	3.75	6.56
Freeboard	Feet				0.0	0.6	4				
Temperature	Celsius	0.6	8.6	20.5	0.5	10.0	21.2	8.1	9.7	14.4	11.2
Conductivity	umhos/cm	130	375	540	160	355	570	360	320	270	320
pH	su	6.4	7.6	8.4	6.9	7.9	8.4	7.8	7.9	8.2	8.1
Field Comments											
Lab											
Parameters	UNITS										
Bicarbonate	mg/L	66.0	74.0	82	74.3	194.5	288			74.29	
Carbonate	mg/L	<MDL	<MDL	<MDL	<MDL	3.7	20			<MDL	
Chloride	mg/L	1.0	1.0	1	<MDL	30.4	173.71			151.63	
Conductivity	umhos/cm	128.0	141.0	154	99	372	508			459	
Hardness	mg/L	63.0	67.5	72	91	181	260			201.1	
Acidity	mg/L				2	13	37			6	
pH	su	7.6	7.8	7.9	7.3	7.8	8.5			7.57	
ResidueFilterable-TDS	mg/L	88.0	89.0	90	110	260	356			321	
ResidueNonFilterable-TSS	mg/L	6.0	6.0	6	<MDL	18.7	65			20	
SAR		0.2	0.2	0.26	0.15	0.47	0.767			0.767	
Sulfate	mg/L	12.0	12.0	12	<MDL	7.8	20			7.17	
Calcium (Dissolved)	mg/L	15.8	17.4	19	20.3	41.8	65.2			46.4	
Iron (Dissolved)	mg/L				0.05	0.15	0.27			0.27	
Iron (Total)	mg/L				0.22	1.03	2.25			2.25	
Magnesium (Dissolved)	mg/L	5.7	5.8	6	8.6	18.4	33.16			20.7	
Manganese (Total)	mg/L				0.01	0.13	0.44			0.44	
Sodium (Dissolved)	mg/L	4.0	4.4	4.8	3.8	14.6	25			25	
TDS Ratio (grav./calc.)	%	<MDL	<MDL	<MDL	<MDL	0.94	1.15			0.98	

Pond 10-7 is a man made pond (approximately 25' x 25') with an earthen dam on the south side. The pond is located in the NE1/4SE1/4 of Section 10, T13S, R92W. Source of surface water is from natural runoff and the Overland Ditch. (Simon Hydro Search, 92)

Baseline Information for Point P1007 is derived from events beginning on 10/1/91 through 2/1/96.
Point influenced by mining on 2/1/96.

Plot of Flow and Conductivity



P1007 - East Roatcap Creek Pond 10-7

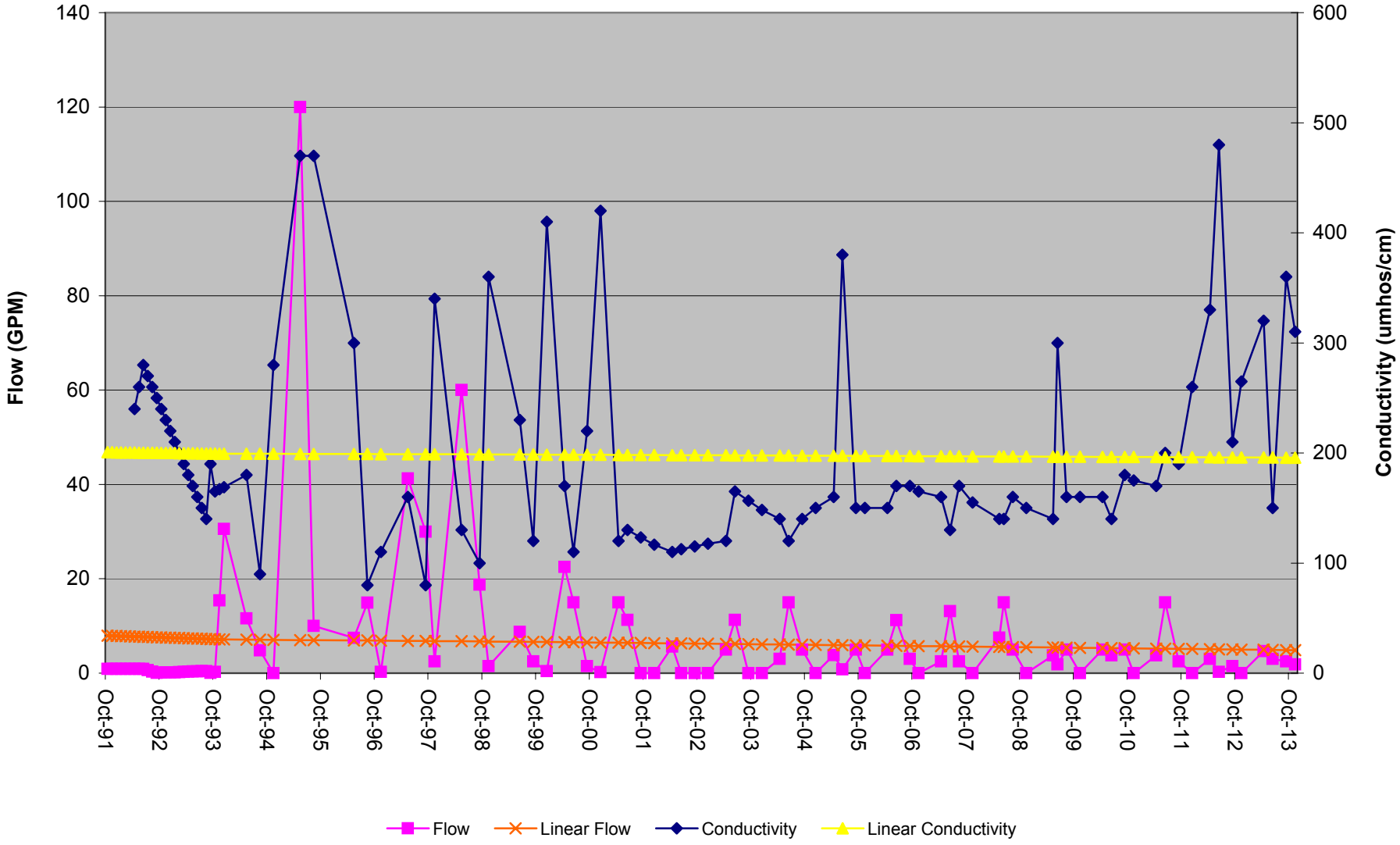
P1009
East Roatcap Creek - Pond 10-9
Depth - 3'
Elevation -8395

Initiated								10/1/91	10/1/91	10/1/91	10/1/91
Activated								9/1/95	9/1/95	9/1/95	9/1/95
Date								11/4/13	9/11/13	6/24/13	4/26/13
		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Flow	GPM	0.0	6.4	120	0.0	6.4	60.0	1.875	2.5	3	4.67
Freeboard	Feet				0.0	0.4	3.2				
Temperature	Celsius	8.0	13.7	23.2	0.4	12.4	22.9	8.2	9.8	19.3	11.4
Conductivity	umhos/cm	90	222	470	80	197	480	310	360	150	320
pH	su	7.7	8.0	8.3	7.2	8.1	8.5	8.2	8.1	8	8.1
Field Comments											
Lab											
Parameters	UNITS										
Bicarbonate	mg/L	98	98	98	71	126	232			222.61	
Carbonate	mg/L	<MDL	<MDL	<MDL	<MDL	1	5			<MDL	
Chloride	mg/L	2	2	2	<MDL	41.77	297.78			179.78	
Conductivity	umhos/cm	184	184	184	142	261	671			671	
Hardness	mg/L	85	85	85	55	107	212			104.85	
Acidity	mg/L				4.00	18.98	53.99			4	
pH	su	7.8	7.8	7.8	6.6	7.8	8.4			7.89	
ResidueFilterable-TDS	mg/L	96	96	96	76	198	555			488	
ResidueNonFilterable-TSS	mg/L	6	6	6	1	38	116			21	
SAR		0.24	0.24	0.24	0.15	0.31	0.658			0.658	
Sulfate	mg/L	8	8	8	<MDL	8.2	20.0			7.43	
Calcium (Dissolved)	mg/L	21.0	21.0	21	8.3	24.2	50.4			22.2	
Iron (Dissolved)	mg/L				0.05	0.21	0.46			0.46	
Iron (Total)	mg/L				0.14	2.05	4.38			4.38	
Magnesium (Dissolved)	mg/L	8.0	8.0	8	6.1	11.3	21.4			12	
Manganese (Total)	mg/L				0.003	0.080	0.16			0.16	
Sodium (Dissolved)	mg/L	5.0	5.0	5	3.2	7.7	17.1			15.5	
TDS Ratio (grav./calc.)	%				0.69	1.04	1.28			1.05	

Pond 10-9 is a man made pond (approximately 45' x 20') with an earthen dam located on the south side. The pond is located in the NE1/4SE1/4 of Section 10, T13S, R92W. The source of surface water is from the Overland Ditch and natural runoff. (Simon Hydro Search, 92)

Baseline Information for Point P1009 is derived from events beginning on 10/1/91 through 9/1/95.
Point influenced by mining on 9/1/95.

Plot of Flow and Conductivity



P1009 - East Roatcap Creek Pond 10-9

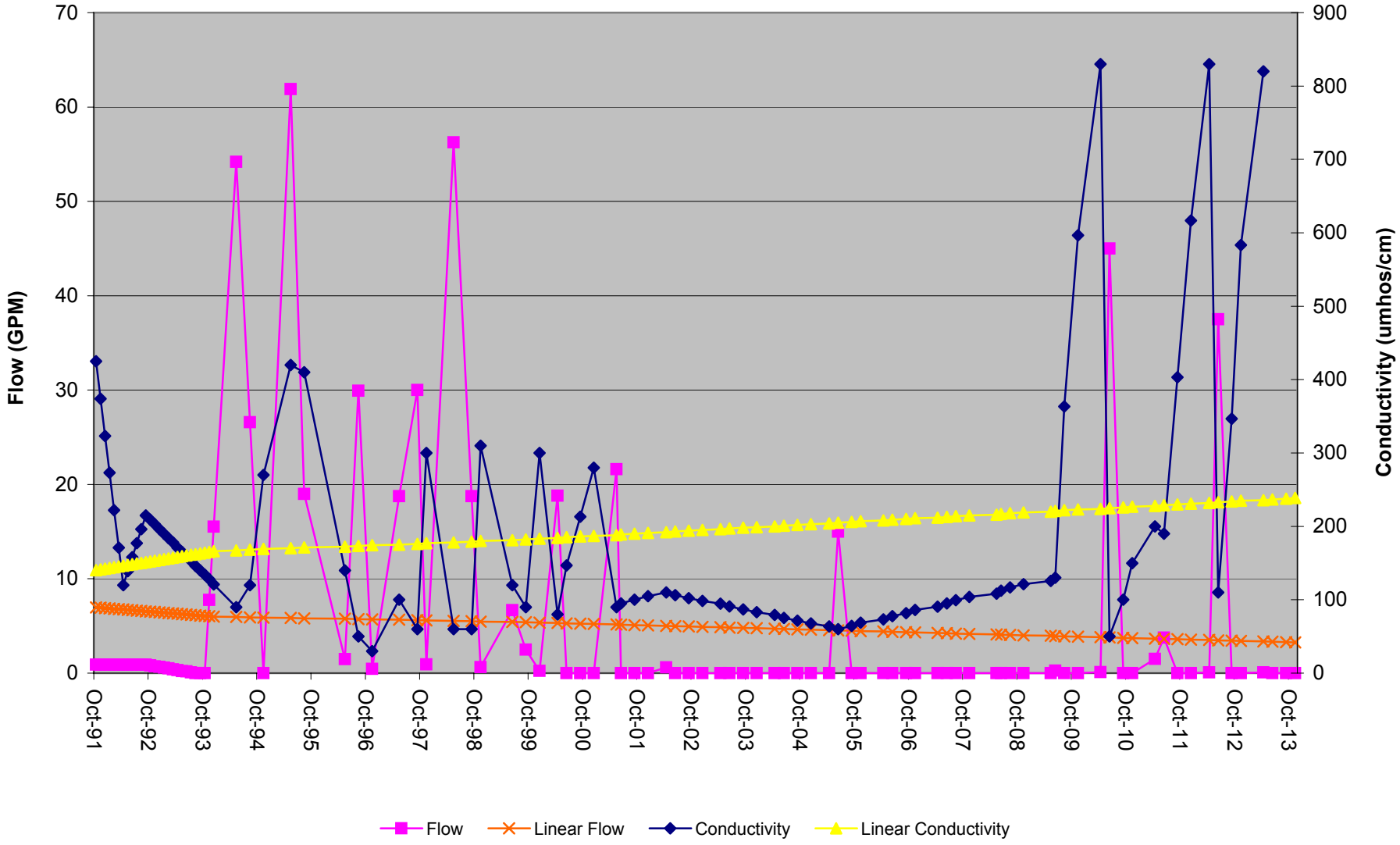
P1014
East Roatcap Creek - Pond 10-14
Depth - 3'
Elevation -8795

