

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: Charter Oak
Legal Description: T 9N R 7W
Mining District: Elliston
Latitude: N 46° 29' 25"
Longitude: W 112° 25' 10"
Land Status: Private/Public
Quad: Bison Mountain
Inspectors: Bullock, Babits, Flammang, Clark,
Lasher/Pierson
Organization: Pioneer Tech. Services//TD&H

County: Powell
Section(s): SW 1/4, NE 1/4, Sec. 36
Mine Type: Hardrock/Pb, Zn, Cu, Ag, Au
Primary Drainage: Little Blackfoot River
USGS Code: 17010201
Secondary Drainage: Little Blackfoot River
Date Investigated: June 11, 1993
P.A. # 39-003

- The volume of tailings associated with this site was estimated to be approximately 6,000 cubic yards. The tailings extended out into a wetlands associated with the Little Blackfoot River. The following elements were at least three times background:

Arsenic: 14,500 to 63,700 mg/kg	Cadmium: 61J mg/kg
Copper: 198 to 318 mg/kg	Iron: 111,000 mg/kg
Mercury: 0.365JX to 0.375JX mg/kg	Lead: 3670 to 18,200 mg/kg
Antimony: 131J to 843J mg/kg	Zinc: 314J to 6650J mg/kg

- The volume of waste rock associated with this site was estimated to be approximately 19,000 cubic yards. The following elements were elevated at least three times background:

Arsenic: 2650 to 13,500 mg/kg	Cadmium: 1.8J to 2.0J mg/kg
Copper: 144 mg/kg	Mercury: 0.329JX to 0.984JX mg/kg
Lead: 4100 to 12,300 mg/kg	Antimony: 71J to 284J mg/kg
Zinc: 244J mg/kg	

- Two discharging adits were associated with this site. The lower, and more recently worked adit discharged approximately 10 to 15 gpm, at a pH of 2.4 to 2.5 and a specific conductance of 2380 to 3030 umhos/cm. Total arsenic concentrations in this discharge range from 24,100 to 41,900 ug/l. A dissolved arsenic sample concentration was measured at 16,100 ug/l. This discharge exceeded MCL/MCLGs for arsenic, cadmium, copper, and antimony. This discharge also exceeded aquatic life criteria for these metals and zinc. The upper adit discharge was comparatively benign with a neutral pH, no MCL/MCLG exceedances, and only exceeded the acute aquatic life criteria for iron.

- The Little Blackfoot River flowed adjacent to the site. No observed releases to the river were documented during this investigation, however, cyanide was elevated in the discharge from the wetlands to the river.

- There were several barrels of chemicals, solvents, and liquids present on the site.

- A domestic water supply well within one mile downgradient of the site had a slightly elevated arsenic concentration (10.9 ug/l), but well below the MCL of 50 ug/l.

Charter Oak PA# 39-003
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 06/11/83

SOLID MATRIX ANALYSES

Results per dry weight basis, mg/kg

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	CYANIDE
39-003-SE-1	44	26.2	1.6 J	4.9	13.9	8.1	10300	0.026 JX	199 J	8	31	5 UJ	261 J	0.16
39-003-SE-2	107	44.7	0.6 U	6	17.5	12.1	14600	0.032 JX	291 J	13	74	5 J	156 J	NR
39-003-SE-3	81	66	0.5 U	5.8	15.8	10.7	14000	0.025 JX	397 J	8	82	5 J	150 J	NR
39-003-TP-1	14500	54	1.7 J	2.7	7.5	198	48700	0.375 JX	71.3 J	2 U	3670	131 J	314 J	NR
39-003-TP-2	63700	22.4	61 J	9.7	1.8	318	111000	0.365 JX	30.5 J	2 U	18200	843 J	6650 J	NR
39-003-WR-1	2650	62.6	1.8 J	1.2 U	2.4	34.8	27000	0.361 JX	124 J	2 U	1960	71 J	244 J	NR
39-003-WR-2	13500	55.2	1 J	1.2 U	1.6	144	26700	0.984 JX	28.3 J	2 U	12300	113 J	233 J	NR
39-003-WR-3	2930	20.4	2 J	1.3	5	50.3	34200	0.329 JX	142 J	3	4100	284 J	72 J	NR
BACKGROUND	163	147	0.6 U	9.2	9.3	21.7	35800	0.066 JX	933 J	9	30	8 J	78 J	NR

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR		SULFUR ACID BASE POTENT.	
	%	V/10000	%	V/10000	%	V/10000	%	V/10000	%	V/10000	%	V/10000	%	V/10000
39-003-TP-1	2.97	92.8	-7.8	-101	0.54	1.98	0.45	61.9	0.45	-69.7	0.12 J	233000	33.3	440 J
39-003-TP-2	13.8	430	-5.9	-436	0.79	6.25	6.72	195	6.72	-201	0.13 J	120000	18.3 J	127 J
39-003-WR-1	1.8	56.2	-1.5	-58	1.73	<0.01	0.07	0	0.07	-1.52	0.12 U	162000	19.2 J	256 J
39-003-WR-2	1.01	31.8	-3.5	-35	0.86	<0.01	0.15	0	0.15	-3.5	0.11 J	3270	8.78 U	1.31 J
39-003-WR-3	5.06	158	-3.3	-161	0.2	3.14	1.72	98.1	1.72	-101	0.181	128	12.7 U	1.57
39-003-WR-3DUP	5.08	159	-4	-163	0.24	3.14	1.7	98.1	1.7	-102	0.11 J	154	8.78 U	2.16 J

LEGEND

SED1 - AI PPE
 SED2 - Downstream of PPE on Little Blackfoot River.
 SED3 - Upstream of PPE on Little Blackfoot River.
 TP1 - Composite of subsamples TP1A, 2A, and 3.
 TP2 - Composite of subsamples WR1, 4, and 5.
 WR2 - Composite of subsamples WR2A and 2B.
 WR3 - Composite of subsamples WR3, 6, 7, 8, and 9.
 BACKGROUND - From the Charter Oak Mine (39-003-SS-1).
 WR3DUP - Duplicate of sample 39-003-WR-3

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Reported

WATER MATRIX ANALYSES

Results in ug/L

FIELD ID	Metals in Water		Results in mg/l		Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	Hardness Calc (mg CaCO3/L)
	As	Ba	Cd	Co										
39-003-GW-1(TM)	41900	10	140	40.1	5 U	2370	233000	0.12 J	2610	33.3	440 J	148	14500	406
39-003-GW-1A(DM)	16100	10.2	73.1	18.8	6.83 U	1180 J	120000	0.13 J	1930	18.3 J	127 J	30.7 U	8160 J	400
39-003-GW1A(TM)	24100	10.5	97.5	25.1	6.83 U	1520 J	162000	0.12 U	2350	19.2 J	256 J	42.5	10500 J	419
39-003-GW-2(TM)	196	9.13	2.55 U	5.99 U	5 U	1.35 U	3270	0.11 J	2290	8.78 U	1.31 J	18.3 U	421	593
39-003-GW-3(TM)	10.9 J	5.37	2.57 U	9.7 U	6.83 U	3.23 J	128	0.181	6.87	12.7 U	1.57	30.7 U	50	53.7
39-003-GW-3(DM)	8.73 J	4.8	2.57 U	9.7 U	6.83 U	3.3 J	100	0.118 U	9.8	12.7 U	0.72 U	30.7 U	68.3	52.5
39-003-SW-1(TM)	20.1	7.3	2.55 U	5.99 U	5 U	1.5	182	0.077 J	31.4	8.78 U	2.18 J	18.3 U	46.4	72.9
39-003-SW-2(TM)	10.4	2.24 U	2.55 U	5.99 U	5 U	1.35 U	154	0.11 J	2.6 U	8.78 U	2.16 J	18.3 U	6 U	44.3

Wet Chemistry

Results in mg/l

Field ID	TOTAL DISSOLVED SOLIDS				CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
	1720	< 5.0	1020	< 0.05				
39-003-GW-1	804	< 5.0	363	< 0.05	NR	NR	NR	NR
39-003-GW-2	113	< 5.0	33	< 0.05	0.02	0.02	0.02	NR
39-003-SW-1	95	< 5.0	21	< 0.05	NR	NR	NR	NR
39-003-SW-2	95	< 5.0	21	< 0.05	NR	NR	NR	NR

LEGEND

GW1(TM) - Adit discharge associated with waste rock dump 9, Total metals.
 GW1A(DM) - Same location, yet filtered and sampled for dissolved metals
 GW1A(TM) - Same location, sampled for total metals
 GW2(TM) - Adit directly above old mill building - total metals
 GW3(TM) - Well at Sunshine Kiwanis camp - total metals
 GW3(DM) - Same location, yet filtered and sampled for dissolved metals
 SW1(TM) - PPE - Beaver pond discharge - total metals
 SW2 - Background and water quality sample - total metals

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Reported

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Lily/Orphan Boy</u>	County: <u>Powell</u>
Legal Description: T <u>8N</u> R <u>6W</u>	Section(s): <u>NE 1/4, SW 1/4, Sec. 15</u>
Mining District: <u>Elliston</u>	Mine Type: <u>Hardrock/Au, Pb, Zn, Ag, Cu</u>
Latitude: <u>N 46° 26' 34"</u>	Primary Drainage: <u>Telegraph Creek</u>
Longitude: <u>W 112° 20' 27"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Telegraph Creek</u>
Quad: <u>Three Brothers</u>	Date Investigated: <u>June 28, 1993</u>
Inspectors: <u>Bullock, Flammang, Clark</u>	P.A. # <u>39-006</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be 2600 cubic yards. The following elements were elevated at least three times background:

Arsenic: 13,000 to 21,500 mg/kg	Cadmium: 5.9 mg/kg
Copper: 125 mg/kg	Iron: 71,800 mg/kg
Mercury: 0.289J to 0.861J mg/kg	Lead: 9720 to 9850 mg/kg
Antimony: 164J to 254J mg/kg	Zinc: 612 mg/kg
- The waste rock dumps were unvegetated and WR-2 was being undercut and eroded by Telegraph Creek.
- A discharging adit (GW-1) was present, with a flow of 15 gpm, a pH of 3.36, and a specific conductance of 910 umhos/cm. The adit discharge exceeded MCL/MCLGs for arsenic, cadmium, and antimony. Acute aquatic life criteria were exceeded for arsenic, cadmium, copper, lead, and zinc and chronic aquatic life standards were exceeded for arsenic, cadmium, copper, iron, lead and zinc.
- Telegraph Creek was in contact with part of Waste Rock 2. The stream sampling was conducted during a storm runoff event. Water samples from the creek documented observed releases of arsenic, cadmium, copper, iron, lead, and zinc, as well as an exceedance of the MCL/MCLG for cadmium. The acute aquatic life criteria for copper and the chronic aquatic life criteria for iron were exceeded and directly attributable to the site. Stream sediment samples also documented releases of arsenic, cadmium, copper, iron, mercury, lead, antimony, and zinc.
- The shaft associated with Waste Rock 1 was a hazardous mine opening and has been grouted by MDSL.

Lilly/Orphan Boy PA# 39-006
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 06/28/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
39-006-SE-1	4450	283	38.4	118	4.1 U	440	61800	0.106 J	14200	86	550	15 UJ	1200	NR
39-006-SE-2	104	62.8	0.5 U	15.5	3.5	11.5	18300	0.018 U	1570	13	65	4 UJ	164	NR
39-006-WR-1	13000	43.7	5.9	7	1.9	78.3	29900	0.861 J	1310	9	9720	254 J	612	NR
39-006-WR-2	21500	15.1	0.4 U	11.2	1.7	125	71800	0.289 J	43	1 U	9850	164 J	251	NR
BACKGROUND	88	61	1.2 J	6.9	5.4	32.7	18500	0.017 JX	1220 J	10	62	5 J	133 J	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENTIAL		SULFUR ACID BASE POTENTIAL		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC ACID BASE POTENTIAL		SULFUR ACID BASE POTENTIAL	
	%	U/1000X	U/1000X	U/1000X	%	U/1000X	%	U/1000X	%	U/1000X	%	U/1000X	%	U/1000X
39-006-WR-1	1.78	55.6	-1.3	-57	0.49	-57	0.73	17.5	0.56	17.5	0.73	-18.8	0.56	-18.8
39-006-WR-2	8.55	267	-5.7	-273	0.54	-273	2.4	175	5.61	175	2.4	-181	5.61	-181

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
39-006-GW-1	881	14.5	342 J	42.1 JX	5 U	620	19200	0.038 U	5410	32.6	398	36.7	22500	132
39-006-SW-1	20.5	15.7	7.3 J	7.33 JX	7.93	11.7	1900	0.038 U	226	11	4.77	18.3 U	635	16.8
39-006-SW-2	4.3	8.87	2.55 U	5.99 UX	7	1.57	552	0.042	41.5	8.78 U	1.38	18.3 U	23.4	11

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
39-006-GW-1	470	< 5.0	282	< 0.05	NR
39-006-SW-1	83	< 5.0	16	< 0.05	NR
39-006-SW-2	69	< 5.0	8	< 0.05	NR

LEGEND

- SE1 - Downstream of waste rock dump 2 approx. 200'
- SE2 - Upstream of pond behind waste rock dump 2
- WR1 - Composite of subsamples WR1A, 1B, 1C, and 1D
- WR2 - Composite of subsamples WR2A, 2B, and 2C.
- BACKGROUND - From the Ontario Millsite (39-010-SS-1).
- GW1 - Collapsed acid #1.
- SW1 - Same as sample SE1
- SW2 - Same as sample SE2

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Monarch</u>	County: <u>Powell</u>
Legal Description: T <u>8N</u> R <u>6W</u>	Section(s): <u>NE 1/4, NW 1/4, Sec. 31</u>
Mining District: <u>Elliston</u>	Mine Type: <u>Hardrock/Au, Ag</u>
Latitude: <u>N 46° 24' 27"</u>	Primary Drainage: <u>Little Blackfoot River</u>
Longitude: <u>W 112° 24' 12"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Monarch Creek</u>
Quad: <u>Bison Mountain</u>	Date Investigated: <u>August 18, 1993</u>
Inspectors: <u>Bullock, Belanger</u>	P.A. # <u>39-008</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings observed at this site during the investigation. The claim holder was in the process of assembling a small-scale mill but had not achieved production at the time of this investigation.
- The volume of waste rock associated with the site was estimated to be approximately 4,200 cubic yards. The following elements were elevated at least three times background:

Arsenic: 163J mg/kg	Copper: 727J mg/kg
Mercury: 1.85J mg/kg	Manganese: 4240J mg/kg
Lead: 469J mg/kg	Antimony: 195 mg/kg
- One discharging adit was observed at the site during the investigation. No MCLs were exceeded in the adit discharge; however, the chronic aquatic life criteria for mercury was exceeded. The discharge had a pH measurement of 9.0 and a specific conductance of 780 umhos/cm. After flowing adjacent to the waste rock dump for its entire length, the discharge had a pH measurement of 8.26 and a specific conductance of 180 umhos/cm.
- One potentially hazardous adit opening was identified at the site, as well as one potentially hazardous structure.

