

5.0 SITE SUMMARY FORMS

The following section presents a one-page summary sheet for each of the 276 sites investigated during the inventory. Each summary sheet provides the site name, location and other geographic information, and investigation details and a summary of findings. Analytical data obtained at each site is summarized on the back of each summary sheet. The sites are presented in the order listed in the Table of Contents for this document.

SAMPLE DESIGNATION LEGEND

- GW: Groundwater sample from well, spring, shaft, or adit discharge.
- SW: Surface water sample from stream, river, or ditch.
- AD: Adit discharge.
- SE: Stream sediment sample.
- TP: Mill tailings sample from tailings pond or pile or streamside tailings deposit.
- WR: Waste rock sample from waste rock dump.
- SS: Background soil sample.

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

Mine/Site Name: <u>Apex Millsite</u>	County: <u>Beaverhead</u>
Legal Description: <u>T 8S R 11W</u>	Section(s): <u>SW 1/4, SE 1/4, NW 1/4, Sec. 6</u>
Mining District: <u>Bannack</u>	Mine Type: <u>Millsite/Au, Ag, Cu, Pb</u>
Latitude: <u>N 45° 09' 48"</u>	Primary Drainage: <u>Grasshopper Creek</u>
Longitude: <u>W 112° 59' 50"</u>	USGS Code: <u>10020002</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Grasshopper Creek</u>
Quad: <u>Bannack</u>	Date Investigated: <u>September 16, 1993</u>
Inspectors: <u>Bullock/Pierson</u>	P.A. # <u>01-006</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- The data used to evaluate this site was collected by the MDHES CECRA Program during previous investigations and cleanup efforts.
- The volume of tailings associated with this site was estimated to be approximately 79,800 cubic yards. Previous sampling results have documented elevated levels of arsenic, copper, lead, and zinc in the tailings. A CECRA response action consisting of tailings consolidation and runoff control was conducted by MDHES in 1989. The tailings impoundments were inspected during the MDSL site investigation and were in fair condition. The tailings impoundments were considered to be on the edge of the 100 year flood plain of Grasshopper Creek.
- Monitoring well data did not document any exceedances of MCLs, and no observed releases to groundwater were documented; although, arsenic concentrations were slightly elevated.
- Grasshopper Creek was located approximately 800 feet north (downgradient) of the tailings impoundments. Previous sampling results did not document any observed releases to the Creek attributable to this site.
- One potentially hazardous open adit was identified at the site; although, the adit was gated and locked. The mill building was stabilized as part of the cleanup efforts by MDHES and MDSL/AMRB and is maintained by MDFWP.

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

Mine/Site Name: <u>Gold Leaf/Priscilla</u>	County: <u>Beaverhead</u>
Legal Description: <u>T 8S R 11W</u>	Section(s): <u>NW 1/4, Sec. 8</u>
Mining District: <u>Bannack</u>	Mine Type: <u>Hardrock/Au, Ag, Pb, Zn, Cu; Placer/Au</u>
Latitude: <u>N 45° 09' 19"</u>	Primary Drainage: <u>Grasshopper Creek</u>
Longitude: <u>W 112° 59' 05"</u>	USGS Code: <u>10020002</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Grasshopper Creek</u>
Quad: <u>Bannack</u>	Date Investigated: <u>September 16, 1993</u>
Inspectors: <u>Bullock/Pierson</u>	P.A. # <u>01-031</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- There were approximately 89,000 cubic yards of tailings in two separate impoundments, the Gold Leaf tailings (70,000) and the Excelsior tailings (19,000). The following elements were at least three times background in the Gold Leaf tailings:

Arsenic: 429J to 593J mg/kg	Cadmium: 4.3J to 4.4J mg/kg
Cobalt: 19.4 to 22.7 mg/kg	Copper: 789 to 902 mg/kg
Iron: 94,000JX to 98,100JX mg/kg	Mercury: 4.09J to 4.59J mg/kg
Lead: 589 to 937 mg/kg	Antimony: 30J to 36.9J mg/kg
Zinc: 587J to 629J mg/kg	

The following elements were at least three times background in the Excelsior tailings:

Cadmium: 2.6J mg/kg	Cobalt: 42.5 mg/kg
Copper: 925 mg/kg	Mercury: 11.4J mg/kg
Lead: 360 mg/kg	Zinc: 345J mg/kg
- There were approximately 267,500 cubic yards of waste rock associated with this site. The following elements were at least three times background:

Cobalt: 12.3 to 16.1 mg/kg	Copper: 392 to 483 mg/kg
Iron: 49,000 to 49,700 mg/kg	Mercury: 0.547J to 0.788J mg/Kg
- There were no adit discharges, seeps or springs associated with this site.
- Grasshopper creek flowed from west to east through this site. Observed releases were documented for copper and zinc. There were no MCLs or MCLGs exceeded. The acute and chronic aquatic life criteria for zinc were exceeded and could be attributed to this site.
- Other potentially hazardous materials on site included two 55-gallon barrels of lube oil, one 55-gallon barrel of hydraulic oil, one 55-gallon barrel of waste oil, and one sealed 55-gallon barrel of unknown content.
- One HMO, the Priscilla Adit, was open and accessible.

Gold Leaf/ Priscilla PA# 01-031
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 09/16/93

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)
01-031-SE-1	9.41 J	178 J	1.4 U	5.99	5.81 J	19.9	8660 JX	0.16 J	723	12.2	12	9.47 UJ	56.4 J	NR
01-031-SE-2	18.3 J	108 J	0.9 U	3.89	1.64 J	3.13	5420 JX	0.032 U	400	5.46	6.39 UJ	6.17 UJ	28.5 J	NR
01-031-TP-1	593 J	198 J	4.4 J	22.7	12.7 J	789	94000 JX	4.09 J	937	17.5	589	36.9 J	629 J	2.51
01-031-TP-2	429 J	118 J	4.3 J	19.4	11.1 J	902	98100 JX	4.59 J	573	10.6	989	30 J	587 J	3.54
01-031-TP-3	198 J	217 J	2.6 J	42.5	8.03 J	925	34800 JX	11.4 J	1360	17.3	360	20.1 J	345 J	0.142 U
01-031-WR-1	72.8 J	60.4 J	1.3 J	16.1	4.52 J	392	49000 JX	0.547 J	454	10.6	12.1	4.86 UJ	91.1 J	NR
01-031-WR-2	116 J	55.8 J	1.1 J	12.3	7.97 J	483	49700 JX	0.788 J	536	18.6	38.7	9.41 J	93.8 J	NR
BACKGROUND	76	134	0.5 U	3	10	14.1	12100	0.024 J	482	10	23	7 J	59	NR

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	U/1000K	%	U/1000K	%	U/1000K	%	U/1000K	%	U/1000K	%	U/1000K
01-031-TP-1	0.25	7.81	73.8	66	0.22	66	0.03	0	<0.01	0	73.8	73.8
01-031-TP-2	0.34	10.6	74.3	63.7	0.26	63.7	0.05	0.62	0.02	0.62	73.7	73.7
01-031-TP-3	0.26	8.12	137	129	0.19	129	0.02	1.56	0.05	1.56	135	135
01-031-WR-1	3.53	110	176	66.1	<0.01	66.1	2.39	76.9	2.46	76.9	99.5	99.5
01-031-WR-2	1.48	46.2	115	68.4	0.67	68.4	0.45	11.2	0.36	11.2	103	103

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)
01-031-SW-1	2.62	51	4.59 U	5 U	6.24 U	7.3	228	0.12 U	22.3	74.4	1.14	31.7 U	248	84
01-031-SW-2	1.73	50.5	4.59 U	5 U	6.24 U	2.33 U	215	0.12 U	15.6	10.9 U	1.3	31.7 U	87.1 U	82.9

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
01-031-SW-1	141	6	16	< 0.05	NR
01-031-SW-2	182	6	17	0.05	NR

LEGEND

- SE1 - Downgradient of tailing pond 2 on Grasshopper Creek
- SE2 - Upgradient of waste rock dump 4 on Grasshopper Creek
- TP1 - Composite of subsamples TP1A, 1B-A, and 1B-B
- TP2 - Composite of subsamples TP2C-A, 1C-B, and 1C-C
- TP3 - Composite of subsamples TP2A and 2B
- WR1 - Composite of subsamples WR1A, 1B, 2A, and 2B
- WR2 - Composite of subsamples WR4A, 4B, 4C, 5A, 5B, and 5C
- BACKGROUND - From the Element Mill (01-005-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>Indian Queen</u>	County: <u>Beaverhead</u>
Legal Description: <u>T 5S R 10W</u>	Section(s): <u>NE 1/4, SE 1/4, Sec. 15</u>
Mining District: <u>Birch Creek</u>	Mine Type: <u>Hardrock/Cu</u>
Latitude: <u>N 45 ° 53' 55"</u>	Primary Drainage: <u>Birch Creek</u>
Longitude: <u>W 112 ° 49' 10"</u>	USGS Code: <u>10020004</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Birch Creek</u>
Quad: <u>Twin Adams Mountain</u>	Date Investigated: <u>June 15, 1993</u>
Inspectors: <u>Babits, Lasher, Belanger, Clark/ Pierson</u>	P.A. # <u>01-034</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean, and Hoskins, Inc.</u>	

- There were no mill tailings at this site.
- There were approximately 2,600 cubic yards of mostly uncovered slag at the site that extend to the creek. The following were elevated at least three times background:

Cobalt: 57.3 mg/kg	Chromium: 40 mg/kg
Copper: 7,130 mg/kg	Iron: 155,000 mg/kg
Manganese: 14,300 mg/kg	Nickel: 19 mg/kg
Zinc: 873 mg/kg	
- There was approximately 15,490 cubic yards of uncovered waste rock. The following were elevated at least three times background:

Arsenic: 377 to 5,210 mg/kg	Cadmium: 7.4 to 15.6 mg/kg
Cobalt: 20.2 to 74.6 mg/kg	Chromium: 16.4 to 48.2 mg/kg
Copper: 2,070 to 15,900 mg/kg	Iron: 88,400 to 107,000 mg/kg
Mercury: 0.715 to 0.822 mg/kg	Manganese: 1,800 to 2,910 mg/kg
Nickel: 10 to 25 mg/kg	Lead: 468 to 503 mg/kg
Zinc: 431 to 1,490 mg/kg	
- There were no discharging adits identified at the site.
- No surface water samples were collected from Birch Creek due to extremely high water conditions; however, observed releases to Birch Creek sediment were documented for arsenic, cadmium, cobalt, copper, manganese, nickel, lead, and zinc.

Indian Queen PA# 01-034
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER-BABITS
 INVESTIGATION DATE: 06/15/93

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)
01-034-SE-1	5	38.9	< 0.7	2.6	5.7	14	28400	< 0.019	237	< 3	9	< 5	29	NR
01-034-SE-2	448	91.8	7.9	15.4	11.1	4200	51900	< 0.029	1100	9	176	< 6	432	NR
01-034-SG-1	105	42.6	4.6	57.3	40	7130	155000	< 0.013	14300	19	47	< 3	873	NR
01-034-WR-1	759	9.1	7.4	20.2	17.1	15900	107000	0.169	2910	10	503	< 4	431	NR
01-034-WR-2	377	253	15.6	9.7	8.1	826	28000	0.822	1800	12	20	9	646	NR
01-034-WR-3	5210	79.1	11.5	74.6	48.2	13500	92100	0.215	1820	25	468	11	1490	NR
01-034-WR-4	1150	55.1	1.3	12.3	16.4	2070	88400	0.715	2320	7	96	< 3	244	NR
BACKGROUND	43	104	2.2	6.5	5.1	382	19200	0.085	582	3	56	< 4	117	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.		SULFATE		ORGANIC SULFUR		PYRITIC SULFUR		ACID BASE POTENT.		TOTAL SULFUR	
	%	1/1000	1/1000	%	SULFUR	%	%	%	SULFUR	%	1/1000	1/1000	1/1000	1/1000
01-034-WR-1	0.47	14.7	15.2	0.02	0.49	<0.01	0.49	0	<0.01	15.2	0	15.2	0	15.2
01-034-WR1-DUP	0.48	15	15.9	<0.01	0.51	<0.01	0.51	0	<0.01	15.9	0	15.9	0	15.9
01-034-WR-2	0.02	0.62	41	0.02	<0.01	<0.01	<0.01	0	<0.01	41	0	41	0	41
01-034-WR-3	0.06	1.87	49.3	0.05	0.01	<0.01	0.01	0	<0.01	49.3	0	49.3	0	49.3
01-034-WR-4	0.02	0.62	37.2	0.02	<0.01	<0.01	<0.01	0	<0.01	37.2	0	37.2	0	37.2

LEGEND

- SE1 - 20' upgradient of slag on Birch Creek
- SE2 - 20' downgradient of slag on Birch Creek
- SG1 - slag from East on road on creek
- WR1 - Sample of subsample WR1B.
- WR2 - Composite of subsamples WR1A, 1B, and 1C.
- WR3 - Composite of subsamples WR3A and 5.
- WR4 - Composite of subsamples WR2, 3E, and 4.
- WR1-DUP - Duplicate of 01-034-WR-1
- BACKGROUND - From Indian Queen (01-034-00SS-1)

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

Mine/Site Name: <u>Old Elkhorn</u>	County: <u>Beaverhead</u>
Legal Description: <u>T 4S R 12W</u>	Section(s): <u>NE 1/4, NE 1/4, Sec. 14</u>
Mining District: <u>Elkhorn</u>	Mine Type: <u>Hardrock/Au, Ag, Cu, Pb, Zn</u>
Latitude: <u>N 45° 29' 23"</u>	Primary Drainage: <u>Wise River</u>
Longitude: <u>W 113° 02' 18"</u>	USGS Code: <u>10020004</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Elkhorn Creek</u>
Quad: <u>Elkhorn Hot Springs</u>	Date Investigated: <u>September 15, 1993</u>
Inspectors: <u>Bullock/Pierson</u>	P.A. # <u>01-169</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- Ore from this site was milled at the Elkhorn Mill, PA# 01-009.
- The volume of waste rock associated with this site was estimated to be 50,000 cubic yards. The following elements were elevated at least three times background:

Arsenic: 121J mg/kg	Mercury: 1.59J mg/kg to 1.75J mg/kg
Cadmium: 4.8J mg/kg	Lead: 717 mg/kg
Copper: 189 mg/kg to 573 mg/kg	Zinc: 821J mg/kg
- There was one open adit identified with a discharge associated with this site with a significant estimated flow of 150 gpm. The pH at this discharge point was 5.72 and the specific conductance was measured at 291 umhos/cm. The MCL for cadmium was exceeded in the adit discharge. Acute and chronic aquatic life criteria were exceeded for iron, cadmium, copper, lead, and zinc were exceeded. A portion of the adit discharge flows over and through waste rock to a settling pond prior to discharging into Elkhorn Creek. There are two seeps associated with this site. The PPE for the adit discharge was sampled as SW-3 just prior to its confluence with Elkhorn Creek. One seep emanates from the northern toe of a waste rock dump characterized by sample SW-2. The MCL/MCLGs were exceeded for cadmium (SW-2, SW-3) and copper (SW-2). The MCL/MCLG for antimony was exceeded for the seep (SW-2). Acute aquatic life criteria was exceeded for copper and zinc in SW-2 and SW-3. Chronic aquatic life criteria were exceeded for cadmium, copper, lead, and zinc in SW-2 and SW-3.
- Two surface water samples were collected on Elkhorn Creek; SW-1 was downstream and SW-4 was upstream of the site. Observed releases to Elkhorn Creek were documented for copper and zinc. No MCLs were exceeded; however, acute and chronic aquatic life criteria were exceeded for copper and zinc which were directly attributable to the site.
- There were two potentially hazardous structures associated with this property. In addition, WR-1 was rated overly steep and was eroding. The open adit was classified as a hazardous mine opening, especially due to the heavy tourist use.

