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

Mine/Site Name: Boaz
Legal Description: T 3S R 1E
Mining District: Norris/Red Bluff
Latitude: N 45° 33' 35"
Longitude: W 111° 39' 16"
Land Status: Private
Quad: Norris
Inspectors: M. Babits, S. Babits
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): NW 1/4, SW 1/4, Sec. 19
Mine Type: Hardrock/Au, Pb, Zn, Ag
Primary Drainage: Hot Springs Creek
USGS Code: 10020007
Secondary Drainage: Unnamed tributary of Hot Springs Creek
Date Investigated: September 13, 1993
P.A. # 29-013

- The volume of tailings associated with this site was estimated to be approximately 56,500 cubic yards. The following elements were elevated at least three times background:
  Arsenic: 95.1J to 127J mg/kg
  Copper: 205 to 241 mg/kg
  Manganese: 1,130 to 1,810 mg/kg
  Zinc: 1,710 to 2,440 mg/kg
  Cadmium: 12.8 to 18 mg/kg
  Mercury: 0.536J to 1.26J mg/kg
  Lead: 3,030 to 4,800 mg/kg
  Cyanide: 0.445 to 2.21 mg/kg

- The volume of waste rock associated with this site was estimated to be approximately 138,770 cubic yards. The following elements were elevated at least three times background:
  Cadmium: 2.06 mg/kg
  Lead: 576 mg/kg
  Manganese: 1,220 mg/kg
  Zinc: 399 mg/kg

- No discharging adits, filled shafts, seeps, or springs were identified at the site.

- An unnamed tributary to Hot Springs Creek flowed directly through the tailings at the site and eventually discharged into wetlands. Surface water and sediment samples were collected in the tributary upstream and downstream from the site. An observed release to the tributary was documented for lead; and the chronic aquatic life criteria for lead was exceeded in the downstream sample. The upstream sample indicated the presence of an upstream source.

- Two potentially hazardous open adits were identified at the site. The on site shaft had previously been grated by MDSL-AMRB.

Boaz PA# 29-013
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
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)	CYANIDE (mg/Kg)
29-013-SE-1	6.74 J	119	0.94 U	8.27	35.4	26.6	16400	0.114 J	190	25	6.75	6.5 UJ	50.3	NR
29-013-SE-2	16.7 J	70.9	1.66	5.52	14.8	38.3	10400	0.159 J	337	12.2	596	6.08 UJ	330	NR
29-013-TP-1	95.1 J	230	12.80	9.04	32.4	205	29600	0.536 J	1130	31.1	3030	6.41 UJ	1710	2.21
29-013-TP-2	127 J	303	18.00	11.6	41.1	241	40900	1.26 J	1810	35.2	4800	6.81 J	2440	0.445
29-013-WR-1	25.2 J	253	2.06	12.8	53.8	54.2	27200	0.157 J	1220	44	576	5.44 UJ	399	NR
BACKGROUND	11.4	105	0.4 U	12.8	34.3	31.3	22100	0.11 J	363 J	26.7	6.81 U	5.18 U	43.1	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-013-TP-1	1.25	39	48.3	9.28	0.24	0.84	0.17	26.2	22.1
29-013-TP-2	0.68	21.2	45.3	24	0.14	0.45	0.09	14.1	31.2
29-013-WR-1	<0.01	0	51.4	51.4	<0.01	<0.01	0.05	0	51.4

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)
29-013-SW-1	3.69	102	4.59 U	5 U	6.24 U	3.47	1610	0.14 J	71.8	28.3	1.38	31.7 U	35	129
29-013-SW-2	3.9	95.6	4.59 U	5 U	6.24 U	2.33 U	73.1	0.12 U	5.27	10.9 U	15.6	31.7 U	13.8	142

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-013-SW-1	190	< 5	11	0.29	< 0.01
29-013-SW-2	196	< 5	11	0.05	< 0.01