Monarch PA# 39-008
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 08/18/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
39-008-WR-1	163 J	40 J	3.3	8.49	2.85	727 J	42100 J	1.85 J	4240 J	3.49	469 J	195	109 J	NR
BACKGROUND	22.6 J	141 J	1.4	7.17	8.13	18.9 J	16600 J	0.043 J	835 J	5.56	37 J	6.78 U	90.9 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	ACID BASE POTENT. %	NEUTRAL POTENT. %	SULFUR ACID BASE POTENT. %	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE POTENT. %
39-008-WR-1	1	31.2	6.19	-25	0.44	0.31	0.25	9.68
								-3.5

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
39-008-GW-1	4.21	19.6	2.57 U	9.7 U	6.83 U	1.67 J	46.7	0.19 J	41.6	12.7 U	2.19 J	30.7 U	38.5 J	115

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
39-008-GW-1	167	< 5.0	133	< 0.05	NR

LEGEND

WRI - Composite of subsamples WRI A, 1B, 1C, and 1D.
 BACKGROUND - From the Monarch Mine (39-008-SS-1).

GW1 - Discharge from acid associated with waste rock dump 1.

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Ontario Millsite</u>	County: <u>Powell</u>
Legal Description: <u>T 8N R 6W</u>	Section(s): <u>NE 1/4, SW 1/4, Sec. 22</u>
Mining District: <u>Elliston</u>	Mine Type: <u>Hardrock/Pb, Zn, Cu, Ag, Au</u>
Latitude: <u>N 46° 25' 45"</u>	Primary Drainage: <u>Little Blackfoot River</u>
Longitude: <u>W 112° 15' 00"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Ontario Creek</u>
Quad: <u>Three Brothers</u>	Date Investigated: <u>June 10, 1993</u>
Inspectors: <u>Babits, Bullock, Flammang, Clark, Lasher/Pierson</u>	P.A. # <u>39-010</u>
Organization: <u>Pioneer Technical Services, Inc./ Thomas, Dean and Hoskins, Inc.</u>	

- The volume of tailings on site was estimated to be approximately 5,110 cubic yards. Additionally, an undetermined volume of tailings have been deposited in the floodplain 1/2 mile downstream in an unnamed tributary and Ontario Creek. The following elements were elevated at least three times background:

Arsenic: 1,510 to 2,730 mg/kg	Lead: 1,290 to 2,090 mg/kg
Cadmium: 13.8J to 30.7J mg/kg	Antimony: 55J to 130J mg/kg
Copper: 178 to 628 mg/kg	Zinc: 1,770 to 2,530 mg/kg
Mercury: 0.085JX to 0.113JX mg/kg	
- The volume of waste rock associated with this site was estimated to be approximately 25,750 cubic yards. The following elements were elevated at least three times background (based on XRF analyses):

Arsenic: 905 mg/kg	Lead: 393 to 1,396 mg/kg
Barium: 454 to 701 mg/kg	
- Two discharging adits (collapsed) were observed at the site during the investigation. MCLs were exceeded for arsenic, cadmium, and antimony in the Adit #1 discharge. Acute and chronic aquatic life criteria were exceeded for arsenic, cadmium, copper, lead, and zinc, and chronic aquatic life criteria were exceeded for iron and mercury in the Adit #1 discharge. Acute and chronic aquatic life criteria were exceeded for cadmium, copper, and zinc, and chronic aquatic life criteria were exceeded for iron and mercury in the Adit #2 discharge. Adit discharge pH measurements were 2.3 and 3.6 for Adit #1 and Adit #2, respectively.
- Ontario Creek was flowing near the site and received the discharge from Adit #2. Observed releases to Ontario Creek were documented for copper and zinc in water samples, and arsenic, copper, lead and antimony in sediment samples; however, no MCLs or acute or chronic aquatic life criteria were exceeded in Ontario Creek that were attributable to the site. The upstream surface water sample indicated the presence of an upgradient contaminant source.
- A potentially hazardous collapsing building was observed at the site.

Ontario Millisite PA# 39-010
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BABITS
 INVESTIGATION DATE: 06/10/93

SOLID MATRIX ANALYSES

Metals in soils Results per dry weight basis

FIELD ID	Au (mg/Kg)	Pb (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
39-010-SE-1	851	26.7	1.8 J	8.5	2.9	60.7	8060	0.034 JX	544 J	4	337	18 J	150 J	NR
39-010-SE-2	3420	17.4	0.5 U	1.3 U	2.5	52.1	25000	0.114 JX	19.9 J	2	2080	128 J	273 J	NR
39-010-SE-4	12	26.7	0.6 U	8	1.8	9.3	8410	0.031 JX	269 J	3	12	4 UJ	62 J	NR
39-010-TP-1	1790	41.1	30.7 J	4	4	628	7560	0.085 JX	74.4 J	9	1410	61 J	2530 J	NR
39-010-TP-2	2730	8.5	13.8 J	1.2	1 U	178	6930	0.113 JX	22.2 J	2 U	1290	130 J	1770 J	NR
39-010-TP-5	1510	5.8	0.4 U	1 U	0.9	47.4	3550	0.093 JX	4.3 J	2 U	2090	55 J	76 J	NR
BACKGROUND	88	61	1.2 J	6.9	5.4	32.7	18500	0.017 JX	1220 J	10	62	5 J	133 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Reported

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	U/1000	%	U/1000	%	U/1000	%	U/1000	%	U/1000	%	U/1000
39-010-TP-1	1.35	42.2	-6.1	-48	<0.01	0.13	1.22	4.06	0.35	1.56	-10.2	-3.29
39-010-TP-2	0.52	16.2	-1.7	-18	0.12	0.05	0.35	1.56	0.03	0	0.09	0.09
39-010-TP-5	0.1	3.12	0.09	-3	0.07	<0.01	0.03	0				

WATER MATRIX ANALYSES

Metals in Water Results in ug/L

FIELD ID	Au	Pb	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
39-010-GW-1	1190	9.27	35	33	5 U	306	44300	0.053 J	2100	21.3	425 J	29.5	5310	82.1
39-010-GW-2	20.3	14.6	3.9	15.2	6	12.4	6420	0.11 J	1170	8.78 U	2.79 J	18.3 U	768	58.5
39-010-SW-1	5.4	6.27	2.55 U	5.99 U	5 U	5.67	177	0.093 J	44.4	8.78 U	5.5 J	18.3 U	75	8
39-010-SW-2	11.3	14	8.6	14.6	5 U	92	480	0.099 J	1160	8.78 U	153 J	18.3 U	1690	47
39-010-SW-4	2.87	6.73	2.55 U	5.99 U	5 U	1.35 U	198	0.1 J	8.1	8.78 U	2.7 J	18.3 U	7.4	7

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Reported

Wet Chemistry Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS		CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
	<	<	<	<	<	NR
39-010-GW-1	48	5.0	220	0.05	NR	NR
39-010-GW-2	204	5.0	92	0.05	NR	NR
39-010-SW-1	302	5.0	10	< 0.05	NR	NR
39-010-SW-2	186	5.0	83	< 0.05	NR	NR
39-010-SW-4	46	5.0	8	< 0.05	NR	NR

LEGEND

SE1 - Downgradient of TP5 & majority of streambank tailings on Ontario Creek
 GW1 - Adit furthest North, by waste rock dump 1.
 GW2 - Adit furthest South, by waste rock dump 2.
 SW1 - Same as sample SE1.

SE2 - Downgradient of furthest downgradient tailings impoundment (TP4).
 SE4 - Upstream of confluence with tailings in Ontario Creek.

TP1 - Composite of subsamples TP 1B, 2AC, and 4AD.

TP2 - Composite of subsamples TP1A, 2AA, 2AB, and 4AA through 4AC.

TP5 - Grab of subsample TP5A.

BACKGROUND - From the Ontario Millisite (39-010-SS-1)

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Golden Anchor</u>	County: <u>Powell</u>
Legal Description: <u>T 8N R 7W</u>	Section(s): <u>NE 1/4, SW 1/4, Sec. 1</u>
Mining District: <u>Elliston</u>	Mine Type: <u>Hardrock/Unknown</u>
Latitude: <u>N 46° 28' 20"</u>	Primary Drainage: <u>Little Blackfoot River</u>
Longitude: <u>W 112° 25' 27"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Little Blackfoot River</u>
Quad: <u>Bison Mountain</u>	Date Investigated: <u>July 14, 1993</u>
Inspectors: <u>Bullock, Flammang, Clark</u>	P.A. # <u>39-012</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be 5000 cubic yards. The following elements were elevated at least three times background:
Cadmium: 3.1J mg/kg Antimony: 29J mg/kg
Zinc: 329J mg/kg.
- The waste rock dumps were mostly unvegetated.
- A discharging adit, sampled as GW-1, was present, with a flow of approximately 1.4 gpm, a pH of 6.85, and a specific conductance of 188.7 umhos/cm. The adit discharge exceeded the MCL for arsenic, the acute aquatic life criteria for zinc and the chronic aquatic life criteria for iron, mercury, and zinc.
- An unnamed tributary to the Little Blackfoot River flowed past the northern boundary of the site. There were no observed releases, MCL/MCLG or aquatic life criteria exceedances attributable to this site. Samples were collected during a storm event which visibly intensified between the downstream and upstream sample collection. This storm event may be partially responsible for inconclusive results generated by this sampling.
- Two highwalls were present and classified as hazardous; one approximately 25 feet high and associated with collapsed Adit #1, and the second approximately one half mile above the adit in an exploration cut that was about 50 feet high. A metal building in poor repair was also classified as potentially hazardous.

Golden Anchor PA# 39-012
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 07/14/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	Au (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
39-012-SE-1	247 J	69	6.6 J	19.2	1.7	8.6 JX	12200	0.084 J	1910	3 UJX	137 J	7 J	643 J	NR
39-012-SE-2	697 J	69.7	7 J	12.8	2.7	19.4 JX	20800	0.131 J	1200	4 UJX	454 J	12 J	726 J	NR
39-012-WR-1	323 J	379	3.1 J	3.3	3.9	17.2 JX	13500	0.074 J	310	2 UJX	80 J	29 J	329 J	NR
BACKGROUND	163	147	0.6 U	9.2	9.3	21.7	35800	0.066 JX	933 J	9	30	8 J	78 J	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Reported

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC ACID BASE POTENT	
	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x
39-012-WR-1	2.84	88.7	52.6	52.6	-36	1	1.3	0.54	40.6	12		

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	Au	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
39-012-GW-1	61.6	10.40	2.57 U	9.70 U	6.83 U	1.55 U	3610	0.260	953 J	12.7 U	1.42 J	30.7 U	208 J	80.9
39-012-SW-1	30.6	5.87	2.57 U	9.70 U	6.83 U	1.55 U	188	0.230	58.5 J	12.7 U	1.85 J	30.7 U	183 J	69
39-012-SW-2	27.9	6.77	2.57 U	9.70 U	6.83 U	23.10	154	0.094	18.4 J	12.7 U	2.19 J	30.7 U	152 J	65.4

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Reported

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
39-012-GW-1	201	6.3	55	< 0.05	NR
39-012-SW-1	271	< 5.0	58	< 0.05	NR
39-012-SW-2	151	< 5.0	57	< 0.05	NR

LEGEND

SE1 - Downstream of waste rock dump 1.
 SE2 - Above access road to mine approx. 40'.
 WR1 - Composite of subsamples WR1A, 1B, and 1C.
 BACKGROUND - From the Charter Oak (39-003-SS-1).
 GW1 - At the mouth adit #1.
 SW1 - Same as sample SE1.
 SW2 - Same as sample SE2.

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Hard Luck</u>	County: <u>Powell</u>
Legal Description: <u>T 8N R 6W</u>	Section(s): <u>NW 1/4, SW 1/4, Sec. 21</u>
Mining District: <u>Elliston</u>	Mine Type: <u>Hardrock/Ag, Zn, Pb, Cu, Au</u>
Latitude: <u>N 46° 25' 43"</u>	Primary Drainage: <u>Ontario Creek</u>
Longitude: <u>W 112° 22' 12"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Ontario Creek</u>
Quad: <u>Three Brothers</u>	Date Investigated: <u>July 14, 1993</u>
Inspectors: <u>Tuesday, Belanger, Lasher</u>	P.A. # <u>39-014</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings observed at this site during the investigation.
- The volume of waste rock associated with this site was estimated to be approximately 650 cubic yards. The following elements were elevated at least three times background:

Arsenic: 4290J to 3750J mg/kg	Cadmium: 6J mg/kg
Mercury: 0.061J to 0.391J mg/kg	Manganese: 26,500 mg/kg
Lead: 16,500 J mg/kg	Antimony: 15J to 314J mg/kg
Zinc: 492J mg/kg	
- One adit discharge was observed at the site during the investigation. The minor flow was discharged from the open adit through a 2-inch pipe around a waste dump, to a wooden bucket and eventually seeped into the ground. No MCLs were exceeded in the adit discharge; however, the acute aquatic life criteria for cadmium and the chronic aquatic life criteria for mercury were exceeded. No other surface water was observed in the vicinity of the site.
- Two potentially hazardous mine openings were observed during the investigation including one partially caved adit and one partially caved shaft, and a potentially hazardous collapsing building was located on the west side of the site.