Old Elkhorn PA# 01-169
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 09/15/93

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)
01-169-SE-1	7.09 J	35.4 J	0.9 U	2.37	1.22 U	52.9	6980 JX	0.032 U	392	4.58	6.68	6.18 UJ	134 J	NR
01-169-SE-2	4.02 U	18.2 J	0.8 U	1.09	1.05 U	1.83	2820 JX	0.031 U	251	4	5.51 UJ	5.32 UJ	19 J	NR
01-169-WR-1	17.1 J	121 J	0.9 U	4.59	1.18 U	189	14500 JX	1.59 J	393	5.16	22.2	5.99 UJ	123 J	NR
01-169-WR-2	121 J	55.1 J	4.8 J	4.19	1.25 U	573	18200 JX	1.75 J	1590	4.13	717	9.92 J	821 J	NR
BACKGROUND	12.3 J	182 J	1.1 U	6.54	4.37 J	17.8	12300 JX	0.052 J	1170	8.28	15.8	7.35 UJ	158 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 ACID BASE POTENTIAL		SULFUR ACID BASE POTENTIAL		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC ACID BASE POTENTIAL	
	%	1/1000	1/1000	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000
01-169-WR-1	0.26	8.12	33.1	25	<0.01	0.09	0.17	2.81	30.3			
01-169-WR-2	1.07	33.4	7.61	-26	0.38	0.11	0.58	3.44	4.18			

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)
01-169-GW-1	19.9	5.03	17.8	6.47	6.24 U	745	3590	0.12 U	3590	10.9 U	107	31.7 U	3630	99.3
01-169-SW-1	1.12 U	11.7	4.59 U	5 U	6.24 U	23.6	32.2	0.12 U	71.1	10.9 U	1.88	31.7 U	159	22.8
01-169-SW-2	1.18	8.2	49.2	10	6.24 U	2930	926	0.12 U	9490	14.7	57.5	50.8	11100	225
01-169-SW-3	1.26	11.8	16.5	6.33	6.24 U	700	193	0.12 U	3210	10.9 U	25	31.7 U	3500	102
01-169-SW-4	1.12 U	10.1	4.59 U	5 U	6.24 U	2.33 U	30.1	0.12 U	7.47	10.9 U	0.94 U	35.3	8.71 U	17.3

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
01-169-GW-1	238	< 5	124	0.09	NR
01-169-SW-1	67	< 5	12	0.07	NR
01-169-SW-2	542	< 5	297	0.05	NR
01-169-SW-3	204	< 5	131	< 0.05	NR
01-169-SW-4	42	< 5	< 5	0.05	NR

LEGEND

- SE1 - Downgradient Elkhorn Creek near old bridge
- SE2 - Upgradient Elkhorn Creek
- WR1 - Composite of subsamples WR1A and 1B
- WR2 - Composite of subsamples WR1C through 1G
- BACKGROUND - From the Old Elkhorn Mine (01-169-SS-1)
- GW1 - Adit #1 discharge
- SW1 - Same as sample SE1
- SW2 - Seepage from North end of waste rock dump 1 at PPE to Elkhorn Creek
- SW3 - Adit discharge at PPE to Elkhorn Creek
- SW4 - Upgradient Elkhorn Creek

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

Mine/Site Name: <u>Ermont Mill</u>	County: <u>Beaverhead</u>
Legal Description: <u>T 6S R 11W</u>	Section(s): <u>NW 1/4, SE 1/4, Sec. 35</u>
Mining District: <u>Ermont</u>	Mine Type: <u>Hardrock/Ag, Au, Cu</u>
Latitude: <u>N 45° 16' 05"</u>	Primary Drainage: <u>Beaverhead River</u>
Longitude: <u>W 112° 54' 50"</u>	USGS Code: <u>10020002</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Ermont Gulch</u>
Quad: <u>Ermont</u>	Date Investigated: <u>June 14, 1993</u>
Inspectors: <u>Babits, Belanger, Lasher, Clark/Pierson</u>	P.A. # <u>01-005</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- There were approximately 200,000 cubic yards of uncovered tailings on site. The following were elevated at least three times background:

Arsenic: 3,510 mg/kg	Mercury: 1.38J mg/kg
Barium: 796 mg/kg	Antimony: 54J mg/kg
Cobalt: 11.5 mg/kg	Zinc: 334 mg/kg
Iron: 36,500 mg/kg	
- There were approximately 4,160 cubic yards of uncovered waste rock on site. The following were elevated at least three times background:

Arsenic: 431 mg/kg
Cobalt: 9.3 mg/kg
Mercury: 1.06J mg/kg
- There were no discharging adits on site.
- A dry intermittent drainage was identified on site; however, no surface water or sediment samples were collected because the nearest flowing water was one and one-half miles from the site.

Ermont Mill and Mines PA# 01-005
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BABITS
 INVESTIGATION DATE: 06/14/83

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)
01-005-TP-1	3510	796	1.3	11.5	11.8	22.4	36500	1.38 J	852	14	61	54 J	334	13.5
01-112-WR-1	431	192	0.4 U	9.3	5.1	17.6	20300	1.06 J	629	6	16	10 J	43	NR
BACKGROUND	76	134	0.5 U	3	10	14.1	12100	0.024 J	482	10	23	7 J	59	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 %	NEUTRAL POTENT	SULFUR POTENT	SULFATE %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC ACID BASE	SULFUR ACID BASE	SULFUR POTENTIAL
01-005-TP-1	0.14	4.37	84.2	79.8	0.13	<0.01	0.02	0	84.2	398
01-112-WR-1	<0.01	0	398	398	<0.01	0.01	<0.01	0.31	398	398

LEGEND

TP1 - Composite of subsamples TP1A-A, -B, -C, and 1B-A, -B, -C, -D, -E
 WR1 - Composite of subsamples WR1, 2A, 2B, 3, and 5
 BACKGROUND - Across drainage from adit #4,
 From the Ermont Mill (01-005-SS-1)

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

Mine/Site Name: <u>Silver King</u>	County: <u>Beaverhead</u>
Legal Description: T <u>3S</u> R <u>11W</u>	Section(s): <u>NE 1/4, SW 1/4, Sec. 11</u>
Mining District: <u>Hecla</u>	Mine Type: <u>Hardrock/Pb, Zn, Ag</u>
Latitude: <u>N 45° 35' 08"</u>	Primary Drainage: <u>Big Hole River</u>
Longitude: <u>W 112° 55' 42"</u>	USGS Code: <u>10020004</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Trapper Creek</u>
Quad: <u>Hardrock/Pb, Zn, Ag</u>	Date Investigated: <u>August 26, 1993</u>
Inspectors: <u>Bullock, Tuesday</u>	P.A. # <u>01-094</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings found to be associated with this site.
- The volume of waste rock associated with this site was estimated to be approximately 1,100 cubic yards. The following elements were elevated at least three times background:
 - Cadmium: 918J mg/kg
 - Mercury: 26.6J mg/kg
 - Lead: 32,300JX mg/kg
 - Antimony: 339J mg/kg
 - Zinc: 113,000J mg/kg
- There were two collapsed adits observed at this site. Groundwater was not likely to be present; and limestone was present to buffer water that may pass through the old workings. There were no adit discharges, seeps or springs associated with this site.
- There were no direct pathways observed from this site to Trapper Creek, located approximately ¼ mile below the site. No surface water or groundwater samples were collected.
- No other hazardous materials were observed at this site.

Silver King PA# 01-094
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 08/26/93

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)
01-094-WR-1	91.9	23 J	918.00 J	2.68	4.57 JX	266	25800	26.6 J	544 J	7.99 JX	32300 JX	339 J	113000 J	NR
BACKGROUND	43	104	2.2	6.5	5.1	382	19200	0.085 J	582	3	56	4 UJ	117	< 0.271

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		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE		SULFUR ACID BASE POTENT	
	%	U/1000	%	U/1000	%	U/1000	%	U/1000	%	U/1000	%	U/1000	%	U/1000
01-094-WR-1	0.67	20.9	0.41	401	<0.01	380	0.3	0.66	0.3	20.6	0.3	20.6	381	381
01-094-WR-1DUP	0.67	20.9	0.406	406	<0.01	385	0.28	0.7	0.28	21.9	0.28	21.9	384	384

LEGEND

SE2 -
 WR1 - Composite of subsamples WELA, 1B, and 2
 BACKGROUND - From the Indian Queen Mine (01-034-SS-1)
 WR1DUP - Duplicates of the 01-094-WR-1 sample.

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

Mine/Site Name: <u>True Blue</u>	County: <u>Beaverhead</u>
Legal Description: <u>T 3S R 11W</u>	Section(s): <u>SW 1/4, NE 1/4, Section 2</u>
Mining District: <u>Hecla/Vipond Park</u>	Mine Type: <u>Millsite/Ag, Pb, Au</u>
Latitude: <u>N 45° 36' 18"</u>	Primary Drainage: <u>Trapper Creek</u>
Longitude: <u>W 112° 55' 42"</u>	USGS Code: <u>10020004</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Spring Creek</u>
Quad: <u>Mount Tahepia</u>	Date Investigated: <u>August 1, 1994</u>
Inspectors: <u>Bisch, Flammang, West</u>	P.A. # <u>01-138</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings observed at the site was estimated to be 5,860 cubic yards. The following elements were elevated to at least three times the background concentrations:

Silver: 81.4 to 85.7 mg/kg	Arsenic: 142J to 3,030J mg/kg
Cadmium: 37.9J to 293J mg/kg	Copper: 767 to 8,970 mg/kg
Mercury: 2.96JX to 90.4JX mg/kg	Lead: 7,780 to 38,400 mg/kg
Antimony: 114J to 1,420J mg/kg	Zinc: 12,800 to 34,000 mg/kg

- The volume of waste rock observed at the site was estimated to be 1,350 cubic yards. The waste rock was sampled for XRF analysis only due to the coarse nature of the material in conjunction with well established vegetation on the dumps. The following elements were elevated at least three times background:

Copper: 337 mg/kg	Iron: 66,247 mg/kg
Manganese: 3,794 mg/kg	

- An unnamed tributary to Sappington Creek flows adjacent to the site on the north side; observed releases to the tributary (sediment) were documented for silver, arsenic, and cadmium.

- No MCLs were exceeded in the tributary; however, the chronic aquatic life criteria for mercury was exceeded in both the upstream and downstream samples, and the chronic aquatic life criteria for lead was exceeded in the upstream sample.

- A spring emanating from near the foot of the mill was sampled during the investigation. The EPA action level for lead and the acute and chronic aquatic life criteria for copper, lead, and zinc were all exceeded in the spring sample.

- Potential safety hazards observed at the site included the collapsing mill building (which is a very large structure) and several collapsing cabins.

True Blue PA# 01-138
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BISCH
 INVESTIGATION DATE: 08/01/94

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	Ag (mg/Kg)	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)
01-138-SE1	4.2	54.1 J	21.8	3.8 J	3.6	5.1 J	125	19200 JX	0.60 JX	268 J	9.3	548	22.1 J	537	NR
01-138-SE2	1.2	17.7 J	44.4	1.1 UJ	8.5	8.0 J	47.6	23700 JX	0.43 JX	342 J	13.1	243	14.3 UJ	232	NR
01-138-TP1	81.4	142 J	6.9	37.9 J	2.5	1.3 UJ	767	3620 JX	2.96 JX	724 J	3.2	7780	11.4 J	12800	NR
01-138-TP2	85.7	3030 J	37.0	293 J	4.6	14.8 J	8970	32800 JX	90.4 JX	2520 J	14.7	38400	1420 J	34000	NR
BACKGROUND	2.1	45.0 J	223 J	2.2 J	10.1	16.2 J	45.7	19600 JX	0.34 JX	1190 J	14.2	275	13.0 UJ	322	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	
	%	1/1000R	%	1/1000R	%	1/1000R	%	1/1000R	%	1/1000R	%	1/1000R
01-138-TP1	<0.01	0.00	200	172	<0.01	0.07	<0.01	<0.01	0.03	0.00	0.00	200
01-138-TP2	0.08	2.50	172	169	0.07	0.02	<0.01	<0.01	0.02	0.00	0.00	172

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
01-138-SW1	0.12	1.9	23.6	4.0 U	8.4 U	6.8 U	5.9 U	37.4	0.13	2.3 U	14.4 U	4.5 J	51.6 U	15.6 U	158
01-138-SW2	0.12 U	2.1	23.3	4.0 U	8.4 U	6.8 U	5.9 U	98.9	0.12	6.4	14.4 U	6.3 J	51.6 U	15.6 U	162
01-138-SW3	1.02	11.8	10.5	4.0 U	8.4 U	9.0	35.2	222	0.25	24.0	14.4 U	252 J	51.6 U	247	109

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
01-138-SW1	103	<5.0	5.0	0.14	NR
01-138-SW2	134	<5.0	5.0	0.17	NR
01-138-SW3	56	<5.0	<0.05	<0.05	NR

LEGEND

- SE1 - Downgradient of TP1; job is 340' west and 100' north.
- SE2 - Upgradient of SE1, just below where three pipes merge together.
- TP1 - One sample of the TPA sub-sample.
- TP2 - One sample of the TP1C sub-sample.
- BACKGROUND - From the True Blue Mine (01-138-BE1).
- SW1 - Same as sample 01-138-BE1.
- SW2 - Same as sample 01-138-BE2.
- SW3 - Spring system. 10' southeast of southeast mill building corner.

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

Mine/Site Name: <u>Lower and Upper Cleve</u>	County: <u>Beaverhead</u>
Legal Description: T <u>3S</u> R <u>11W</u>	Section(s): <u>NE 1/4, SW 1/4, Sec. 1</u>
Mining District: <u>Hecla</u>	Mine Type: <u>Hardrock/Ag, Cu, Pb</u>
Latitude: <u>N 45° 36' 14"</u>	Primary Drainage: <u>Trapper Creek/Big Hole River</u>
Longitude: <u>W 112° 54' 45"</u>	USGS Code: <u>10020004</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Sappington Creek</u>
Quad: <u>Mount Tahepia</u>	Date Investigated: <u>September 14, 1993</u>
Inspectors: <u>Bullock/Pierson</u>	P.A. # <u>01-143</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- There were no mill tailings found to be associated with this site.
- The volume of waste rock associated with this site was estimated to be 49,000 cubic yards. (Upper Cleve adits and dumps were added due to the close proximity and contribution to erosion problems.) The following elements were elevated at least three times background:

Arsenic: 268J to 615J mg/kg	Nickel: 12.8 mg/kg
Cadmium: 18.9 to 51.0 mg/kg	Lead: 1,920 to 9,770 mg/kg
Copper: 1,540 mg/kg	Antimony: 225J to 352J mg/kg
Mercury: 8.97J to 16.6J mg/kg	Zinc: 3,310 to 7,670 mg/kg
Manganese: 6,600 mg/kg	
- There were no adit discharges, seeps or springs identified at this site.
- The mine was located near the headwaters of the North Fork of Sappington Creek. Surface water samples were collected upstream and downstream from the site; no MCLs/MCLGs or acute or chronic aquatic life criteria were exceeded. The pH ranged between 8.63 and 8.80 and Eh ranged between 218 to 240 mV.
- Observed releases to the North Fork of Sappington Creek (sediment) were documented for arsenic, lead, and antimony.
- Two open adits located at this site were classified as hazardous mine openings.