Initiated								10/1/91	10/1/91	10/1/91	10/1/91
Activated								1/1/94	1/1/94	1/1/94	1/1/94
Date								11/4/13	9/11/13	6/24/13	4/26/13
		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Flow	GPM	0.0	1.4	15.53	0.0	6.6	61.9	0	0	0	0.085
Freeboard	Feet				0.0	1.8	3				
Temperature	Celsius				0.2	10.0	22.4				9.3
Conductivity	umhos/cm	120	195	425	30	222	830				820
pH	su				7.2	7.7	8.5				7.4
Field Comments								No Flow	No Flow	No Flow	
Lab											
Parameters	UNITS										
Bicarbonate	mg/L				41	67	106.7				
Carbonate	mg/L				<MDL	<MDL	<MDL				
Chloride	mg/L				1	67	384.63				
Conductivity	umhos/cm				95	157	325				
Hardness	mg/L				47	63	96.11				
Acidity	mg/L				4	10	19.88				
pH	su				6.4	7.4	8.1				
ResidueFilterable-TDS	mg/L				60	143	465				
ResidueNonFilterable-TSS	mg/L				1	42	208				
SAR					0.10	0.22	0.51				
Sulfate	mg/L				<MDL	9.2	16.05				
Calcium (Dissolved)	mg/L				6.4	15.7	24.8				
Iron (Dissolved)	mg/L				0.06	0.15	0.22				
Iron (Total)	mg/L				0.20	1.92	3.82				
Magnesium (Dissolved)	mg/L				3.6	5.7	9.77				
Manganese (Total)	mg/L				<MDL	0.02	0.02				
Sodium (Dissolved)	mg/L				1.7	4.2	8.92				
TDS Ratio (grav./calc.)	%				0.95	1.10	1.35				

Pond 10-14 is a man made pond (approximately 10' x 10') with an earthen dam on the east side. The pond is located in the SW1/4NE1/4 of Section 10, T13S, R92W. The source of the surface water is from the Overland Ditch and natural runoff. (Simon Hydro Search, 92)

Baseline Information for Point P1014 is derived from events beginning on 10/1/91 through 1/1/94.
Point influenced by mining on 1/1/94.

Plot of Flow and Conductivity



P1014 - East Roatcap Creek Pond 10-14

P1307
Steven's Gulch - Pond 13-7
Depth - 5'
Elevation -8875

Initiated	7/6/1983	7/6/1983	7/6/1983	7/6/1983
Activated	4/1/1992	4/1/1992	4/1/1992	4/1/1992
Date	11/4/2013	9/11/2013	6/27/2013	4/26/2013

Summary Information

Field Parameters	UNITS	Baseline Min	Baseline Ave	Baseline Max	Operation Min	Operation Ave	Operation Max				
Flow	GPM	0.0	0.1	2.78	0.0	0.0	0.15	0	0	0	0
Freeboard	Feet	0.0	0.0	0	0.0	3.6	6.72	6.23	5.68	4.12	2.21
Temperature	Celsius	2.5	15.6	28.1	0.1	13.9	25.7				
Conductivity	umhos/cm	155	292	480	100	229	520				
pH	su	6.6	22.6	256	7.2	8.2	9.7				
Field Comments								No Inflow	No Inflow	No Inflow	No Inflow
Lab Parameters	**UNITS**										
Bicarbonate	mg/L	32	148	187	71	98	132				
Carbonate	mg/L	<MDL	3	25	<MDL	<MDL	<MDL				
Chloride	mg/L	1	6	12	3	3	3				
Conductivity	umhos/cm	256	296	404	144	187	232				
Hardness	mg/L	107	135	153	66	81	89				
pH	su	6.8	7.6	8.3	7.0	8.0	9.9				
ResidueFilterable-TDS	mg/L	160	185	226	90	129	186				
ResidueNonFilterable-TSS	mg/L	8	44	176	8	9	12				
SAR		0.08	0.23	0.38	0.10	0.12	0.14				
Sulfate	mg/L	2	21	101	10	15	20				
Calcium (Dissolved)	mg/L	23.0	31.1	36	17.9	23.6	30.6				
Magnesium (Dissolved)	mg/L	6.0	12.4	16	5.1	7.0	9.1				
Sodium (Dissolved)	mg/L	2.0	5.9	10	2.0	2.7	3.2				
Potassium	mg/L				<MDL	4	7				
TDS Ratio (grav./calc.)					1.15	1.19	1.24				

Pond 13-7 is a man made stock pond (approximately 80' x 20' x 2'). The source of the surface water that feeds this pond is runoff. (Gordon, 83)

Baseline Information for Point P1307 is derived from events beginning on 7/6/83 through 4/1/92.
Point influenced by mining on 4/1/92.

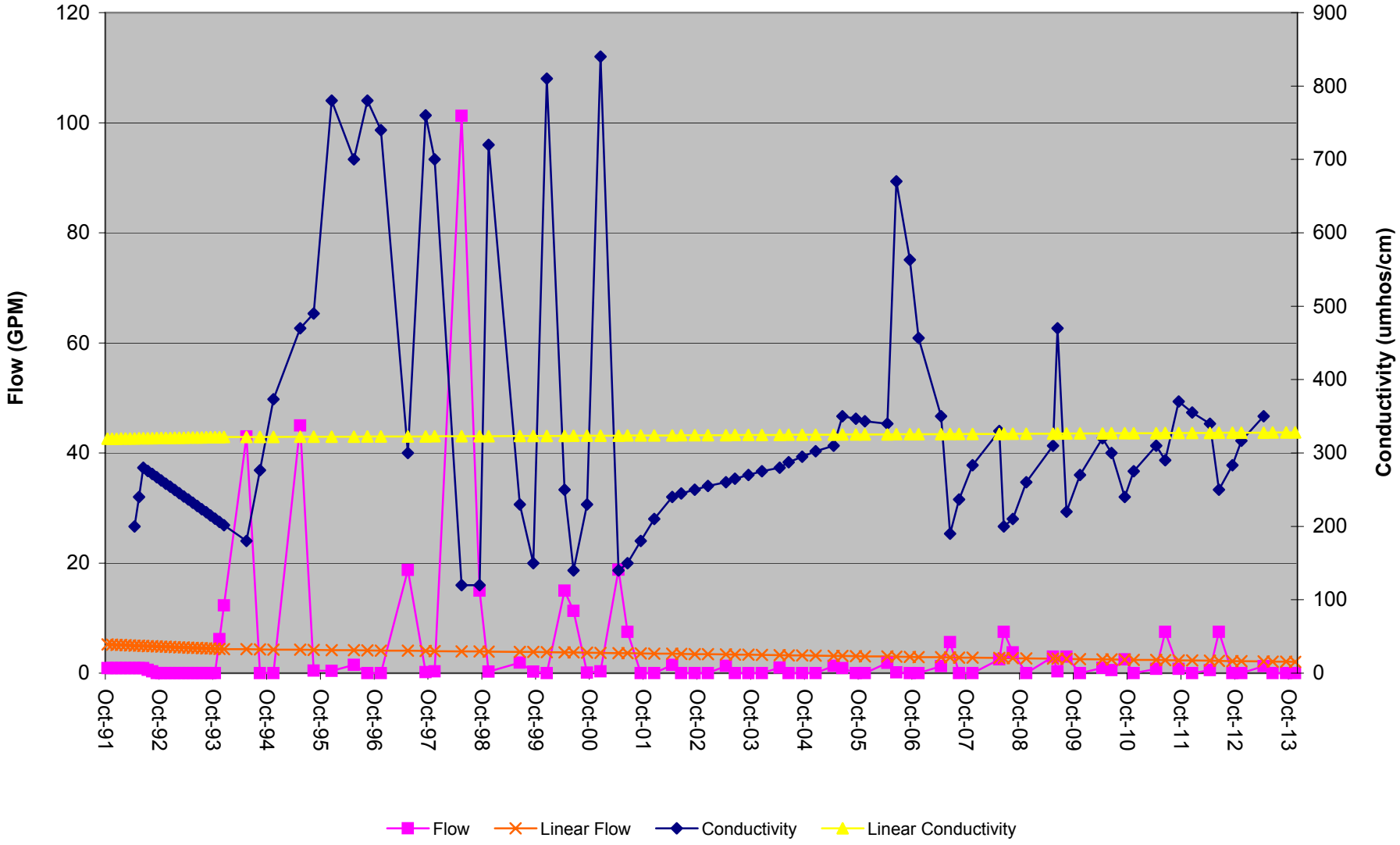
P1501
East Roatcap Creek - Pond 15-1
Depth - 4'
Elevation -8055

Initiated								10/1/1991	10/1/1991	10/1/1991	10/1/1991
Activated								8/1/1994	8/1/1994	8/1/1994	8/1/1994
Date								11/4/2013	9/11/2013	6/24/2013	4/25/2013
		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Flow	GPM	0.0	2.5	43	0.0	4.0	101.25	0	0	0	1.25
Freeboard	Feet	0.0	0.0	0	0.0	1.4	4	0.9	0.87	0.72	
Temperature	Celsius	7.0	7.0	7	0.5	12.7	26.5				11.4
Conductivity	umhos/cm	180	236	280	120	380	840				350
pH	su	8.1	8.1	8.1	6.8	8.1	8.4				8.4
Field Comments											
Lab Parameters	UNITS										
Bicarbonate	mg/L	102	102	102	82	159	337				
Carbonate	mg/L	<MDL	<MDL	<MDL	<MDL	0.9	7.0				
Chloride	mg/L	2	2	2	<MDL	19.9	148.9				
Conductivity	umhos/cm	200	200	200	161	315	689				
Hardness	mg/L	90	90	90	75	156	442.1				
Acidity	mg/L				6	23	54.93				
pH	su	8.0	8.0	8	7.4	8.0	8.5				
ResidueFilterable-TDS	mg/L	118	118	118	90	233	484				
ResidueNonFilterable-TSS	mg/L				<MDL	34	83				
SAR		0.32	0.32	0.32	0.19	0.55	1.055				
Sulfate	mg/L	8	8	8	<MDL	15.74	35.81				
Calcium (Dissolved)	mg/L	23.0	23.0	23	12.2	38.4	116				
Iron (Dissolved)	mg/L				0.01	0.07	0.11				
Iron (Total)	mg/L				0.24	0.40	0.69				
Magnesium (Dissolved)	mg/L	8.0	8.0	8	6.8	15.0	37.02				
Manganese (Total)	mg/L				<MDL	0.02	0.034				
Sodium (Dissolved)	mg/L	7.0	7.0	7	4.4	15.9	51				
TDS Ratio (grav./calc.)	%	1.08	1.08	1.08	0.93	1.00	1.13				

Pond 15-1 is a man made pond (approximately 20' x 25') with an earthen dam on its south side. The pond is located in the NE1/4 of Section 15, T13S, R92W. Origin of surface water was observed to be from the Overland Ditch. (Simon Hydro Search, 92)

Baseline Information for Point P1501 is derived from events beginning on 10/1/91 through 8/1/94.
Point influenced by mining on 8/1/94.