Hard Luck PA# 39-014
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - TUESDAY
 INVESTIGATION DATE: 07/14/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
39-014-WR-1	3750 J	16.7	6 J	9.6	1.9	13.3 JX	52400	0.061 J	26500	7 JX	151 J	15 J	492 J	NR
39-014-WR-2	4290 J	70.2	3.3 J	1.5 U	1.1 U	55.1 JX	17300	0.391 J	8.1	2 UJX	16500 J	314 J	97 J	NR
BACKGROUND	88	61	1.2 J	6.9	5.4	32.7	18500	0.017 JX	1220 J	10	62	5 J	133 J	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR			SULFUR ACID BASE			PYRITIC SULFUR			ORGANIC SULFUR			PYRITIC SULFUR ACID BASE			SULFUR ACID BASE POTENTIAL			
	%	U/1000		%	U/1000		%	U/1000		%	U/1000		%	U/1000		%	U/1000		
39-014-WR-1	1.6	50	119	0.44	69.3	0.44	0.29	27.2	0.87	0.29	92.1								
39-014-WR-2	0.76	23.7	-0.3	0.72	-24	0.72	0.03	0.31	0.01	0.03	-0.65								

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
39-014-GW-1	31.7 J	2.01 U	2.57 U	9.70 U	6.83 U	1.55 U	23.7	0.038 U	4.08 U	12.7 U	0.72 U	30.7 U	7.57 U	62.8

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
39-014-GW-1	116 <	5.0	24 <	0.05	NR

LEGEND

WR1 - Composite of subsamples WR1A and 1B
 WR2 - Composite of subsamples WR2A and 2B
 BACKGROUND - From the Ontario Millsite (39-010-SS-1).
 GW1 - Airt discharge

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Kimball</u>	County: <u>Powell</u>
Legal Description: <u>T 8N R 7W</u>	Section(s): <u>NW 1/4, NE 1/4, Sec. 12</u>
Mining District: <u>Elliston</u>	Mine Type: <u>Hardrock/Pb, Ag, Au, Zn, Cu</u>
Latitude: <u>N46° 27' 49"</u>	Primary Drainage: <u>Little Blackfoot River</u>
Longitude: <u>W 112° 25' 04"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Little Blackfoot River</u>
Quad: <u>Bison Mountain</u>	Date Investigated: <u>August 18, 1993</u>
Inspectors: <u>Bullock, Belanger/Pierson</u>	P.A. # <u>39-018</u>
Organization: <u>Pioneer Technical Services, Inc./ Thomas, Dean and Hoskins, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be 6500 cubic yards. The following elements were elevated at least three times background:
Arsenic: 2350J mg/kg Cadmium: 5.6 mg/kg
Antimony: 97.6 mg/kg Zinc: 385J mg/kg
Lead: 901J mg/kg
- The waste rock was 90% unvegetated.
- No discharging adits, seeps, or springs were observed during the investigation.
- No surface water samples were collected due to an absence of direct runoff pathways to the nearest surface water.
- The adit associated with Waste Rock 3 had a culvert closure installed by the MDSL.
- An old loadout present on the site was classified as a potential hazardous structure.

Kimball PA# 39-018
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 08/18/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
39-018-WR-1	2350 J	66.6 J	5.6	3.91	4.47	32.2 J	38800 J	0.064 J	412 J	2.64 U	901 J	97.6	385 J	NR
BACKGROUND	163	147	0.6 U	9.2	9.3	21.7	35800	0.066 JX	933 J	9	30	8 J	78 J	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	SULFUR ACID BASE %	NEUTRAL POTENT. v/1000x	SULFUR ACID BASE POTENT. v/1000x	ORGANIC SULFUR %	PYRITIC SULFUR %	PYRITIC SULFUR ACID BASE v/1000x	PYRITIC SULFUR ACID BASE POTENT. v/1000x
39-018-WR-1	3.07	95.9	43.4	-53	0.33	2.09	65.3	-21.9

LEGEND

WR1 - Composite of subsamples WR1, 2A, 2B, and 3.
 BACKGROUND - From Charter Oak Mine (39-003-SS-1).

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Sure Thing</u>	County: <u>Powell</u>
Legal Description: T <u>8N</u> R <u>6W</u>	Section(s): <u>NW 1/4, SE 1/4, Sec. 15</u>
Mining District: <u>Elliston</u>	Mine Type: <u>Hardrock/Au, Ag, Cu, Pb, Zn</u>
Latitude: <u>N 46° 26' 23"</u>	Primary Drainage: <u>Telegraph Creek</u>
Longitude: <u>W 112° 19' 55"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>O'Keefe Creek</u>
Quad: <u>Three Brothers</u>	Date Investigated: <u>June 28, 1993</u>
Inspectors: <u>Bullock, Flammang, Clark</u>	P.A. # <u>39-020</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be 7700 cubic yards. The following elements were elevated at least three times background:

Arsenic: 2810-4930 mg/kg	Cobalt: 57.3 mg/kg
Mercury : 0.149J-0.285J mg/kg	Nickel: 57 mg/kg
Copper: 129-248 mg/kg	Iron: 123,000 mg/kg
Antimony: 35J-42J mg/kg	Zinc: 556 mg/kg
- The waste rock dump(WR-2) had elevated radiation readings ranging from 0.15-0.7 mR/hr.
- One discharging adit had a small flow of 3 gpm. The discharge, sampled as GW-1, had a pH of 3.36, and a specific conductance of 990 umhos/cm. The sample exceeded MCL/MCLGs for antimony, arsenic, cadmium, and copper, exceeded aquatic life standards (chronic) for iron, cadmium, copper, lead, and zinc, and aquatic life standards (acute) for cadmium, copper, lead, and zinc.
- Seeps were located below the Sure Thing Mine site, associated with mine workings that were not originally inventoried under this PA number also had low pH's ranging from 3.71 to 5.34.
- The hazardous highwall associated with the collapsed adit was 20 feet high.

Sure Thing PA# 39-020
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 06/28/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
39-020-WR-1	2810	9.6	0.6 U	1.3 U	1.7	54.8	12000	0.149 J	16.5	2 U	3850	42 J	43	NR
39-020-WR-2	4460	11.7	0.5 U	57.3	1 U	129	123000	0.285 J	6.8	57	24000	35 J	166	NR
39-020-WR-3	4930	22.9	0.5 U	3.1	4.9	248	54100	0.18 J	151	3	1620	13 J	556	NR
BACKGROUND	88	61	1.2 J	6.9	5.4	32.7	18500	0.017 JX	1220 J	10	62	5 J	133 J	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	U/1000x	U/1000x	U/1000x	U/1000x	%	%	%	U/1000x	U/1000x	U/1000x	
39-020-WR-1	0.47	14.7	-0.8	-15	0.16	0.13	0.18	4.06	-4.82			
39-020-WR-2	17.7	554	-4.5	-558	2.08	7.92	7.72	247	-252			
39-020-WR-3	1.54	48.1	-7.4	-56	1.24	0.05	0.25	1.56	-8.97			

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
39-020-GW-1	1740	4.57	101 J	61.2 JX	7.8	1360	29400	0.038 U	12800	52.7	183	25.5	11000	114

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
39-020-GW-1	490	< 5.0	286	< 0.05	NR

LEGEND

- WR1 - Composite of subsamples WR1A, 1B, and 1C.
- WR2 - Sample of the WR2A subsample.
- WR3 - Composite of the subsamples WR2B and 2C.
- BACKGROUND - From the Ontario Millsite (39-010-SS-1).
- GW1 - Discharge from adit #1.

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Julia</u>	County: <u>Powell</u>
Legal Description: <u>T 8N R 6W</u>	Section(s): <u>S 1/2, SW 1/4, Sec. 5</u>
Mining District: <u>Elliston</u>	Mine Type: <u>Hardrock/Cu, Pb, Au, Ag</u>
Latitude: <u>N 46° 28' 00"</u>	Primary Drainage: <u>Telegraph Creek</u>
Longitude: <u>W 112° 22' 35"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Booth Gulch</u>
Quad: <u>Bison Mountain and Three Brothers</u>	Date Investigated: <u>June 28, 1993</u>
Inspectors: <u>Babits, Lasher/Pierson</u>	P.A. # <u>39-022</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- There were no mill tailings associated with this site.
- There were approximately 10,720 cubic yards of uncovered waste rock on site. The following were elevated at least 3 times background:
 - Cadmium: 3.9 to 291 mg/kg
 - Copper: 108 to 155 mg/kg
 - Mercury: 1.37J to 5.12J mg/kg
 - Lead: 2,030 to 10,500 mg/kg
 - Antimony: 382J to 602J mg/kg
- There were no discharging adits at this site.
- There was no surface water on the site. The nearest surface water is 0.5 miles away.
- There was one open adit and two hazardous loadout structures on site.

Julia PA# 39-022
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BABBITTS
 INVESTIGATION DATE: 06/28/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
39-022-WR-1	106	17.8	3.9	2.3	1.2	108	25000	1.37 J	67.2	2 U	2030	382 J	458	NR
39-022-WR-2	136	5.8	291	8.6	1.1 U	155	90500	5.12 J	16.7	4	10500	602 J	27600	NR
BACKGROUND	163	147	0.6 U	9.2	9.3	21.7	35800	0.066 JX	933 J	9	30	8 J	78 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE		SULFATE		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR		SULFUR ACID BASE	
	%	U/10000	U/10000	U/10000	%	U/10000	%	U/10000	%	U/10000	%	U/10000	%	U/10000	%	U/10000
39-022-WR-1	1.77	55.3	-1.9	-57	1.24	0.12	0.41	3.75	0.12	0.41	3.75	0.41	3.75	0.12	0.41	-5.66
39-022-WR-2	17.2	537	-3.5	-540	<0.01	6.96	10.9	217	6.96	10.9	217	10.9	217	6.96	10.9	-221

LEGEND

WR1 - Composite of subsamples WR1A, 1B, 1C, and 3.
 WR2 - Sample from the WR2 subsample
 BACKGROUND - From Charter Oak Mine (39-003-SS-1)

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Telegraph</u>	County: <u>Powell</u>
Legal Description: T <u>8N</u> R <u>6W</u>	Section(s): <u>NW 1/4, NE 1/4, Sec. 11</u>
Mining District: <u>Elliston</u>	Mine Type: <u>Hardrock, Placer/Au, Ag</u>
Latitude: <u>N 46° 27' 51"</u>	Primary Drainage: <u>Telegraph Creek</u>
Longitude: <u>W 112° 18' 51"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Bryan Creek</u>
Quad: <u>Three Brothers</u>	Date Investigated: <u>June 10, 1993</u>
Inspectors: <u>Bullock/Pierson</u>	P.A. # <u>39-023</u>
Organization: <u>Pioneer Technical Services, Inc./ Thomas, Dean and Hoskins, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be 1260 cubic yards. The following elements were elevated at least three times background:
Arsenic: 524J mg/kg Copper: 99.2 mg/kg
Mercury: 0.147 to 0.506 mg/kg Lead: 425 mg/kg
- The waste rock dumps were unvegetated.
- Two discharging adits were present, GW-1 had a flow of 5 gpm, a pH of 4.77, and specific conductance of 135.3 umhos/cm. The second adit (GW-2) had a flow of 8 gpm, a neutral pH of 6.53, and a low specific conductance of 36 umhos/cm. Both adit discharges empty into Bryan Creek below the site. One seep was also located between WR-3 and WR-4.
- The discharge flowed over the waste rock at the site and then into Bryan Creek south of the mine. An observed release of copper was documented in the surface water. MCL/MCLGs were not exceeded in Bryan Creek. Although, there were several aquatic life criteria exceedances in the Bryan Creek samples, none were directly attributed to this site.
- Two hazardous structures were present at the site, an old loadout or mill, and a cabin. There was a highwall present behind adit #1 and WR-1 was over-steepened and eroding into the adit discharge.

Telegraph PA# 39-023
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 06/10/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
39-023-SE-1	58 J	91.9	10.1	7.7	6.3	54.2	14300	0.217	2080	17 J	62	6 J	913	NR
39-023-SE-2	57 J	112	19.6	5.3	5.9	70.3	13000	0.131	3080	23 J	40	4 UJ	1840	NR
39-023-WR-1	208 J	48	0.4 UJ	1.3	4.3	48.9	25500	0.506	24.2	1 UJ	425	3 UJ	47	NR
39-023-WR-2	524 J	23.8	0.5 UJ	1.1 U	1.9	89.2	27500	0.147	24.1	2 UJ	58	8 J	133	NR
BACKGROUND	88	61	1.2 J	6.9	5.4	32.7	18500	0.017 JX	1220 J	10	62	5 J	133 J	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Reported

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT.		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR		SULFUR ACID BASE POTENT.	
	%	U/1000X	%	U/1000X	%	U/1000X	%	U/1000X	%	U/1000X	%	U/1000X	%	U/1000X
39-023-WR-1	0.35	10.9	-0.1	-11	0.34	-11	<0.01	0	0.01	0	0	0	-0.05	
39-023-WR-2	0.44	13.7	-4.1	-18	0.43	-18	<0.01	0	0.01	0	0	0	-4.14	

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
39-023-SW-1	2.9	13.9	4.5	5.99 U	5 U	8.43	142	0.14	40.5	8.78 U	3.6	18.3 U	726	15.2
39-023-SW-2	1.49 U	14.4	4.07	5.99 U	5 U	4.57	107	0.1 J	62.2	8.78 U	2.39 J	18.3 U	1090	16.6
39-023-SW-3	2.84	16.3	2.55 U	5.99 U	5 U	34.2	166	0.11 J	103	8.78 U	6.17 J	18.3 U	76.8	13.3
39-023-SW-4	1.87	15.4	2.55 U	5.99 U	5 U	17.7	329	0.07 J	129	8.78 U	1.9 J	18.3 U	80.5	20

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Reported

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
39-023-SW-1	55	< 5.0	19	0.07	NR
39-023-SW-2	54	< 5.0	18	0.06	NR
39-023-SW-3	69	< 5.0	28	< 0.05	NR
39-023-SW-4	72	< 5.0	26	< 0.05	NR

LEGEND

- SE1 - Bryan Creek downstream from edit discharge confluence
- SE2 - Bryan Creek upstream from edit discharge and possible influence from waste rock dump 2.
- WR1 - Composite of subsamples WRI A, 1B, and 1C.
- WR2 - Sample of the WR2 subsample.
- BACKGROUND - From the Ontario Millrite (39-010-S8-1).
- SW1 - Same as sample SE1
- SW2 - Same as sample SE2
- SW3 - Audit discharge below waste rock dump 1.
- SW4 - Confluence of seeps in edit #1 area on the N. side of the road.

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Third Term</u>	County: <u>Powell</u>
Legal Description: T <u>9N</u> R <u>6W</u>	Section(s): <u>NE 1/4, SE 1/4, Sec. 28</u>
Mining District: <u>Elliston</u>	Mine Type: <u>Hardrock/Zn, Cu, Pb, Au, Ag</u>
Latitude: <u>N 46° 30' 08"</u>	Primary Drainage: <u>Little Blackfoot</u>
Longitude: <u>W 112° 21' 09"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Flume Creek</u>
Quad: <u>Mac Donald Pass</u>	Date Investigated: <u>July 14, 1993</u>
Inspectors: <u>Tuesday, Belanger, Lasher</u>	P.A. # <u>39-024</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings observed at this site during the investigation.
- The volume of waste rock associated with the site was estimated to be approximately 2,700 cubic yards. The dumps were previously reclaimed. The following elements were elevated at least three times background:
Copper: 116JX mg/kg Lead: 200J mg/kg
- There were no adit discharges, filled shafts, seeps, or springs observed at the site during the investigation.
- Little Flume Gulch flowed from east to west approximately eight feet south of the toe of WR-1. No MCLs were exceeded in Little Flume Gulch in either the upstream or downstream water samples; however, the chronic aquatic life criteria for mercury and lead were exceeded in both the upstream and downstream samples. The acute and chronic aquatic life criteria were exceeded for copper and zinc in the downstream sample.
- Observed releases to Little Flume Gulch were documented for copper and zinc. The aquatic life criteria exceedances for copper and zinc were directly attributed to the site.