LEGEND

SE1 - 180 feet upgradient from tailings pond 1.
SE2 - 10 feet downgradient from tailings pond 2.
TP1 - Composite of subsamples TP1A-A, 1A-B, 1A-C, and TP-2A.
TP2 - Composite of subsamples TP1A-D, 1A-E, 1B-B, and TP-2B.
WR1 - Composite of subsamples WR1A, 1B, 2, and 3.
BACKGROUND - From the Grubstake (29-399-SS-1).
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: Grubstake
Legal Description: T 3S R 1E
Mining District: Norris/Red Bluff
Latitude: N 45° 33' 23"
Longitude: W 111° 38' 30"
Land Status: Private
Quad: Norris
Inspectors: Babits, Lasher/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): SE 1/4, SE 1/4, Sec. 19
Mine Type: Hardrock/Au
Primary Drainage: Hot Springs Creek
USGS Code: 10020007
Secondary Drainage: South Fork Hot Springs Creek
Date Investigated: July 22, 1993
P.A. # 29-399

- There were approximately 5,780 cubic yards of uncovered tailings at the site. The following were elevated at least 3 times background:
  Arsenic: 52 to 63.4 mg/kg
  Cadmium: 4 to 10 mg/kg
  Copper: 101 to 148 mg/kg
  Mercury: 0.331J mg/kg
  Manganese: 1,360 mg/kg
  Lead: 566 to 1,690 mg/kg
  Zinc: 588 to 1,340 mg/kg
  Cyanide: 22.3 to 40.3 mg/kg

- There were approximately 1,030 cubic yards of uncovered waste rock at the site. The following were elevated at least 3 times background:
  Arsenic: 65 mg/kg
  Cadmium: 4 mg/kg
  Lead: 417 mg/kg
  Zinc: 546 mg/kg

- There were no discharging adits at the site.

- An dry intermittent drainage was on the site. No surface water samples were collected, but sediment samples were collected. There were no observed releases to downstream sediments; however, cyanide was detected in one downstream sediment sample (SE-3).

- There was one open shaft at the site.

Grubstake PA# 29-399
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 07/22/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-399-SE-1	28.3	275	2.1	24.5	81.1	58.8	29200	0.246 J	711 J	78.3	81.1	5.51 U	133	NR
29-399-SE-2	14	125	1.6	12.4	28.4	36.5	16600	0.064 J	439 J	26.3	81	6 U	109	0.387
29-399-SE-3	20.6	226	1.6	19.2	48.4	54	27800	0.145 J	563 J	45.6	156	5.46 U	213	0.295 U
29-399-TP-1	52	117	4.3	11	34.9	54.3	21800	0.122 J	727 J	33	566	5.65 U	588	10.6
29-399-TP-2	63.4	267	9.9	18.3	51.2	148	36600	0.331 J	1360 J	55.3	1690	5.7 U	1340	40.3
29-399-TP-3	54.9	247	9.4	15.2	42.9	101	30600	0.199 J	994 J	38.8	1450	6.99 U	1220	22.3
29-399-WR-1	65	161	3.9	21.7	61.3	72.6	32500	0.289 J	901 J	65.3	417	5.33 U	546	NR
BACKGROUND	11.4	105	0.4 U	12.8	34.3	31.3	22100	0.11 J	363 J	26.7	6.81 U	5.18 U	43.1	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT t/1000t
29-399-TP-1	0.48	15	34.7	19.7	0.1	0.19	0.19	5.94	28.8
29-399-TP-2	0.53	16.6	53.8	37.2	<0.01	0.9	0.12	28.1	25.6
29-399-TP-3	0.57	17.8	41.3	23.5	0.19	0.23	0.15	7.19	34.2
29-399-WR-1	0.29	9.06	48.9	39.8	<0.01	0.15	0.15	4.69	44.2

LEGEND

SE1 - Background sediment.
SE2 - At outfall of culvert below tailings pond 5.
SE3 - Next dam below tailings pond 5
TP1 - Composite of subsamples TP1A, 1B, 2A, and 3A.
TP2 - Composite of subsamples TP4A and 5A.
TP3 - Composite of subsamples TP4B and 5B.
WR1 - Composite of subsamples WR1A, 1B, and 2.
BACKGROUND - From the Grubstake (29-399-SS-1).