Plot of Flow and Conductivity



P1501 - East Roatcap Creek Pond 15-1

P8500
Stephen's Gulch - Pond 85
Depth - 4'
Elevation -7580

Initiated	2/22/83	2/22/83	2/22/83	2/22/83
Activated	12/1/92	12/1/92	12/1/92	12/1/92
Date	11/4/13	9/11/13	6/9/13	4/26/13

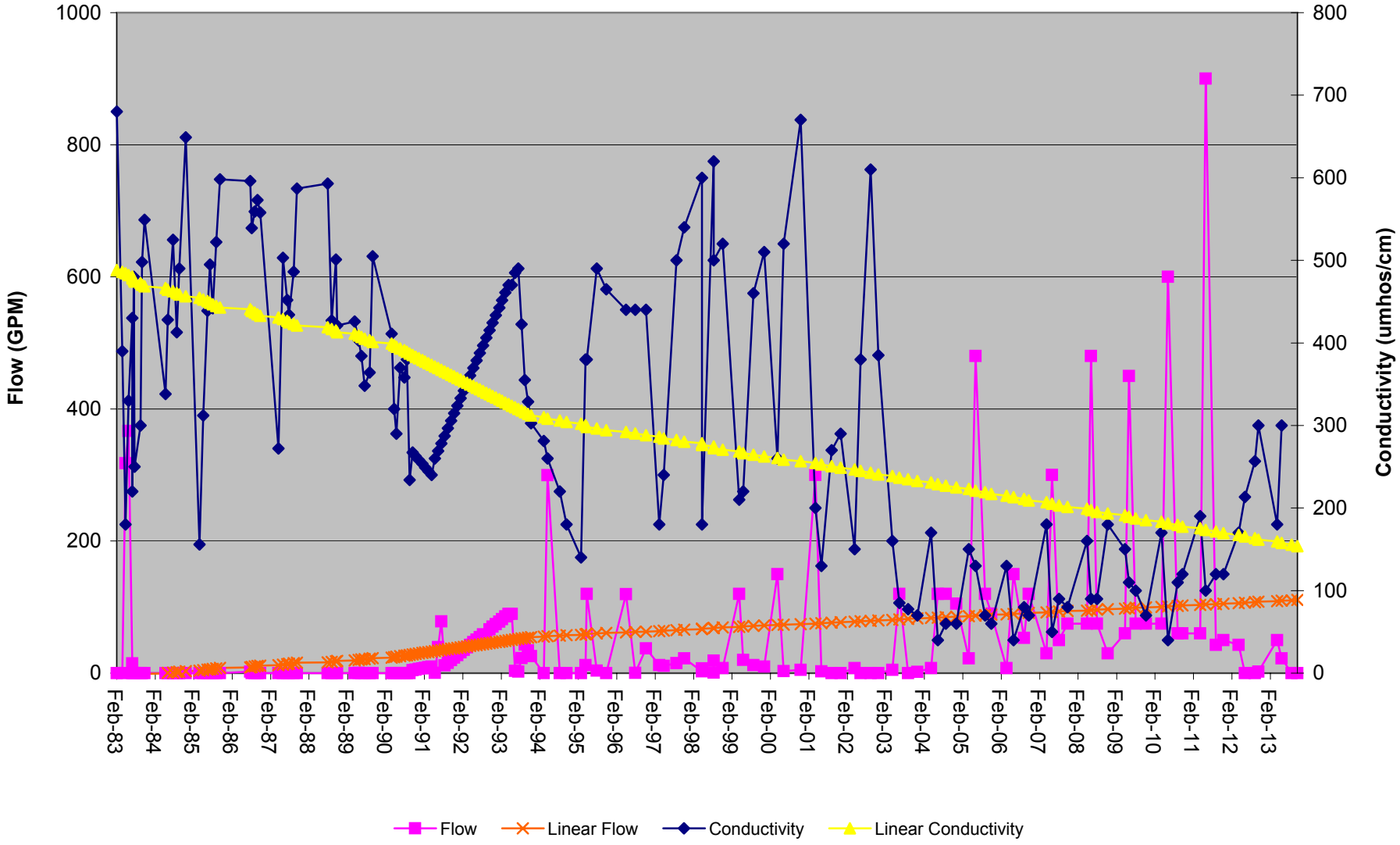
Summary Information

Field Parameters	UNITS	Baseline Min	Baseline Ave	Baseline Max	Operation Min	Operation Ave	Operation Max				
Flow	GPM	0.0	19.4	366.6	0.0	78.4	900	0	0	22.5	50
Freeboard	Feet	0.0	0.0	0	0.0	0.10	2.6	0.71	0.41		
Temperature	Celsius	1.0	15.8	27.7	0.9	9.9	20.4			14.9	9.8
Conductivity	umhos/cm	156	393	680	40	261	670			300	180
pH	su	5.7	8.5	10.9	7.2	8.0	9.7			7.7	8.1
Field Comments											
Lab Parameters	UNITS										
Bicarbonate	mg/L	5	177	336	18	88	323			88.65	
Carbonate	mg/L	<MDL	89.1	550	<MDL	0.7	6			<MDL	
Chloride	mg/L	1.0	42.8	258	<MDL	10	42.19			2.43	
Conductivity	umhos/cm	8	395	610	79	200	556			346	
Hardness	mg/L	61.0	173.1	258	23	99	271			265.06	
Acidity	mg/L				4	5	8			4	
pH	su	7.5	8.4	12	6.9	7.7	8.5			6.93	
ResidueFilterable-TDS	mg/L	114.0	256.3	410	60	130	320			278	
ResidueNonFilterable-TSS	mg/L	4.0	31.7	128	<MDL	16.4	53			22	
SAR		0.4	1.0	1.85	0.07	1.36	14.8			2.24	
Sulfate	mg/L	8.0	30.2	66	<MDL	19	93.02			11.11	
Calcium (Dissolved)	mg/L	16.0	42.2	67	4.9	21.6	49.6			32.6	
Iron (Dissolved)	mg/L				0.03	0.08	0.13			0.13	
Iron (Total)	mg/L				0.16	0.49	0.72			0.72	
Magnesium (Dissolved)	mg/L	5.0	16.1	24	2.6	10.9	44.6			44.6	
Manganese (Total)	mg/L				<MDL	<MDL	<MDL			0.13	
Sodium (Dissolved)	mg/L	8.0	29.8	52	2.9	43.9	554			84	
TDS Ratio (grav./calc.)					0.12	0.95	1.61			1.05	

This large pond is approximately 300' x 400' and is found near the Steven's Gulch Road. (Hanna, 99)

Baseline Information for Point P8500 is derived from events beginning on 2/22/83 through 12/1/92.
Point influenced by mining on 12/1/92.

Plot of Flow and Conductivity



P8700
East Roatcap Creek - Pond 87
Depth - 4'
Elevation -7990

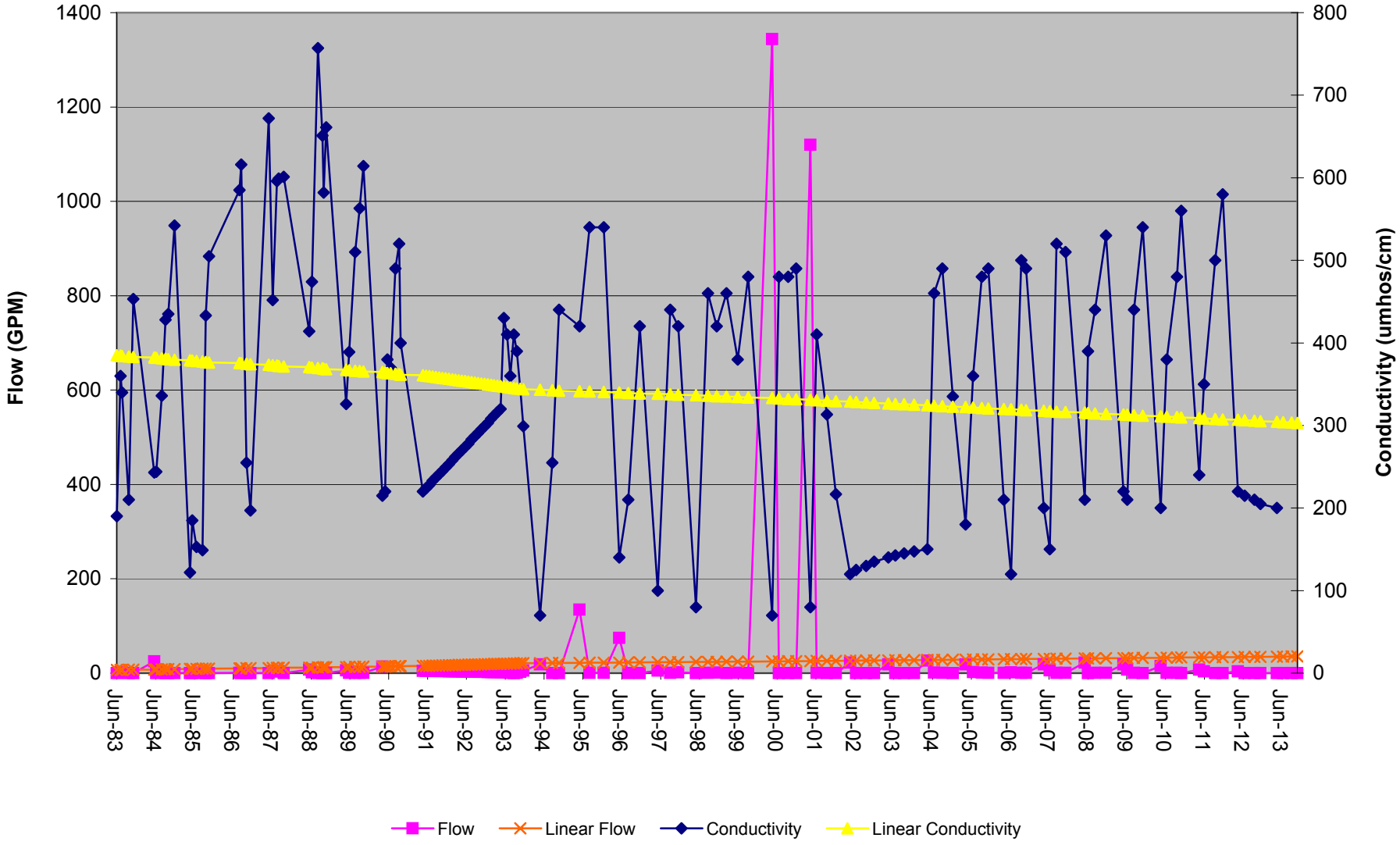
Initiated	6/14/83	6/14/83	6/14/83	6/14/83
Activated	10/1/95	10/1/95	10/1/95	10/1/95
Date	11/4/13	9/11/13	6/24/13	4/26/13

		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Flow	GPM	0.0	4.0	134.6	0.0	39.9	1344	0	0	0	5
Freeboard	Feet	0.0	0.0	0	0.0	0.8	4	1.35	1.28	1.12	
Temperature	Celsius	0.7	16.2	28.9	0.5	10.6	23.5				11.9
Conductivity	umhos/cm	70	367	757	70	349	580				200
pH	su	5.8	11.6	174	7.1	8.0	8.4				8.1
Field Comments								No inflow	No inflow	seep inflow	
Lab											
Parameters	UNITS										
Bicarbonate	mg/L	36	211	385	58	166	279				
Carbonate	mg/L	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL				
Chloride	mg/L	1	2	6	<MDL	6.60	22.33				
Conductivity	umhos/cm	77	299	543	112	307	504				
Hardness	mg/L	37	142	247	50	129	213				
Acidity	mg/L				14	39	64.44				
pH	su	7.3	7.8	8.2	6.7	7.8	8.4				
ResidueFilterable-TDS	mg/L	60	196	324	60	208	336				
ResidueNonFilterable-TSS	mg/L	10	96	585	2	22	44				
SAR		0.17	3.48	36	0.23	0.64	1.18				
Sulfate	mg/L	<MDL	7	21	<MDL	9.17	20				
Calcium (Dissolved)	mg/L	10.0	32.8	53	9.4	28.7	46.4				
Iron (Dissolved)	mg/L				0.03	0.05	0.06				
Iron (Total)	mg/L				0.67	1.06	1.45				
Magnesium (Dissolved)	mg/L	3.0	16.4	31	4.4	13.9	23.5				
Manganese (Total)	mg/L				<MDL	<MDL	<MDL				
Sodium (Dissolved)	mg/L	3.0	21.3	47	3.8	18.2	39				
TDS Ratio (grav./calc.)					0.93	1.07	1.49				

This large pond is approximately 200' x 75' (Hanna, 99)

Baseline Information for Point P8700 is derived from events beginning on 6/14/83 through 10/1/95.
Point influenced by mining on 10/1/95.