Upper and Lower Cleve PA# 01-143
 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)
01-143-SE-1	319 J	31.1	8.92	7.61	9.51	416	24800	3.51 J	542	19.5	1680	327 J	1310	NR
01-143-SE-2	162 J	22.8	14.70	4.89	11.9	522	12800	6.28 J	670	12.1	3930	135 J	2730	NR
01-143-SE-3	81.5 J	46.6	5.43	4.41	11.3	214	12500	1.88 J	704	14.7	1270	51.5 J	1230	NR
01-143-WR-1	615 J	22.7	51.00	3.11	5.68	1540	12700	16.6 J	6600	12.8	9770	352 J	7670	NR
01-143-WR-2	268 J	0.19 U	18.90	1.09	2.14	440	11500	8.97 J	878	4.36	1920	225 J	3310	NR
BACKGROUND	43	104	2.2	6.5	5.1	382	19200	0.065 J	582	3	56	4 UJ	117	< 0.271

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/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x
01-143-WR-1	<0.01	0	482	482	<0.01	482	0.01	0	482	0	482	497
01-143-WR-2	<0.01	0	497	497	<0.01	497	0.01	0	497	0	497	497

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)
01-143-SW-1	3.09	13.1	4.59 U	5 U	6.24 U	2.33 U	13.7 U	0.23 J	3.76 U	10.9 U	2.58	31.7 U	15.6	159
01-143-SW-2	2.81	11.5	4.59 U	5 U	6.24 U	2.33 U	15.5	0.13 J	3.76 U	10.9 U	1.33	31.7 U	8.71 U	154

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
01-143-SW-1	193	< 5	< 5	0.1	NR
01-143-SW-2	199	< 5	< 5	0.1	NR

LEGEND

- SE1 - Downgradient sediment, 650' below road to Trapper Mine in Seppington Creek.
- SE2 - 150' below waste rock dump 1 on Seppington Creek.
- SE3 - 110' above waste rock dump 1 on Seppington Creek.
- WR1 - Composite of subsamples WR1A and 1C
- WR2 - Composite of subsamples WR2A and 2B
- BACKGROUND - From the Indian Queen Mine (01-034-SS-1).
- SW1 - 150' below waste rock dump 1 on Seppington Creek.
- SW2 - 110' above waste rock dump 1 on Seppington Creek.

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

Mine/Site Name: <u>Trapper</u>	County: <u>Beaverhead</u>
Legal Description: <u>T 3S R 11W</u>	Section(s): <u>NW 1/4, NW 1/4, Sec. 12</u>
Mining District: <u>Hecla</u>	Mine Type: <u>Hardrock/Au, Ag, Pb, Cu</u>
Latitude: <u>N 45° 35' 45"</u>	Primary Drainage: <u>Trapper Creek</u>
Longitude: <u>W 112° 54' 52"</u>	USGS Code: <u>10020004</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>N. Fk. Sappington Ck.</u>
Quad: <u>Mount Tahepia</u>	Date Investigated: <u>August 26, 1993</u>
Inspectors: <u>Bullock, Tuesday</u>	P.A. # <u>01-144</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of mill tailings associated with this site was estimated to be 1,460 cubic yards. The following elements were elevated at least three times background:

Arsenic: 818J to 1,260J mg/kg	Manganese: 1770 mg/kg
Cadmium: 65.9J to 110J mg/kg	Nickel: 16.3 to 34.3 mg/kg
Chromium: 16.8 mg/kg	Lead: 7860 to 13,600 mg/kg
Copper: 2570 to 3980 mg/kg	Antimony: 463 to 536 mg/kg
Mercury: 39.6J to 85.8J mg/kg	Zinc: 21,800 to 24,200 mg/kg
- The volume of waste rock associated with this site was estimated to be 6,700 cubic yards. The following elements were elevated at least three times background:

Arsenic: 505J mg/kg	Nickel: 10.6 mg/kg
Cadmium: 96.2J mg/kg	Antimony: 157 mg/kg
Mercury: 10.6J mg/kg	Zinc: 1060 mg/kg
- There were no adit discharges, seeps or springs observed at this site.
- The Main Fork of Sappington Creek appeared to flow through and around the tailings pond during high flow events. Surface water samples were collected up and down stream of this site and there were no documented releases or MCL/MCLGs exceedences. No acute or chronic aquatic life criteria were exceeded. Sediment samples were collected up and down stream from this site. Observed releases of copper, lead, mercury, nickel, and zinc were documented in the sediments.
- There were two hazardous structures identified at this site, the old mill and a cabin.

Trapper PA# 01-144
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 09/15/93

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)
01-144-SE-1	11.1	13.4 J	0.987 UJ	3.48	8.27 JX	22.1	7640	0.181 J	302 J	9.57 JX	374 JX	10.9 J	206 J	NR
01-144-SE-2	5.62	12.4 J	0.963 UJ	2.37	3.14 JX	0.484 U	3920	0.038 UJ	251 J	2.55 JX	6.81 UJX	6.58 UJ	22.7 J	NR
01-144-TP-1	818 J	4.92	65.9 J	2.78	6.58	2570	10200	39.6 J	811	16.3	7860	463	21800	NR
01-144-TP-2	1260 J	32.5	110 J	6.71	16.8	3980	18500	85.8 J	1770	34.3	13600	536	24200	NR
01-144-WR-1	505 J	0.187 U	96.2 J	2.46	1.48	0.396 U	7240	34.3 J	1180	10.6	5.58 U	157	1060	NR
BACKGROUND	43	104	2.2	6.5	5.1	382	19200	0.085 J	582	3	56	4 UJ	117	< 0.271

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		SULFATE		PYRITIC		ORGANIC		PYRITIC		SULFUR ACID BASE POTENT.	
	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x
01-144-TP-1	0	1	188	187	<0.01	0	<0.01	0	<0.01	0	<0.01	0	0	0	188	188
01-144-TP-2	0	1	136	135	<0.01	0	<0.01	0	0	1	135	0	1	135	135	135
01-144-WR-1	0	2	888	886	<0.01	0	<0.01	0	<0.01	0	888	0	0	888	888	888

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)
01-144-SW-1	1.12 U	32.8	4.59 U	5 U	6.24 U	2.33 U	31.1 J	0.22	376 U	10.9 U	1.02	31.7 U	11.4	152
01-144-SW-2	1.12 U	31.1	4.59 U	5 U	6.24 U	2.33 U	36.3 J	0.2	5.8	10.9 U	0.94 U	31.7 U	8.71 U	168

Wet Chemistry Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
01-144-SW-1	179	< 5.0	6	< 0.05	NR
01-144-SW-2	169	< 5.0	5	< 0.05	NR

LEGEND

- SE1 - Sapprington Creek 200 feet below last tailings pond
- SE2 - Sapprington Creek 100 feet upstream from waste rock
- TP1 - Composite of subsamples TP1B, 2AA, and 3AA
- TP2 - Composite of subsamples TP2AB and 3AB
- WR1 - Composite of subsamples WR1A, 1B, 2A, and 2B
- BACKGROUND - From Indian Queen Mine (01-034-SB-1)
- SW1 - Same as sample SE1
- SW2 - Same as sample SE2

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

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

Mine/Site Name: Last Chance No. 1/IER County: Beaverhead
Legal Description: T 10S R 15W Section(s): NE 1/4, NW 1/4, Sec. 29
Mining District: Lemhi Pass Mine Type: Hardrock/Thorium, Uranium
Latitude: N 44° 56' 25" Primary Drainage: North Frying Pan Creek
Longitude: W 113° 28' 12" USGS Code: 10020001
Land Status: Public Secondary Drainage: North Frying Pan Creek
Quad: Lemhi Pass Date Investigated: August 25, 1993
Inspectors: Bullock, Tuesday P.A. # 01-216
Organization: Pioneer Technical Services, Inc.

- This site was an uranium mine associated with the Last Chance No. 2 (PA# 01-220) and the South Frying Pan Creek (PA# 01-211) mines.
- 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 13,000 cubic yards. The following elements were elevated at least three times background:

Arsenic: 37.4 mg/kg	Mercury: 4.53J mg/kg
Barium: 4,370J mg/kg	Manganese: 4,760 mg/kg
Cobalt: 18.8 mg/kg	Lead: 31.1 mg/kg
Copper: 70.6 mg/kg	Zinc: 149 mg/kg
Thorium-228: 440 pCi/l	Thorium-230: 150 pCi/l
Thorium -232: 420 pCi/l	Uranium-234: 6.8 pCi/l
Uranium-238: 7.2 pCi/l	
- No discharging adits, filled shafts, seeps, or springs were observed at the site during the investigation.
- The nearest surface water drainage was a small intermittent stream bed (dry during the investigation) located approximately 250 feet from toe of dump. No direct runoff pathways from the waste rock dump to the drainage were identified.
- High radiation readings were observed in the open trench (7.0 mR/HR) located above the adit and in the waste rock material (0.90 to 4.0 mR/HR).
- Potential safety hazards associated with the site included a adit with a locked gate, a highwall associated with the trench cut, and a steep and unstable waste rock dump.

Last Chance #1/IER PA# 01-216
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 08/26/93

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)
01-216-WR-1	37.4	4370 J	0.8 U	18.8	2.63	70.6	9120	4.53 J	4760	13 J	31.1	11.8 J	149	NR
BACKGROUND	5.13 U	221 J	1.0 U	3.82	4.61	6.23	7120	0.033 U	944	9.52 J	7.03 J	6.79 UJ	33.6	NR

U - Not Detected, J - Estimated Quantity, X - Odilor for Accuracy or Precision, NR - Not Reported, * - From Barringer Laboratory

Radiochemistry

FIELD ID	Analyte (pCi/l)				
01-216-WR-1*	440 [20]	150 [10]	420 [20]	6.8 [1.1]	0.1 [0.3]
BACKGROUND*	1.6 [0.7]	1.4 [0.05]	1.7 [0.7]	0.9 [0.5]	0.0 [0.2]

[] - Plus or minus

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	SULFUR ACID BASE %	NEUTRAL POTENT. %	SULFUR ACID BASE POTENT. %	SULFATE %	SULFUR %	PYRITIC %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE %	SULFUR ACID BASE POTENT. %
01-216-WR-1	0.49	15.3	20.1	4.8	0.03	0.04	1.25	0.42	1.25	18.9

LEGEND

WR1 - Composite of subsamples WR1A and 1B
 BACKGROUND - From the Last Chance #1/IER (01-216-SS-1)

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

Mine/Site Name: <u>Tungsten Millsite</u>	County: <u>Beaverhead</u>
Legal Description: T <u>4S</u> R <u>9W</u>	Section(s): <u>SW 1/4, Sec. 4; SE1/4, SE/14, Sec. 5</u>
Mining District: <u>Lost Creek</u>	Mine Type: <u>Millsite/Tungsten</u>
Latitude: <u>N 45° 30' 45"</u>	Primary Drainage: <u>Big Hole River</u>
Longitude: <u>W 112° 43' 45"</u>	USGS Code: <u>10020004</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Sassman Gulch</u>
Quad: <u>Earls Gulch</u>	Date Investigated: <u>September 13, 1993</u>
Inspectors: <u>Bullock/Pierson</u>	P.A. # <u>01-170</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings associated with this site was estimated to be approximately 448,000 cubic yards. A heavy petroleum odor was observed in the lower clay of TP-4 (Total Petroleum Hydrocarbons = 611 mg/kg). The following elements were elevated at least three times background:

Barium: 2620 mg/kg	Manganese: 4,380 to 14,900 mg/kg
Cadmium: 2.81 mg/kg	Lead: 123 mg/kg
Copper: 107 to 567 mg/kg	Antimony: 19.9 mg/kg
Mercury: 0.054 to 0.475 mg/kg	Zinc: 468 mg/kg

- The volume of waste rock associated with this site was estimated to be approximately 11,700 cubic yards. The following elements were elevated at least three times background:

Copper: 2380 mg/kg	Antimony: 18.5 mg/kg
Mercury: 0.054 mg/kg	Manganese: 2310 mg/kg

- The site was partially reclaimed in 1990.

- Several residences were located in close proximity to the site. Groundwater samples were collected from residential well located directly downgradient from the site and one directly upgradient from the site. Total petroleum hydrocarbons were measured at 23.3 mg/L in the downgradient well (GW-1). No MCLs were exceeded in either of the wells; however, the chronic aquatic life criteria for mercury was exceeded in the upgradient well (GW-2). Additionally, an observed release to groundwater was documented for barium, which was directly attributable to the site.

- No surface water was observed on or near the site during the investigation, intermittent Sassman Gulch (dry during the investigation) was located more than 1,000 feet south of the site; consequently, no surface water samples were collected.

- Potential safety hazards identified at the site include a 15 feet tall loadout wall and an eroding tailings pile (TP-6); however, the majority of the site was surrounded by a fence.

Tungsten Millsite PA# 01-170
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 09/13/93

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)	Total Petroleum Hydrocarbons (mg/Kg)
01-170-TP-1	7.5 J	89.2	0.89 U	7.35	11.6	107	32500	0.055 J	4380	10.1	17.9	6.39 J	119	NR
01-170-TP-2	107 J	2620	0.73	17.8	7.94	123	17600	0.475 J	14900	29.5	35.1	19.9 J	79.6	NR
01-170-TP-3	5.58 J	88.9	1.48	7.5	9.78	189	38200	0.087 J	4870	10.4	31.5	6.59 UJ	125	NR
01-170-TP-4	12.6 J	41.6	2.81	12.7	15.5	567	62500	0.143 J	5310	16.5	123	6.78 UJ	154	611
01-170-TP-5	8.03 J	134	1.72	16.2	16.5	331	47900	0.072 J	7000	21.8	7.36	10.5 J	468	NR
01-170-WR-1	6.28 J	40.9	2.29	9.59	6.08	2380	28600	0.055 J	2310	10.7	8.87	18.5 J	323	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		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		ORGANIC SULFUR		PYRITIC SULFUR		SULFUR ACID BASE POTENT.	
	%	1/10000	1/10000	%	1/10000	%	1/10000	%	1/10000	%	1/10000	
01-170-TP-1	<0.01	0	165	<0.01	165	0.02	0	0.02	0	165	0	165
01-170-TP-2	<0.01	0	47.7	<0.01	47.7	<0.01	0	<0.01	0	47.7	0	47.7
01-170-TP-3	0.01	0.31	125	<0.01	125	0.01	0	0.01	0	125	0	125
01-170-TP-4	0.03	0.94	135	0.01	134	0.02	0	0.02	0	135	0	135
01-170-TP-5	0.06	1.87	206	0.05	204	0.01	0	0.01	0	206	0	206
01-170-WR-1	<0.01	0	131	<0.01	131	<0.01	0	<0.01	0	131	0	131

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)
01-170-GW-1	3.39	97.5	4.59 U	5 U	6.24 U	2.33 U	53.1	0.12 U	3.76 U	10.9 U	1.22 U	31.7 U	8.71 U	309
01-170-GW-2	2.09	29.1	4.59 U	5 U	6.24 U	2.33 U	24.4	0.15 J	4.6	10.9 U	2.17	31.7 U	69.3	175

Wet Chemistry

Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	TOTAL PETROLEUM HYDROCARBONS (mg/L)
01-170-GW-1	408	31	60	0.64	23.3
01-170-GW-2	234	9	16	0.4	NR