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

Mine/Site Name: Atlantic/Pacific
Legal Description: T 2S R 3W
Mining District: Pony
Latitude: N 45° 38' 50"
Longitude: W 111° 59' 20"
Land Status: Private/Public
Quad: Pony
Inspectors: M. Babits, S. Babits, Flammang
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): E 1/2, Sec. 20; W 1/2, Sec. 21
Mine Type: Hardrock/Ag, Au
Primary Drainage: South Boulder River
USGS Code: 10020005
Secondary Drainage: Park Creek
Date Investigated: September 16 and 18,1993
P.A. # 29-033

- The volume of tailings associated with this site was estimated to be approximately 64,500 cubic yards. The following elements were elevated at least three times background:
  Lead: 69.9 mg/kg

- The volume of waste rock associated with this site was estimated to be approximately 19,000 cubic yards. The following elements were elevated at least three times background:
  Cobalt: 34.9 mg/kg Copper: 91 mg/kg
  Manganese: 6,710 mg/kg Lead: 156 mg/kg

- A soil sample collected at the base of the heap leach pad revealed a cyanide concentration of 16.1mg/kg, and a water sample collected from a lined impoundment revealed 0.75 mg/l cyanide.

- One discharging adit was identified at the site. MCLs and acute and chronic aquatic life criteria were exceeded for cadmium and copper in the adit discharge. Additionally, the chronic aquatic life criteria for iron was exceeded. The adit discharge pH measurement was 3.6.

- Park Creek flowed adjacent to the site on the west site. Surface water and sediment samples were collected upstream and downstream from the site. An observed release to Park Creek was documented for lead. Acute and chronic aquatic life criteria for copper were exceeded in the downstream sample, and the chronic aquatic life criteria for lead was exceeded in the downstream sample.

- Three potentially hazardous open adits were identified at the site.

Atlantic & Pacific PA# 29-033
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
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)
29-033-SE-1	6.04 U	36.9	1.2 U	3.42	12.7	19.1	6290	0.034 U	123 J	15.1	8.28 U	7.99 UJ	15	NR
29-033-SE-2	6.25 U	55.7	1.2 U	3.29	4.53	17.6	8190	0.038 U	256 J	7.5	8.57 U	8.27 UJ	8.9	NR
29-033-TP-1	5.16 U	103	1.0 U	2.31	1.93	21.8	10600	0.049	173 J	2.35 U	27	6.83 UJ	5.41	NR
29-033-TP-2	4.05 U	187	0.8 U	1.88	2.74	18	19000	0.099	85.6 J	1.99	69.9	5.35 UJ	6.19	0.102 U
29-033-WR-1	4.98	145	0.8 U	7.43	3.85	61.6	19400	0.025 U	521 J	5.71	156	5.31 UJ	13.6	NR
29-033-WR-2	4.76 U	256	0.9 U	34.9	1.37	91	15500	0.242	6710 J	7.08	17.6	6.3 UJ	15.7	NR
29-033-SS-1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	16.1
29-033-SS-2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.609
BACKGROUND	20.1 J	168	0.8 U	10.7	31.5	29.2	21300	0.037 UJ	596	22	15.9	5.47 UJ	74.9	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-033-TP-1	0.1	3.12	6.78	3.65	0.1	<0.01	<0.01	0	6.78
29-033-TP-2	0.26	8.12	0.24	-7.9	0.25	0.01	<0.01	0.31	-0.07
29-033-WR-1	0.15	4.69	0.27	-4.4	0.1	<0.01	0.05	0	0.27
29-033-WR-2	0.14	4.37	0.41	-4	0.14	<0.01	<0.01	0	0.41

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)
29-033-SW-1	1.29 J	23.4	4.59 U	5 U	6.24 U	6.37	50.8 JX	0.12 U	4.2	10.9 U	1.22 U	31.7 U	8.71 U	39.7
29-033-SW-2	5.61 J	31.1	4.59 U	5 U	6.24 U	12.6	79.2 JX	0.12 U	11.3	10.9 U	4.39 J	31.7 U	8.71 U	58.1
29-033-SW-3	3.38 J	16	7.37	158	6.24 U	2130	21200 JX	0.12 U	9220	29.3	3.59 J	31.7 U	112	172

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-033-SW-1	72	< 5	13	0.26	< 0.01
29-033-SW-2	124	< 5	25	0.43	< 0.01
29-033-SW-3	570	< 5	342	1.63	NR
29-033-SW-4	NR	NR	NR	NR	0.76

LEGEND

SE1 - In Park Creek, 5' upstream of where road crosses creek.
SE2 - In Park Creek, 30' downstream of spring that flows adjacent to tailings pond 1.
TP1 - Composite of subsamples TP1AA, 1AB, 1BA, 1CA, 1DA, and 1DB.
TP2 - Composite of subsamples TP1BB, 1BC, 1CB, 1CC, and 1DC.
WR1 - Composite of subsamples WR1A and 1B.
WR2 - Composite of subsamples WR2A and 2B.
BACKGROUND - From the Strawberry Mine (29-038 -SS-1).
SS1 - Base of heap leach nearest middle pond. Grab 0-6".
SS2 - Composite of 3 holes in lysimeter field.
SW1 - Same as sample SE1.
SW2 - Same as sample SE2.
SW3 - Adit discharge at waste dump 2.
SW4 - Middle pond, Southwest.