Plot of Flow and Conductivity



P8700 - East Roatcap Creek Pond 87

P8800
East Roatcap Creek - Pond 88
Depth - 5'
Elevation -7790

Initiated	6/14/83	6/14/83	6/14/83	6/14/83
Activated	10/1/97	10/1/97	10/1/97	10/1/97
Date	11/4/13	9/11/13	6/21/13	4/26/13

		Summary Information									
		Baseline			Operation						
Field Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Flow	GPM	0.0	1.2	30	0.0	0.0	0.75	0	0	0	0
Freeboard	Feet	3.3	4.6	5	2.1	4.6	6.33	6.28	6.3	6.33	3.28
Temperature	Celsius	2.0	17.2	28.9	0.8	18.7	29.8				
Conductivity	umhos/cm	80.0	307.1	449	90.0	258.8	380				
pH	su	4.9	8.5	10.3	7.6	8.1	8.8				
Field Comments								Dry	Dry	Dry	
Lab Parameters	UNITS										
Bicarbonate	mg/L	61.0	146.1	320	133.0	133.0	133				
Carbonate	mg/L	<MDL	7.9	108	<MDL	<MDL	<MDL				
Chloride	mg/L	<MDL	5.6	12	1.0	1.0	1				
Conductivity	umhos/cm	106.0	263.0	404	267.0	267.0	267				
Hardness	mg/L	37.0	108.4	197	128.0	128.0	128				
pH	su	6.9	7.7	9.3	7.7	7.7	7.7				
ResidueFilterable-TDS	mg/L	40.0	177.2	318	150.0	150.0	150				
ResidueNonFilterable-TSS	mg/L	2.0	40.2	212	8.0	8.0	8				
SAR		0.2	0.6	1.01	0.4	0.4	0.37				
Sulfate	mg/L	<MDL	12.5	25	20.0	20.0	20				
Calcium (Dissolved)	mg/L	10.0	26.7	49	36.7	36.7	36.7				
Magnesium (Dissolved)	mg/L	3.0	9.2	15	8.8	8.8	8.8				
Sodium (Dissolved)	mg/L	3.0	13.6	22	9.7	9.7	9.7				
Potassium	mg/L	<MDL	2.1	6.2							
TDS Ratio (grav./calc.)		0.9	1.0	1.04							

This large pond is approximately 75' x 75'. (Hanna, 99)

Baseline Information for Point P8800 is derived from events beginning on 6/14/83 through 10/1/97.
Point influenced by mining on 10/1/97.

P8900
East Roatcap Creek - Pond 89
Depth - 7.5'
Elevation -7490

Initiated	5/16/83	5/16/83	5/16/83	5/16/83
Activated				
Date	11/4/13	9/11/13	6/24/13	10/29/12

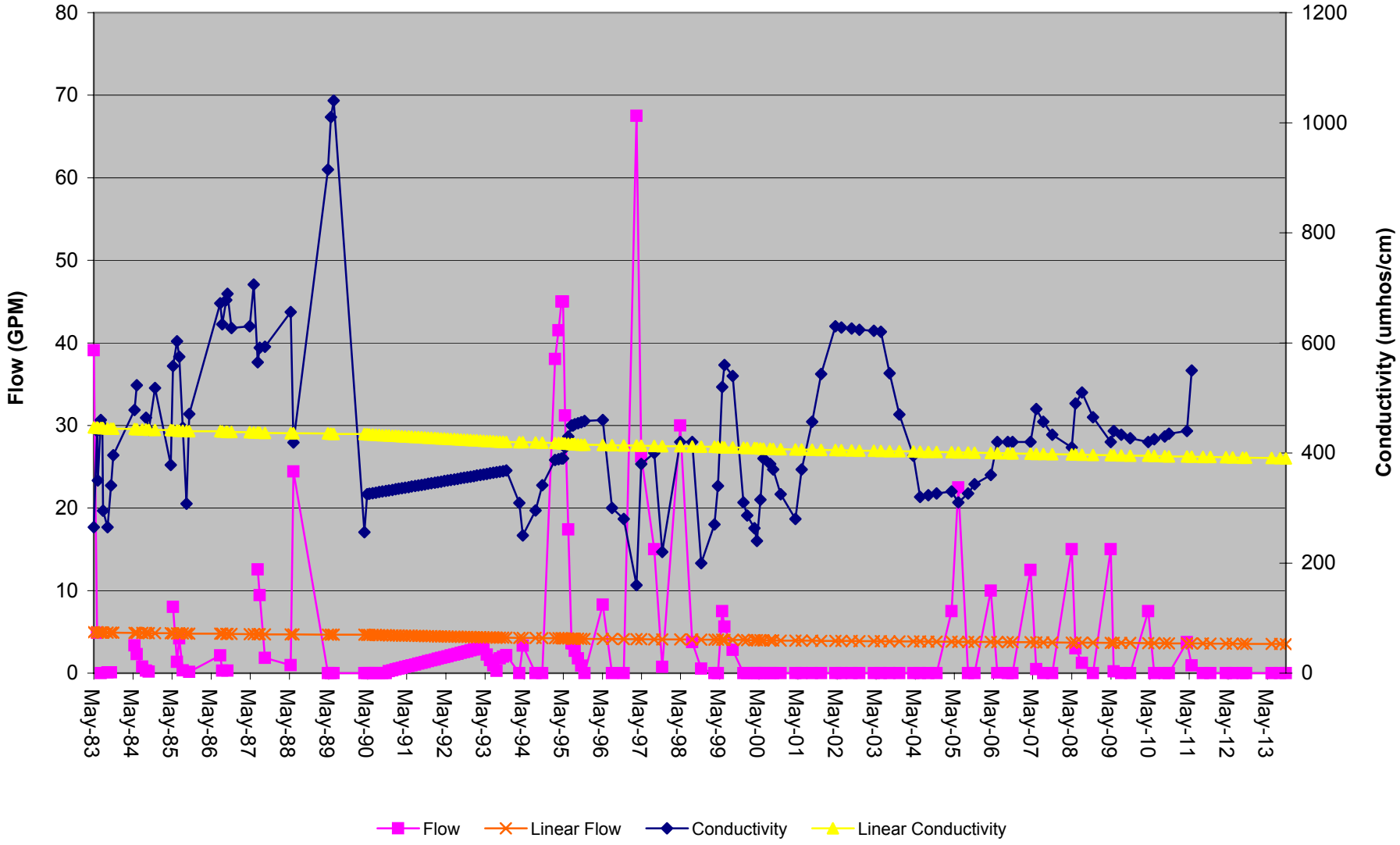
Field Parameters	UNITS	Summary Information Baseline Min	Ave	Max	Operation Min	Ave	Max				
Flow	GPM	0.0	4.2	67.5				0	0	0	0
Freeboard	Feet	0.0	1.7	8.26				7.05	6.87	6.62	6.92
Temperature	Celsius	0.8	15.0	27.1							
Conductivity	umhos/cm	160	419	1040							
pH	su	6.1	8.0	9.9							
Field Comments								No Inflow	No Inflow	No Inflow	No Inflow
Lab Parameters	UNITS										
Bicarbonate	mg/L	40.0	202.9	308.9							
Carbonate	mg/L	<MDL	1	24							
Chloride	mg/L	1.00	8.58	29.78							
Conductivity	umhos/cm	100	470	823							
Hardness	mg/L	37	219	418							
Acidity	mg/L	26.38	26.38	26.38							
pH	su	6.7	7.7	9.2							
ResidueFilterable-TDS	mg/L	50	306	552							
ResidueNonFilterable-TSS	mg/L	4	44	320							
SAR		0.17	0.46	0.9							
Sulfate	mg/L	4	61	198							
Calcium (Dissolved)	mg/L	10.0	59.6	113.0							
Iron (Dissolved)	mg/L	0.010	0.010	0.010							
Iron (Total)	mg/L	0.030	0.030	0.030							
Magnesium (Dissolved)	mg/L	3.0	17.4	33.0							
Manganese (Total)	mg/L	0.009	0.009	0.009							
Sodium (Dissolved)	mg/L	3.0	15.5	28.4							
TDS Ratio (grav./calc.)		0.91	1.02	1.11							

The area of concern for monitoring point P8900 has not been affected by the mining operation. Therefore, all recorded monitoring events are considered Baseline.

This large pond is approximately 100' x 100'. (Hanna, 99)

Baseline Information Collection initiated on 5/16/83 and not yet considered complete.
Point P8900 has not been influenced by mining.

Plot of Flow and Conductivity



P8900 - East Roatcap Creek Pond 89

SP1305
Steven's Gulch - Pond Spring 13-5
Depth 4'
Elevation - 7680

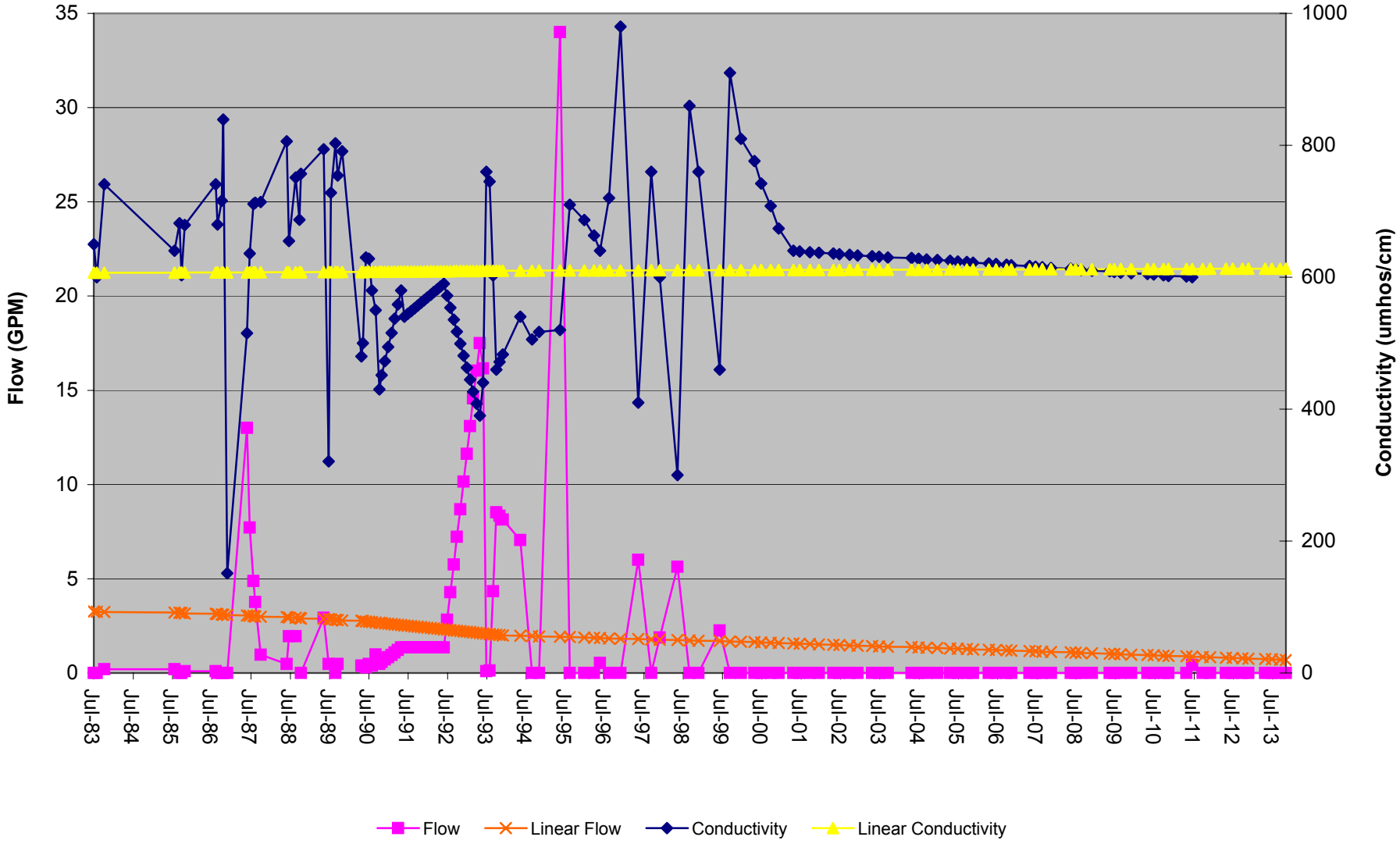
Initiated	7/6/83	7/6/83	7/6/83	7/6/83
Activated	12/1/92	12/1/92	12/1/92	12/1/92
Date	11/4/13	9/11/13	6/28/13	4/26/13