LEGEND

- TP1 - Composite of subsamples TP1A, 1B, and 1D.
- TP2 - Sample of the TP1C subsample.
- TP3 - Composite of subsamples TP2A, 2B, 2C, 3A, 3B, 3C, 4A, and 4B
- TP4 - Sample of the TP4C subsample.
- TP5 - Sample of the TP6A subsample.
- WR1 - Composite of subsamples WR1A and 1B
- BACKGROUND - From the Emma Mine (29-061-SS-1).
- GW1 - Downgradient sample at trailer; below tailings pond 8.
- GW2 - Water supply well for mill; converted to residence

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>Clara</u>	County: <u>Beaverhead</u>
Legal Description: <u>T 3S R 14W</u>	Section(s): <u>NE 1/4, NW 1/4, Sec. 18</u>
Mining District: <u>Wisdom</u>	Mine Type: <u>Hardrock/Unknown</u>
Latitude: <u>N 45° 34' 43"</u>	Primary Drainage: <u>Sleek Creek</u>
Longitude: <u>W 113° 22' 38"</u>	USGS Code: <u>10020004</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Dry Gulch</u>
Quad: <u>Highland Ranch</u>	Date Investigated: <u>August 13, 1993</u>
Inspectors: <u>Bullock, Tuesday, Belanger</u>	P.A. # <u>01-262</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings identified to be associated with this site.
- The volume of waste rock associated with this site was estimated to be approximately 2,185 cubic yards. The following elements were elevated at least three times background:

Barium: 622 mg/kg	Mercury: 1.1 mg/kg
Cadmium: 6.1J mg/kg	Lead: 145 mg/kg
Copper: 86.8 mg/kg	Iron: 39,300 mg/kg
Zinc: 995 mg/kg	
- There was one discharging adit identified at this site and it was characterized by sample GW-1. The pH of GW-1 was 7.02 and specific conductance was 240 umhos/cm. No MCLs or MCLGs were exceeded. The acute aquatic life criteria for cadmium was exceeded. Chronic aquatic life criteria were exceeded for lead. The adits discharge flows over a portion of Waste Rock Dump #1, prior to seeping back into the ground.
- Two surface water samples were collected from Dry Gulch, one up gradient and one down gradient represented by SW-2 and SW-1 respectively. Observed releases were documented for copper, iron, lead and zinc, all directly attributable to this site. The MCL/MCLG for lead was exceeded in SW-1. The acute aquatic life standard for iron and zinc were exceeded in SW-1. Chronic aquatic life criteria were exceeded for copper and zinc in SW-1.
- Several safety hazards were found to be present at this site including the collapsed shaft, a structure near the shaft, and a cabin. Access to this site was unrestricted.

Clara PA# 01-262
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 08/13/83

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)
01-262-SE-1	7 U	173	1 J	4.5	5.8	8.3	11800	0.061 U	249	4 U	12 U	9 U	49	NR
01-262-SE-2	8 U	48.5	0.8 U	3.1 U	2.6	2.6	6390	0.045 U	140	4 U	14	10 U	40	NR
01-262-WR-1	14 U	622	6.1 J	6.6	4.1 U	86.8	39300	1.1	1990	8	145	18 U	995	NR
BACKGROUND	6	178	0.5 U	4.5	4	3.4	11400	0.027 U	880	4	10	6 U	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 ACID BASE POTENT.	
	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x
01-262-WR-1DUP	0.01	0.31	33.0	32.4	0.01	0.01	0.01	0.00	0.00	0.00	33.0	32.4
01-262-WR-1	<0.01	0.00	32.4	32.4	<0.01	<0.01	<0.01	0.00	0.00	0.00	32.4	32.4

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)
	01-262-GW-1	2.64	153	3.27	9.7 U	6.83 U	7.7 J	162	0.160	87.7	12.7 U	2.62	30.7 U	40.7
01-262-SW-1	9.37	140	2.57 U	9.7 U	6.83 U	17.2 J	3100	0.250	434	165	2.32	30.7 U	204	122
01-262-SW-2	2.15	49	2.57 U	9.7 U	6.83 U	1.55 U	203	0.160	6.97	12.7 U	0.72 U	30.7 U	7.57 U	57.4

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
01-262-GW-1	209	5.0	23	< 0.05	NR
01-262-SW-1	330	10.0	15	< 0.05	NR
01-262-SW-2	181	8.0	22	< 0.05	NR

LEGEND

- SE1 - Downgradient of site on Dry Gulch.
- SE2 - Upgradient of site on Dry Gulch.
- WR1 - Composite of subsamples WR1A, 1B, 2, and 3
- BACKGROUND - From the Clara Mine (01-262-SS-1)
- WR1DUP - Duplicates of the 01-262-WR-1 sample
- GW1 - Discharge from acid associated with waste rock dump 3
- 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>Martin</u>	County: <u>Beaverhead</u>
Legal Description: <u>T 3S R 13W</u>	Section(s): <u>NE 1/4, NW 1/4, Sec. 19</u>
Mining District: <u>Wisdom</u>	Mine Type: <u>Hardrock/Cu, Pb, Ag, Au</u>
Latitude: <u>N 45° 33' 32"</u>	Primary Drainage: <u>Warm Spring Creek</u>
Longitude: <u>W 113° 15' 23"</u>	USGS Code: <u>10020004</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>E. Fk. Warm Spring Ck.</u>
Quad: <u>Stewart Mountain</u>	Date Investigated: <u>September 9, 1993</u>
Inspectors: <u>Bullock, Tuesday</u>	P.A. # <u>01-270</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings found to be associated with this site.
- The volume of waste rock associated with this site was estimated at 1,100 cubic yards. The following elements were elevated at least three times background:

Arsenic: 15.6 mg/kg	Lead: 1850 mg/kg
Cadmium: 10.8 mg/kg	Antimony: 18J mg/kg
Copper: 177J mg/kg	Zinc: 1240 mg/kg
Mercury: 9.26 mg/kg	
- There was one discharging adit identified at this site. The flow was approximately 1.5 gpm with a pH of 6.9. No MCLs or MCLGs were exceeded. Acute and chronic aquatic life criteria were exceeded for cadmium, copper, lead, and zinc.
- The East Fork of Warm Spring Creek flowed along the western end of this site. An observed release was documented for zinc. The acute aquatic life criteria were exceeded for copper and zinc, and the chronic aquatic life criteria were exceeded for zinc; these exceedances were attributable to the site.
- There were six standing or partially collapsed cabins at this site that present a safety hazard.

Martin PA# 01-270
 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)
01-270-SE-1	6.24 U	49.5 J	0.7 U	3.71 J	1.76	5.86 J	11900	0.104	285 J	3.35 U	27.9	8.13 UJ	52.5	NR
01-270-SE-2	4.67 U	79.1 J	0.5 U	4.97 J	2.28	3.57 J	11300	0.038 U	321 J	2.51 U	8.01 U	6.09 UJ	33.7	NR
01-270-WR-1	15.6	143 J	10.8	5.41 J	2.08	1.77 J	12100	9.26	396 J	1.86 U	1850	18 J	1240	NR
BACKGROUND	5.08	84.5 J	0.4 U	6.91 J	10.1	7.2 J	12500	0.031 U	403 J	3.54	6.85 U	5.21 UJ	37.8	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 v/1000x	NEUTRAL POTENT. v/1000x	SULFUR ACID BASE POTENT. v/1000x	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	IRONIC SULFUR ACID BASE POTENT. v/1000x
01-270-WR-1	0.01	0.31	9.45	9.14	<0.01	<0.01	0.01	0

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)
01-270-GW-1	3.72 JX	20.2	2.7	9.7 U	6.83 U	23.3	767	0.28	59.2	12.7 U	53	30.7 UJX	162	17.8
01-270-SW-1	3.18 JX	8.4	2.57 U	9.7 U	6.83 U	2.13	633	0.15	24.5	12.7 U	1.78	30.7 UJX	26.4	10.3
01-270-SW-2	1.34 JX	4.7	2.57 U	9.7 U	6.87	1.55 U	24.8	0.17	4.08 UJ	12.7 U	2.9	30.7 UJX	7.57 U	8.4

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
01-270-GW-1	81	< 5.0	< 5.0	0.12	NR
01-270-SW-1	55	< 5.0	< 5.0	< 0.05	NR
01-270-SW-2	47	< 5.0	< 5.0	< 0.05	NR

LEGEND

- SE1 - Downstream of waste rock dump 3 on East Fork Warm Spring Creek
- SE2 - Upstream of site on East Fork Warm Spring Creek
- WR1 - Composite of subsamples WR1A, 1B, 2, 3A, and 3B.
- BACKGROUND - From the Martin Mine (01-270-SS-1).
- CW1 - Large collapsed acid in drainage
- 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>Miller</u>	County: <u>Broadwater</u>
Legal Description: <u>T 10N R 2E</u>	Section(s): <u>SW 1/4, SE 1/4, Sec. 13</u>
Mining District: <u>Confederate</u>	Mine Type: <u>Hardrock/Au</u>
Latitude: <u>N 46° 37' 12"</u>	Primary Drainage: <u>Confederate Gulch</u>
Longitude: <u>W 111° 24' 58"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Greenhorn Gulch</u>
Quad: <u>Diamond City</u>	Date Investigated: <u>July 26, 1993</u>
Inspectors: <u>Babits, Flammang, Lasher</u>	P.A. # <u>04-138</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no tailings on site.
- There were approximately 11,950 cubic yards of mostly uncovered waste rock on site. The following were elevated at least three times background:

Cadmium: 3.2 to 4.1 mg/kg	Copper: 91.8 to 2,520 mg/kg
Iron: 52,600 to 54,600 mg/kg	Mercury: 1.57J to 2.46J mg/kg
Manganese: 1,540 mg/kg	Lead: 89 to 2,960 mg/kg
Zinc: 250 mg/kg	
- There was a discharging adit on site that entered the gulch; the pH measurement was 5.23. The MCL for nickel and the acute and chronic aquatic life criteria for copper and zinc were exceeded in the adit discharge. Additionally, the chronic aquatic life criteria for iron and mercury were exceeded in the adit discharge.
- Adit discharge flowed over waste rock and made up the entire flow of Greenhorn Gulch. The gulch flowed into Confederate Gulch 1.5 miles away.
- There were several open or partially open adits and hazardous structures on site.

Miller PA# 04-138
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BABITS
 INVESTIGATION DATE: 07/26/93

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)
04-138-SE-1	9	109	1.6	8.6	16.1	30.3	27100	0.221 J	365	21 J	59	7 UJ	125	NR
04-138-WR-1	10	152	1.6	5.5	7.4	91.8	29200	1.57 J	247	14 J	135	7 UJ	102	NR
04-138-WR-2	24	156	3.2	13.5	5.2	902	54600	2.46 J	452	10 J	89	6 UJ	59	NR
04-138-WR-3	27	293	4.1	13.8	8.3	2520	52600	2.39 J	1540	26 J	2960	6 UJ	250	NR
BACKGROUND	20	98.5	0.8	5.8	11.9	21.6	14100	0.042 J	419	10 J	22	6 UJ	66	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		SULFUR ACID BASE POTENT	
	%	g/1000g	%	g/1000g	%	g/1000g	%	g/1000g	%	g/1000g	%	g/1000g	%	g/1000g
04-138-WR-1	1.38	43.1	48.6	5.45	0.46	0.59	0.33	18.4	0.27	0.06	5.00	30.1	27.1	19.5
04-138-WR-2	0.57	17.8	32.1	14.3	0.14	0.16	0.27	5.00	0.06	1.87	1.87	19.5		
04-138-WR-3	0.24	7.50	21.4	13.9	0.12	0.06	0.06	1.87	0.06	1.87	1.87	19.5		

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)
04-138-SW-1	1	2.01 U	2.57 U	78.8	6.83 U	189	63300	0.13	7000 J	145	7.03	30.7 U	1920	1090

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
04-138-SW-1	1810	< 5.0	1160	< 0.05	NR

LEGEND

- SE1 - 500 feet from waste rock dump 1 in Greenhorn Gulch.
- WR1 - Composite of subsamples WR1, 2A, and 2B
- WR2 - Composite of subsamples WR3A, 3B, and 3C.
- WR3 - Composite of subsamples WR4, 5, and 6.
- BACKGROUND - From the Hummingbird Mine (04-144-S5-1).
- SW1 - Discharge from addit #1.

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

Mine/Site Name: <u>Argo Mine and Millsite</u>	County: <u>Broadwater</u>
Legal Description: <u>T 11N R 1E</u>	Section(s): <u>NW 1/4, NE 1/4, Sec. 27</u>
Mining District: <u>Hellgate</u>	Mine Type: <u>Hardrock/Cu</u>
Latitude: <u>N 46° 41' 16"</u>	Primary Drainage: <u>Missouri River</u>
Longitude: <u>W 111° 33' 52"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Hellgate Gulch</u>
Quad: <u>Hellgate Gulch</u>	Date Investigated: <u>July 26, 1993</u>
Inspectors: <u>Bullock, Clark/Pierson</u>	P.A. # <u>04-015</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- The volume of tailings associated with this site was estimated to be 9,000 cubic yards. The following elements were elevated at least three times background:
Copper: 7,810 mg/kg
Mercury: 0.562J mg/kg
- The volume of waste rock associated with this site was estimated to be 14,400 cubic yards. The following elements were elevated at least three times background:
Cadmium: 2.2 mg/kg
Copper: 58,200 mg/kg
Iron: 55,100 mg/kg
Mercury: 0.511J mg/kg
Nickel: 31J mg/kg
Lead: 59 mg/kg
- There were no adit discharges, seeps or springs identified at this site.
- Hellgate Gulch Creek was flowing through and around this site. Storm water was observed running off the tailings directly into Hellgate Creek. Surface water samples were collected from Hellgate Creek above the site and below the majority of the workings, just upstream from the Harris Gulch confluence. An observed release was documented for copper. No MCL/MCLGs were exceeded. In addition, no acute or chronic aquatic life criteria were exceeded.
- Adit #1 did have a gate, but it was not locked and was determined to present a potential safety hazard. The mill and the cabin at WR-2 were identified as hazardous structures.

Argo PA# 04-015
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 07/26/83

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)
04-015-SE-1	11	33.7	0.9	4.3	6.9	2240	15400	0.013 J	299	12 J	22	6 UJ	42	NR
04-015-SE-2	8	39.7	0.9	5.4	5.9	14.8	14900	0.017 J	244	12 J	19	6 UJ	54	NR
04-015-TP-1	5	35.6	1.4	4.4	3.1	7810	18000	0.562 J	286	8 J	30	7 UJ	25	NR
04-015-WR-1	14	34.1	2.2	6.8	5.2	59200	55100	0.511 J	201	31 J	59	6 UJ	40	NR
BACKGROUND	16	225	0.6	4.7	4.5	52.4	8640	0.023 J	410	5 J	14	7 UJ	39	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
04-015-TP-1	0.99	30.9	77.9	47.0	<0.01	0.04	0.97	1.25	0.97	1.25	76.6	76.6
04-015-WR-1	1.14	35.6	62.9	27.3	<0.01	0.22	1.06	6.87	1.06	6.87	56.0	56.0

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Ca	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
04-015-SW-1	0.96 U	29.6	2.57 U	9.7 U	6.83 U	22.9	388	0.09	14.8 J	12.7 U	3.34	30.7 U	7.57 U	318
04-015-SW-2	0.96 U	25.5	2.57 U	9.7 U	6.83 U	1.55 U	220	0.14	10.2 J	12.7 U	2.45	30.7 U	7.57 U	314

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
04-015-SW-1	380	< 5.0	59	< 0.05	NR
04-015-SW-2	349	5.7	53	< 0.05	NR

LEGEND

- SE1 - Downgradient from most of the site, but upgradient of Harris Gulch confluence.
- SE2 - Upgradient of site, 200' above trail head.
- TP1 - Composite of subsamples TP1A-A, 1A-B, 1A-C, 1B-A, 1B-B, and 1B-C.
- WR1 - Composite of subsamples WR1A, 1B, and 2A.
- BACKGROUND - From the Argo (04-015-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>Park</u>	County: <u>Broadwater</u>
Legal Description: <u>T 7N R 1W</u>	Section(s): <u>NE 1/4, NE 1/4, Sec. 15</u>
Mining District: <u>Indian Creek</u>	Mine Type: <u>Hardrock/Au, Pb, Ag</u>
Latitude: <u>N 46° 21' 53"</u>	Primary Drainage: <u>Indian Creek</u>
Longitude: <u>W 111° 42' 21"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Indian Creek</u>
Quad: <u>Giant Hill</u>	Date Investigated: <u>July 27, 1993</u>
Inspectors: <u>Bullock, Clark/Pierson</u>	P.A. # <u>04-012</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- The volume of tailings associated with this site was estimated to be 60 cubic yards. The impoundments were breached and the majority of the volume of tailings have washed down the drainage. The following elements were elevated at least three times background:

Arsenic: 1,260J mg/kg	Lead: 4,160 mg/kg
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 Cyanide was also at 0.292U mg/kg.