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

Mine/Site Name: Boss Tweed
Legal Description: T 2S R 3W
Mining District: Pony
Latitude: N 45° 39' 50"
Longitude: W 111° 57' 20"
Land Status: Private
Quad: Pony
Inspectors: M. Babits, S. Babits, Flammang
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): SW 1/4, NE 1/4, Sec. 15
Mine Type: Hardrock/Au, Ag, Cu, Fe
Primary Drainage: North Willow Creek
USGS Code: 10020005
Secondary Drainage: Pony Creek
Date Investigated: September 14 and 15,1993
P.A. # 29-034

- The volume of tailings associated with this site was estimated to be approximately 65,900 cubic yards. The following elements were elevated at least three times background:
  Cadmium: 2.7 to 9 mg/kg Copper: 95 to 518 mg/kg
  Mercury: 0.468J to 3.53J mg/kg Lead: 91.7 to 327 mg/kg
  Zinc: 279 to 1,030 mg/kg

- A sample of leach pad material collected from this site revealed a cyanide concentration of 0.394 mg/kg.

- The volume of waste rock associated with this site was estimated to be approximately 26,520 cubic yards. The following elements were elevated at least three times background:
  Cadmium: 5.6 to 13.3 mg/kg Copper: 146 to 195 mg/kg
  Mercury: 0.26J to 1.16 mg/kg Manganese: 2,340 to 2,990 mg/kg
  Lead: 138 to 1,870 mg/kg Zinc: 373 to 842 mg/kg

- Four discharging adits were identified at the site. One of the discharges was sampled for laboratory analysis. No MCLs were exceeded in the adit discharge; however, acute and chronic aquatic life criteria for zinc were exceeded. The chronic aquatic life criteria for mercury was also exceeded.

- Pony Creek flowed through the center of the site. Surface water and sediment samples were collected upstream and downstream from the site in Pony Creek. No MCLs were exceeded; the chronic aquatic life criteria for lead was exceeded in both the upstream and downstream samples. An observed release to Pony Creek (sediment) was documented for zinc.

- Potential safety hazards observed at the site included five open adits, a collapsing loadout structure, and three highwalls (>25 feet).

Boss Tweed PA# 29-034
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 09/14/93

SOLID MATRIX ANALYSES

Metals in soils — Results per dry weight basis (mg/kg)