		Summary Information									
		Baseline			Operation						
Field Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Flow	GPM	0	1.82	13	0	2.07	34	0	0	0	0
Freeboard	Feet	0	0.00	0	0	1.93	4	0.65	0.61	0.62	0.58
Temperature	Celsius	2.8	13.6	24.4	0.4	12.2	21.2				
Conductivity	umhos/cm	151	603	839	300	591	980				
pH	su	7.1	26.5	640	7	7.8	8.6				
Field Comments								No Inflow	Damp		Seep Inflow
Lab Parameters	UNITS										
Bicarbonate	mg/L	253	369	434	96	224	323				
Carbonate	mg/L	<MDL	1	6	<MDL	<MDL	<MDL				
Chloride	mg/L	3	12	66	2	16	62.04				
Conductivity	umhos/cm	477	651	804	231	444	635				
Hardness	mg/L	225	267	325	98	179	248				
Acidity	mg/L				24	24.00	24				
pH	su	7.4	7.83	8.2	7.46	7.86	8.1				
ResidueFilterable-TDS	mg/L	156	367	452	130	267	372				
ResidueNonFilterable-TSS	mg/L	2	103	358	8	40	108				
SAR		0.84	1.38	1.8	0.89	1.13	1.748				
Sulfate	mg/L	23	64	130	10	39	60.92				
Calcium (Dissolved)	mg/L	47	61.92	79	24.9	45.08	60				
Iron (Dissolved)	mg/L				0.04	0.04	0.04				
Iron (Total)	mg/L				0.77	0.77	0.77				
Magnesium (Dissolved)	mg/L	20	27.33	32	8.7	16.07	24				
Manganese (Total)	mg/L				0.42	0.42	0.42				
Sodium (Dissolved)	mg/L	29	51.67	64	12.8	33.60	57.8				
TDS Ratio (grav./calc.)					0.96	1.04	1.1				

Spring and Pond 13-5 is a man made stock pond with a piped spring (approximately 50' x 30'). The pond is fed from a spring and seep located above the pond. (Gordon, 83)

Baseline Information for Point SP1308 is derived from events beginning on 7/6/83 through 12/1/92.
Point influenced by mining on 12/1/92.

Plot of Flow and Conductivity



SP1305 - Steven's Gulch Spring Pond 13-5

SP1306
Steven's Gulch - Pond Spring 13-6
Depth 4'
Elevation - 7590

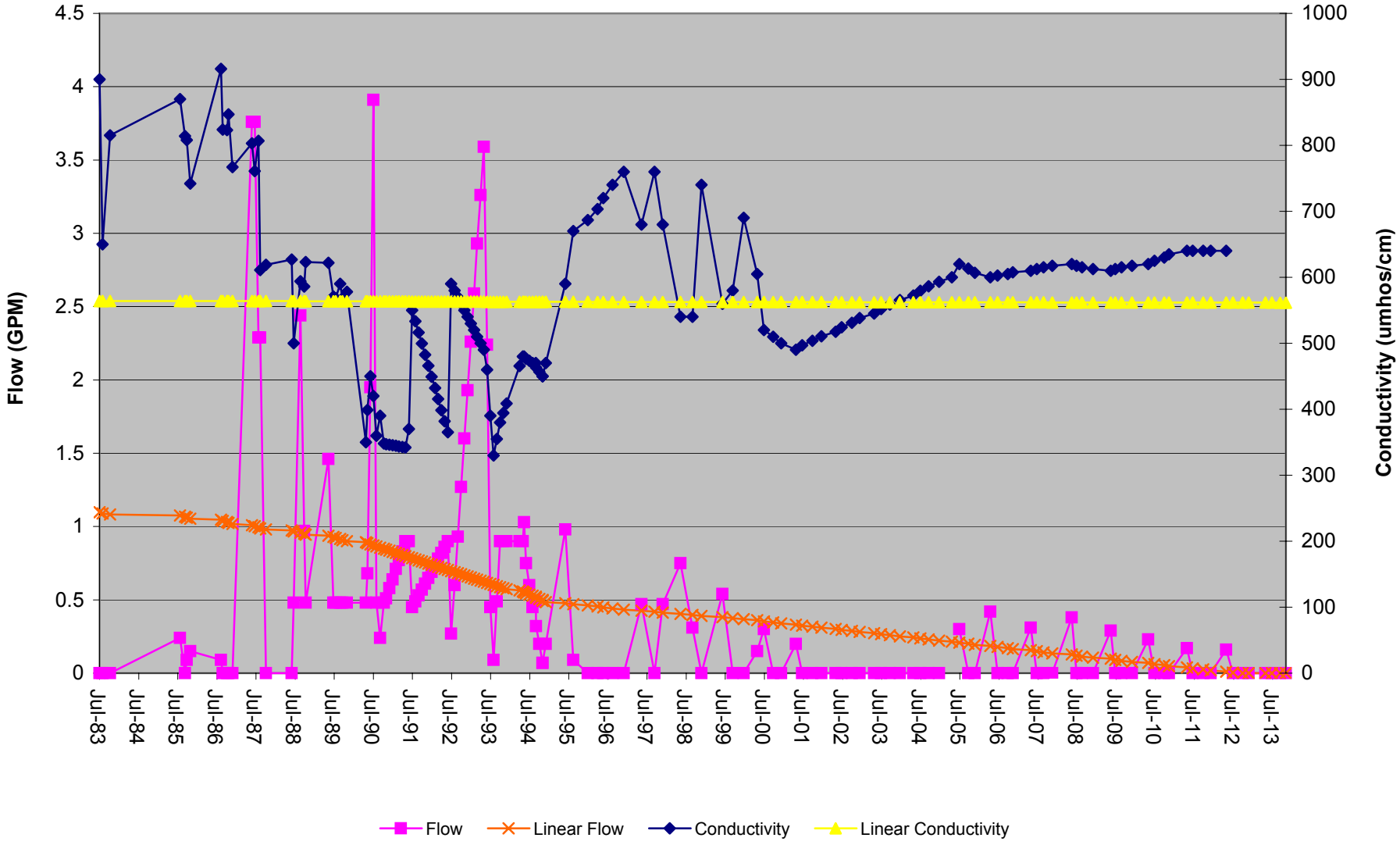
Initiated	7/5/83	7/5/83	7/5/83	7/5/83
Activated	1/1/88	1/1/88	1/1/88	1/1/88
Date	11/4/13	9/11/13	6/27/13	4/26/13

		Summary Information									
Field		Baseline			Operation						
Parameters	UNITS	Min	Ave	Max	Min	Ave	Max				
Flow	GPM	0	0.75	3.76	0	0.51	3.91	0	0	0	0.15
Freeboard	Feet	0	0.00	0	0	0.85	4	0.72	0.7	0.68	0
Temperature	Celsius	5	14.0	24	0.3	12.8	25.6				11.9
Conductivity	umhos/cm	611	787	916	330	510	760				640
pH	su	7.2	7.8	8.4	6.9	8.0	8.9				7.6
Field Comments											
Lab											
Parameters	UNITS										
Bicarbonate	mg/L	407	431	470	280	340	410				
Carbonate	mg/L	<MDL	<MDL	<MDL	<MDL	3	26				
Chloride	mg/L	5	9	12	2	6	8				
Conductivity	umhos/cm	650	729	868	491	596	752				
Hardness	mg/L	325	370	423	242	305	414				
pH	su	7.6	7.98	8.3	7	7.9	8.6				
ResidueFilterable-TDS	mg/L	330	416	473	300	351	430				
ResidueNonFilterable-TSS	mg/L	4	22	40	6	26	76				
SAR		0.59	0.71	0.92	0.35	0.43	0.60				
Sulfate	mg/L	29	42	58	10	38	200				
Calcium (Dissolved)	mg/L	63	71.50	87	51.0	61.9	86.5				
Magnesium (Dissolved)	mg/L	39	46.50	50	28.0	36.7	48.0				
Sodium (Dissolved)	mg/L	27	31.50	40	13.0	17.6	23.0				
Potassium	mg/L				<MDL	1.50	6				
TDS Ratio (grav./calc.)					<MDL	0.77	1.08				

Spring and Pond 13-6 is a man made pond (approximately 25' x 25') and is fed by a spring located on the hillside above the pond. (Gordon, 83)

Baseline Information for Point SP1308 is derived from events beginning on 7/5/83 through 1/1/88.
Point influenced by mining on 1/1/88.

Plot of Flow and Conductivity



SP1306 - Steven's Gulch Spring Pond 13-6

2013
ANNUAL INFLOW REPORT

BOWIE RESOURCES, LLC

BOWIE RESOURCES, LLC
BOWIE NO. 1 MINE
P.O. BOX 483
PAONIA, COLORADO 81428
PERMIT C-81-038

PREPARED BY:

J. E. STOVER & ASSOCIATES
2352 N. 7th St., Unit B
Grand Jct., CO 81501

Introduction

According to Stipulation No. 29, Permit No. C-1981-038, the operator submits the following Annual Mine Inflow Report for the period of July 1, 2012 through June 30, 2013.

Mining Locations and Projections

Mining operations at Bowie No. 1 Mine have ceased due to market conditions and coal quality issues. It is highly unlikely mining operations will resume since the surface facilities have been reclaimed.

Mine Inflow

The underground Mine Inflow Study at the Bowie No. 1 Mine was not conducted during 2013, as the mine was inactive and inaccessible.

No water was discharged from the mine to the surface during the 2012-2013 reporting period. The operator has no plans to discharge water from within the mine to the surface during the 2013-2014 reporting period. No water has been discharged from the mine to date.

Water Importation and Balance

There was no production of coal from the Bowie No. 1 Mine from July 1, 2012 through June 30, 2013. Production estimates for the following twelve month period remain at zero. Historically, mine water importation is estimated from recorded flows and the number on tons mined. With no coal production to base water usage upon, the operator submits only evaporative loss from ponds for the consumptive use during the water year. Evaporative loss is based upon the assumption that all of the ponds have full dead pool storage during the entire reporting period.

These water quantities are listed as:

	Acre Feet
Dust Suppression on Bowie No. 1 Roadway	0.00
Bathhouse Consumption[1]	0.00
Evaporative Loss from Ponds	4.60
Silo Usage	0.00
Total water usage	4.60

Hydrologic Impacts

Historically, there was virtually no water inflow into the mine. Therefore, the hydrologic impact caused by the mining operation is either non-existent or not measurable.

Conclusions

No mine discharge and no importation of water is anticipated during the 2013 - 2014 reporting period. Therefore, the quality and quantity of surface water adjacent to the mine will not be affected. The operator will continue to submit the Annual Subsidence and Hydrology Report which will summarize all subsidence and hydrology data.

[1] Bathhouse has been dismantled.

2013
ANNUAL SUBSIDENCE REPORT

BOWIE RESOURCES, LLC

BOWIE RESOURCES, LLC
BOWIE NO. 1 MINE
P.O. BOX 483
PAONIA, COLORADO 81428
PERMIT C-81-038

PREPARED BY:

2013 Production and Geologic Conditions

The Bowie No. 1 Mine suspended operations during December, 1997 and remained idle throughout the calendar year. The mine has been reclaimed.

Operation Unit Descriptions

Bowie No. 1 Mine has no operating units to report on during the calendar year.

Subsidence Impacts - 2013

Selected subsidence monitoring stations established over the Pitkin Mesa pipeline were monitored in June and November of 2013.

Wide-Spaced Monitoring Grid Station Summary

Through technical revision number 45, the DRMS approved a reduction in subsidence monitoring. The wide spaced subsidence monuments, Sites 6, 14, 15, 16, DH 55, DH 65, DH 66, DH 68, 81, 82, 83 and 95 were not monitored during the year.

Pitkin Mesa Pipeline

Seven subsidence monitoring stations were established at locations along the Pitkin Mesa Pipeline which overlies Panel C. Panel C development commenced in October with twenty-four crosscuts completed by January 1, 1993. Panel C was mined utilizing a partial extraction design intended to preclude the development of subsidence in order to protect the pipeline. The subsidence monitoring stations along the pipeline are depicted on Map No. 2-5. The stations were surveyed twice in 2013; July 20th and November 16th. The results of this survey are appended to this report. The 2013 survey was conducted by Cragg Surveying. The Cragg surveys provide consistent survey values, which will show that this area is stable. Surveys will continue approximately semi-annually until stability is documented.