- The volume of waste rock associated with this site was estimated to be approximately 65,000 cubic yards. The following elements were elevated at least three times background:

Arsenic: 4,730J to 9,820J mg/kg	Mercury: 0.59J to 0.713J mg/kg
Cadmium: 14 to 101 mg/kg	Lead: 8270to 13,100 mg/kg
Chromium: 86J mg/kg	Antimony: 33J mg/kg
Copper: 159J to 308J mg/kg	Zinc: 1,220J to 2,230J mg/kg

- There were three discharging adits identified at this site, the most significant of which was characterized by sample GW-1. GW-1 had a measured discharge of 0.6 cfs, a pH of 4.29, and a specific conductance of 270 umhos/cm. The MCL/MCLGs for arsenic and cadmium were exceeded. Acute aquatic life criteria were exceeded for arsenic, cadmium, copper, lead, and zinc. Chronic aquatic life criteria were exceeded for arsenic, cadmium, copper, iron, lead, mercury, and zinc. There was one significant seep associated with this site which was sampled as GW-2. This seep was discharging from the toe of WR-2 at an estimated flow of 35 gpm, a pH of 2.93 and a specific conductance of 1380 umhos/cm. The MCL/MCLGs for arsenic, cadmium, and antimony were exceeded. Acute aquatic life criteria were exceeded for arsenic, cadmium, copper, and zinc. Chronic aquatic life criteria were exceeded for arsenic, iron, copper, lead, and zinc.

- Indian Creek and a small perennial tributary into the creek were identified to be associated with this site. Observed releases were documented for arsenic, cadmium, lead, and zinc, which were directly attributable to this site. MCL/MCLGs were exceeded for arsenic and cadmium, which were directly attributable to the site. Acute aquatic life criteria were exceeded for cadmium, copper, and zinc. Chronic aquatic life criteria were exceeded for cadmium, copper, lead, mercury, and zinc.

Park PA# 04-012
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 07/27/93

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)
04-012-SE-1	4350 J	84.7	25	17.7 J	13 J	56.9 J	30600	0.144 J	1690 J	7 J	1850	9 UJ	2090 J	NR
04-012-SE-2	11 J	112	0.5 U	8.2 J	11 J	11.4 J	14500	0.064 J	399 J	8 J	11	6 UJ	46 J	NR
04-012-TP-1	1260 J	66	1	2.1 J	3 J	48.9 J	35500	0.056 J	143 J	3 UJ	4160	7 J	190 J	0.292 U
04-012-WR-1	4730 J	59.9	14	7.9 J	6 J	159 J	65700	0.59 J	790 J	2 UJ	8270	19 J	1430 J	NR
04-012-WR-2	8900 J	50.4	18	6.8 J	7 J	202 J	58900	0.713 J	781 J	2 UJ	12800	27 J	1220 J	NR
04-012-WR-3	9820 J	30.1	101	16 J	86 J	308 J	71200	0.137 J	702 J	2 J	13100	33 J	2320 J	NR
BACKGROUND	44 J	315	1 U	24 J	15 J	28.9 J	37600	0.088 J	1220 J	9 J	31	11 UJ	112 J	NR

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC ACID BASE POTENT.		SULFUR ACID BASE POTENT.	
	%	V/1000R	%	V/1000R	%	V/1000R	%	V/1000R	%	V/1000R	%	V/1000R	%	V/1000R
04-012-TP-1	2.00	62.5	-0.00	-62.5	1.97	0.03	<0.01	0.00	0.03	0.00	-0.00			
04-012-WR-1	4.02	126	2.06	-105	0.37	1.65	2.00	62.5	1.65	62.5	-41.8			
04-012-WR-2	1.25	39.0	-0.62	-39.7	0.82	0.33	0.10	3.12	0.33	3.12	-3.74			
04-012-WR-3	0.20	6.25	2.58	-3.67	0.13	0.05	0.02	0.62	0.05	0.62	1.96			

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)
04-012-GW-1	548	2.01 U	44.7	9.7 U	6.83 U	64.2	3450	0.16	842 J	12.7 U	104	30.7 U	5710	81
04-012-GW-2	3380	7.6	563	134	6.83 U	975	32600	0.083	19900 J	36.8	252	93.7	73600	374
04-012-SW-1	71	15	11	9.7 U	6.83 U	15.6	902	0.055	324 J	12.7 U	19.4	30.7 U	1540	38.7
04-012-SW-2	1.69 U	30.3	2.57 U	9.7 U	6.83 U	7.43 J	308 J	0.093	14.5	13.2	1.55 U	30.7 U	46.1 JX	21
04-012-SW-3	215	10.8	30.6	9.7 U	6.83 U	42.1 J	1700 J	0.11	495	12.7 U	31.2	30.7 U	3620 JX	62.4

Wet Chemistry Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NOMINO2-N	CYANIDE
04-012-GW-1	203	< 5.0	104	0.39	NR
04-012-GW-2	1270	< 5.0	800	0.31	<0.005
04-012-SW-1	121	< 5.0	30	0.08	<0.005
04-012-SW-2	105	< 5.0	< 5	< 0.05	NR
04-012-SW-3	167	< 5.0	76	0.19	NR

LEGEND

- SE1 - Downgradient Indian Creek.
- SE2 - Upgradient Indian Creek.
- TP1 - Composite of subsamples TP1 and 2.
- WR1 - Composite of subsamples WR1A, 1B, 2A, 2B, and 2C.
- WR2 - Composite of subsamples WR3A, 4A, 4B, 4C, 5A, 6A, 6B, 7A, and 9A.
- WR3 - Sample of the WR3 subsample.
- BACKGROUND - From the Park Mine (04-012-SS-1).

- GW1 - Aidi discharge at waste rock dump 2.
- GW2 - Seep below mill.
- SW1 - Same as sample SE1
- SW2 - Same as sample SE2
- SW3 - Eastern tributary prior to confluence.

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>St. Louis</u>	County: <u>Broadwater</u>
Legal Description: T <u>7N</u> R <u>1W</u>	Section(s): <u>NW 1/4, NW 1/4, Sec.26</u>
Mining District: <u>Indian Creek</u>	Mine Type: <u>Hardrock/Ag, Au, Pb</u>
Latitude: <u>N 46° 20' 19"</u>	Primary Drainage: <u>Indian Creek</u>
Longitude: <u>W 111° 41' 55"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>West Fork Indian Creek</u>
Quad: <u>Giant Hill</u>	Date Investigated: <u>July 27, 1993</u>
Inspectors: <u>Bullock, Clark/Pierson</u>	P.A. # <u>04-013</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 leach pad material associated with this site was estimated to be approximately 1,300 cubic yards. The concentration of cyanide measured in a sample of the leach pad material was 5.27 mg/kg. The following elements were elevated at least three times background:
Arsenic: 2,110J mg/kg Lead: 1,110 mg/kg
Cadmium: 9 mg/kg Zinc: 1,180J mg/kg
Copper: 202J mg/kg
- The volume of waste rock associated with this site was estimated to be approximately 17,000 cubic yards. The following elements were elevated at least three times background:
Arsenic: 4,840 mg/kg Lead: 2,590 mg/kg
Cadmium: 38 mg/kg Zinc: 1,540J mg/kg
Copper: 316J mg/kg
- No MCLs were exceeded in upstream or downstream surface water samples collected from West Fork Indian Creek; however, chronic aquatic life criteria were exceeded for mercury in both the upstream and downstream samples, and the chronic aquatic life criteria for lead was exceeded in the downstream sample.
- Observed releases to West Fork Indian Creek were documented for arsenic and lead. The chronic aquatic life criteria exceedance for lead was directly attributable to the site. Additionally, significant increases in lead and zinc concentrations (greater than three times) were observed in downstream sediment samples collected from West Fork Indian Creek (compared to upstream concentrations).
- Potentially hazardous structures that were observed at the site included a trench highwall (20 to 40 feet high) and three small unstable buildings.

St. Louis PA# 04-013
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - Bullock
 INVESTIGATION DATE: 07/27/93

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)
04-013-LP-1	2110 J	47.6	9	7.9 J	5 J	202 J	33900	0.184 J	307 J	5 J	1110	7 J	1180 J	5.27
04-013-SE-1	22	78.4	2.6	7.1	7	19.1	22100	0.035 J	277	3 J	318	6 UJ	368	NR
04-013-SE-2	11	34.2	0.9	11	5.9	7.2	18600	0.017 J	335	5 J	15	6 UJ	60	NR
04-013-WR-1	4840 J	81.6	38	9 J	4 J	316 J	37500	0.164 J	776 J	4 J	2590	7 J	1540 J	NR
BACKGROUND	44 J	315	1 U	24 J	15 J	28.9 J	37600	0.088 J	1220 J	9 J	31	11 UJ	112 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		ACID BASE POTENT		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC ACID BASE POTENT	
	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x
04-013-LP-1	0.74	23.1	13.6	8.29	-8.52	<0.01	0.25	0.56	7.81	5.78		
04-013-WR-1	0.35	10.9	8.29	-2.64	0.33	<0.01	0.03	0.00	0.00	8.29		

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)
04-013-SW-1	3	< 16.6 U	2.57 U	9.7 U	6.83 U	1.55 U	666	0.044	18.3 J	12.7 U	13.1	30.7 U	20.7 U	74.7
04-013-SW-2	0.96 U	7.67	2.57 U	9.7 U	6.83 U	1.55 U	44.5	0.052	9.1 J	12.7 U	1.86	30.7 U	7.57 U	71.3

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
04-013-SW-1	150	< 5.0	13	0.13	< 0.01
04-013-SW-2	151	< 5.0	10	0.47	NR

LEGEND

LPI - Composite LPIA and 1B (Leach Pad).
 SE1 - Downgradient on West Fork Indian Creek.
 SE2 - Upgradient on West Fork Indian Creek.
 WR1 - Sample of the WR1 subsample.
 BACKGROUND - From the Park Mine (04-012-SB-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>Diamond Hill</u>	County: <u>Broadwater</u>
Legal Description: <u>T 7N R 1W</u>	Section(s): <u>SW 1/4, NW 1/4, Sec. 36</u>
Mining District: <u>Indian Creek</u>	Mine Type: <u>Hardrock/Au</u>
Latitude: <u>N 46° 18' 48"</u>	Primary Drainage: <u>Indian Creek</u>
Longitude: <u>W 111° 40' 38"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>West Fork Indian Creek</u>
Quad: <u>Giant Hill</u>	Date Investigated: <u>July 28, 1993</u>
Inspectors: <u>Babits, Flammang, Lasher</u>	P.A. # <u>04-020</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were approximately 220 cubic yards of uncovered tailings on site. The following were elevated at least three times background:
Copper: 181J mg/kg
Mercury: 3.38J mg/kg
- There were 75,000 cubic yards of mostly uncovered waste rock on site. The following was elevated at least three times background:
Mercury: 0.369J to 0.61J mg/kg
- There were no discharging adits on site. There was one monitoring well located on site; no MCLs/MCLGs were exceeded.
- Tailings were located adjacent to the West Fork of Indian Creek; however, no MCLs/MCLGs or acute or chronic aquatic life criteria were exceeded which were attributable to the site.
- An observed release to the West Fork of Indian Creek (sediment) was documented for mercury.
- There were numerous hazardous openings and pits located on site.

**Diamond Hill PA# 04-020
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 07/28/93**

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)
04-020-SE-1	78 J	165	2	20.6 J	12 J	107 J	39400	0.158 J	419 J	13 J	285	11 UJ	300 J	0.622 U
04-020-SE-2	20 J	75.8	0.6 U	9.4 J	8 J	120 J	27000	0.526 J	226 J	3 J	36	9 J	49 J	0.335 U
04-020-TP-1	44 J	73	1.3	14.3 J	3 J	181 J	51200	3.38 J	366 J	2 UJ	15	6 UJ	46 J	0.291 U
04-020-WR-1	23 J	56.8	0.9	5.8 J	5 J	67.4 J	52400	0.61 J	119 J	17 J	14	7 UJ	7 J	NR
04-020-WR-2	76 J	55.4	0.5	18.4 J	3 J	88.7 J	39200	0.369 J	526 J	3 J	13	5 UJ	47 J	NR
BACKGROUND	44 J	315	1 U	24 J	15 J	28.9 J	37600	0.088 J	1220 J	9 J	31	11 UJ	112 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
04-020-TP-1	1.29	40.3	7.45	-32.9	1.13	0.09	0.07	2.81	4.64			
04-020-WR-1	2.64	82.5	-1.86	-84.3	2.52	0.02	0.10	0.62	-2.49			
04-020-WR-2	0.97	30.3	12.2	-18.1	0.89	0.02	0.06	0.62	11.6			

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 (mg CaCO3/L)	HARDNESS CALC.
	04-020-GW-1	1.69 U	22.3	2.57 U	9.7 U	6.83 U	5.27 J	23 J	0.072	4.08 U	12.7 U	1.55 U	30.7 U	23.5 JX	232
04-020-GW-2	3.03	22.4	2.57 U	9.7 U	6.83 U	5.33 J	23 J	0.1	4.08 U	12.7 U	1.55 U	30.7 U	17.7 JX	239	
04-020-SW-1	4.62	20.8	2.57 U	9.7 U	6.83 U	5.47 J	310 J	0.096	31.4	12.7 U	6.36	30.7 U	22.4 JX	96.8	
04-020-SW-2	4.37	20.2	2.57 U	9.7 U	6.83 U	5.1 J	211 J	0.12	13.6	12.7 U	3.73	30.7 U	18.5 JX	103	

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
	04-020-GW-1	375	6.7	98	0.82	NR
04-020-GW-2	385	7.2	99	0.79	NR	
04-020-SW-1	188	< 5.0	37	0.05	< 0.01	
04-020-SW-2	195	< 5.0	38	< 0.05	< 0.01	

LEGEND

- SE1 - Upgradient on West Fork Indian Creek.
 - SE2 - Downgradient on West Fork Indian Creek.
 - TP1 - Composite of subsamples TP1A-A, B, TP1B-A, and B.
 - WR1 - Composite of subsamples WR1A, TB, 1C, and 1D.
 - WR2 - Composite of subsamples WR2, WR4, WR6, WR9, and WR11.
 - BACKGROUND - From Park (Marietta) (04-012-SS1)
-
- GW1 - Monitoring well at mouth of Eragh Pt by site 3
 - GW2 - Duplicate of GW1.
 - SW1 - Same as SE1
 - SW2 - Same as SE2.