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	CYANIDE
29-034-SE-1	17.7 J	55.6	1.3 U	7.71	21.8	13.5	14700	0.0347 UJ	486	12.7	9.34 U	9.01 UJ	44.7	NR
29-034-SE-2	8.05 J	27	2.2	4.72	5.5	93.6	12400	0.0877 J	619	6.21	34.4	7.39 UJ	206	NR
29-034-TP-1	11 J	55.7	2.3	5.62	28.4	95	24000	0.0853 J	1290	15.4	91.7	8 UJ	279	NR
29-034-TP-2	17.3 J	36	8.3	9.49	5.91	164	24500	0.468 J	745	8.58	327	8.42 UJ	1030	0.353
29-034-TP-3	8.96 J	15.8	5.0	6.49	7.25	354	20500	0.971 J	681	6.63	148	6.86 UJ	389	NR
29-034-TP-4	7.31 J	45.9	9.0	9.88	6.24	518	27600	3.53 J	1060	11	326	7.29 UJ	849	0.646
29-034-TP-5	4.45 U	103	2.7	7.05	13.4	32.6	14800	0.109 J	527	9.81	31.8	5.89 UJ	593	NR
29-034-WR-1	20.4 J	133	5.6	16.3	14.3	195	27900	1.16 J	2340	16.9	138	4.3 UJ	373	NR
29-034-WR-2	13.6 J	237	13.3	11.4	5.43	154	31500	0.838 J	2990	11.6	139	5.26 UJ	842	NR
29-034-WR-3	37.9 J	112	2.3	6.48	9.78	146	29200	0.26 J	439	6.26	1870	5.49 UJ	99.8	NR
29-034-LP-1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.394
BACKGROUND	20.1 J	168	0.8 U	10.7	31.5	29.2	21300	0.0367 UJ	596	22	15.9	5.47 UJ	74.9	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-034-TP-1	0.23	7.19	67.3	60.1	0.05	0.12	0.06	3.75	63.6
29-034-TP-2	1.11	34.7	29.2	-5.45	0.2	0.84	0.07	26.2	2.98
29-034-TP-3	0.92	28.7	27.8	-0.97	0.33	0.48	0.11	15	12.8
29-034-TP-4	1.03	32.2	34.1	1.96	0.3	0.61	0.12	19.1	15.1
29-034-TP-5	0.09	2.81	7.05	4.23	0.04	0.01	0.04	0.31	6.73
29-034-WR-1	1.17	36.6	64.5	27.9	<0.01	0.86	0.51	26.9	37.6
29-034-WR-2	0.28	8.75	39.6	30.9	0.12	<0.01	0.17	0	39.6
29-034-WR-3	0.58	18.1	2.05	-16.1	0.57	0.01	<0.01	0.31	1.74
29-034-WR-3	0.56	17.5	2.45	-15	0.55	0.01	<0.01	0.31	2.13

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)
29-034-SW-1	7.82	15.5	4.59 U	5 U	6.24 U	2.33 U	576	0.12 J	28.1	10.9 U	4.99	31.7 U	8.71 U	47.3
29-034-SW-2	1.12 U	13.7	4.59 U	5 U	6.24 U	2.57	195	0.12 U	19.3	10.9 U	3.55	31.7 U	8.71 U	93.7
29-034-SW-3	4.1	3.23	4.59 U	5 U	6.24 U	12	235	0.13 J	394	10.9 U	1.37	31.7 U	250	139
29-034-SW-4	1.41	1.1 U	4.59 U	5 U	6.24 U	2.33 U	13.7 U	0.12 U	3.76 U	10.9 U	1.25	31.7 U	8.71 U	0.1

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

Wet Chemistry — Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-034-SW-1	96	< 5	< 5	0.1	NR
29-034-SW-2	160	< 5	49	0.44	< 0.005
29-034-SW-3	217	< 5	89	0.58	NR
29-034-SW-4	NR	NR	NR	NR	< 0.005

LEGEND

LP1 - Small leach pond by WR2.
TP1 - Composite of subsamples TP1A-A through 1A-F, 1B-A through 1B-C, and 2A
TP2 - Composite of subsamples TP1A-D, 1A-E, 1B-D, and 1B-E
TP3 - Composite of subsamples TP2A-A, 2A-B, 2A-C, 2B-A, 2B-B and 2B-C.
TP4 - Composite of subsamples TP3B-A, 3B-B, 3A-A, 3A-B, and 3A-C.
TP5 - Composite of subsamples TP3B-C and 3A-D.
WR1 - Composite of subsamples WR1, 2, and 3.
WR2 - Composite of subsamples WR4, 5, 6, 7, and 8.
WR3 - Composite of subsamples WR9A, 9B, and 10.
BACKGROUND - From the Strawberry Mine (29-038-SS-1)
SE1 - 500 feet upgradient from waste rock dump 6 in Pony Cr
SE2 - Downgradient of TP3 prior to confluence with tributary.
SW1 - Same as sample SE1.
SW2 - Same as sample SE2.
SW3 - Adit discharge at WR1.
SW4 - QA/QC Blank.

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

Mine/Site Name: Garnet Gold Mine
Legal Description: T 2S R 3W
Mining District: Pony
Latitude: N 45° 38' 42"
Longitude: W 111° 56' 07"
Land Status: Private
Quad: Pony
Inspectors: Flammang, Belanger, West
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): SE 1/4, Section 23
Mine Type: Hardrock/Au, Cu, Ag, Zn, Pb
Primary Drainage: North Willow Creek
USGS Code: 10020005
Secondary Drainage: Cataract Creek
Date Investigated: July 8, 1994
P.A. # 29-035