Third Term PA# 39-024
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - TUESDAY
 INVESTIGATION DATE: 07/14/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
39-024-SE-1	51 J	199	3.6 J	24.9	8.9	23.6 JX	25500	0.107 J	3680	9 JX	20 J	9 UJ	132 J	NR
39-024-SE-2	23 J	116	9.8 J	28.2	3.5	169 JX	11100	0.072 J	3300	11 JX	13 J	6 UJ	405 J	NR
39-024-WR-1	29 J	93.7	2.8 J	6.3	83.2	116 JX	28400	0.12 J	281	42 JX	200 J	10 J	128 J	NR
BACKGROUND	20 J	180	1.9 J	8.2	39.2	29 JX	15900	0.067 J	588	19 JX	28 J	6 UJ	123 J	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		SULFATE		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	U/10000	%	U/10000	%	U/10000	%	U/10000	%	U/10000	%	U/10000	%	U/10000
BACKGROUND	0.02	0.62	4.49	201	3.86	173	0.01	0.53	0.01	0.16	<0.01	0.31	4.18	196
39-024-WR-1	0.9	28.1	2.57	201	14.30	173	6.83	0.53	1.67	0.21	0.21	5	5	196

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Cu	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
39-024-SW-1	6.90	9.30	2.57 U	9.70 U	6.83 U	24.50	628	0.240	58.5 J	12.7 U	1.25 J	30.7 U	89.1 J	25.2
39-024-SW-2	6.11	14.30	2.57 U	9.70 U	6.83 U	1.67	598	0.210	32.5 J	12.7 U	1.22 J	30.7 U	7.57 U	24.5

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
39-024-SW-1	92	< 5.0	10	< 0.05	NR
39-024-SW-2	87	< 5.0	8	< 0.05	NR

LEGEND

SE1 - Downstream of dump in Little Flame Gulch.
 SE2 - Upstream from dump in Little Flame Gulch.
 WR1 - Composite of WR1A and 1B.
 BACKGROUND - West of subsample WR1B, From the Third Term (39-024-SS-1)

SW1 - Same as sample SE1.
 SW2 - Same as sample SE2.

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Anna R./Hattie M.</u>	County: <u>Powell</u>
Legal Description: <u>T 8N R 6W</u>	Section(s): <u>NE 1/4, NE 1/4, NW 1/4, Sec. 15</u>
Mining District: <u>Elliston</u>	Mine Type: <u>Hardrock/Au</u>
Latitude: <u>N 46° 27' 04"</u>	Primary Drainage: <u>Little Blackfoot River</u>
Longitude: <u>W 112° 20' 27"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Telegraph Creek</u>
Quad: <u>Three Brothers</u>	Date Investigated: <u>June 28, 1993</u>
Inspectors: <u>Babits, Lasher/Pierson</u>	P.A. # <u>39-044</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with this site.
- There were approximately 2,230 cubic yards of uncovered waste rock at the site. The following were elevated at least three times background:

Arsenic: 3,540 to 10,400 mg/kg	Cadmium: 5.9 mg/kg
Cobalt: 28.6 mg/kg	Copper: 167 to 343 mg/kg
Mercury: 0.195J to 0.721J mg/kg	Nickel: 37 mg/kg
Lead: 2,030 to 5,980 mg/kg	Antimony: 38J mg/kg
Zinc: 673 mg/kg	
- There was one discharging adit at the site, but it did not enter surface water directly. A sample of this discharge had a pH of 5.73, and the MCL/MCLG for cadmium was exceeded.
- There was no surface water on the site. The nearest surface water was 500 feet away.
- There was one open shaft, one hazardous loadout structure, and one collapsing cabin (mill) at the site.

Anna R/Hattie M. PA# 39-044
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BABITS
 INVESTIGATION DATE: 06/28/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
39-044-WR-1	3540	25.1	5.9	28.6	2.4	343	27000	0.721 J	5840	37	2030	14 J	673	NR
39-044-WR-2	10400	18.5	0.5 U	4.1	1 U	167	54900	0.195 J	63.3	4	5980	38 J	272	NR
BACKGROUND	88	61	1.2 J	6.9	5.4	32.7	18500	0.017 JX	1220 J	10	62	5 J	133 J	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Registered

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT.		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENT.	
	%	U/1000	%	U/1000	%	U/1000	%	U/1000	%	U/1000	%	U/1000
39-044-WR-1	0.57	17.8	1.37	-16	0.36	-16	0.16	1.56	0.05	0.05	0.16	-0.19
39-044-WR-2	2.53	79	-11	-90	0.73	-90	0.58	38.1	1.22	1.22	0.58	-48.8

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
39-044-SW-1	40.2	2.67	6.93 J	11.9 JX	5 U	64	1390	0.038 U	630	10.4	12.5	18.3 U	810	57.3

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Registered

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
39-044-SW-1	145	< 5.0	49	0.15	NR

LEGEND

WR1 - Composite of subsamples WR1A, 1B, and 3B.
 WR2 - Composite of subsamples WR2A, 2B, and 3A.
 BACKGROUND - From Ontario Millsite (39-010-SS-1).

SW1 - Acid discharge from waste rock dump 1

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Mountain View</u>	County: <u>Powell</u>
Legal Description: T <u>8N</u> R <u>6W</u>	Section(s): <u>SW 1/4, NW 1/4, Sec. 6</u>
Mining District: <u>Elliston</u>	Mine Type: <u>Hardrock/Pb, Ag, Au</u>
Latitude: <u>N 46° 28' 26"</u>	Primary Drainage: <u>Little Blackfoot River</u>
Longitude: <u>W 112° 24' 20"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Unnamed Tributary</u>
Quad: <u>Bison Mountain</u>	Date Investigated: <u>July 14, 1993</u>
Inspectors: <u>Bullock, Flammang, Clark</u>	P.A. # <u>39-062</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no tailings directly associated with this site. Approximately 10 cubic yards of tailings were found to be associated with a mine west of the Mountain View.
- The volume of waste rock associated with this site was estimated to be 6500 cubic yards. The following elements were elevated at least three times background:

Arsenic: 706J mg/kg	Cadmium: 12.4J mg/kg
Mercury: 0.177J mg/kg	Antimony: 41J mg/kg
Lead: 687J mg/kg	Zinc: 1870J mg/kg
- The waste rock dumps were mostly unvegetated.
- The adit associated with Waste Rock 1, sampled as GW-1, was discharging at approximately 5 gpm, had a pH of 6.81, and a specific conductance of 2050 umhos/cm. This sample exceeded the MCL/MCLGs for arsenic, and antimony, as well as the acute aquatic life criteria for zinc and the chronic aquatic life criteria for iron, and zinc.
- A seep at the toe of WR-1 was the start of the flow in the unnamed tributary to the Little Blackfoot River. This seep had a pH of 6.68 and a specific conductance of 205 umhos/cm.
- The unnamed tributary was sampled as SW-1 below Waste Rock 2. The stream had a flow rate of approximately 30 gpm, a pH of 6.87, and a specific conductance of 187.8 umhos/cm. This sample exceeded the MCL for arsenic, as well as the acute aquatic life criteria for cadmium and zinc, and the chronic aquatic life criteria for cadmium, lead, and zinc. Arsenic, cadmium, copper, mercury, lead, antimony and zinc were detected in the stream sediment sample collected at this location higher than three times background for the area.
- The discharging adit at WR-1 was open and classified as potentially hazardous. Water was ponded behind a berm pushed up in front of the adit opening.

Mountain View PA# 39-062
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 07/14/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
39-062-SE-1	4390 J	105	74.4 J	16.8	3.8	194 JX	75800	0.195 J	2400	5 UJX	1700 J	49 J	11500 J	NR
39-062-WR-1	706 J	31	12.4 J	9.8	3	46.2 JX	28300	0.177 J	1130	3 JX	687 J	41 J	1870 J	NR
BACKGROUND	163	147	0.6 U	9.2	9.3	21.7	35800	0.066 JX	933 J	9	30	8 J	78 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENTIAL		SULFUR ACID BASE POTENTIAL		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENTIAL	
	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x
39-062-WR-1	2.97	92.8	52.9	-40	0.98	1.24	0.75	38.7	14.2			

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
39-062-GW-1	149 J	9.57	2.57 U	9.70 U	6.83 U	1.55 U	1660	0.038 U	928	12.7 U	1.37 J	31.1	132	111
39-062-SW-1	92.6 J	5.10	4.70 J	9.70 U	6.83 U	1.55 U	190	0.038 U	23.1	12.7 U	4.31 J	30.7 U	931	116

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
39-062-GW-1	222	< 5.0	58	< 0.05	NR
39-062-SW-1	204	< 5.0	65	< 0.05	NR

LEGEND

SE1 - Just downstream of waste rock dump 2.
 WR1 - Composite of subsamples WR1A, 1B, 2A, and 2B
 BACKGROUND - From the Charter Oak Mine (39-003-SS-1).
 GW1 - At the mouth of edit #1.
 SW1 - Same as sample SE1.

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Emery</u>	County: <u>Powell</u>
Legal Description: <u>T 7N R 8W</u>	Section(s): <u>Sec. 10 and Sec. 11</u>
Mining District: <u>Emery/Zosell</u>	Mine Type: <u>Hardrock/Au, Ag, Pb, Zn</u>
Latitude: <u>N 46° 22' 30"</u>	Primary Drainage: <u>Cottonwood</u>
Longitude: <u>W 112° 35' 00"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Rocker Gulch</u>
Quad: <u>Baggs Creek/Sugarloaf Mountain</u>	Date Investigated: <u>July 6, 1993</u>
Inspectors: <u>Tuesday, Belanger, Lasher</u>	P.A. # <u>39-004</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings associated with this site was estimated to be approximately 21,400 cubic yards. The following elements were elevated at least three times background:

Arsenic: 6480J mg/kg	Cadmium: 17.1 mg/kg
Copper: 226J mg/kg	Lead: 1560 mg/kg
Antimony: 65J mg/kg	Zinc: 2070 JX mg/kg
- The volume of waste rock associated with this site was estimated to be approximately 244,625 cubic yards (over 12 waste rock dumps were observed). The following elements were elevated at least three times background:

Arsenic: 3630J to 12,900J mg/kg	Cadmium: 34 to 87.2 mg/kg
Copper: 3131J to 472J mg/kg	Mercury: 0.785 to 1.56 mg/kg
Manganese: 8080J mg/kg	Nickel: 29J to 81J mg/kg
Lead: 1970 to 9230 mg/kg	Antimony: 32J to 564J mg/kg
Zinc: 2070JX to 9910JX mg/kg	
- This site was situated on both sides and between two flowing streams: Rocker Gulch and North Fork Rocker Gulch. North Fork Rocker Gulch intersected the site from the north and disappeared into the ground before reaching the tailings ponds located in the center of the site. Rocker Gulch intersected the site from the northeast and disappeared into the ground on the north side of the tailings ponds. Rocker Gulch reappeared farther south on the south side of WR-9. No MCLs were exceeded in upstream samples collected from either stream; however, acute aquatic life criteria for cadmium and chronic aquatic life criteria were exceeded for cadmium and lead in North Fork Rocker Gulch. Chronic aquatic life criteria were exceeded for cadmium and mercury in Rocker Gulch. The MCL for arsenic and chronic aquatic life criteria were exceeded for cadmium and mercury in the downstream Rocker Gulch sample.
- Observed releases to Rocker Gulch were documented for arsenic, mercury, lead, and zinc.
- Three potentially hazardous mine openings including two shafts and one adit were observed during the investigation.

Emery PA# 39-004
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 07/16/93

SOLID MATRIX ANALYSES

Metals in soils Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
39-004-SE-1	318	49.5	5.7	15.8	39.5	28.6	38500	0.151	970	18	645	6 UJ	957	NR
39-004-SE-2	157	110	2.9	17.1	32.1	26.1	45400	0.15	1210	8	141	8 UJ	247	NR
39-004-SE-3	454	77.2	5.5	20.2	43.7	29.5	47700	0.182	1010	14	303	7 UJ	1020	NR
39-004-SE-4	390 J	159 J	7	42.7 JX	60.3 JX	64.4 J	89900 J	0.457	2540 J	46 J	482	19 UJ	620 JX	NR
39-004-TP-1	6480 J	39.1 J	17.1	12.5 JX	29.3 JX	226 J	43000 J	0.363	3030 J	19 J	1560	65 J	2070 JX	NR
39-004-WR-1	12900 J	162 J	87.2	23.8 JX	14.5 JX	472 J	81600 J	1.56	8080 J	29 J	9230	564 J	9910 JX	NR
39-004-WR-2	6080 J	14.5 J	34	20.1 JX	33.5 JX	175 J	61300 J	1.14	3780 J	81 J	5980	32 J	2070 JX	NR
39-004-WR-3	3630 J	477 J	56.3	21.2 JX	27.6 JX	313 J	45300 J	0.785	11600 J	13 J	1970	126 J	4490 JX	NR
BACKGROUND	91	295	3.5	13.9	36.9	67.3	43400	0.165	2960	7	43	7 UJ	171	NR

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x
39-004-TP-1	1.44	45	90.6	45.6	<0.01	1.24	0.27	38.7	51.9			
39-004-WR-1	4.5	141	51	-90	0.86	2.1	1.54	65.6	-14.6			
39-004-WR-2	2.34	73.1	94.3	21.2	0.77	0.98	0.59	30.6	63.7			
39-004-WR-3	3.04	95	124	28.6	0.7	1.44	0.9	45	78.6			

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

WATER MATRIX ANALYSES

Metals in Water Results in ug/l

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	CALC. (mg CaCO3/L)
39-004-SW-1	15.5	7.43	3.63 J	9.7 U	6.83 U	1.6	152	0.038 U	13.1	12.7 U	10.7	30.7 U	54.5	70.6
39-004-SW-2	12.6	8.73	3.13 J	9.7 U	6.83 U	1.55 U	411	0.038 U	29	12.7 U	2.88	30.7 U	7.57 U	42.7
39-004-SW-3	92.4	11.2	3.9 J	9.7 U	6.83 U	1.55 U	152	0.250	11.9	12.7 U	6.76	30.7 U	32.3	214
39-004-SW-4	8.61	10	2.6 J	9.7 U	6.83 U	1.55 U	21.7	0.052	4.08 U	12.7 U	1.61	30.7 U	7.57 U	111