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

Mine/Site Name: <u>Bullion King</u>	County: <u>Broadwater</u>
Legal Description: T <u>7N</u> R <u>1W</u>	Section(s): <u>SE 1/4, SE 1/4, Section 10; NW 1/4, NW 1/4, Section 14; NE 1/4, NE 1/4, Section 15</u>
Mining District: <u>Indian Creek</u>	Mine Type: <u>Hardrock/Ag, Pb, Au</u>
Latitude: <u>N 46° 22' 12"</u>	Primary Drainage: <u>Missouri River</u>
Longitude: <u>W 111° 42' 12"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Indian Creek</u>
Quad: <u>Giant Hill</u>	Date Investigated: <u>June 20, 1994</u>
Inspectors: <u>Tuesday, Belanger, Clark, West</u>	P.A. # <u>04-081</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- No mill tailings were observed at the site.
- The volume of waste rock observed at the site was estimated to be 6,745 cubic yards. The following elements were elevated to at least three times the background concentrations:

Arsenic: 3,190 mg/kg	Cadmium: 11.8J mg/kg
Copper: 91.5 to 1,320 mg/kg	Mercury: 0.98JX to 1.51JX mg/kg
Manganese: 37,100 mg/kg	Lead: 8,160 to 47,900 mg/kg
Zinc: 350J to 1,070J mg/kg	
- One discharging adit was observed at the site during the investigation. The discharge flowed approximately 200 feet before seeping into the ground. No MCLs were exceeded in the adit discharge; however, the acute and chronic aquatic life criteria for cadmium, copper, and zinc were exceeded in the adit discharge. Additionally, the chronic aquatic life criteria for mercury and lead were exceeded in the adit discharge.
- No significant sources of surface water were on or near the site.
- Potential safety hazards observed at the site included two unstable trenches and one caved shaft with steep slopes.

Bullion King PA# 04-081
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/20/94

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	Ag (mg/Kg)	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)
04-081-WR1	43.9	77.3	179	11.8 J	20.8	4.7	1320	58400	1.51 JX	37100	1.5 U	47900	28.3 J	1070 J	NR
04-081-WR2	31.9	3190	104	1.1 J	4.1	5.3	91.5	59200	0.98 JX	290	1.4 U	8160	5.8 J	350 J	NR
BACKGROUND	NR	44 J	315	1.0 U	24.0 J	15.0 J	28.9 J	37600	0.088 J	1220 J	9.05 J	31	11.0 UJ	112 J	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		SULFUR ACID BASE POTENTIAL		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENTIAL	
	%	U/10000	%	U/10000	%	U/10000	%	U/10000	%	U/10000
04-081-WR1	0.96	30.0	49.0	19.0	0.10	0.46	0.46	12.5	36.5	-7.30
04-081-WR2	2.04	63.7	-1.05	-65	1.32	0.52	0.52	6.25		

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/l

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
04-081-AD1	0.12 U	12.3	3.6	4.9	8.7 U	4.7 UX	50.0	725	0.18	83.1	8.0 U	13.0 J	29.4 U	712	48.0
04-081-GW1	0.12 U	1.1 U	4.5	2.6 U	8.7 U	4.7 UX	4.6 U	45.7	0.11 U	4.4 U	8.0 U	1.1 U	29.4 U	5.77	29.5

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
04-081-AD1	4.0	<5.0	48	0.65	NR
04-081-GW1	60	<5.0	7.0	0.15	NR

LEGEND

WR1 - Composite of WR1A through 1C.
 WR2 - Composite of WR2A through 2C and 3
 BACKGROUND - From the Fish Mtn (84-812-081) (1991 data)
 AD1 - All discharge vent
 GW1 - No. 2 trench discharge vent.

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

Mine/Site Name: Ohio
Legal Description: T 5N R 1W
Mining District: Radersburg
Latitude: N 46° 11' 08"
Longitude: W 111° 40' 07"
Land Status: Private
Quad: Radersburg
Inspectors: Bullock, M. Babits, S. Babits,
Flanmang/Pierson
Organization: Pioneer Technical Services,
Inc./Thomas, Dean and Hoskins, Inc.

County: Broadwater
Section(s): NW 1/4, SE 1/4, Sec. 13
Mine Type: Hardrock/Au
Primary Drainage: Crow Creek
USGS Code: 10030101
Secondary Drainage: Keating Gulch
Date Investigated: September 3, 1993
P.A. # 04-009

- The volume of tailings associated with this site was estimated to be 37,000 cubic yards. The following elements were elevated at least three times background:
Arsenic: 203J to 321J mg/kg Iron: 79,600J mg/kg
Cobalt: 32.2 to 86.3 mg/kg Mercury: 0.35J to 0.595J mg/kg
Copper: 142 to 350 mg/kg Zinc: 207J to 333J mg/kg

- The volume of waste rock associated with this site was estimated to be 19,500 cubic yards. The following elements were elevated at least three times background:
Arsenic: 136J mg/kg Iron: 75,400J mg/kg
Cobalt: 29.4 mg/kg Mercury: 0.622J mg/kg
Copper: 98.4 mg/kg Lead: 189J mg/kg

- There were no adit discharges, seeps or springs associated with this site.

- Keating Gulch flowed to the north of this site. No observed water releases were attributable to this site. No MCLs or MCLGs, or acute or chronic aquatic life criteria were exceeded. Sediment samples were collected up and down stream of this site. Observed releases of arsenic, copper, and iron were documented; directly attributed to this site.

- The shaft and adit on the north side of Keating Gulch were identified as hazard mine openings. In addition, the loadout and several of the cabins were classified as hazardous structures.

Ohio PA# 04-009
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BULLOCK
 INVESTIGATION DATE: 09/03/93

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Cu (mg/Kg)	Cr (mg/Kg)	Co (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)
04-009-SE-1	8.63 J	55.3 J	0.9 U	22.6	3.96	7.53	17700 J	0.059 J	355	7.59 J	30.2 J	6.12 UJ	148 J	NR
04-009-SE-2	50.6 J	56.4 J	0.8 U	75.9	4.9	12.5	35300 J	0.071 J	295	7.85 J	29.4 J	5.76 UJ	85.5 J	NR
04-009-TP-1	321 J	36.3 J	1.1 U	350	8.35	86.3	79600 J	0.595 J	269	8.45 J	70.9 J	7.44 UJ	333 J	NR
04-009-TP-2	203 J	54 J	1.0 U	142	7.41	32.2	48000 J	0.35 J	264	5.82 J	50.1 J	6.56 UJ	207 J	NR
04-009-WR-1	136 J	94.1 J	0.7 U	98.4	3.07	29.4	75400 J	0.622 J	27.7	1.89 J	189 J	5.13 UJ	36.1 J	NR
BACKGROUND	6.11 J	214 J	1.0 U	22.6	6.14	8.92	19200 J	0.106 J	819	7.83 J	25.2 J	6.96 UJ	79.6 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 SULFUR ACID BASE POTENT.	
	%	#/1000r	%	#/1000r	%	#/1000r	%	#/1000r	%	#/1000r	%	#/1000r
04-009-TP-1	4.85	152	36.7	-115	3.11	1.5	0.24	46.9	-10.1			
04-009-TP-2	3.44	107	39.9	-88	104	2.28	0.12	71.2	-31.3			
04-009-WR-1	9.32	291	-16	-307	4.3	3.07	1.95	95.9	-112			

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)
04-009-SW-1	1.18 U	37.9	4.59 U	5 U	6.24 U	2.33 U	34.4	0.12 U	5.4	10.9 U	0.72 U	31.7 U	11.1	309
04-009-SW-2	1.18 U	33.4	4.59 U	5 U	6.24 U	2.33 U	85.9	0.12 U	3.76 U	10.9 U	0.93	31.7 U	9.33	281

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
04-009-SW-1	390	7.0	131	< 0.05	NR
04-009-SW-2	366	8.0	135	< 0.05	NR

LEGEND

- SE1 - 540 feet upgradient of mill building in Keating Gulch.
- SE2 - 400 feet downgradient in Keating Gulch.
- TP1 - Composite of subsamples TP1A-A, 2A-B, 2A-C, 2A-D, 2B-A, 2B-B, and 2B-C.
- TP2 - Composite of subsamples TP2A-A, 2A-B, 2A-C, 2A-D, 2B-A, 2B-B, and 2B-C.
- WR1 - Composite of subsamples WR1A through 1C, 2A, and 2B.
- BACKGROUND - \$50 feet upgradient from mill building.
- From the Ohio Mine (04-009-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>Keating Tailings</u>	County: <u>Broadwater</u>
Legal Description: <u>T 5N R 1E</u>	Section(s): <u>SE 1/4, SE 1/4, Sec. 18</u>
Mining District: <u>Radersburg</u>	Mine Type: <u>Hardrock/Au, Cu</u>
Latitude: <u>N 46° 11' 02"</u>	Primary Drainage: <u>Crow Creek</u>
Longitude: <u>W 111° 39' 34"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Keating Gulch</u>
Quad: <u>Radersburg</u>	Date Investigated: <u>September 3, 1993</u>
Inspectors: <u>M. Babits, S. Babits,</u>	P.A. # <u>04-121</u>
<u>Flammang/Pierson</u>	
Organization: <u>Pioneer Technical Services,</u>	
<u>Inc./Thomas, Dean and Hoskins, Inc.</u>	

- The volume of tailings associated with this site was estimated to be 144,000 cubic yards. The following elements were elevated at least three times background:

Arsenic: 143J to 336J mg/kg	Manganese: 3040 mg/kg
Copper: 378 to 486 mg/kg	Lead: 684J mg/kg
Iron: 43,200J to 55,200J mg/kg	Zinc: 251J to 2640J mg/kg
Mercury: 0.76J mg/kg	
- Waste rock associated with this site was located in an active mining area and was not investigated.
- There were no discharges associated with mine openings identified at this site. There was a spring located near the northeast corner of the toe of TP-2, which was characterized by sample SW-1. The flow of the spring was measured at 0.04 cfs with a pH of 6.6 and specific conductance of 470 umhos/cm. No MCLs or MCLGs were exceeded. In addition, no acute or chronic aquatic life criteria were exceeded.
- Keating Gulch, and intermittent stream, was dry at the time of this investigation. The stream channel had been diverted around the tailings impoundment. Sediment samples were collected in the dry gulch up gradient and down gradient from this site. No observed releases could be attributed to this site.
- Precipitation was ponded on the lower tailings pond.

Keating Tailings PA# 04-121
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 09/03/93

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)
04-121-SE-1	26.7 J	50 J	0.7 U	13.1	6.48	52.5	21500 J	0.026 U	455	8.18 J	40.6 J	5.09 UJ	108 J	NR
04-009-SE-2	50.6 J	56.4 J	0.8 U	12.5	4.9	75.9	35300 J	0.071 J	295	7.85 J	29.4 J	5.76 UJ	85.5 J	NR
04-121-TP-1	143 J	128 J	0.9 U	9.52	11.6	378	43200 J	0.184 J	235	5.23 J	57.3 J	5.91 UJ	251 J	NR
04-121-TP-2	336 J	279 J	1.7	11.2	8.17	486	55200 J	0.76 J	3040	11.1 J	684 J	7.74 UJ	2640 J	NR
BACKGROUND	6.11 J	214 J	1.0 U	8.92	6.14	22.6	19200 J	0.106 J	819	7.83 J	25.2 J	6.96 UJ	79.6 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.	
	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x
04-121-TP-1	1.81	56.5	-2	-59	1.29	15.6	0.02	0.02	0.5	15.6	-17.7	
04-121-TP-1	1.8	56.2	-1.9	-58	1.28	13.7	0.08	0.08	0.44	13.7	-15.7	
04-121-TP-2	0.93	29.1	7.93	-21	0.85	0.94	0.05	0.05	0.03	0.94	6.99	

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)
04-121-SW-1	3.85	8.6	4.59 U	5 U	9.37 U	2.33 U	894	0.12 U	707	10.9 U	0.72 U	31.7 U	13.6	1050
04-009-SW-2	1.18 U	33.4	4.59 U	5 U	6.24 U	2.33 U	85.9	0.12 U	3.76 U	10.9 U	0.93	31.7 U	9.33	281

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
04-121-SW-1	1604	18	981	< 0.05	< 0.005
04-009-SW-2	366	8.0	135	< 0.05	NR

LEGEND

SE1 - Downgradient in Keating Cribch.
 SE2 - 400' downgradient of berm on tailing pond 2 of the Ohio Mine. This serves as the upgradient sample for 04-121.
 TP1 - Composite of subsamples TP1A-A, B, C, and 1B-A, B, C.
 TP2 - Composite of subsamples TP2A-A, B, C, and 2B-A, B.
 BACKGROUND - From the Ohio Mine (04-009-SS-1)
 TP1DLEP - Duplicate of the sample 04-121-TP1

SW1 - Spring at the toe of tailings pond 2.
 SW2 - Same as sample SE2.

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

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

Mine/Site Name: <u>Custer Millsite</u>	County: <u>Broadwater</u>
Legal Description: <u>T 8N R 1W</u>	Section(s): <u>SE 1/4, Section 13</u>
Mining District: <u>Winston</u>	Mine Type: <u>Hardrock/Au, Pb, Zn</u>
Latitude: <u>N 46° 26' 48"</u>	Primary Drainage: <u>Missouri River</u>
Longitude: <u>W 111° 39' 59"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Iron Age Gulch</u>
Quad: <u>Winston</u>	Date Investigated: <u>June 22, 1994</u>
Inspectors: <u>Tuesday, Belanger, Clark, West</u>	P.A. # <u>04-006</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings observed at the site was estimated to be 22,960 cubic yards. The following elements were elevated to at least three times the background concentrations:

Silver: 5.5 mg/kg	Nickel: 13.8 mg/kg
Arsenic: 535 mg/kg	Lead: 507 mg/kg
Cadmium: 8.6J mg/kg	Zinc: 1,640J mg/kg
Chromium: 17.7 mg/kg	Manganese: 2,810 mg/kg
- No waste rock was observed at the site.
- No discharging adits, filled shafts, seeps, or springs were observed at the site during the investigation; however, a groundwater monitoring well was sampled. No MCLs were exceeded in the well sample.
- No surface water or sediment samples were collected during the investigation due to the extended distance to the nearest surface water and the lack of a direct runoff route.
- Potential safety hazards observed at the site included a highwall located above the mill foundation.