- The volume of mill tailings observed at the site was estimated to be 23,450 cubic yards. The following elements were elevated to at least three times the background concentrations:
  Silver: 8.1 to 14.6 mg/kg
  Barium: 471 mg/kg
  Mercury: 0.76J to 0.82J mg/kg
  Lead: 2,160 to 5,380 mg/kg
  Copper: 306 to 1,290 mg/kg

- The volume of waste rock observed at the site was estimated to be 21,640 cubic yards. The following elements were elevated to at least three times the background concentrations:
  Copper: 105 to 194 mg/kg
  Mercury: 0.29J to 0.34J mg/kg
  Lead: 351 to 515 mg/kg

- One discharging adit was observed at the site. MCLs for cadmium and antimony were exceeded in the adit discharge. In addition, acute and chronic aquatic life criteria for copper and zinc and chronic aquatic life criteria for cadmium and lead were exceeded in the adit discharge.

- Cataract Creek flows directly through tailings at the site. Observed releases to Cataract Creek (sediment) were documented for copper, mercury, and lead.

- No MCLs were exceeded in Cataract Creek; however, the chronic aquatic life criteria for lead was exceeded in the downstream sample.

- Potential safety hazards observed at the site included two partially accessible adits and an open shaft.

Garnet Gold Mine PA# 29-035
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 07/09/94

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)
29-035-SE1	0.4 U	3.9 U	26.6	0.4 U	1.4	2.8	4.9	5740	0.02 UJ	468	2.0	15.4	4.3 U	18.4	NR
29-035-SE2	0.7	5.9 U	75.5	0.6 U	1.9 U	2.5	149	5470	0.24 J	45.5	1.8 UJ	861	6.6 U	46.4	NR
29-035-TP1	8.1	5.8 U	196	0.6 U	1.9 U	1.0 U	306	9170	0.76 J	79.9	1.8 UJ	2160	6.5 U	109	NR
29-035-TP2	14.6	4.5 U	471	0.4 U	1.5 U	0.8 U	1290	10200	0.82 J	41.4	1.4 UJ	5380	5.0 U	110	NR
29-035-WR1	1.2	5.4 U	77.2	0.5 U	2.6	1.0 U	194	15900	0.29 J	1240	1.6 UJ	515	6.0 U	80.6	NR
29-035-WR2	0.5 U	5.1 U	42.4	0.5 U	2.4	1.4	105	7730	0.34 J	842	1.5 UJ	351	5.7 U	69.4	NR
BACKGROUND	0.6 U	5.9 U	140	0.6 U	3.6 B	9.2	12.3	11000	0.06 J	735	4.7 B	34.0	6.6 U	55.5	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 t/1000t	NEUTRAL POTENT t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT t/1000t
29-035-TP1	0.12	3.75	0.06	-3.7	0.12	<0.01	<0.01	0.00	0.06
29-035-TP2	0.25	7.81	0.56	-7.3	0.2	0.03	0.02	0.94	-0.38
29-035-WR1	0.29	9.06	3.53	-5.5	0.22	0.01	0.06	0.31	3.22
29-035-WR2	0.05	1.56	6.27	4.71	0.02	0.01	0.02	0.31	5.96

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)
29-035-AD1	0.12 U	1.2	27.2	8.2	8.7 U	4.7 U	205	241	0.11 U	4000	8.0 U	43.5 J	34.0 JX	440 JX	227
29-035-SW2	0.12 U	1.1 U	25.0	2.6 U	8.7 U	4.7 U	4.6 U	124	0.11 U	13.6	8.0 U	19.8 J	29.4 UX	4.9 JX	33.9

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-035-AD1	343	<5.0	157	0.11	NR
29-035-SW2	25	<5.0	<5.0	0.14	NR

LEGEND

SE1 - Upgradient of site, approx. 30' below reservoir dam face.
SE2 - Downgradient of lowest breached dam approx. 30'
TP1 - Composite of subsamples TP1A, 1B, 1C-1, and 1D-1.
TP2 - Composite of subsamples TP1C-2 and 1D-2.
WR1 - Composite of subsamples WR1A through 1D.
WR2 - Composite of subsamples WR1A, 1B, and 4.
BACKGROUND - From the Garnet Gold Mine (29-035-SE1).

AD1 - Discharge from adit #1
SW2 - Same as sample 29-035-SE2.