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Wet Chemistry Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
39-004-SW-1	123	< 5.0	21	< 0.05	NR
39-004-SW-2	83	< 5.0	12	< 0.05	NR
39-004-SW-3	305	< 5.0	114	< 0.05	NR
39-004-SW-4	179	< 5.0	46	< 0.05	NR

LEGEND

- SE1 - Downstream N Fork Rocker Gulch.
 - SE2 - Upstream N Fork Rocker Gulch.
 - SE3 - Downstream Rocker Gulch.
 - SE4 - Downstream Rocker Gulch.
 - TP1 - Composite of subsamples TP1A, 1B, 2, 3, and 4.
 - WR1 - Composite of subsamples WR1A, 1B, 2, and 3.
 - WR2 - Composite of subsamples WR2A, 4B, 5, 6, 7, and 8.
 - WR3 - Composite of subsamples WR3A, 9B, 9C, 10A, 10B, 12A, and 12B.
- BACKGROUND - From the Emery Mine (39-004-SS-1)
 SW1 - Same as sample SE1
 SW2 - Same as sample SE2
 SW3 - Same as sample SE3
 SW4 - Same as sample SE4

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Curlew</u>	County: <u>Ravalli</u>
Legal Description: <u>T8 Mn R2W</u>	Section(s): <u>NE 1/4, NE 1/4, Sec. 14</u>
Mining District: <u>Curlew</u>	Mine Type: <u>Hardrock/Au, Ag, Pb, Cu, Zn</u>
Latitude: <u>N 46° 27' 49"</u>	Primary Drainage: <u>Battered River</u>
Longitude: <u>W 114° 10' 45"</u>	USGS Code: <u>17010205</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Big Creek</u>
Quad: <u>Victor</u>	Date Investigated: <u>September 9, 1993</u>
Inspectors: <u>Bullock, Tuesday</u>	P.A. # <u>41-003</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- An estimated 41,000 cubic yards of tailings were present on the site. The tailings were about 60% unvegetated at the time of this investigation. The following elements were elevated at least three times background:

Arsenic: 1640-3160 mg/kg	Cadmium: 39.6-47.5 mg/kg
Copper: 286-749 mg/kg	Iron: 74,900-76,100 mg/kg
Manganese: 29,600-32,000 mg/kg	Nickel: 31.8-33.3 mg/kg
Lead: 3140-4450 mg/kg	Antimony: 27J-33.1J mg/kg
Zinc: 18,300-20,300 mg/kg	

- The volume of waste rock associated with this site was estimated to be 82,110 cubic yards. The following elements were elevated at least three times background:

Arsenic: 48.3-692 mg/kg	Mercury: 0.439J mg/kg
Lead: 509 mg/kg	Manganese: 8790 mg/kg
Zinc: 1930 mg/kg	

- The waste rock was mostly unvegetated.

- No discharging adits, seeps or springs were observed on site.

- A large pond was present in the glory hole, with a moderately high pH of 8.71. No exceedances of MCL/MCLGs or aquatic life criteria were documented, with the exception of the chronic aquatic life criteria for mercury.

- Two irrigation ditches that were flowing, at the time of this investigation, bisected the site. No samples were collected due to lack of runoff from the site. Spring runoff sampling was recommended for this site.

- The north end of TP-1 had recently been used for a household garbage disposal area.

- Two open adits, two structures, and the highwall associated with the glory hole were classified as potential hazards.

Curlew PA# 41-003
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 09/09/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
41-003-TP-1	3160	6.12	47.5	2.21	5.77	749	76100	0.163 J	29600	31.8	4450	33.1 J	20300	NR
41-003-TP-2	1640	10.5	39.6	2.89	5.66	286	74900	0.069 J	32000	33.3	3140	27 J	18300	NR
41-003-WR-1	692	53.4	1.3	4.65	4.91	11.8	27600	0.091 J	8790	16	509	4.74 UJ	1930	NR
41-003-WR-2	48.3	1000	0.9 U	2.39	3.52	13	31200	0.439 J	508	8.33	32.7	5.94 UJ	86.8	NR
BACKGROUND	5.04 U	357 J	0.6 U	8.34 J	8.69	5.95 J	10700	0.144	2320 J	7.66	18.4	6.56 UJ	58.9	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENTIAL		SULFUR ACID BASE POTENTIAL		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENTIAL		SULFUR ACID BASE POTENTIAL	
	%	U/1000K	%	U/1000K	%	U/1000K	%	U/1000K	%	U/1000K	%	U/1000K	%	U/1000K
41-003-TP-1	1.07	33.4	81	47.6	<0.01	0.59	0.53	18.4	0.53	18.4	62.6			
41-003-TP-2	0.61	19.1	121	102	<0.01	0.25	0.4	7.81	0.4	113				
41-003-WR-1	0.27	8.43	145	136	0.03	0.1	0.14	3.12	0.14	141				
41-003-WR-2	0.59	18.4	259	240	0.04	0.05	0.5	1.56	0.5	257				

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
41-003-SW-1	7.18 JX	17.8	2.57 U	9.7 U	6.83 U	1.55 U	27.9	0.13	35.8	16	3.82	30.7 UJ	47.5	528

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
41-003-SW-1	835	< 5.0	560	< 0.05	NR

LEGEND

- TP1 - Composite of subsamples TP1A, 1B, 1C-A, 1C-B, and 1C-C.
- TP2 - Composite of subsamples TP2A, 2B-A, and 2B-C.
- WR1 - Composite of subsamples WR1A, B, 2, 3A, and 3B.
- WR2 - Composite of subsamples WR4A, 4B, 5A, 5B, 6A, and 6B.
- BACKGROUND - From the Mill Creek Mine (32-049-SS-1).

SW1 - Pond in bottom of Glory Hole.

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Montana Prince</u>	County: <u>Ravalli</u>
Legal Description: <u>T 3N R 17W</u>	Section(s): <u>NE 1/4, NW 1/4, Sec. 14</u>
Mining District: <u>Frog Pond Basin</u>	Mine Type: <u>Hardrock/Au, Ag, Cu, Pb, Zn</u>
Latitude: <u>N 46° 00' 51"</u>	Primary Drainage: <u>Moose Creek</u>
Longitude: <u>W 113° 40' 55"</u>	USGS Code: <u>17010205</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Cuba Creek</u>
Quad: <u>Whetstone Ridge</u>	Date Investigated: <u>June 22, 1993</u>
Inspectors: <u>Flammang, Clark</u>	P.A. # <u>41-004</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There are no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be approximately 3000 cubic yards. The following elements were elevated at least three times background:

Cadmium: 5.7 mg/kg	Copper: 41.6 mg/kg
Mercury: 0.829JX mg/kg	Manganese: 1220 mg/kg
Lead: 267 mg/kg	Zinc: 292 mg/kg
- There was one adit discharge associated with this site. The discharge flow rate was approximately 1 gpm, the pH was 7.54, and the specific conductance was 120 umhos/cm. The discharge did not exceed any of the applicable MCL/MCLGs or aquatic life criteria. The discharge seeped into the dump near the adit and then reappeared below the waste rock dump.
- This seep constituted the headwater of a small tributary to Cuba Creek. The manganese concentration measured in the seep was elevated greater than three times the adit discharge concentration, constituting the only observed release. The seep did not exceed any of the applicable MCL/MCLGs or aquatic life criteria.

Montana Prince PA# 41-004
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 06/22/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
41-004-SE-1	6 J	65.1	5.7	4.4	2.3	16.7	4380	0.726 JX	829	6	19	3 UJ	278	NR
41-004-WR-1	7 J	146	5.7	9.3	5.5	41.6	20900	0.829 JX	1220	12	267	4 UJ	292	NR
BACKGROUND	11 J	267	1.7	11	8.7	7.8	12800	0.08 JX	250	9	15	5 UJ	62	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENT.	
	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x
41-004-WR-1	1.24	38.7	46.7	7.92	0.27	0.41	0.56	12.8	33.8			

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
41-004-GW-1	0.98 U	22.3	2.57 U	9.7 U	6.83 U	1.97	25.5	0.038 U	4.5	12.7 U	0.38 U	30.7 U	7.57 U	44.4
41-004-SW-1	0.98 U	18	2.57 U	9.7 U	6.83 U	2.03	43.3	0.038 U	23.3	12.7 U	0.38 U	30.7 U	13.2	44.8

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
41-004-GW-1	88 <	5.0	5	< 0.05	NR
41-004-SW-1	82 <	5.0	6	< 0.05	NR

LEGEND

SEI - 10 feet below toe of waste rock dump I.
 WRJ - Composite of subsamples WR1A and 1B.
 BACKGROUND - From the Montana Prince (41-004-SS-1).
 GW1 - Water seeping from collapsed adit.
 SW1 - Same as sample SEI.

**Blue Bird PA# 41-009
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 09/08/93**

SOLID MATRIX ANALYSES

**Metals in soils
Results per dry weight basis**

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
41-009-SE-1	14.7 J	138	0.6 U	9.31	7.29	35	24300	0.41 J	1550	5.03	48.5	6.61 UJ	157 J	NR
41-009-SE-2	12.8 J	160	0.6 U	6.1	3.76	20.6	14100	0.034 U	1700	3.6	21.8	7.24 UJ	203 J	NR
41-009-WR-1	7.28 J	24.2	0.6	1.94 U	1.37 U	117	6890	1.43 J	237	2.53 U	64.9	6.13 UJ	102 J	NR
BACKGROUND	5.04 U	357 J	0.6 U	8.34 J	8.69	5.95 J	10700	0.144	2320 J	7.66	18.4	6.56 UJ	58.9	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE %	NEUTRAL POTENT	SULFUR ACID BASE POTENT	SULFATE %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE	PYRITIC SULFUR ACID BASE	SULFUR ACID BASE POTENT	12
41-009-WR-1	0.21	6.56	12.6	6.05	0.1	0.02	0.09	0.62	0.62	12	12

LEGEND

SE1 - Downgradient sediment sample in intermittent drainage
SE2 - Upgradient sediment sample in intermittent drainage
WR1 - Composite of subsamples WR2, 3, and 4
BACKGROUND - From the Mill Creek Mine (32-049-SS-1)

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Broken Hill</u>	County: <u>Sanders</u>
Legal Description: T <u>27N</u> R <u>34W</u>	Section(s): <u>SW 1/4, SW, 1/4, NE 1/4, Sec. 10</u>
Mining District: <u>Blue Creek</u>	Mine Type: <u>Hardrock/Aq, Pb, Zn</u>
Latitude: <u>N 48° 07' 15"</u>	Primary Drainage: <u>East Fork Blue Creek</u>
Longitude: <u>W 115° 58' 06"</u>	USGS Code: <u>17010213</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>East Fork Blue Creek</u>
Quad: <u>Heron</u>	Date Investigated: <u>August 3, 1993</u>
Inspectors: <u>Bullock, Flammang, Clark</u>	P.A. # <u>45-005</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be 6200 cubic yards. The following elements were elevated at least three times background:

Arsenic: 508 to 1140 mg/kg	Mercury: 2.53J to 27.2J mg/kg.
Cadmium: 15.2 to 26 mg/kg	Lead: 18,700J to 55,900J mg/kg
Copper: 140J to 342J mg/kg	Antimony: 61.3 to 344 mg/kg
Iron: 94,400 mg/kg	Zinc: 9600 to 11,400 mg/kg.
- The waste rock dumps were mostly unvegetated.
- A collapsed discharging adit (GW-1) was present, with a flow of approximately 25 gpm, a pH of 8.71, and a specific conductance of 75 umhos/cm. The adit discharge did not exceed any MCL/MCLGs. Chronic aquatic life criteria for mercury, lead and zinc and acute aquatic life criteria for lead and zinc were exceeded in this sample of the discharge.
- A dry tributary to the East Fork of Dry Creek was approximately 100 feet north of the site. There were no direct runoff pathways to surface water identified during this investigation. Therefore, surface water and stream sediment samples were not collected.
- One plastic barrel half full of an unknown material was present at the base of WR-1.

Broken Hill PA# 45-005
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER-BULLOCK
 INVESTIGATION DATE: 08/03/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
45-005-WR-1	1140	27.9	15.2	7.25	5.25	342 J	94400	27.2 J	992	3.84	55900 J	344	9600	NR
45-005-WR-2	508	19.8	26	5.86	4.5	140 J	44200	2.53 J	426	6.23	18700 J	61.3	11400	NR
BACKGROUND	8.68	142	0.6 U	10.4	10.5	21.2 J	22100	0.06 J	710	14.4	33.8 J	6.84 U	78.2	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	1/1000x	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	
45-005-WR-1	2.80	87.5	-5.78	1.86	-93.3	0.86	2.50	0.86	0.86	0.86	-8.28	
45-005-WR-2	2.46	76.9	-4.12	0.59	-81.0	1.72	4.69	1.72	1.72	1.72	-8.81	

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. Zn (mg CaCO3/L)
45-005-GW-1	30.4	2.01 U	2.57 U	9.7 U	6.83 U	2.97	69.6	0.044 J	15.2	12.7 U	107	30.7 U	867	23.4

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
45-005-GW-1	52	6.7	< 5	< 0.05	NR

LEGEND

WR1 - Composite of subsamples WR1A, 1B, 1C, and 3
 WR2 - Composite of subsamples WR2A and 2B
 BACKGROUND - From the Holiday Mine (45-009-SS-1)
 GW1 - From the flow out of adit #2

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Montro Gold</u>	County: <u>Sanders</u>
Legal Description: T <u>19N</u> R <u>26W</u>	Section(s): <u>SW 1/4, NW 1/4, Sec. 3</u>
Mining District: <u>Plains</u>	Mine Type: <u>Hardrock/Unknown</u>
Latitude: <u>N 47° 26' 08"</u>	Primary Drainage: <u>Clark Fork River</u>
Longitude: <u>W 114° 54' 00"</u>	USGS Code: <u>17010213</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Combest Creek</u>
Quad: <u>Plains</u>	Date Investigated: <u>August 6, 1993</u>
Inspectors: <u>Bullock, Clark</u>	P.A. # <u>45-010</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be 6300 cubic yards. The following elements were elevated at least three times background:
Copper: 125J to 345J mg/kg Iron: 41,000 mg/kg
Mercury: 0.306 to 1.51 mg/kg Lead: 4280 to 27,500 mg/kg
Antimony: 28 mg/kg.
- The waste rock dump was 90% unvegetated.
- A collapsed discharging adit (GW-1) was present, with a low flow of approximately 2-3 gpm, a pH of 8.36, and a specific conductance of 250 umhos/cm. The adit discharge did not exceed MCL/MCLGs, but chronic aquatic life criteria for mercury, cadmium, and lead were exceeded.
- Residents downgradient from this site were apparently on a community water supply.
- There were no surface water expressions associated with this site.
- One adit was open with a gate and was classified as a potentially hazardous mine opening.