**Custer Millsite PA# 04-006
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/22/94**

SOLID MATRIX ANALYSES

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

FIELD ID	Ag (mg/Kg)	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)
04-006-TP1	5.5	535	331	8.6 J	9.3	17.7	59.7	20100	0.04 JX	2810	13.8	507	9.2	1640 J	0.308
BACKGROUND	0.8 U	98.6	130	0.8 U	11.8	5.9 JX	49.1 JX	24600	0.05 J	947	3.6 JX	29.2	10.2 UJ	64.9 JX	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 SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE POTENT %
04-006-TP1	0.61	19.1	36.9	17.9	0.40	0.05	5.00
							31.9

WATER MATRIX ANALYSES

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

FIELD ID	Ag	Au	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
04-006-GW1	0.12 U	1.1 U	17.1	2.6 U	6.7 U	4.7 JX	4.6 U	9.4 U	0.11 U	53.2	8.0 U	2.8	29.4 U	5.13	91.8

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	NOMNO2-N	CYANIDE
04-006-GW1	227	9.2	112	<0.05	<0.005

LEGEND

TP1 - Composite of subsamples TP1A and 1B
BACKGROUND - From the Kalamazoo River (04-01A-BS1)

GW1 - Discharge (upflow) of fillings WB-14 monitoring well

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

Mine/Site Name: <u>East Pacific</u>	County: <u>Broadwater</u>
Legal Description: <u>T 8N R 1W</u>	Section(s): <u>Sec. 26 and Sec. 27</u>
Mining District: <u>Winston</u>	Mine Type: <u>Hardrock/Au, Ag, Pb, Zn, Cu</u>
Latitude: <u>N 46° 25.1'</u>	Primary Drainage: <u>Weasel Creek</u>
Longitude: <u>W 111° 42.2'</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Spring Gulch</u>
Quad: <u>Winston</u>	Date Investigated: <u>July 27 and 28, 1993</u>
Inspectors: <u>Babits, Flammang, Lasher</u>	P.A. # <u>04-008</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were approximately 1,450 cubic yards of uncovered tailings on site. The following were elevated at least three times background:

Arsenic: 458J mg/kg	Cadmium: 32 mg/kg
Cobalt: 11.5J mg/kg	Chromium: 35J mg/kg
Copper: 399J mg/kg	Iron: 31,600 mg/kg
Mercury: 0.256J mg/kg	Manganese: 2,510J mg/kg
Nickel: 33J mg/kg	Lead: 4,760 mg/kg
Antimony 33J mg/kg	Zinc: 5,550 J mg/kg

- There were approximately 74,900 cubic yards of mostly uncovered waste rock on site. The following were elevated at least three times background:

Arsenic: 575J mg/kg	Cadmium: 36 to 53 mg/kg
Cobalt: 11.4J to 20.2J mg/kg	Chromium: 11J to 95J mg/kg
Copper: 213J to 980J mg/kg	Iron: 32,700 to 42,100 mg/kg,
Mercury: 0.325J to 0.789J mg/kg	Manganese: 1,620 to 1,710J mg/kg
Nickel: 13J to 101J mg/kg	Lead: 4,000 to 6,160 mg/kg
Antimony: 18J to 116J mg/kg	Zinc: 4,650J to 8,240J mg/kg

- There were two discharging adits identified at the site. The adit associated with WR-4 was sampled (SW-3); the pH measurement was 8.02. The discharge did not enter the creek via a surface route. The MCL/ MCLG for cadmium and acute and chronic aquatic life criteria for zinc were exceeded in the adit discharge. Additionally, the chronic aquatic life criteria for mercury was exceeded in the adit discharge.

- There were tailings in Spring Creek. Observed releases to Spring Creek were documented for arsenic, cadmium, iron, manganese, lead, and zinc. The MCL for cadmium was exceeded in the downstream sample, and acute and chronic aquatic life criteria were exceeded for cadmium and zinc in the downstream sample. These exceedances were directly attributable to the site.

East Pacific PA# 04-008
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BABBITTS
 INVESTIGATION DATE: 07/27/93

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)
04-008-SE-1	30 J	124	1.1 U	13.5 J	36 J	88.3 J	27400	0.173 J	763 J	24 J	49	13 UJ	133 J	0.58 U
04-008-SE-2	365 J	73.3	31	13.6 J	40 J	347 J	27200	0.227 J	2350 J	32 J	2690	42 J	6120 J	0.298 U
04-008-TP-1	458 J	64.2	32	11.5 J	35 J	399 J	31600	0.256 J	2510 J	33 J	4760	33 J	5550 J	0.283 U
04-008-WR-1	575 J	107	48	20.2 J	95 J	980 J	42100	0.608 J	1620 J	101 J	6160	116 J	8240 J	NR
04-008-WR-2	236 J	56.9	53	13.5 J	33 J	475 J	38600	0.789 J	1710 J	28 J	4250	34 J	6950 J	NR
04-008-WR-3	214 J	65.3	36	11.4 J	11 J	213 J	32700	0.325 J	1680 J	13 J	4000	18 J	4650 J	NR
BACKGROUND	85	63.2	0.7	1.9 U	1.9	11.6	9000	0.011 J	470	3 U	77	6 UJ	74	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 SULFUR ACID BASE POTENT	
	%	U/1000r	%	U/1000r	%	U/1000r	%	U/1000r	%	U/1000r	%	U/1000r
04-008-TP1-DUP	0.86	26.9	73.3	46.5	<0.01	0.56	0.34	17.5	55.8			
04-008-TP-1	0.88	27.5	73.3	45.8	<0.01	0.53	0.35	16.6	56.8			
04-008-WR-1	0.58	18.1	22.3	4.16	0.22	0.05	0.31	1.56	20.7			
04-008-WR-2	3.42	107	93.0	-13.9	0.60	1.22	1.60	38.1	54.9			
04-008-WR-3	3.00	93.7	86.7	-7.02	0.42	1.43	1.15	44.7	42.0			

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)
04-008-SW-1	1.69 U	3.9	2.57 U	9.7 U	6.83 U	3.6 J	25.3 J	0.12	4.08 U	12.7 U	1.55 U	30.7 U	7.57 U	30.5
04-008-SW-2	9.59	10.9	12.8	9.7 U	6.83 U	10.7 J	191 J	0.11	33.9	12.7 U	72.6	30.7 U	939 JX	102
04-008-SW-3	6.35	4.6	8.9	9.7 U	6.83 U	4.9 J	16.1 J	0.12	5.57	12.7 U	2.88	30.7 U	774 JX	196

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
04-008-SW-1	97	< 5.0	12	0.1	< 0.01
04-008-SW-2	201	< 5.0	72	0.21	< 0.01
04-008-SW-3	320	< 5.0	139	0.4	NR

LEGEND

- SE1 - 100 feet upgradient of waste rock dump 3 in Spring Creek
- SE2 - 100 feet downgradient of tailings in Spring Creek
- TP1 - Composite of subsamples TP-1A-A, B, C, TP1B-B, and A
- WR1 - Composite of subsamples WR1A, B, C, WR2A, B, and C
- WR2 - Composite of subsamples WR2A and 2B
- WR3 - Composite of subsamples WR3A, B, WR3A, B, and C
- BACKGROUND - From Votburg (04-014-SS1)
- TP1-DUP - Duplicates of 04-008-TP-1
- SW1 - Same as SE1
- SW2 - Same as SE2
- SW3 - Adit discharge at waste rock dump 4

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

Mine/Site Name: <u>Kleinschmidt</u>	County: <u>Broadwater</u>
Legal Description: <u>T 7N R 1W</u>	Section(s): <u>SW 1/4, NE 1/4, Section 3</u>
Mining District: <u>Winston</u>	Mine Type: <u>Hardrock/Au, Pb, Zn, Ag</u>
Latitude: <u>N 46° 23' 25"</u>	Primary Drainage: <u>Missouri River</u>
Longitude: <u>W 111° 42' 45"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Whitehorse Creek</u>
Quad: <u>Winston</u>	Date Investigated: <u>July 21, 1994</u>
Inspectors: <u>Flammang, Clark, West</u>	P.A. # <u>04-010</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings observed at the site was estimated to be 1,210 cubic yards. The following elements were elevated to at least three times the background concentrations:

Silver: 111 mg/kg	Manganese: 3,030 mg/kg
Arsenic: 8,030 mg/kg	Lead: 12,100 mg/kg
Cadmium: 8.8 mg/kg	Antimony: 56.9J mg/kg
Copper: 335JX mg/kg	Zinc: 1,480JX mg/kg
Mercury: 0.66J mg/kg	
- The volume of waste rock observed at the site was estimated to be 8,685 cubic yards. The following elements were elevated to at least three times the background concentrations:

Silver: 28.5 to 61.2 mg/kg	Arsenic: 1,760 to 4,180 mg/kg
Cadmium: 2.9 mg/kg	Mercury: 0.18J to 0.75J mg/kg
Lead: 5,070 to 6,840 mg/kg	Zinc: 421JX to 534JX mg/kg
- No discharging adits, filled shafts, seeps, or springs were observed at the site during the investigation.
- Whitehorse Creek flows adjacent to the site on the south side. Observed releases to Whitehorse Creek were documented for silver, arsenic, copper, lead, and zinc. The MCL for arsenic and the EPA action level for lead were exceeded in the downstream sample. Additionally, the acute and chronic aquatic life criteria for copper, lead, and zinc were exceeded in the downstream sample. These exceedances were directly attributable to the site.
- Potential safety hazards observed at the site included several collapsing wooden structures (loadout and cabins) and several, relatively small, open pits and trenches.

Kleinschmidt PA# 04-010
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - FLAMMANG
 INVESTIGATION DATE: 07/21/94

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	Ag (mg/Kg)	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)
04-010-SE1	49.3	3960	119	5.8	3.0	4.0 JX	147 JX	39200	0.19 J	2510	4.0 UJX	4790	27.3 J	776 JX	NR
04-010-SE2	1.1 U	26.5	34.7	1.0 U	2.1 U	2.1 JX	14.2 JX	8500	0.03 J	191	4.3 JX	42.4	12.6 UJ	222 JX	NR
04-010-WR1	28.5	1780	57.3	2.9	1.7	1.7 JX	88.2 JX	30600	0.75 J	1570	2.3 UJX	5070	8.2 UJ	421 JX	NR
04-010-WR2	61.2	4180	58.2	2.9	2.5	1.3 UJX	123 JX	53100	0.18 J	1400	2.8 UJX	6840	10.2 UJ	534 JX	NR
04-010-WR3	111.0	8030	68.3	8.8	1.7 U	2.7 JX	335 JX	67100	0.66 J	3030	3.0 UJX	12100	56.9 J	1480 JX	NR
BACKGROUND	0.8 U	98.6	130	0.8 U	11.8	5.9 JX	49.1 JX	24600	0.05 J	947	3.8 JX	29.2	10.2 UJ	64.9 JX	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	
	%	V/10000	%	V/10000	%	V/10000	%	V/10000	%	V/10000	%	V/10000
04-010-WR1	1.32	41.2	1.44	-40	1.13	0.01	0.31	1.13				
04-010-WR2	3.60	112	-9.03	-121	2.01	0.54	16.9	-25.9				

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
04-010-SW1	3.1	88.7 J	24.1	4.0 U	8.4 U	6.8 U	19.2	3740	0.16	314	14.4 U	122 J	51.6 U	114	37.3
04-010-SW2	0.12 U	7.5 J	5.5 U	4.0 U	8.4 U	6.8 U	5.9 U	316	0.14	37.9	14.4 U	3.9 J	51.6 U	25.1	29.6

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
04-010-SW1	59	<5	5	0.11	NR
04-010-SW2	59	<5	<5	0.21	NR

LEGEND

SE1 - Approx. 87% degradation of WR1 after two months of large flood event.
 SE2 - 20% degradation of spring that runs White Horse Creek, 150' south of WR3.
 WR1 - Composite of subsamples WR1A through 1C, and 2A and 2B.
 WR2 - Composite of subsamples WR2A through 2C.
 WR3 - Composite of subsamples WR3A, 4, 6, and 4C.
 BACKGROUND - From the Kleinschmidt Mine (4-010-031).

SW1 - Same as sample 04-010-SE1.
 SW2 - Same as sample 04-010-SE2.

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

Mine/Site Name: <u>Vosburg</u>	County: <u>Broadwater</u>
Legal Description: <u>T 8N R 1W</u>	Section(s): <u>SW 1/4, SW 1/4, Sec. 34</u>
Mining District: <u>Winston</u>	Mine Type: <u>Hardrock/Au, Pb, Ag, Zn</u>
Latitude: <u>N 46° 23' 58"</u>	Primary Drainage: <u>Beaver Creek</u>
Longitude: <u>W 111° 43' 11"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Badger Creek</u>
Quad: <u>Winston</u>	Date Investigated: <u>July 27, 1993</u>
Inspectors: <u>Babits, Lasher, Flammang</u>	P.A. # <u>04-014</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were approximately 42,000 cubic yards of tailings at the site. The majority of the tailings were uncovered. The following were elevated three times background:

Arsenic: 13,100 mg/kg	Cadmium: 7.8 mg/kg
Cobalt: 6.2 mg/kg	Chromium: 16.6 mg/kg
Copper: 780 mg/kg	Iron: 78,600 mg/kg
Mercury: 0.256J mg/kg	Manganese: 2,080 mg/kg
Lead: 4,640 mg/kg	Antimony: 12 mg/kg
Zinc: 564 mg/kg	Cyanide: 8.38 mg/kg
- There were approximately 29,850 cubic yards of uncovered waste rock on site. The following were elevated at least three times background:

Arsenic: 204 to 3,990 mg/kg	Cadmium: 5.9 to 8.4 mg/kg
Cobalt: 7.9 mg/kg	Copper: 38.2 to 379 mg/kg
Iron: 30,500 to 32,800 mg/kg	Mercury: 1.41J to 1.64J mg/kg
Manganese: 2,030 to 3,860 mg/kg	Lead: 729 to 737 mg/kg
Zinc: 318 to 596 mg/kg	
- Neither of the two discharging adits had a surface route to water. A sample was collected from the discharge associated with WR-5 (SW-5). The MCL for arsenic and the chronic aquatic life criteria for arsenic, mercury, and lead were exceeded in the adit discharge.
- There were tailings in Badger Creek. Observed releases to Badger Creek were documented for arsenic, copper, iron, manganese, lead, and zinc. The MCL for arsenic was exceeded in downstream sample, as were the acute and chronic aquatic life criteria for copper and lead. Additionally, the chronic aquatic life criteria for iron was exceeded in the downstream sample. These exceedances were directly attributable to the site.

Vosburg PA# 04-014
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - BABITS
 INVESTIGATION DATE: 07/27/93

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)
04-014-SE-1	60	65.3	1.3	3.7	7.4	17.5	10400	0.038 J	392	5 J	47	8 UJ	87	0.436 U
04-014-SE-2	8960	76.8	5.4	3.4	10.3	564	54400	0.102 J	1600	3 U	3590	13 J	332	1.1
04-014-TP-1	13100	95	7.8	6.2	16.6	780	79600	0.256 J	2080	4 J	4640	12 J	564	8.38
04-014-WR-1	2030	131	8.4	7.9	1.5	273	30500	1.64 J	3860	3 U	737	6 UJ	596	NR
04-014-WR-2	204	33.1	0.6	2.4	1.3 U	38.2	8670	1.41 J	598	2 U	86	6 UJ	63	NR
04-014-WR-3	3990	175	5.9	5.6	1.3 U	379	32800	1.56 J	2030	2 U	729	6 UJ	318	NR
BACKGROUND	85	63.2	0.7	1.9 U	1.9	11.6	9000	0.011 J	470	3 U	77	6 UJ	74	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 SULFUR ACID BASE POTENT	
	%	#/10000	%	#/10000	%	#/10000	%	#/10000	%	#/10000	%	#/10000
04-014-TP-1	0.35	10.9	15.8	4.89	0.33	0.01	0.02	0.00	0.00	15.8		
04-014-WR-1	0.04	1.25	6.97	5.72	0.03	<0.01	0.01	0.00	6.97	12.8		
04-014-WR-2	0.04	1.25	12.8	11.6	0.01	<0.01	0.03	0.00	12.8			
04-014-WR-3	0.65	20.3	6.38	-13.9	0.41	0.09	0.15	2.81	3.57			

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)
04-014-SW-1	2.67	2.01 U	2.57 U	9.7 U	6.83 U	1.55 U	123	0.038 U	4.08 U	12.7 U	4.64	30.7 U	7.57 U	21.5
04-014-SW-2	295	4.67	2.57 U	9.7 U	6.83 U	14.9	1300	0.038	61.6 J	12.7 U	35.3	30.7 U	27.1	25.5
04-014-SW-5	268	2.01 U	2.57 U	9.7 U	6.83 U	1.55 U	409	0.087	5.5 J	12.7 U	2.95	30.7 U	7.57 U	43

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	NO3NO2-N	CYANIDE
04-014-SW-1	108	< 5.0	6	< 0.05	< 0.01
04-014-SW-2	127	< 5.0	8	< 0.05	< 0.01
04-014-SW-5	122	< 5.0	12	1.3	NR

LEGEND

- SE1 - 100 feet upgradient of tailings in Badger Creek.
- SE2 - At PPE of acid discharge and tailings in Badger Creek.
- TP1 - Composite of subsamples TP1A, 1B, and TP2A-A.
- WR1 - Composite of subsamples WR1, 2A, and 2B.
- WR2 - Composite of subsamples WR3A and B.
- WR3 - Composite of subsamples WR4A, 4B, 5A, 5B, 5C, and 5D.
- BACKGROUND - From Vosburg (04-014-SB1).
- SW1 - Same as SE1
- SW2 - Same as SE2
- SW5 - Acid discharge of waste rock dump 5.