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

Mine/Site Name: Strawberry
Legal Description: T 2S R 3W
Mining District: Pony
Latitude: N 45° 39' 50"
Longitude: W 111° 55' 50"
Land Status: Private
Quad: Pony
Inspectors: M. Babits, S. Babits, Flammang
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): N 1/2, NE 1/4, Sec. 14
Mine Type: Hardrock/Au, Ag
Primary Drainage: North Willow Creek
USGS Code: 10020005
Secondary Drainage: Pony Creek
Date Investigated: September 14, 1993
P.A. # 29-038

- The volume of tailings associated with this site was estimated to be approximately 13,475 cubic yards. The following elements were elevated at least three times background:
  Copper: 167 to 294 mg/kg Cadmium: 1.8 mg/kg
  Mercury: 1.17J to 1.94J mg/kg Lead: 367 to 584 mg/kg
  Zinc: 360 mg/kg

- The volume of waste rock associated with this site was estimated to be approximately 12,820 cubic yards. The following elements were elevated at least three times background:
  Copper: 155 to 275 mg/kg Cadmium: 1.6 to 2.8 mg/kg
  Mercury: 0.218J to 0.882J mg/kg Lead: 266 to 1,510 mg/kg
  Zinc: 278 mg/kg

- One discharging adit was identified at the site during the investigation. The MCL for cadmium was exceeded in the adit discharge. Acute and chronic aquatic life criteria were exceeded for cadmium, copper, and zinc.

- Pony Creek was flowing through the center of the site during the investigation. Surface water and sediment samples were collected upstream and downstream from the site in Pony Creek. No MCLs were exceeded; however, the chronic aquatic life criteria for mercury was exceeded in both the upstream and downstream samples.

- Ten potentially hazardous open adits and four open shafts were identified at the site.

Strawberry PA# 29-038
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
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)
29-038-SE-1	11.6 J	29.6	1.5	4.04	7.65	77.7	12700	0.113 J	555	12.1	43.7	7.8 UJ	206	NR
29-038-SE-2	5.81 J	55	1.7	7.96	15.4	45.7	13200	0.063 J	470	14.1	21.9	5.95 UJ	140	NR
29-038-TP-1	23.2 J	141	1.8	11.9	40.6	294	21300	1.17 J	330	39.5	367	7.33 UJ	360	NR
29-038-TP-2	26.1 J	139	1.0 U	2.25	9.27	167	20800	1.94 J	52	4.87	584	6.71 UJ	172	1.42
29-038-WR-1	32 J	83.3	2.8	18.8	39.7	275	29500	0.218 J	478	33.4	1510	7 J	278	NR
29-038-WR-2	40.6 J	177	1.6	12.5	36.3	155	36600	0.882 J	415	36.3	266	5.01 UJ	142	NR
BACKGROUND	20.1 J	168	0.8 U	10.7	31.5	29.2	21300	0.037 UJ	596	22	15.9	5.47 UJ	74.9	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-038-TP-1	<0.01	0	77.6	77.6	<0.01	<0.01	0.01	0	77.6
29-038-TP-2	0.34	10.6	0.34	-10	0.33	0.01	<0.01	0.31	0.03
29-038-TP-2DUP	0.32	10	0.39	-9.6	0.31	0.01	<0.01	0.31	0.08
29-038-TP-2	0.34	10.6	0.34	-10	0.33	0.01	<0.01	0.31	0.03
29-038-WR-1	0.07	2.19	5.38	3.19	0.05	0.01	0.01	0.31	5.06
29-038-WR-2	0.45	14.1	2.26	-12	0.44	0.01	<0.01	0.31	1.94

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)
29-038-SW-1	2.82	13.1	4.59 U	5 U	6.24 U	2.33 U	66.5	0.12 U	4.6	10.9 U	1.35	31.7 U	8.71 U	75.5
29-038-SW-2	3.37	16.5	4.59 U	5 U	6.24 U	2.33 U	268	0.23 J	43	10.9 U	1.64	31.7 U	24	87.2
29-038-SW-3	4.86	38.1	12.9	36.7	6.37	77.7	12000	0.16 J	1750	81.4	1.61	31.7 U	762	276

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

Wet Chemistry
Results in mg/l

FIELD I.D.	DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-038-SW-1	164	< 5	31	0.3	NR
29-038-SW-2	151	< 5	40	0.4	NR
29-038-SW-3	401	< 5	187	0.37	NR