Visual Monitoring 2013

Visual subsidence monitoring is accomplished by periodic "walkovers" of recently mined areas within the present permit area. Walkovers are generally done in conjunction with survey monitoring due to the seasonal accessibility of the area. During the 2013 monitoring season, visual monitoring consisted of visual inspections done while performing survey monitoring and water monitoring.

Visual monitoring is concentrated over areas of retreat mining with particular emphasis on areas mined under low overburden. Since the mine has now been idled in excess of 10 years, there are no areas of particular emphasis on which to concentrate visual inspections.

Projected Subsidence Impacts - 2014

Subsidence impacts during 2014 are projected to be minimal based upon subsidence patterns established to date. No mining is currently projected for 2014.

Projected Subsidence Monitoring – 2014
No subsidence monitoring will be performed in 2014.

Through technical revision number 45, the DRMS approved a reduction in subsidence monitoring. The wide spaced subsidence monuments, Sites 6, 14, 15, 16, DH 55, DH 65, DH 66, DH 68, 81, 82, 83, 95 and 99 will not be surveyed during 2014.

Though technical revision number 57, the DRMS approved the cessation of subsidence monitoring of the seven (7) Pitkin Mesa Pipeline monitoring locations. These monitoring stations (PL-01 through PL-07) will not be surveyed during 2014.

BOWIE RESOURCES - BOWIE NO. 1 MINE
SUBSIDENCE MONITORING DATA - 2013

STATION : **PL#1** **ROOF BOLT**

DATE	NORTHING	EASTING	ELEVATION	-DOWN/+UP
8/23/2002	15375.54	9828.65	7367.08	-0.02
12/10/2002	15375.58	9828.59	7367.03	-0.05
6/20/2003	15375.50	9828.67	7367.13	0.10
12/24/2003	15375.61	9828.64	7367.10	-0.03
8/10/2004	15375.62	9828.60	7367.12	0.02
12/24/2004	15375.56	9828.59	7367.10	-0.02
8/30/2005	15375.54	9828.59	7367.10	0.00
12/20/2005	15375.55	9828.62	7367.19	0.09
6/21/2006	15375.53	9828.64	7367.12	-0.07
12/27/2006	15375.55	9828.61	7367.14	0.02
7/12/2007	15375.59	9828.64	7367.07	-0.07
12/18/2007	15375.55	9828.61	7367.15	0.08
6/24/2008	15375.57	9828.59	7367.15	0.00
12/2/2008	15375.55	9828.60	7367.11	-0.04
5/27/2009	15375.55	9828.62	7367.17	0.06
12/3/2009	15375.55	9828.57	7367.10	-0.07
6/23/2010	15375.55	9828.63	7367.07	-0.03
12/13/2010	15375.55	9828.62	7367.13	0.06
7/8/2011	15375.55	9829.59	7367.11	-0.02
12/16/2011	15375.54	9828.58	7367.08	-0.03
7/20/2012	15375.59	9828.59	7367.05	-0.03
11/26/2012	15375.58	9828.61	7367.07	0.02
6/20/2013	15375.57	9828.59	7367.12	0.05
11/21/2013	15375.59	9828.60	7367.10	-0.02

MAXIMUM	15375.62	9829.59	7367.19	0.10
MINIMUM	15375.50	9828.57	7367.03	-0.07
MOVEMENT	0.12	1.02	0.00	

Figure 1

BOWIE RESOURCES - BOWIE NO. 1 MINE
SUBSIDENCE MONITORING DATA - 2013

STATION : **PL#2** **ROOF BOLT**

DATE	NORTHING	EASTING	ELEVATION	-DOWN/+UP
8/23/2002	15745.98	10110.04	7376.89	0.03
12/10/2002	15745.89	10110.00	7376.82	-0.07
6/20/2003	15746.04	10110.01	7376.82	0.00
12/24/2003	15746.00	10109.97	7376.78	-0.04
8/10/2004	15745.99	10109.95	7376.81	0.03
12/24/2004	15746.00	10110.04	7376.74	-0.07
8/30/2005	15745.95	10109.90	7376.82	0.08
12/20/2005	15745.99	10110.00	7376.75	-0.07
6/21/2006	15745.95	10109.97	7376.86	0.11
12/27/2006	15745.96	10110.03	7376.71	-0.15
7/12/2007	15746.01	10110.01	7376.82	0.11
12/18/2007	15745.96	10109.99	7376.82	0.00
6/24/2008	15745.89	10109.97	7376.85	0.03
12/2/2008	15745.96	10110.04	7376.76	-0.09
5/27/2009	15745.96	10110.02	7376.81	0.05
12/3/2009	15745.96	10110.00	7376.85	0.04
6/23/2010	15745.93	10109.95	7376.84	-0.01
12/13/2010	15745.93	10110.03	7376.88	0.04
7/8/2011	15745.97	10110.03	7376.75	-0.13
12/16/2011	15745.93	10110.01	7376.79	0.04
7/20/2012	15745.99	10109.93	7376.92	0.13
11/26/2012	15745.98	10109.97	7376.62	-0.30
6/20/2013	15745.95	10109.99	7376.89	0.27
11/21/2013	15745.94	10109.97	7376.87	-0.02

MAXIMUM	0.01	10110.04	7376.92	0.27
MINIMUM	15745.89	10109.90	7376.62	-0.30
MOVEMENT	-15745.88	0.14	0.01	

Note: PL-2 is down near the creek with large cottonwood trees around. The tree canopy can disrupt the GPS signal resulting in the range of values for the position.

Figure 2

BOWIE RESOURCES - BOWIE NO. 1 MINE
SUBSIDENCE MONITORING DATA - 2013

STATION : **PL#3** **ROOF BOLT**

DATE	NORTHING	EASTING	ELEVATION	-DOWN/+UP
8/23/2002	17332.42	10662.68	7560.57	0.00
12/10/2002	17332.44	10662.67	7560.57	0.00
6/20/2003	17332.48	10662.70	7560.64	0.07
12/24/2003	17332.47	10662.65	7560.59	-0.05
8/10/2004	17332.50	10662.63	7560.60	0.01
12/24/2004	17332.44	10662.62	7560.58	-0.02
8/30/2005	17332.47	10662.65	7560.56	-0.02
12/20/2005	17332.44	10662.60	7560.59	0.03
6/21/2006	17332.44	10662.65	7560.53	-0.06
12/27/2006	17332.46	10662.65	7560.59	0.06
7/12/2007	17332.47	10662.66	7560.61	0.02
12/18/2007	17332.49	10662.65	7560.60	-0.01
6/24/2008	17332.48	10662.64	7560.67	0.07
12/2/2008	17332.45	10662.64	7560.57	-0.10
5/27/2009	17332.48	10662.65	7560.59	0.02
12/3/2009	17332.44	10662.64	7560.54	-0.05
6/23/2010	17332.47	10662.66	7560.59	0.05
12/13/2010	17332.43	10662.65	7560.54	-0.05
7/8/2011	17332.41	10662.63	7560.66	0.12
12/16/2011	17332.42	10662.65	7560.58	-0.08
7/20/2012	17332.44	10662.63	7560.52	-0.06
11/26/2012	17332.46	10662.65	7560.53	0.01
6/20/2013	17332.43	10662.65	7560.63	0.10
11/21/2013	17332.47	10662.67	7560.56	-0.07

MAXIMUM	17332.50	10662.70	7560.67	0.12
MINIMUM	17332.41	10662.60	7560.52	-0.10
MOVEMENT	0.09	0.10	-0.01	

Figure 3

BOWIE RESOURCES - BOWIE NO. 1 MINE
SUBSIDENCE MONITORING DATA - 2013

STATION : **PL#4** **ROOF BOLT**

DATE	NORTHING	EASTING	ELEVATION	-DOWN/+UP
8/23/2002	17572.72	10856.74	7590.42	0.00
12/10/2002	17572.52	10856.82	7590.44	0.02
6/20/2003	17572.55	10856.78	7590.43	-0.01
12/24/2003	17572.52	10856.76	7590.43	0.00
8/10/2004	17572.52	10856.75	7590.40	-0.03
12/24/2004	17572.51	10856.79	7590.44	0.04
8/30/2005	17572.50	10856.80	7590.46	0.02
12/20/2005	17572.50	10856.75	7590.42	-0.04
6/21/2006	17572.48	10856.80	7590.39	-0.03
12/27/2006	17572.53	10856.81	7590.45	0.06
7/12/2007	17572.49	10856.76	7590.42	-0.03
12/18/2007	17572.51	10856.82	7590.45	0.03
6/24/2008	17572.51	10856.80	7590.50	0.05
12/2/2008	17572.50	10856.82	7590.45	-0.05
5/27/2009	17572.54	10856.81	7590.41	-0.04
12/3/2009	17572.52	10856.77	7590.42	0.01
6/23/2010	17572.53	10856.78	7590.46	0.04
12/13/2010	17572.50	10856.81	7590.38	-0.08
7/8/2011	17572.51	10856.81	7590.46	0.08
12/16/2011	17572.48	10856.80	7590.38	-0.08
7/20/2012	17572.48	10856.80	7590.42	0.04
11/26/2012	17572.51	10856.80	7590.43	0.01
6/20/2013	17572.48	10856.81	7590.46	0.03
11/21/2013	17572.51	10856.81	7590.43	-0.03

MAXIMUM	17572.72	10856.82	7590.50	0.08
MINIMUM	17572.48	10856.74	7590.38	-0.08
MOVEMENT	0.24	0.08	0.01	

Figure 4

BOWIE RESOURCES - BOWIE NO. 1 MINE
SUBSIDENCE MONITORING DATA - 2013

STATION : **PL#5** **ROOF BOLT**

DATE	NORTHING	EASTING	ELEVATION	-DOWN/+UP
8/23/2002	16365.97	10153.62	7448.14	0.01
12/10/2002	16366.00	10153.74	7448.09	-0.05
6/20/2003	16365.98	10153.69	7448.19	0.10
12/24/2003	16365.98	10153.66	7448.16	-0.03
8/10/2004	16365.94	10153.66	7448.16	0.00
12/24/2004	16365.96	10153.73	7448.12	-0.04
8/30/2005	16365.91	10153.69	7448.03	-0.09
12/20/2005	16365.97	10153.73	7448.18	0.15
6/21/2006	16365.92	10153.79	7448.19	0.01
12/27/2006	16365.98	10153.80	7448.17	-0.02
7/12/2007	16365.95	10153.79	7448.14	-0.03
12/18/2007	16365.97	10153.79	7448.10	-0.04
6/24/2008	16365.93	10153.80	7448.16	0.06
12/2/2008	16365.97	10153.79	7448.15	-0.01
5/27/2009	16365.96	10153.85	7448.21	0.06
12/3/2009	16365.97	10153.76	7448.13	-0.08
6/23/2010	16365.99	10153.83	7448.17	0.04
12/13/2010	16365.97	10153.81	7448.12	-0.05
7/8/2011	16365.96	10153.84	7448.15	0.03
12/16/2011	16365.97	10153.79	7448.11	-0.04
7/20/2012	16365.92	10153.74	7448.10	-0.01
11/26/2012	16365.97	10153.78	7448.04	-0.06
6/20/2013	16365.90	10153.81	7448.12	0.08
11/21/2013	16365.94	10153.82	7448.04	-0.08