**Monro Gold PA# 45-010
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 08/06/93**

SOLID MATRIX ANALYSES

**Metals in soils
Results per dry weight basis**

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
45-010-WR-1	6 J	43.7	1.3	22.7	7.2	125 J	34400	1.51	733 J	18	4280	5 UJ	57	NR
45-010-WR-2	7 J	30	1.7	13.1	4.3	345 J	41000	0.306	492 J	9	27500	28	17	NR
BACKGROUND	4.44 U	234	1.06	8.15	7.26	8.33	12900	0.037	987	9.72	21.3	5.79 U	95.2	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC ACID BASE POTENT	
	%	U/1000K	U/1000K	%	U/1000K	%	%	U/1000K	U/1000K	U/1000K	U/1000K	
45-010-WR-1DUP	0.05	1.56	4.38	0.03	2.82	<0.01	0.02	0.00	4.38			
45-010-WR-1	0.06	1.87	4.42	0.03	2.54	0.01	0.02	0.31	4.11			
45-010-WR-2	0.21	6.56	2.15	0.19	-4.41	0.01	0.01	0.31	1.84			

WATER MATRIX ANALYSES

**Metals in Water
Results in ug/l**

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
45-010-GW-1	2.92 J	25.7	2.57	9.7 U	6.83 U	5.13	585 J	0.230 JX	53.2	12.7 U	23.2 J	30.7 U	13.8 J	78

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

**Wet Chemistry
Results in mg/l**

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
45-010-GW-1	141	6.7	11	0.37	NR

LEGEND

WR1 - Composite of subsamples WR1A, 1B, and 2A
 WR2 - Sample of the WR2B subsample
 BACKGROUND - From the Monro Gold Mine (45-010-SS-1)
 WR1DUP - Duplicate of the sample 45-010-WR-1
 GW1 - Lower acid discharge

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Lower Letterman</u>	County: <u>Sanders</u>
Legal Description: T <u>19N</u> R <u>26W</u>	Section(s): <u>SW 1/4, SE 1/4, Sec. 3</u>
Mining District: <u>Plains</u>	Mine Type: <u>Hardrock/Ag, Ag, Pb</u>
Latitude: <u>N 47° 25' 43"</u>	Primary Drainage: <u>Clark Fork River</u>
Longitude: <u>W 114° 53' 37"</u>	USGS Code: <u>17010213</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Combest Creek</u>
Quad: <u>Plains</u>	Date Investigated: <u>August 6, 1993</u>
Inspectors: <u>Bullock, Clark</u>	P.A. # <u>45-047</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- No mill tailings were associated with this site.
- The volume of waste material at the site was estimated to be 423 cubic yards. The following elements were elevated at least three times background:
Mercury: 0.543 mg/kg
Lead: 2600 mg/kg
- The waste rock dumps were approximately 75% unvegetated.
- No discharging adits, seeps, or springs were observed during this investigation.
- Water present in the southern stope had a fairly neutral pH of 6.40, and a low specific conductance of 90 umhos/cm. This water appeared to be ponded precipitation
- The nearest surface water expression was Combest Creek approximately 400 feet from the site, Combest Creek was dry at the time of this investigation.
- There were two hazardous stopes present at the Lower Letterman and a hazardous open adit was present. The open adit was approximately 1/4 mile north of the site.

Lower Letterman PA# 45-047
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 08/06/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
45-047-WR-1	4 U	42.4	1.5	9.3	5.9	19.3 J	24800	0.543	2510 J	16	2600	5 UJ	47	NR
BACKGROUND	4.44 U	234	1.06	8.15	7.26	8.33	12900	0.037	987	9.72	21.3	5.79 U	95.2	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	SULFUR ACID BASE %	NEUTRAL POTENT. v/1000x	SULFUR ACID BASE POTENT. v/1000x	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE v/1000x	SULFUR ACID BASE POTENT. v/1000x
45-047-WR-1	0.01	0.31	8.55	8.24	0.01	<0.01	<0.01	0.00	8.55

LEGEND

WR1 - Composite of subsamples WR1 and 2
 BACKGROUND - From the Montro Cold Mine (45-010-38-1).

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Holliday</u>	County: <u>Sanders</u>
Legal Description: T <u>26N</u> R <u>34W</u>	Section(s): <u>SE 1/4, NE 1/4, Sec. 36</u>
Mining District: <u>Trout Creek</u>	Mine Type: <u>Hardrock/Unknown</u>
Latitude: <u>N 47° 58' 30"</u>	Primary Drainage: <u>Pilgrim Creek</u>
Longitude: <u>W 115° 54' 40"</u>	USGS Code: <u>17010213</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>West Fork Pilgrim Creek</u>
Quad: <u>Gem Peak</u>	Date: <u>August 3, 1993</u>
Inspectors: <u>Tuesday, Belanger, Lasher</u>	P.A. # <u>45-009</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings observed at the site during the investigation.
- The volume of waste rock associated with this site was estimated to be approximately 10,490 cubic yards. The following elements were elevated at least three times background:
Lead: 371J mg/kg
- Two adits had minor discharges during the investigation. No MCLs were exceeded for either of the discharges. The chronic aquatic life criteria for lead was exceeded in the Adit #4 discharge.
- West Fork Pilgrim Creek and an unnamed tributary to West Fork Pilgrim Creek converge and flowed within 5 feet of a WR-4. No MCLs were exceeded in upstream or downstream samples collected in West Fork Pilgrim Creek; however, chronic aquatic life criteria for lead were exceeded in both the upstream and downstream samples. Upstream and downstream sediment samples collected in West Fork Pilgrim Creek exhibited metals concentrations similar to background.

Holliday PA# 45-009
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - TUESDAY
 INVESTIGATION DATE: 08/03/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
45-009-SE-1	7.52	45.6	0.6 U	7.84	9.96	35.9 J	21000	0.041 J	406	11.5	65 J	7.17 U	96.6	NR
45-009-SE-2	11.3	38.7	0.4 U	6.53	10.5	18.5 J	20900	0.021 J	398	12.6	50.4 J	5.27 U	94.6	NR
45-009-WR-1	12	77.4	0.5 U	9.55	5.86	45.1 J	21300	0.032 J	513	11.1	371 J	6.07 U	125	NR
BACKGROUND	8.68	142	0.6 U	10.4	10.5	21.2 J	22100	0.06 J	710	14.4	33.8 J	6.84 U	78.2	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	v/1000x	%	v/1000x	%	v/1000x	%	v/1000x	%	v/1000x	%	v/1000x
45-009-WR-1	0.06	1.87	25.7	25.7	23.9	23.9	0.01	0.02	0.03	0.62	0.62	25.1

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
45-009-GW-1	1.69 U	59.2	2.57 U	9.7 U	6.83 U	1.55 U	11.8 U	0.038 U	4.08 U	12.7 U	3.16	30.7 U	69.7	146
45-009-GW-2	2.54	59.7	2.57 U	9.7 U	6.83 U	1.55 U	11.8 U	0.076 J	4.08 U	12.7	2.89	30.7 U	32	42.4
45-009-SW-1	1.54 J	2.5	2.57 U	9.7 U	6.83 U	1.55 U	17.6 J	0.140 JX	4.08 U	12.7 U	2.15 J	30.7 U	10.2 J	12.3
45-009-SW-2	1.74 J	3.07	2.57 U	9.7 U	6.83 U	1.55 U	11.8 U	0.190 JX	4.08 U	12.7 U	1.38 J	30.7 U	7.57 U	13.1

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS		CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
	<	<	<	<	<	<
45-009-GW-1	150	< 5.0	9	< 0.05	NR	NR
45-009-GW-2	41	< 5.0	< 5.0	< 0.05	NR	NR
45-009-SW-1	< 5.0	< 5.0	< 5.0	< 0.05	NR	NR
45-009-SW-2	31	< 5.0	< 5.0	< 0.05	NR	NR

LEGEND

- SE1 - Upgradient on unnamed drainage
- SE2 - Downgradient of mine in W. Fork Pilgrim Creek
- WR1 - Composite of subsamples WR1, 2, 3A, 3B, 4A, and 4B
- BACKGROUND - From the Holliday Mine (45-009-88-1).
- GW1 - Discharge from adit #3 (saved).
- GW2 - Discharge from adit #4 (pipe)
- SW1 - Same as sample SE1.
- SW2 - Same as sample SE2.

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Jack Waite</u>	County: <u>Sanders</u>
Legal Description: T <u>22N</u> R <u>32W</u>	Section(s): <u>NE 1/4, SW 1/4, Sec. 17</u>
Mining District: <u>White Pine</u>	Mine Type: <u>Hardrock/Au, Ag, Cu, Pb, Zn</u>
Latitude: <u>N 47° 39' 50"</u>	Primary Drainage: <u>Beaver Creek</u>
Longitude: <u>W 115° 43' 15"</u>	USGS Code: <u>17010213</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Dixie Creek</u>
Quad: <u>Cooper Gulch</u>	Date Investigated: <u>September 7, 1993</u>
Inspectors: <u>Bullock, Tuesday</u>	P.A. # <u>45-002</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be 3800 cubic yards. The following elements were elevated at least three times background:
Cadmium: 513 mg/kg Copper: 97.2 mg/kg
Lead: 4150 mg/kg Zinc: 7920J mg/kg.
- The waste rock dump was unvegetated and also over-steepened in the drainage.
- A discharging adit (GW-1) was present, with a small flow of 3 gpm, a pH of 7.40, and a specific conductance of 280 umhos/cm. The adit discharge did not exceed MCL/MCLGs; but the chronic aquatic life criteria for lead was exceeded.
- Dixie Creek bisected the site. Water samples collected up and down stream of this site documented an observed release of lead and zinc to surface water. The samples did not exceed MCL/MCLGs. The acute and chronic aquatic life criteria were exceeded for lead and zinc, both attributable to this site. An observed release of lead was also documented in the stream sediment samples.
- One adit was open and classified as potentially hazardous.

Jack Waite PA# 45-002
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 09/07/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
45-002-SE-1	9.91 J	69.2	1	9.06	1.53 U	36.6	16600	0.034 U	274	18	866	6.89 UJ	178 J	NR
45-002-SE-2	21 J	68.3	0.8 U	16.2	5.91	20.1	21200	0.044 U	965	16.9	68.7	9.9 UJ	102 J	NR
45-002-WR-1	25.1 J	56.7	513	9.47	1.7	97.2	22300	0.029 U	374	11.4	4150	11.9 J	7920 J	NR
BACKGROUND	8.66	142	0.6 U	10.4	10.5	21.2 J	22100	0.06 J	710	14.4	33.8 J	6.84 U	78.2	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	1/1000k	%	1/1000k	%	1/1000k	%	1/1000k	%	1/1000k	%	1/1000k
45-002-WR-1	0.53	16.6	21.2	4.68	0.01	0.34	0.18	10.6				

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
45-002-GW-1	5.83	16.2	2.57 U	9.7 U	6.83 U	4.07 J	160	0.12 UJX	25.2	12.7 UX	11.5	30.7 U	18.9 J	122
45-002-SW-1	2.36	11.1	2.63 J	9.7 U	7.67	7.5 J	81.3	0.12 UJX	4.08 U	12.7 UX	76.9	30.7 U	82.7 J	62.9
45-002-SW-2	1.69 U	4.07	3.03 J	9.7 U	6.83 U	5.17 J	75.3	0.12 UJX	4.08 U	16.3 JX	4.41	30.7 U	12.4 J	22.3

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
45-002-GW-1	225 <	5.0	42 <	0.05	NR
45-002-SW-1	162 <	5.0	25 <	0.05	NR
45-002-SW-2	90 <	5.0	8 <	0.05	NR

LEGEND

SE1 - 200 feet downstream of waste rock dump 1
 SE2 - 100 feet upstream from waste rock dump 1
 WR1 - Composite of subsamples WR1A, 1B, and 1C
 BACKGROUND - From the Holiday Mine (45-009-SS-1)
 GW1 - Acid discharge
 SW1 - Same as sample SE1
 SW2 - Same as sample SE2

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Highland</u>	County: <u>Silver Bow</u>
Legal Description: T <u>Mn</u> R <u>W</u>	Section(s): <u>NW 1/4, NE 1/4, Sec. 31</u>
Mining District: <u>Basin Creek</u>	Mine Type: <u>Hardrock/Au</u>
Latitude: <u>N 45° 47' 50"</u>	Primary Drainage: <u>Silver Bow Creek</u>
Longitude: <u>W 112° 31' 10"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Basin Creek</u>
Quad: <u>Mount Humbug</u>	Date Investigated: <u>September 17, 1993</u>
Inspectors: <u>Bullock/Pierson</u>	P.A. # <u>47-028</u>
Organization: <u>Pioneer Technical Services, Inc./ Thomas, Dean and Hoskins, Inc.</u>	

- There were no mill tailings associated with this site. Ore from this mine was processed at the Middle Fork Millsite (PA# 47-081).
- The volume of waste rock associated with this site was estimated to be 40,000 cubic yards. The following elements were elevated at least three times background:
Arsenic: 139J mg/kg Mercury : 0.261J mg/kg
Copper: 943 mg/kg Iron: 128,000JX mg/kg
- The waste rock dumps were approximately 90% unvegetated.
- One discharging adit had a flow of approximately 15 gpm, a pH of 7.42, and a specific conductance of 208 umhos/cm. No MCL/MCLG's were exceeded nor were any aquatic life criteria exceeded in the sample of this discharge.
- The discharge was a source for a perennial flow to Basin Creek. No MCL/MCLGs were exceeded in the downstream sample, however, the chronic aquatic life criteria for mercury was exceeded downstream from the site. The downstream sediment sample also exhibited copper concentrations greater than three times the background soil. Basin Creek was a source of drinking water for the City of Butte.
- Ten cubic yards of a white unknown powder was present at the south end of the site.