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

Mine/Site Name: <u>Golden Age</u>	County: <u>Broadwater</u>
Legal Description: <u>T 8N R 1W</u>	Section(s): <u>SW 1/4, SE 1/4, Section 34</u>
Mining District: <u>Winston</u>	Mine Type: <u>Hardrock/Au, Pb, Zn, Ag</u>
Latitude: <u>N 46° 24' 05"</u>	Primary Drainage: <u>Beaver Creek</u>
Longitude: <u>W 111° 42' 42"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Weasel Creek</u>
Quad: <u>Winston</u>	Date Investigated: <u>July 21, 1994</u>
Inspectors: <u>Flammang, Clark, West</u>	P.A. # <u>04-050</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- No mill tailings were observed at the site.
- The volume of waste rock observed at the site was estimated to be 8,995 cubic yards. The following were elevated to at least three times the background concentrations:

Silver: 15.6 to 17 mg/kg	Arsenic: 1,410 to 11,000 mg/kg
Cadmium: 6.3 mg/kg	Copper: 180JX mg/kg
Mercury: 1.47J mg/kg	Lead: 756 to 2,790 mg/kg
Zinc: 945JX mg/kg	
- Three discharging adits were observed at the site. The MCL for arsenic and the chronic aquatic life criteria for mercury and lead were exceeded in the Adit #1 discharge. The chronic aquatic life criteria for mercury was exceeded in the Adit #2 discharge.
- The flows from two of the discharging adits at the site (Adit #2 and Adit #3) combined to form the headwaters of Weasel Creek. No MCLs were exceeded in Weasel Creek; however, the acute and chronic aquatic life criteria for zinc and the chronic aquatic life criteria for mercury and lead were exceeded.
- Potential safety hazards observed at the site included two open adits, a 15-foot highwall, and a 20-foot-deep open pit.

Golden Age PA# 04-050
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - FLAMMANG
 INVESTIGATION DATE: 07/21/94

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	Ag (mg/Kg)	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)
04-050-SE1	12.0	1690	32.7	13.9	4.4	1.8 UJX	219 JX	30200	0.06 J	6440	3.3 UJX	12400	11.7 UJ	1730 JX	NR
04-050-WR1	17.0	1410	60.6	6.3	1.6	1.2 UJX	51.7 JX	23400	0.14 J	1870	2.6 UJX	2790	9.2 UJ	945 JX	NR
04-050-WR2	15.6	11000	42.7	1.0	3.7	1.1 UJX	180 JX	59800	1.47 J	1850	2.3 UJX	756	8.3 UJ	77.4 JX	NR
BACKGROUND	0.8 U	98.6	130	0.8 U	11.8	5.9 JX	49.1 JX	24600	0.05 J	947	3.8 JX	29.2	10.2 UJ	64.9 JX	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		SULFUR ACID BASE POTENT		SULFUR ACID BASE POTENT		PYRITIC ACID BASE POTENT		PYRITIC ACID BASE POTENT		PYRITIC ACID BASE POTENT	
	%	U/1000	%	U/1000	%	U/1000	%	U/1000	%	U/1000	%	U/1000
04-050-WR1	1.77	55.3	24.0	-31	1.17	0.22	0.38	6.87	17.4	0.22	0.08	2.50
04-050-WR2	1.09	34.1	-2.95	-37.0	0.78	0.06	0.23	2.50	-5.44	0.06	0.08	2.50

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
04-050-AD1	0.12 U	72.7 J	10.8	4.0 U	8.4 U	6.8 U	5.9 U	233	0.14	26.7	14.4 U	1.9	51.6 U	15.6 U	50.8
04-050-AD2	0.12 U	13.4 J	11.7	4.0 U	8.4 U	6.8 U	5.9 U	92.8	0.14	12.6	14.4 U	0.4	51.6 U	54.4	115
04-050-SW1	0.12 U	13.7 J	9.0	4.0 U	8.4 U	6.8 U	5.9 U	50.2	0.14	7.4	14.4 U	2.9	51.6 U	178	88.9

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
04-050-AD1	124	<5	16	1.38	NR
04-050-AD2	182	<5	32	0.39	NR
04-050-SW1	160	<5	34	0.74	NR

LEGEND

SE1 - Designated as WRI
 WR1 - Composite of subsamples WRI1A through 1D
 WR2 - Composite of subsamples WR2A and 2B
 BACKGROUND - From the Characterization Map (04-010-SB1)
 AD1 - Discharge from ADE 01A
 AD2 - Discharge from ADE #1, where it flows from a F 29C
 SW1 - Same as sample 04-050-SB1

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

Mine/Site Name: <u>Sunrise/January</u>	County: <u>Broadwater</u>
Legal Description: <u>T 8N R 1W</u>	Section(s): <u>S 1/2, SW 1/4, Section 26</u>
Mining District: <u>Winston</u>	Mine Type: <u>Hardrock/Cu, Pb, Zn, Ag, Au</u>
Latitude: <u>N 46° 24' 55"</u>	Primary Drainage: <u>Beaver Creek</u>
Longitude: <u>W 111° 41' 48"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Weasel Creek</u>
Quad: <u>Winston</u>	Date Investigated: <u>August 5, 1994</u>
Inspectors: <u>Flammang, Clark, West</u>	P.A. # <u>04-130 & 04-126</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- No mill tailings were observed at the site.
- The volume of waste rock observed at the site was estimated to be 11,030 cubic yards. The following elements were elevated to at least three times the background concentrations:

Silver: 63.9J to 70.7J mg/kg	Mercury: 0.21J to 0.63J mg/kg
Arsenic: 402 to 905 mg/kg	Lead: 10,400 to 15,900 mg/kg
Cadmium: 8.8 to 24.8 mg/kg	Antimony: 42.8J mg/kg
Chromium: 17.9 mg/kg	Zinc: 1,600 to 4,070 mg/kg
Copper: 489 to 515 mg/kg	
- Two discharging adits were associated with the site; both flows discharge to Weasel Creek. The MCLs for cadmium and antimony and the acute and chronic aquatic life criteria for cadmium and zinc were exceeded in the Adit #1 discharge. Additionally, the chronic aquatic life criteria for copper and mercury were exceeded in the Adit #1 discharge. Only the chronic aquatic life criteria for mercury was exceeded in the Adit #2 discharge.
- Weasel Creek flows through the center of the site. An observed release to Weasel Creek was documented for zinc. The MCL for cadmium, as well as the acute and chronic aquatic life criteria, were exceeded in the downstream sample. These exceedances were directly attributable to the site. The acute and chronic aquatic life criteria for zinc and the chronic aquatic life criteria for mercury and lead were exceeded both upstream and downstream from the site.
- Potential safety hazards observed at the site included one small mine opening, a 30-foot highwall, and several collapsing structures.

Sunrise/January PA# 04-130/04-128
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - FLAMMANG
 INVESTIGATION DATE: 08/05/94

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	Ag (mg/Kg)	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)
04-130-SE1	3.5 J	361	77.7	16.8	7.0	4.2	145	24500	0.09 J	761	3.7 U	860	13.4 UJ	2170	NR
04-130-SE2	1.8 J	312	63.0	7.3	7.1	5.1	130	23300	0.03 J	624	3.0 U	321	10.8 UJ	797	NR
04-130-WR1	63.9 J	905	168	8.8	3.8	1.2 U	489	39600	0.63 J	371	2.6 U	10400	28.2 J	1600	NR
04-130-WR2	70.7 J	614	64.0	24.8	6.1	17.9	515	32200	0.21 J	1020	5.0	15900	42.8 J	4070	NR
04-130-WR3	0.8 UJ	402	47.1	1.5	11.5	4.9	95.7	43100	0.03 J	1590	6.3	83.5	9.9 UJ	162	NR
BACKGROUND	0.8 U	98.6	130	0.8 U	11.8	5.9 JX	49.1 JX	24600	0.05 J	947	3.8 JX	29.2	10.2 UJ	64.9 JX	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 v/1000r		SULFUR ACID BASE POTENT v/1000r		PYRITIC SULFUR ACID BASE POTENT v/1000r		PYRITIC SULFUR ACID BASE POTENT v/1000r	
	SULFUR v/1000r	%	POTENT v/1000r	%	POTENT v/1000r	%	POTENT v/1000r	%	POTENT v/1000r	%
04-130-WR1	1.93	60.3	-1.98	-62	1.69	0.07	2.19	-4.17	5.00	-0.29
04-130-WR2	0.99	30.9	4.71	-26	0.72	0.16	5.00	-0.29	20.9	37.4
04-130-WR3	1.25	39.0	58.3	19.3	0.39	0.87	20.9	37.4		

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
04-130-AD1	0.12 U	1.1 U	9.6	128	8.4 U	6.8 U	106	117	0.16 JX	5210	20.6	0.4	54.3	26000	838
04-130-AD2	0.12 U	29.0	5.5 U	4.0 U	8.4 U	6.8 U	5.9 U	572	0.17 JX	30.4	14.4 U	0.4 U	51.6 U	23.3	212
04-130-SW1	0.12 U	16.5	7.2	10.7	8.4 U	6.8 U	5.9 U	138	0.13 JX	39.4	15.5	4.6	51.6 U	1060	119
04-130-SW2	0.12 U	18.8	5.5	4.0 U	8.4 U	6.8 U	5.9 U	119	0.16 JX	10.4	14.4 U	3.1	51.6 U	217	90.9

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
04-130-AD1	991	<5.0	699	<0.05	NR
04-130-AD2	244	<5.0	83	0.61	NR
04-130-SW1	170	<5.0	62	0.47	NR
04-130-SW2	72	<5.0	37	0.56	NR

LEGEND

- SE1 - 10% below test add, below when tested deep center ft.
- SE2 - 15% optimum of WEL
- WR1 - Composite of subsamples WEL1 and 10
- WR2 - Composite of subsamples WEL2 through 20 and WEL3
- WR3 - Composite of WEL4, 10, 15A, and 10
- BACKGROUND - From the Eshelbach files (04-01-02-01)
- AD1 - Discharge from 4th north of WEL
- AD2 - Discharge from 4th above WEL
- SW1 - Same as sample 04-02-01
- SW2 - Same as sample 04-02-02

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

Mine/Site Name: Chartam County: Broadwater
Legal Description: T 8N R 1W Section(s): Sections 13 and 24
Mining District: Winston Mine Type: Hardrock/Ag. Au
Latitude: N 46° 26' 52" Primary Drainage: Missouri River
Longitude: W 111° 39' 45" USGS Code: 10030101
Land Status: Private Secondary Drainage: Iron Age Gulch
Quad: Winston Date Investigated: June 22, 1994
Inspectors: Tuesday, Belanger, Clark, West P.A. # 04-501
Organization: Pioneer Technical Services, Inc.

- No mill tailings were observed at the site.
- The volume of waste rock observed at the site was estimated to be 10,690 cubic yards. The following elements were elevated to at least three times the background concentrations:

Silver: 3.8 to 23 mg/kg	Arsenic: 1,740 to 10,300 mg/kg
Cadmium: 48.0J to 55.0J mg/kg	Copper: 169 to 515 mg/kg
Mercury: 0.34JX to 2.12JX mg/kg	Manganese: 4,580 mg/kg
Lead: 109 to 8,070 mg/kg	Zinc: 3,030J to 7,630J mg/kg
- No discharging adits, filled shafts, seeps, or springs were observed at the site during the investigation.
- Miller Gulch flowed directly through the center of the site. An observed release to Miller Gulch was documented for mercury. Also, the MCL for mercury and the acute and chronic aquatic life criteria for mercury were exceeded in the downstream sample. These exceedences were directly attributable to the site.
- Potential safety hazards observed at the site included one open adit and a large, open pit.

Chartam PA# 04-501
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - TUESDAY
 INVESTIGATION DATE: 06/22/94

SOLID MATRIX ANALYSES

Metals in soils
 Results per dry weight basis

FIELD ID	Ag (mg/Kg)	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)
04-501-SE1	1.2	8.2	83.8 J	1.4	9.7	12.5 J	29.1	25600	0.03 U	397 J	8.9	42.6	7.0 U	201	NR
04-501-SE2	13.5	4880	117 J	49.1	17.0	13.3 J	306	52100	0.14	1940 J	10.0	3770	16.0	7930	NR
04-501-WR1	3.8	217	32.0	1.0 J	1.2 U	0.6 U	47.8	14200	2.12 JX	66.5	1.1 U	109	4.0 UJ	190 J	NR
04-501-WR2	4.8	1740	29.5	55.0 J	13.6	8.2	169	35700	0.14 JX	4590	10.9	1440	19.0 J	7630 J	NR
04-501-WR3	23	10300	71.1	48.0 J	12.5	9.2	515	72000	0.34 JX	1120	2.6	8070	12.9 J	3030 J	NR
BACKGROUND	0.8 U	96.6	130	0.8 U	11.8	5.9 JX	49.1 JX	24600	0.05 J	947	3.6 JX	29.2	10.2 UJ	64.9 JX	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		SULFUR ACID BASE POTENT	
	%	v/1000r	%	v/1000r	%	v/1000r	%	v/1000r	%	v/1000r	%	v/1000r	%	v/1000r
04-501-WR1	0.34	10.6	-2.59	-13	0.32	0.31	0.01	0.01	0.01	0.01	0.31	-2.90	-2.90	-2.90
04-501-WR2	2.04	63.7	21.3	-42	1.06	24.4	0.2	0.2	0.2	24.4	17.2	-3.05	-3.05	
04-501-WR3	2.03	63.4	1.20	-82	1.20	17.2	0.28	0.28	0.28	17.2	-16.0	-16.0	-16.0	

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
04-501-SW1	0.16	4.6	58.0	2.6 U	8.7 U	4.7 UJ	11.2	2680	0.11 U	113	8.0 U	23.8 J	29.4 U	74.4	135
04-501-SW2	0.12 U	8.3	36.3	2.6 U	8.7 U	5.0 JX	4.6 U	14.2	5.48	4.4 U	8.0 U	2.3	29.4 U	9.9	295

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
04-501-SW1	175	5.2	30	0.44	NR
04-501-SW2	396	<5.0	167	0.65	NR

LEGEND

- SE1 - Upstream in Miller Gulch
- SE2 - Downstream in Iron Age Gulch after confluence with Miller Gulch
- WR1 - Grab sample of the WRJ sub-sample
- WR2 - Composite of sub-samples WR2A and 2B
- WR3 - Grab sample of the WRJ sub-sample
- BACKGROUND - From the Klamathville Mine (04-5118-SE1)
- SW1 - Same as sample 04-501-SE1
- SW2 - Same as sample 04-501-SE2