MAXIMUM	16366.00	10153.85	7448.21	0.15
MINIMUM	16365.90	10153.62	7448.03	-0.09
MOVEMENT	0.10	0.23	-0.09	

Figure 5

BOWIE RESOURCES - BOWIE NO. 1 MINE
SUBSIDENCE MONITORING DATA - 2013

STATION : **PL#6** **ROOF BOLT**

DATE	NORTHING	EASTING	ELEVATION	-DOWN/+UP
8/23/2002	18005.10	11195.10	7587.92	-0.01
12/10/2002	18005.11	11195.12	7587.95	0.03
6/20/2003	18005.14	11195.09	7587.88	-0.07
12/24/2003	18005.10	11195.08	7588.00	0.12
8/10/2004	18005.09	11195.13	7587.96	-0.04
12/24/2004	18005.08	11195.11	7587.98	0.02
8/30/2005	18005.02	11195.07	7588.07	0.09
12/20/2005	18005.09	11195.05	7588.05	-0.02
6/21/2006	18005.06	11195.14	7587.98	-0.07
12/27/2006	18005.11	11195.10	7588.01	0.03
7/12/2007	18005.07	11195.14	7588.00	-0.01
12/18/2007	18005.08	11195.10	7588.01	0.01
6/24/2008	18005.09	11195.12	7588.11	0.10
12/2/2008	18005.09	11195.10	7588.01	-0.10
5/27/2009	18005.11	11195.10	7588.03	0.02
12/3/2009	18005.10	11195.11	7587.99	-0.04
6/23/2010	18005.09	11195.14	7588.05	0.06
12/13/2010	18005.06	11195.12	7588.01	-0.04
7/8/2011	18005.08	11195.12	7588.04	0.03
12/16/2011	18005.06	11195.11	7588.02	-0.02
7/20/2012	18005.11	11195.11	7587.96	-0.06
11/26/2012	18005.08	11195.08	7587.94	-0.02
6/20/2013	18005.11	11195.14	7588.02	0.08
11/21/2013	18005.12	11195.15	7588.01	-0.01

MAXIMUM	18005.14	11195.15	7588.11	0.12
MINIMUM	18005.02	11195.05	7587.88	-0.10
MOVEMENT	0.12	0.10	0.08	

Figure 6

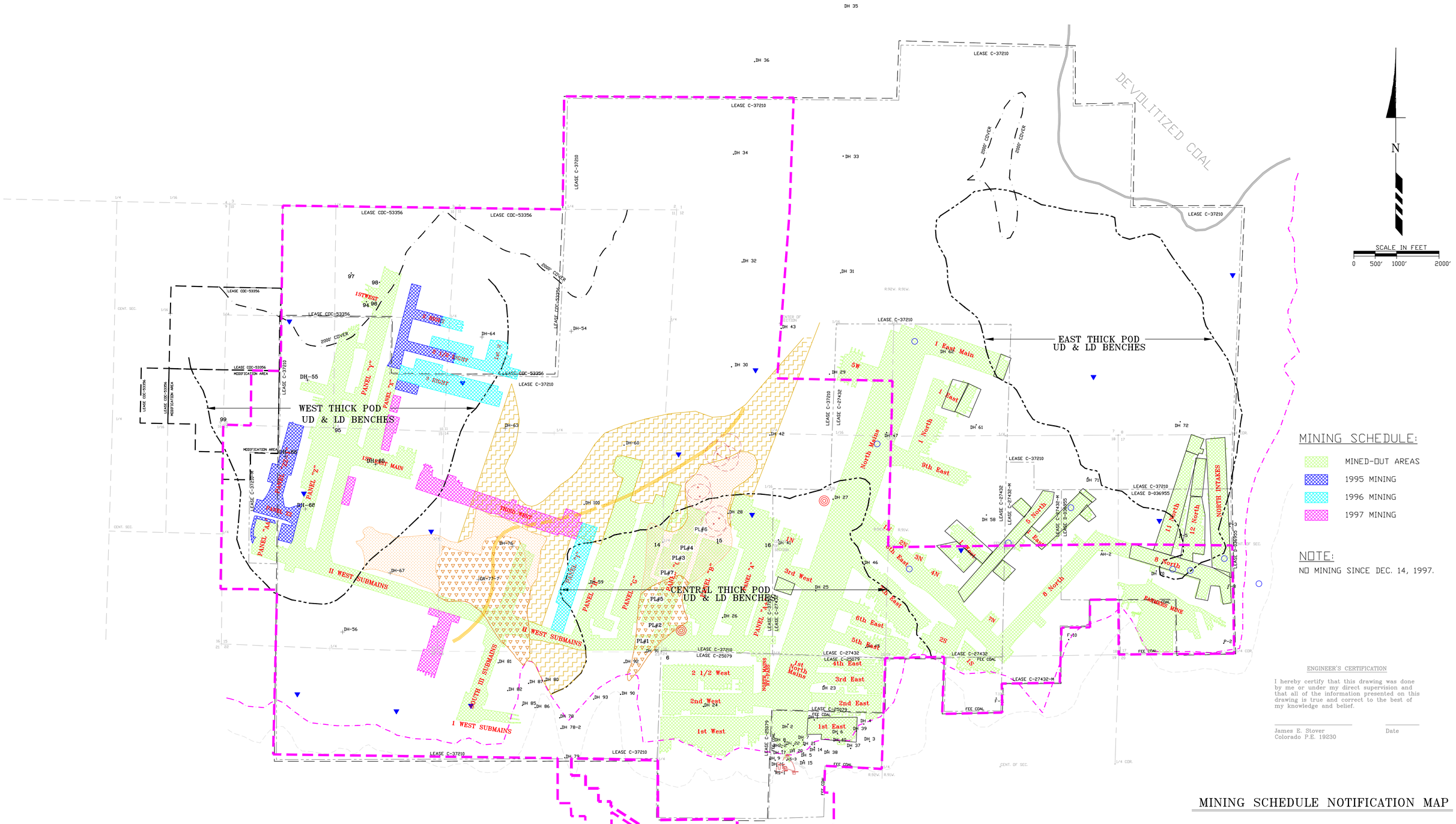
BOWIE RESOURCES - BOWIE NO. 1 MINE
SUBSIDENCE MONITORING DATA - 2013

STATION : **PL#7** **ROOF BOLT**

DATE	NORTHING	EASTING	ELEVATION	-DOWN/+UP
8/23/2002	16985.75	10390.71	7504.61	0.10
12/10/2002	16985.72	10390.68	7504.56	-0.05
6/20/2003	16985.72	10390.69	7504.66	0.10
12/24/2003	16985.71	10390.67	7504.60	-0.06
8/10/2004	16985.70	10390.71	7504.64	0.04
12/24/2004	16985.72	10390.71	7504.60	-0.04
8/30/2005	16985.71	10390.70	7504.71	0.11
12/20/2005	16985.73	10390.70	7504.55	-0.16
6/21/2006	16985.63	10390.78	7504.69	0.14
12/27/2006	16985.72	10390.75	7504.62	-0.07
7/12/2007	16985.66	10390.77	7504.58	-0.04
12/18/2007	16985.75	10390.74	7504.54	-0.04
6/24/2008	16985.65	10390.75	7504.62	0.08
12/2/2008	16985.70	10390.75	7504.59	-0.03
5/27/2009	16985.71	10390.80	7504.59	0.00
12/3/2009	16985.71	10390.72	7504.55	-0.04
6/23/2010	16985.72	10390.73	7504.63	0.08
12/13/2010	16985.72	10390.74	7504.65	0.02
7/8/2011	16985.67	10390.76	7504.63	-0.02
12/16/2011	16985.70	10390.73	7504.54	-0.09
7/20/2012	16985.63	10390.66	7504.64	0.10
11/26/2012	16985.72	10390.68	7504.56	-0.08
6/20/2013	16985.67	10390.70	7504.62	0.06
11/21/2013	16985.67	10390.72	7504.74	0.12

MAXIMUM	16985.75	10390.80	7504.74	0.14
MINIMUM	16985.63	10390.66	7504.54	-0.16
MOVEMENT	0.12	0.14	0.23	

Figure 7



MINING SCHEDULE:

- MINED-OUT AREAS
- 1995 MINING
- 1996 MINING
- 1997 MINING

NOTE:

NO MINING SINCE DEC. 14, 1997.

ENGINEER'S CERTIFICATION

I hereby certify that this drawing was done by me or under my direct supervision and that all of the information presented on this drawing is true and correct to the best of my knowledge and belief.

James E. Stover
Colorado P.E. 19230

Date

LEGEND

- POSSIBLE FUTURE SITES FOR VENTILATION OPENINGS
- MFP AREA BOUNDARY
- PERMIT BOUNDARY
- PROPOSED WASTE ROCK SAMPLE LOCATIONS (COAL, ROOF, FLOOR & INTERBURDEN IF EXPOSED)
- EXISTING SAMPLE LOCATIONS
- L. M. U. BOUNDARY
- NO RECOVERABLE RESERVES THIS LOCATION
- "D" OUTCROP
- DRILL HOLE AND OR SUBSIDENCE MONUMENT
- DEVOLITIZED COAL
- "D" BURN ZONE
- 2,000 OVERBURDEN LINE
- UD/LD 1'-0" SPLIT LINE (THICK COAL PODS, UD & LD BENCHES)
- UD OR LD MINEABLE BENCH
- MINIMUM MINEABLE 8'-0" THICKNESS LINE

BUFFER ZONES (PROJECTED TO SEAM LEVEL)

- 0'-600" OVERBURDEN DEPTH
- 600"-800" OVERBURDEN DEPTH
- 300' RADIUS STRUCTURE MINING LIMIT

STRIKE N 88° W
DIP 4° NE

REF.	REVISION BY	DATE
AHR	J.E.S.	4/10/06
AHR	J.E.S.	3/2/07
AHR	J.E.S.	2/10/07
AHR	J.E.S.	2/11/10
AHR	J.E.S.	4/20/11
AHR	J.E.S.	02/18/13
AHR	J.E.S.	4/30/14

PREPARED FOR:

BOWIE RESOURCES, LLC
BOWIE NO. 1 MINE
P.O. BOX 1488
PAONIA, COLORADO 81428

J. E. STOVER & ASSOCIATES, INC.
2352 N 7th ST, UNIT B
Grand Jct., CO 81501

MINING SCHEDULE NOTIFICATION MAP

MAP NO. 2-5

PERMIT TERM AND LONG TERM MINE PLANNING

DESIGN BY:	DATE: FEB. 02, 1994
DRAWN BY: J. MENKE	CHK'D BY:
SCALE: 1"= 1000'	
DIRECTORY: \Kirt\Bowie-1\2-5a	DWG. NAME: MAP NO. 2-5

DRILL HOLE ROAD DISTURBANCE					
ACTION/ SEGMENT	ROAD NAME	DIST. TYPE	YEAR	ACRES	MILES
TR-38					
001	METHANE HOLE ROAD	NEW	2001	1.0	0.4
		TOTAL		1.0	0.4
TR-50					
007	BV-1 North Road	New	2008	0.2	0.1
007	BV-1 North Road	Upgraded	2008	0.5	0.4
008	BV-2 South Road	Upgraded	2008	1.1	0.7
		TOTAL		1.8	1.2
MR-127					
011	2011-1 Road	NEW	2011	0.12	0.04
012	2011-2 Road	NEW	2011	0.23	0.08
013	2011-3 Road	NEW	2011	1.00	0.34
		TOTAL		1.35	0.46

DRILL HOLE PAD DISTURBANCE				
ACTION/ SEGMENT	ROAD NAME	DIST. TYPE	YEAR	ACRES
TR-38				
002	BRL1-GMW-01	NEW	2001	0.2
		TOTAL		0.2
TR-50				
009	BV-1	NEW	2008	0.5
010	BV-2	NEW	2008	0.0
		TOTAL		0.5
MR-127				
014	2010-1	NEW	2011	1.0
015	2010-2	NEW	2011	1.0
016	2010-3	NEW	2011	1.0
		TOTAL		3.0

Prepared By:
J. E. STOVER & ASSOCIATES, INC.
2352 S 7th ST UNIT B
Grand Jct., CO 81501

REFERENCES

REVISIONS

No.	DESCRIPTION:	BY	DATE
6.	PERMIT RENEWAL	J.K.J.	02/03/08
7.	AHR, REVISED PERMIT BOUNDARY	D.A.J.	03/20/01
8.	ADDED GAS MONITORING WELL, BRL1-GMW-01	D.A.J.	08/01/01
9.	ADDED EXPLORATION HOLE, P-BRL-1-03-01	D.A.J.	03/10/03
10.	TR-44 EXPLORATION HOLES & ROADS	J.E.S.	04/19/04
11.	TR-50 TWO EXP. HOLES & ROADS	J.E.S.	09/10/08
12.	PR-04, Revised Permit Bndry, monitoring points	T.K.B.	08/30/10
13.	MR-127 3 Exploration Holes	J.E.S.	06/01/11
14.	TR-55 Remove B-4 from Monitoring Program	J.E.S.	08/20/13

LEGEND

- PERMIT BOUNDARY – Bowie No. 1
- PERMIT BOUNDARY – Bowie No. 2
- DRAINAGE BASIN PERIMETER
- POND OR SPRING & POND
- SHALLOW MONITORING WELL
- SPRING
- SW-1 F — SURFACE WATER MONITORING POINT FLUME, STILLING WELL, RECORDER
- SW-1 C — SURFACE WATER MONITORING POINT CREST STAGE GUAGE
- DRILL HOLE
- DRILL HOLE AND PAD
- NEW LIGHT USE ROAD
- UPGRADED UNPAVED ROAD
- TR-REVISION CLOUD

DRAINAGE KEY

1 – EAST ROATCAP CREEK DRAINAGE
2 – STEVENS GULCH DRAINAGE
3 – TERROR CREEK DRAINAGE
4 – COAL GULCH DRAINAGE
5 – WEST ROATCAP CREEK DRAINAGE

NOTE:
SEE MAP 8-3 FOR THE LOCATION OF TRAIN LOADOUT MONITORING WELLS MW-1, MW-2, AND MW-3.