Highland PA# 47-028
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 09/17/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
47-028-SE-1	26.5 J	32.3 J	1.1 U	4.05	3.61 J	38.9	9700 JX	0.038 J	289	71.9	42.9	7.68 UJ	305 J	NR
47-028-WR-1	139 J	38.7 J	1.9 J	9.77	1.81 J	943	128000 JX	0.261 J	491	7.57	13.5	7.09 UJ	79.4 J	NR
BACKGROUND	40.1 J	173 J	1.1 U	10.1	21.1 J	34.3	18500 JX	0.039 J	832	18.1	14.8	7.28 UJ	61.9 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT.		SULFUR ACID BASE POTENT. U/1000g
	%	U/1000g	%	U/1000g	%	U/1000g	%	U/1000g	%	U/1000g	%	U/1000g	
47-028-WR-1	1.64	51.2	321	270	<0.01	2	0.85	62.5	259				

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn (mg CaCO3/L)	HARDNESS CALC. (mg CaCO3/L)
47-028-GW-1	1.88	12.4	4.59 U	5 U	6.24 U	2.33 U	116	0.12 U	10	10.9 U	1.12	31.7 U	8.71 U	211
47-028-SW-1	1.63	13	4.59 U	5 U	6.24 U	2.33 U	107	0.35	6.3	10.9 U	1.19	31.7 U	8.71 U	206
47-028-SW-2	1.12 U	1.1 U	4.59 U	5 U	6.24 U	2.33 U	13.7 U	0.12 U	3.76 U	10.9 U	0.94 U	31.7 U	8.71 U	0.1

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3NO2-N	CYANIDE
47-028-GW-1	178	< 5	15	0.18	NR
47-028-SW-1	210	< 5	16	0.15	NR
47-028-SW-2	NR	NR	NR	< 0.01	

LEGEND

SE1 - At edit discharge below Moose Creek road.
 WR1 - Composite of subsamples WR1A, 1B, and 1C.
 BACKGROUND - From the Highland Mine (47-028-SS-1).
 GW1 - Adit #1 discharge.
 SW1 - Adit discharge below Moose Creek road.
 SW2 - QA/QC Blank.

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Mary Emme/Clinton</u>	County: <u>Silver Bow</u>
Legal Description: <u>T 3N R 7W</u>	Section(s): <u>NE 1/4, SW 1/4, Sec. 10</u>
Mining District: <u>Elk Park-Butte</u>	Mine Type: <u>Hardrock/Unknown</u>
Latitude: <u>N 46° 01' 17"</u>	Primary Drainage: <u>Silver Bow Creek</u>
Longitude: <u>W 112° 27' 14"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Woodville Gulch</u>
Quad: <u>Elk Park Pass</u>	Date: <u>August 20, 1993</u>
Inspectors: <u>Babits, Flammang, Lasher</u>	P.A. # <u>47-035</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with site.
- There were approximately 66,620 cubic yards of uncovered waste rock on site. The following elements were elevated at least three times background:
Mercury: 1.27 mg/kg Lead: 834 to 1,670 mg/kg
Antimony: 61.8 to 235 mg/kg
- There was one discharging adit at the site which entered Woodville Gulch. A sample of this discharge had a pH of 5.40, and MCLs were exceeded for arsenic, cadmium, and lead. The chronic fresh water aquatic life criteria for iron and lead was exceeded. The acute fresh water aquatic life criteria for cadmium was exceeded, and the chronic and acute fresh water aquatic life criteria for copper and zinc were exceeded.
- Woodville Gulch flowed approximately 100 feet from the waste rock. There were no observed releases to downstream surface water or sediment. Cadmium and copper exceeded MCLs, and the acute fresh water aquatic life criteria for cadmium was exceeded in downstream surface water samples. The acute and chronic fresh water aquatic life criteria for copper and zinc were also exceeded in downstream surface water.
- There were three open shafts at the site.

Mary Emmeel/Clinton PA# 47-035
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BABITS
 INVESTIGATION DATE: 08/20/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
47-035-SE-1	110	205 J	29 J	13.5 U	10.2	1230	9470	0.232 U	480 J	17.6 U	119	42.6 U	4420 J	NR
47-035-SE-2	48.8	39 J	1.2 U	7.65 J	12.7	347	26400	0.062 U	762 J	5.69 U	91.8	13.8 U	577 J	NR
47-035-WR-2	263	45.1 J	0.4 J	4.67 J	2.33	365	33300	1.27	144 J	3.07	1670	235	1200 J	NR
47-035-WR-1	216	23.4 J	1.8 J	2.09 U	1.47 U	422	17600	0.833	51.5 J	2.72 U	834	61.8	865 J	NR
BACKGROUND	143	228 J	3.7 J	9.72 J	6.81	447	20200	0.177	480 J	3.84	156	6.01 U	911 J	NR

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE		SULFUR ACID BASE POTENT	
	%	1/1000x	1/1000x	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x
47-035-WR-1	1.04	32.5	-4	-37	0.49	0.49	0.09	0.09	0.46	0.46	2.81	2.81	-6.58	-6.58
47-035-WR-2	2.45	76.5	-1.1	-78	0.69	0.69	0.66	0.66	1.1	1.1	20.6	20.6	-21.7	-21.7

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cz	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
47-035-SW-1	3.89 J	33.4	2.57 U	9.7 U	6.83 U	13.3 J	64.3 J	0.12 U	12.7	12.7 U	1.56	30.7 U	248	60.3
47-035-SW-2	1.69 U	21.9	27.9	16.9	6.83 U	2670 J	863 J	0.12 U	2590	12.7 U	4	30.7 U	7970	136
47-035-SW-3	65.6 J	2.01 U	29.7	9.7 U	6.83 U	1260 J	19100 J	0.12 U	2120	12.7 U	28.6	30.7 U	4710	84.7

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
47-035-SW-1	148	< 5.0	29	< 0.05	NR
47-035-SW-2	432	< 5.0	281	< 0.05	NR
47-035-SW-3	8	< 5.0	134	< 0.05	NR

LEGEND

- SE1 - Upgradient of tributary approx. 50' above waste rock dump 1.
- SE2 - 10' above where tributary enters culvert going under freeway.
- WR1 - Composite of subsamples WR1A, 1B, and 1C.
- WR2 - Composite of subsamples WR2, 3A, 3B, 3C, 4A, and 4B.
- BACKGROUND - From Mary Emmeel/Clinton Mine (47-035-SS-1).
- SW1 - Same as sample SE1
- SW2 - Same as sample SE2
- SW3 - Acid discharge of waste rock dump 1.

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Rising Sun</u>	County: <u>Silver Bow</u>
Legal Description: T <u>3N</u> R <u>7W</u>	Section(s): <u>NE 1/4, SW 1/4, Sec. 22</u>
Mining District: <u>Elk Park</u>	Mine Type: <u>Hardrock/Ag, Cu</u>
Latitude: <u>N 45° 59' 47"</u>	Primary Drainage: <u>Silver Bow Creek</u>
Longitude: <u>W 112° 27' 27"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Tramway Gulch</u>
Quad: <u>Homestake</u>	Date Investigated: <u>September 14, 1993</u>
Inspectors: <u>Bullock/Pierson</u>	P.A. # <u>47-037</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- There were no mill tailings observed at this site during the investigation.
- The volume of waste rock associated with this site was estimated to be approximately 2,000 cubic yards. The only element elevated at least three times background was mercury (0.661J mg/kg).
- One adit discharge was present at this site with a flow of approximately 20 gpm and a pH of 7.28. No MCL/MCLGs or acute or chronic aquatic life criteria were exceeded in the adit discharge.
- The adit discharge served as the headwaters for the stream associated with Tramway Gulch. No other surface water was observed on or near the site.
- The adit opening was identified as a potential safety hazard. Recreation use in the area appeared to be high.

Rising Sun PA# 47-037
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 09/14/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
47-037-WR-1	10 J	83.2	0.86 U	7.71	4.89	24.5	13500	0.661 J	311	4.04	9.26	5.9 UJ	37	NR
BACKGROUND	143	228 J	3.7 J	9.72 J	6.81	447	20200	0.177	480 J	3.84	156	6.01 U	911 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Reported

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC ACID BASE POTENT	
	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x
47-037-WR-1	0.01	0.31	13.6	13.6	<0.01	<0.01	0.01	0.01	0	0	13.6	13.6

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
47-037-GW-1	3.06	15.1	4.59 U	5 U	6.24 U	2.33 U	13.7 U	0.12 U	3.76 U	10.9 U	1.22 U	31.7 U	8.71 U	98.6

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Reported

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
47-037-GW-1	180	< 5	33	0.12	NR

LEGEND

WR1 - Composite of subsamples WR1A, 1B, and 1C.
 BACKGROUND - From the Mary Emma/Critton Mine (47-035-SS-1).
 GWT - Open, discharging water #1.

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Old Glory</u>	County: <u>Silver Bow</u>
Legal Description: <u>T 1S R 8W</u>	Section(s): <u>NW 1/4, NW 1/4, Sec. 31</u>
Mining District: <u>Melrose</u>	Mine Type: <u>Hardrock/Ag, Au, Cu</u>
Latitude: <u>N 45° 42' 40"</u>	Primary Drainage: <u>Soap Gulch</u>
Longitude: <u>W 112° 38' 38"</u>	USGS Code: <u>10020004</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Soap Gulch</u>
Quad: <u>Melrose</u>	Date Investigated: <u>August 24, 1993</u>
Inspectors: <u>Bullock, Tuesday</u>	P.A. # <u>47-027</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- No mill tailings were associated with this site.
- The volume of waste material at the site was estimated to be 10,025 cubic yards. The following elements were elevated at least three times background:

Arsenic: 843 mg/kg	Cadmium: 6.2 mg/kg
Mercury: 0.608J mg/kg	Manganese: 11,600 mg/kg
Nickel: 92.1J mg/kg	Lead: 254 mg/kg
Antimony: 12.6J mg/kg	
- The waste rock dumps were unvegetated.
- No discharging adits, seeps, or springs were observed.
- No surface water samples were collected as there was no surface water on or near the site.
- Hazards present at the site during the investigation included an old cabin near the shaft, and unstable slopes around the collapsed shaft.

Old Glory PA# 47-027
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 08/24/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Ct (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
47-027-WR-1	843	414 J	6.2	36.9	4.38	69.3	28300	0.608 J	11600	92.1 J	254	12.6 J	354	NR
BACKGROUND	56	169	0.8 JX	13.8	29.4	34.2	25300	0.014 U	462	26	30	4 UJ	119	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Reported

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACTD BASE U/0000	NEUTRAL POTENT U/0000	SULFUR ACTD BASE POTENT U/0000	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACTD BASE U/0000	SULFUR POTENT U/0000
47-027-WR-1	0.12	3.75	5.06	1.31	0.12	<0.01	0.01	0	5.06

LEGEND

WR1 - Composite of subsamples WR1A, 1B, 2, and 3.
 BACKGROUND - From the Emma Mine (29-061-SS-1).

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Clipper</u>	County: <u>Silver Bow</u>
Legal Description: T <u>1S</u> R <u>8W</u>	Section(s): <u>NE 1/4, NW 1/4, Sec. 26</u>
Mining District: <u>Melrose</u>	Mine Type: <u>Hardrock/Cu</u>
Latitude: <u>N 45° 43' 30"</u>	Primary Drainage: <u>Camp Creek</u>
Longitude: <u>W 112° 33' 35"</u>	USGS Code: <u>10020004</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Wickiup Creek</u>
Quad: <u>Wickiup Creek</u>	Date Investigated: <u>August 24, 1993</u>
Inspectors: <u>Bullock, Tuesday</u>	P.A. # <u>47-029</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings observed at this site during the investigation.
- The volume of waste rock associated with this site was estimated to be approximately 3,760 cubic yards. The following elements were elevated at least three times background:

Arsenic: 177 to 236 mg/kg	Cobalt: 86 mg/kg
Copper: 1290 to 19,100 mg/kg	Mercury: 0.219J to 0.293J mg/kg
Lead: 389 to 979 mg/kg	Antimony: 274J mg/kg
- One discharging adit was identified at the site. The MCL for copper was exceeded in the adit discharge. Also, the acute and chronic aquatic life criteria for copper and chronic aquatic life criteria for mercury and lead were exceeded in the adit discharge.
- Upstream and downstream surface water samples were collected from Wickiup Creek. No MCLs were exceeded in either of the samples; however, chronic aquatic life criteria were exceeded for mercury and lead in both the upstream and downstream samples. Acute and chronic aquatic life criteria were exceeded for copper in the downstream sample.
- An observed release to Wickiup Creek was documented for copper. The acute and chronic aquatic life criteria exceedances for copper in Wickiup Creek were directly attributable to the site. Additionally, concentrations of arsenic, cobalt, copper, and lead were significantly elevated (>3X) in the downstream sample when compared to the upstream sample.
- Two potentially hazardous mine openings were identified at the site including a fenced shaft and an open adit.

Cilipper PA# 47-029
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 08/24/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
47-029-SE-1	44.4	20.4 J	1.1 U	18.4	6.72	1650	32400	0.031 U	85.5	13.6 J	41.8	7.26 UJ	43.7	NR
47-029-SE-2	10.4	29.4 J	0.8 U	5.02	8.09	12.7	17800	0.034 U	181	11.8 J	5.43 U	5.24 UJ	27.3	NR
47-029-WR-1	236	2.79 J	0.8 U	2.45	3.04	1290	27100	0.219 J	20.2	3.37 J	389	5.67 UJ	14.6	NR
47-029-WR-2	177	15.4 J	1.4	86	9.37	19100	39400	0.293 J	609	18.2 J	979	274 J	87.3	NR
BACKGROUND	56	169	0.8 JX	13.8	29.4	34.2	25300	0.014 U	462	26	30	4 UJ	119	NR

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC ACID BASE POTENT.	
	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x
47-029-WR-1	0.92	28.7	-0.3	-29	0.76	0.06	0.13	0.94	0.03	0.03	0.06	-1.23
47-029-WR-2	0.12	3.75	2.62	-1.1	0.06	0.06	0.06	0.00	<0.01	0.00	0.00	2.62

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
47-029-GW-1	1.97	4.93	2.57 U	43.3	6.83 U	3050	725	0.18 JX	165	25.3	4.29 J	30.7 U	52.6 J	68.9
47-029-SW-1	2.18	8.03	2.57 U	9.7 U	10.3 J	206	291	0.45 JX	37.6	12.9	2.72 J	30.7 U	7.9 J	57.2
47-029-SW-2	2.67	7.73	2.57 U	9.7 U	6.83 U	1.55 U	102	0.16 JX	8.2	20	3.52 J	30.7 U	13.1 J	52.9

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
47-029-GW-1	131	< 5.0	40	0.11	NR
47-029-SW-1	106	< 5.0	15	< 0.05	NR
47-029-SW-2	107	< 5.0	11	< 0.05	NR

LEGEND

- SE1 - Downstream from mine site in Wickcup Creek
- SE2 - Upstream from mine in Wickcup Creek
- WR1 - Composite of subsamples WR1A, 1B, 1C, and 2
- WR2 - Composite of subsamples WR3, 5, and 6
- BACKGROUND - From the Emma Mine (29-061-S5-1).
- GW1 - Adit #1 discharge
- SW1 - Same as sample SE1
- SW2 - Same as sample SE2

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Middle Fork Millsite</u>	County: <u>Silver Bow</u>
Legal Description: <u>T 1N R 8W</u>	Section(s): <u>SW 1/4, SE 1/4, Sec. 36</u>
Mining District: <u>Moose Creek</u>	Mine Type: <u>Mill tailings/Au</u>
Latitude: <u>N 46° 47' 15"</u>	Primary Drainage: <u>Moose Creek</u>
Longitude: <u>W 112° 33' 10"</u>	USGS Code: <u>10020004</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Middle Fork Moose Ck.</u>
Quad: <u>Mount Humbug</u>	Date Investigated: <u>August 27, 1993</u>
Inspectors: <u>Bullock, Tuesday</u>	P.A. # <u>47-081</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of mill tailings associated with this site was estimated to be 36,500 cubic yards. The following elements were elevated at least three times background:
Arsenic: 261J to 265J mg/kg Copper: 783 to 1120 mg/kg
Iron: 70,700 to 106,000 mg/kg Mercury: 0.705J to 0.93J mg/kg
Lead: 62 to 195 mg/kg Zinc: 241 mg/kg
- There was no waste rock associated with this site.
- There were no discharges associated with mine openings at this site. Several seeps were identified associated with small tributaries to Moose Creek.
- Moose Creek was sample upstream and downstream of this site. The water samples documented an observed release of iron, attributable to this site. Sampling did not document exceedances of MCL/MCLGs or aquatic life criteria attributable to this site. Stream sediment samples documented observed releases of arsenic, copper, iron, mercury, lead, and zinc.
- Level areas of the tailings impoundments were well vegetated, except where disturbed by cattle grazing.

Middle Fork Millsite PA# 47-081
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 08/27/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
47-081-SE-1	418 J	204	2.59 J	27.8	14.3	993	127000	0.546 J	6420	20	109	14.8 U	249	NR
47-081-SE-2	1080 J	259	9.08 J	19.1	7.27 U	393	221000	0.805 J	2070	13.5	75.1	36.9 U	635	NR
47-081-SE-3	12.5 J	96.3	0.99 U	5.56	7.05	14.5	8490	0.126 J	349	8.54	7.05 U	6.8 U	24.1	NR
47-081-TP-1	261 J	29.5	1.52 J	6.68	15.5	783	70700	0.93 J	213	5.73	62	7.16	155	NR
47-081-TP-2	265 J	40	2.47 J	13.5	10.7	1120	106000	0.705 J	432	7.99	195	7.71 U	241	NR
BACKGROUND	40.1 J	173 J	1 U	10.1	21.1 J	34.3	18500 JX	0.039 J	832	18.1	14.8	7.28 UJ	61.9 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Reported

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		SULFATE		PYRITIC		ORGANIC		PYRITIC		SULFUR		HARDNESS CALC. (mg CaCO3/L)
	SULFUR	%	POTENT	%	POTENT	%	SULFUR	%	SULFUR	%	SULFUR	%	SULFUR	%	ACID BASE POTENT	ACID BASE POTENT	
47-081-TP-1	1.15	35.9	98.3	0.78	62.4	0.1	0.27	0.1	8.43	89.9							
47-081-TP-2	3	93.7	56.4	<0.01	-37	0.37	2.83	0.37	88.4	-32							

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
47-081-SW-1	4.15	30	4.59 U	5 U	6.24 U	9.23 J	467 J	0.21	49.9	10.9 U	2.1	31.7 U	8.71 U	295
47-081-SW-2	3.03	24.5	4.59 U	5 U	6.24 U	5.73 J	371 J	0.21	27.6	10.9 U	0.94 U	31.7 U	8.71 U	209
47-081-SW-3	3.53	37.9	4.59 U	5 U	6.24 U	10.6 J	46.7 J	0.19	30.9	10.9 U	0.94 U	31.7 U	8.71 U	219

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Reported

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
47-081-SW-1	329 <	5.0	57 <	0.05	NR
47-081-SW-2	285 <	5.0	52 <	0.05	NR
47-081-SW-3	272 <	5.0	7 <	0.05	NR

LEGEND

- SE1 - Downstream below lowest tailings pond. SW1 - Same as sample SE1.
- SE2 - Intermediate sample on tributary between mill and tailings. SW2 - Same as sample SE2.
- SE3 - Upgradient on Middle Fork Moose Creek. SW3 - Same as sample SE3.
- TP1 - Composite of subsamples TP1, 2A-A, 2A-B, and 2A-C.
- TP2 - Composite of subsamples TP3A-A, 3A-B, and 4.
- BACKGROUND - From the Highland Mine (47-028-SS-1)

**MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
HAZARDOUS MATERIALS INVENTORY
SITE SUMMARY**

Mine/Site Name: <u>Benbow Millsite</u>	County: <u>Stillwater</u>
Legal Description: <u>T 5S R 16E</u>	Section(s): <u>NW 1/4, Sec. 21</u>
Mining District: <u>Stillwater</u>	Mine Type: <u>Hardrock/Cr, Fe, Ni</u>
Latitude: <u>N 45° 23' 20"</u>	Primary Drainage: <u>Stillwater River</u>
Longitude: <u>W 109° 45' 55"</u>	USGS Code: <u>10070005</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Little Rocky Creek</u>
Quad: <u>Nye</u>	Date Investigated: <u>August 11, 1993</u>
Inspectors: <u>Babits, Flammang, Lasher</u>	P.A. # <u>48-005</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were approximately 5,950 cubic yards of mostly covered mill tailings at the site. The following were elevated at least three times background:
Cadmium: 1.08J to 1.60J mg/kg Cobalt: 44.7 to 68.3 mg/kg
Chromium: 66.8 to 908 mg/kg Mercury: 0.199 mg/kg
Nickel: 72.3 to 983 mg/kg
- There was no waste rock associated with this site.
- There were no discharging adits at the site.
- An unnamed tributary of Little Rocky Creek flowed adjacent to the tailings. There were observed releases of cobalt, chromium, and nickel in downstream sediment, and there were no observed releases to downstream surface water. No MCL/MCLGs or fresh water aquatic life criteria were exceeded in downstream surface water.
- A conveyor gallery in the mill was partially open and hazardous and the mill wall is 20 feet high.

Benbow Millsite PA# 48-005
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 08/11/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
48-005-SE-1	6.77 U	71	0.74 U	5.62	46 J	13.9	7060	0.051 U	183	23.9	11.6 U	8.82 UJ	39.4	NR
48-005-SE-2	5.38 U	16.1	0.59 U	34.7	497 J	13.3	25200	0.102	625	531	9.22 U	7 UJ	13.9	NR
48-005-SE-3	11.4 U	85.9 J	1.25 UJ	16.5	160	33.9	21600	0.088 U	511	134	38.8	14.9 UJ	68.6	NR
48-005-SE-4	4.76 U	22 J	0.52 UJ	44.7	495	16.1	34800	0.034 U	687	668	8.16 U	6.2 UJ	25.9	NR
48-005-TP-1	5.18 U	9.25 J	1.08 J	68.3	908	26	43700	0.198	1040	953	8.88 U	6.74 UJ	25.6	NR
48-005-TP-2	4.12 U	5.36 J	1.60 J	67.4	715	16.1	44800	0.03 U	754	983	7.06 U	5.36 UJ	24.9	NR
48-005-TP-3	8.66	134 J	0.56 UJ	11.6	66.8	13.5	20700	0.034 U	806	72.3	16.4	6.68 UJ	58.7	NR
BACKGROUND	14.8 J	97.1	0.54 U	6.45	10.8 J	12.9	21100	0.051	381	11.5	11.8	6.41 UJ	58.1	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR		SULFUR ACID BASE POTENT.	
	%	#/1000K	%	#/1000K	%	#/1000K	%	#/1000K	%	#/1000K	%	#/1000K	%	#/1000K
48-005-TP-1	0.04	1.25	108	107	<0.01	0.01	0.01	0.03	0.31	0.31	0.16	4.13	108	
48-005-TP-1DUP	0.04	1.25	109	108	0.01	<0.01	<0.01	0.04	0.00	0.00	0.12 U	60.4	109	
48-005-TP-2	0.01	0.31	87.3	87.0	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.12 U	60.4	87.3	
48-005-TP-3	0.03	0.94	10.3	9.35	<0.01	0.01	0.01	0.03	0.31	0.31	0.12 U	60.4	9.97	

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CAUC. (mg CaCO3/L)
48-005-SW-1	1.18 U	28.3	2.57 U	9.7 U	6.83 U	2.03	112	0.16	4.13	12.7 U	1.09 J	30.7 U	11.7	83
48-005-SW-2	1.19	41.3	2.57 U	9.7 U	8.6	1.7	645	0.12 U	60.4	12.7 U	1.23 J	30.7 U	7.57 U	139

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
48-005-SW-1	123	< 5.0	14	< 0.05	NR
48-005-SW-2	169	< 5.0	7	< 0.05	NR

LEGEND

- SE1 - In unstream trib. N of road crossing.
- SE2 - In unstream trib. at base of tailings pond 2.
- SE3 - In Little Rocky Creek, 30' upstream of confluence with unstream tributary.
- SE4 - In Little Rocky Creek, 30' downstream of confluence with unstream tributary.
- TP1 - Composite of subsamples TP1AA, 1BA, and 1BB.
- TP2 - Composite of subsamples TP2AA, 2AB, and 2BA.
- TP3 - Sample of the TP2BB subsample.
- BACKGROUND - From the Benbow Millsite (48-005-SS-1).
- SW1 - Same as sample SE1.
- SW2 - Same as sample SE2.

Yager/Daisy PA# 49-002
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 08/11/93

SOLID MATRIX ANALYSES

Metals in soils Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
49-002-SE-1	5.66	49.2 J	0.54 UJ	5.8	17.7	58.8	12100	0.032 U	205	12.2	50.5	6.44 UJ	49.3	NR
49-002-SE-2	5.21 U	45.8 J	0.57 UJ	9.28	17.7	61.6	13200	0.031 U	307	16.6	109	6.78 UJ	82.8	NR
49-002-TP-1	138	122 J	0.56 UJ	2.73	6.13	95.4	29300	1.91	24.8	6.87	700	6.72 UJ	82.2	NR
49-002-TP-2	19.6	82.4 J	1.31 J	7.82	8.82	65	25300	31.9	99	12	226	5.76 UJ	64	NR
49-002-WR-1	59.1	140 J	2.92 J	31	9.42	168	56900	0.644	627	24.5	2520	5.91 UJ	296	NR
49-002-WR-2	30.8	155 J	0.88 J	12.1	17.4	160	41400	23.5	199	18.9	389	5.77 UJ	40.4	NR
BACKGROUND	16.3	78.3 J	0.68 J	13.5	45.6	40.1	28500	0.064	612	24	37.2	7.97 UJ	99	NR

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENT.		SULFUR ACID BASE POTENT.	
	%	g/1000g	%	g/1000g	%	g/1000g	%	g/1000g	%	g/1000g	%	g/1000g	%	g/1000g
49-002-TP-1	0.60	18.7	-1.05	-19.8	0.32	0.48	0.48	0.48	10.0	10.0	10.0	10.0	-11.0	-11.0
49-002-TP-2	2.34	73.1	1.83	-71.3	0.75	1.06	1.06	1.06	23.4	23.4	23.4	23.4	-21.8	-21.8
49-002-WR-1	3.59	112	0.86	-111	1.65	2.45	2.45	2.45	51.5	51.5	51.5	51.5	-50.7	-50.7
49-002-WR-2	2.51	78.4	0.07	-78.3	0.37	1.58	1.58	1.58	11.6	11.6	11.6	11.6	-11.5	-11.5

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Reported

WATER MATRIX ANALYSES

Metals in Water Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
49-002-GW-1	1.18 U	37.5	2.57 U	9.7 U	6.83 U	5.37	112	0.12 U	4.08 U	12.7 U	1.33 J	30.7 U	10.1	30.8
49-002-GW-2	1.18 U	33	2.57 U	9.7 U	6.83 U	8.13	11.8 U	0.12 U	4.08 U	12.7 U	0.72 U	30.7 U	7.57 U	18.1
49-002-GW-3	1.18 U	32.9	2.57 U	9.7 U	14.7	186	155	0.12 U	9.17	115	1.22 J	30.7 U	171	51.2
49-002-GW-4	1.18 U	26.3	2.57 U	9.7 U	6.83 U	3.07	1500	0.12 U	92.5	12.7 U	9.37 J	30.7 U	20.5	23.9
49-002-SW-1	1.18 U	24.3	2.57 U	9.7 U	6.83 U	4.53	137	0.12 U	8.43	12.7 U	1.05 J	30.7 U	12.4	14.6
49-002-SW-2	1.18 U	14.5	2.57 U	9.7 U	6.83 U	2.27	15.2	0.12 U	4.08 U	12.7 U	0.75 J	30.7 U	10.3	19.7

Wet Chemistry

FIELD ID	Results in mg/l			
	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
49-002-GW-1	71	8.0	22	< 0.05
49-002-GW-2	56	8	9	< 0.05
49-002-GW-3	100	7.0	46	0.06
49-002-GW-4	72	< 5.0	37	0.05
49-002-SW-1	45	6	9	< 0.05
49-002-SW-2	56	13	8	< 0.05

Wet Chemistry

FIELD ID	Results in mg/l			
	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
49-002-GW-1	71	8.0	22	< 0.05
49-002-GW-2	56	8	9	< 0.05
49-002-GW-3	100	7.0	46	0.06
49-002-GW-4	72	< 5.0	37	0.05
49-002-SW-1	45	6	9	< 0.05
49-002-SW-2	56	13	8	< 0.05

LEGEND

- SE1 - In Basin Creek, downgradient from site.
- SE2 - In Basin Creek, upgradient of site.
- TP1 - Composite of subsamples TP1A-A, 1B-A, and 1C-A.
- TP2 - Composite of subsamples TP2A-B, 1B-B, and 1C-B.
- WR1 - Composite of subsamples WR1A, 1B, 2A, 2B, and 3.
- WR2 - Composite of subsamples WR2C, 4A, 5A, 5B, 6A, and 6B.
- BACKGROUND - From the Poor Man/Emma Mine (49-001-SB-1).

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Reported

- GW1 - Airt discharge above lower, waste rock dump 6A.
- GW2 - Airt discharge above waste rock dump 5.
- GW3 - Airt discharge above waste rock dump 4.
- GW4 - Airt discharge above waste rock dump 2.
- SW1 - Same as sample SE1.
- SW2 - Same as sample SE2.