NOTE:
CURRENTLY MONITORED LOCATIONS ARE SHOWN IN BLUE.

ENGINEER'S CERTIFICATION

I hereby certify that this drawing was done by me or under my direct supervision and that all of the information presented on this drawing is true and correct to the best of my knowledge and belief.

James E. Stover
Colorado P.E. 19230
Date

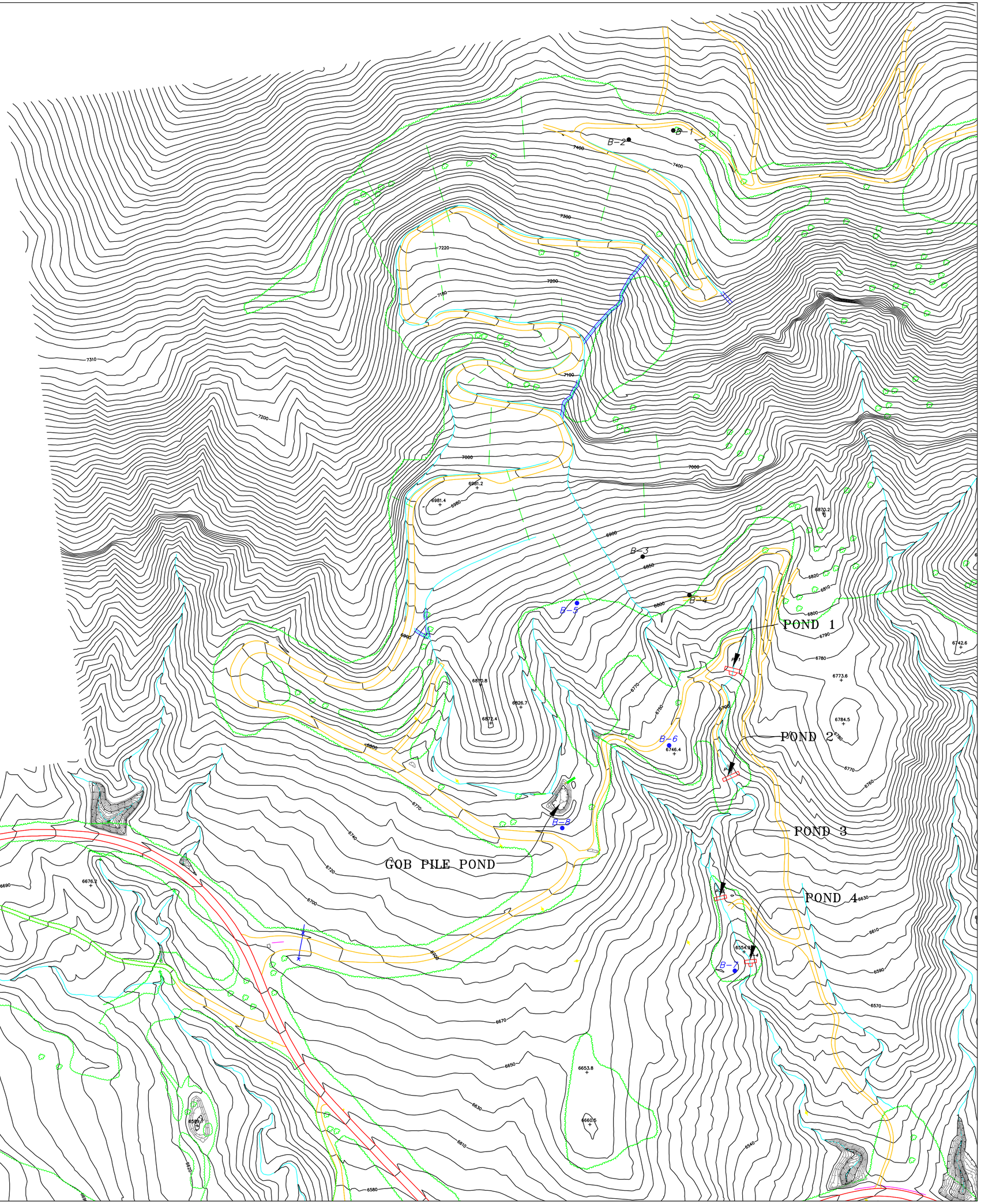
DESIGNED:
DRAWN: T.K.B. 03/2010
CHECKED:

PREPARED FOR:
BRL BOWIE RESOURCES, LLC
BOWIE RESOURCES, LLC
BOWIE NO. 1 MINE
P.O. BOX 1468
PAONIA, COLORADO 81428

PROJECT: BOWIE NO. 1 MINE

TITLE: HYDROLOGIC RECONNAISSANCE
SPRINGS, PONDS, DRILL HOLES AND STREAM GUAGES

DRMS I.D. No.: C – 1981 – 038
SCALE: 1" = 1000'
DWG. NAME: MAP 4 - 1



J. E. STOVER & ASSOCIATES
2352 N 7th ST UNIT B
Grand Jct., CO 81501

REFERENCES

REVISIONS

No.	DESCRIPTION:	BY	DATE
1.	2009 AHR	J.E.S.	2/11/10
2.	2010 AHR	J.E.S.	4/20/11
3.	2011 AHR	J.E.S.	4/10/12
4.	2012 AHR	J.E.S.	02/18/13
5.	2013 AHR	J.E.S.	04/30/13

N
W E
S
HALF INCH

ENGINEER'S CERTIFICATION

I hereby certify that this drawing was done by me or under my direct supervision and that all of the information presented on this drawing is true and correct to the best of my knowledge and belief.

James E. Stover
Colorado P.E. 19230
Date

DESIGNED:		
DRAWN:	D.A.J.	03/15/01
CHECKED:		

PREPARED FOR:

BRL
BOWIE RESOURCES, LLC

BOWIE RESOURCES, LLC
BOWIE NO. 1 MINE
P.O. BOX 483
PAONIA, COLORADO 81428

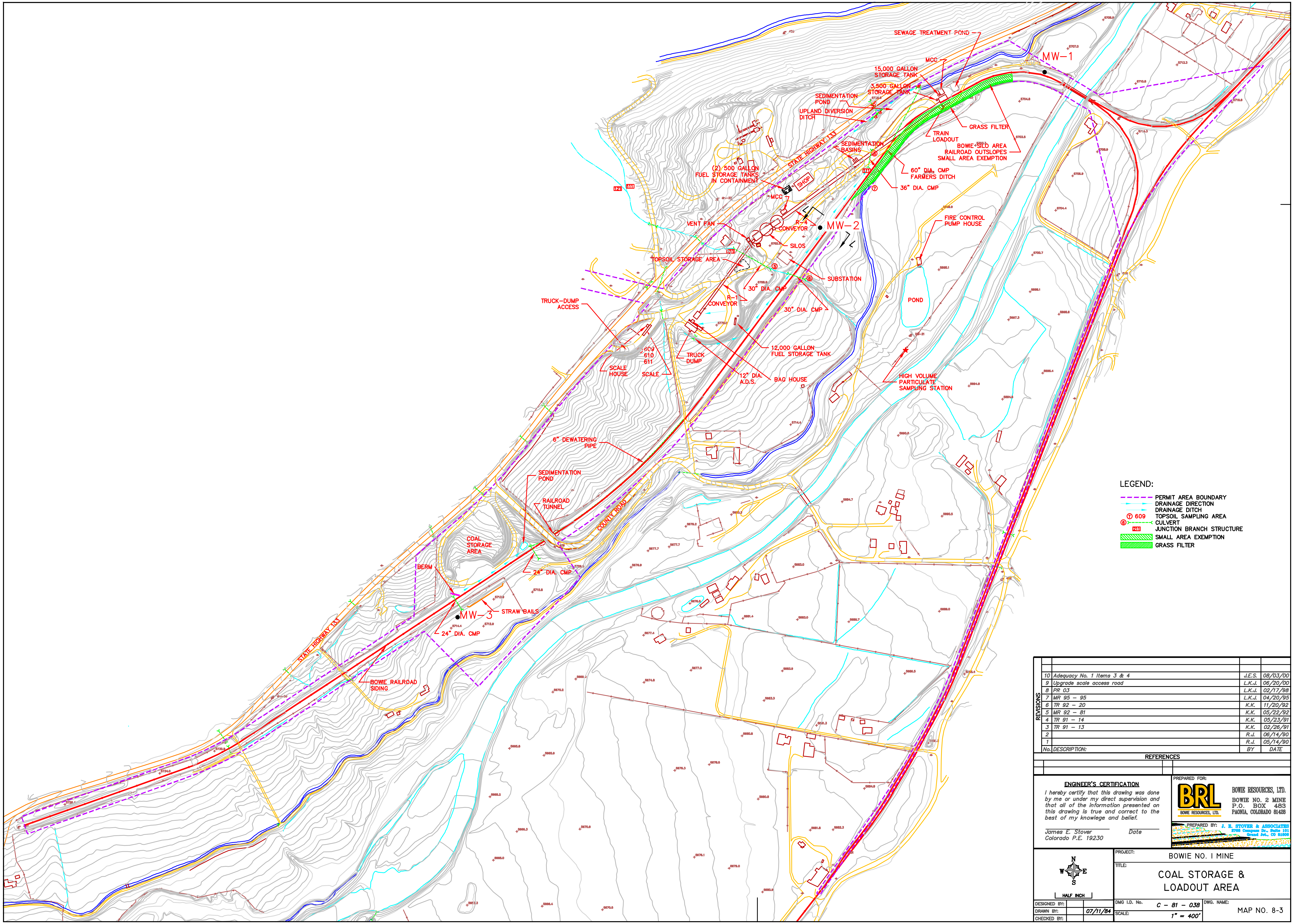
PROJECT: BOWIE NO. 1 MINE

TITLE: RECLAMATION MAP

DRMS I.D. No. C - 1981 - 038

SCALE: 1" = 200'

DWG. NAME: MAP 8-1



REVISIONS

No.	DESCRIPTION:	BY	DATE
10	Adequacy No. 1 Items 3 & 4	J.E.S.	08/03/00
9	Upgrade scale access road	L.K.J.	06/20/00
8	PR 03	L.K.J.	02/17/98
7	MR 95 – 95	L.K.J.	04/20/95
6	TR 92 – 20	K.K.	11/20/92
5	MR 92 – 81	K.K.	05/22/92
4	TR 91 – 14	K.K.	05/23/91
3	TR 91 – 13	K.K.	02/26/91
2		R.J.	06/14/90
1		R.J.	05/14/90

REFERENCES

ENGINEER'S CERTIFICATION

I hereby certify that this drawing was done by me or under my direct supervision and that all of the information presented on this drawing is true and correct to the best of my knowlege and belief.

James E. Stover
Colorado P.E. 19230

Date

PREPARED FOR: BOWIE RESOURCES, LTD.
BOWIE NO. 2 MINE
P.O. BOX 483
PAONIA, COLORADO 81428

PREPARED BY: J. E. STOVER & ASSOCIATES
2768 Compass Dr., Suite 101
Grand Jct., CO 81506

HALF INCH

PROJECT: BOWIE NO. I MINE

TITLE: COAL STORAGE & LOADOUT AREA

DESIGNED BY:		
DRAWN BY:		07/11/84
CHECKED BY:		

DMG I.D. No.: C – 81 – 038

SCALE: 1" = 400'

DWG. NAME: MAP NO. 8-3