LEGEND

SE1 - 250 feet upstream of mine access road Pony Creek crossing.
SE2 - 1200' downstream of mill ruins below last tailings.
TP1 - Composite of subsamples TP1A-A 1A-B, 2A-A, 2A-B, 2C-A, 2B-A, and 2B-C.
TP2 - Composite of subsamples TP1A-C, 1A-D, 1A-E, and 2B-C.
WR1 - Composite of subsamples WR1, 2, 3A, and 3B.
WR2 - Composite of subsamples WR4A, 4B, 6, 7, 8, and 9.
BACKGROUND - From the Strawberry Mine (29-038-SS-1).

SW1 - Same as sample SE1.
SW2 - Same as sample SE2.
SW3 - Adit discharge at waste rock dump 9.

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

Mine/Site Name: Chicago Mining Corp. Pony Millsite
Legal Description: T 2S R 3W ; T 2S R 2W
Mining District: Pony
Latitude: N 45° 39' 27"
Longitude: W 111° 54' 17"
Land Status: Private
Quad: Pony
Inspectors: Tuesday, Belanger, West
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): SE 1/4, SE 1/4, Section 13; SW 1/4, SW 1/4, Section 18
Mine Type: Millsite/Au
Primary Drainage: North Willow Creek
USGS Code: 10020005
Secondary Drainage: North Willow Creek
Date Investigated: August 11, 1994
P.A. # 29-500

- No samples were collected at this site during the 1994 inventory; the team was unable to enter the locked premises.
- One tailings pond was observed at the site; however, the tailings were not bored or sampled. and the volume is unknown.
- Cyanide has been detected in the groundwater downgradient from this facility in a spring and a residential well. Cyanide concentrations detected in November of 1994 did not exceed drinking water standards.
- No discharging adits or filled shafts were observed at the site.
- Pony Creek flows adjacent to the site on the north side, and North Willow Creek flowed adjacent to the site on the southeast side. Surface water data collected in 1994 indicated that no metals were elevated downstream in North Willow Creek compared to upstream concentrations. No 1994 surface water data was available for Pony Creek downstream from the site.

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

Mine/Site Name: Emma
Legal Description: T 3S R 7W
Mining District: Rochester
Latitude: N 45° 34' 37"
Longitude: W 112° 02' 19"
Land Status: Public
Quad: Nez Perce Hollow
Inspectors: Babits, Lasher/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): SE 1/4, SW 1/4, Sec. 6
Mine Type: Hardrock/Au, Pb, Ag, Zn
Primary Drainage: Big Hole River
USGS Code: 10020004
Secondary Drainage: Nez Perce Creek
Date Investigated: June 18, 1993
P.A. # 29-061

- The volume of tailings associated with this site was estimated to be approximately 11,700 cubic yards. The following elements were elevated at least three times background:
  Arsenic: 3,710 to 5,840 mg/kg
  Copper: 492 to 1,440 mg/kg
  Lead: 8,990 to 29,500 mg/kg
  Zinc: 7,400 to 46,200 mg/kg
  Cadmium: 115JX to 495JX mg/kg
  Mercury: 0.199 to 0.5 mg/kg
  Antimony: 95J to 194J mg/kg

- The volume of waste rock associated with this site was estimated to be approximately 15,185 cubic yards. The following elements were elevated at least three times background:
  Arsenic: 9,500 to 11,900 mg/kg
  Copper: 552 to 870 mg/kg
  Manganese: 2,030 mg/kg
  Antimony: 40J to 100J mg/kg
  Cadmium: 82.3JX to 206JX mg/kg
  Mercury: 1.08 to 3.88 mg/kg
  Lead: 27,500 to 41,200 mg/kg
  Zinc: 9,100 to 9,200 mg/kg

- No discharging adits, filled shafts, seeps, or springs were identified at the site during the investigation.

- No surface water was identified on or near the site. The nearest flowing water was approximately one mile away; consequently, no surface water or sediment samples were collected.

- Potentially hazardous mine openings identified at the site included one open shaft and four open adits.

Emma PA# 29-061
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 06/18/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-061-TP-1	3710	29.9	115 JX	7.8	9	492	46700	0.5	727	21	8990	95 J	7400	NR
29-061-TP-2	5840	33.7	495 JX	16.2	7	1440	59600	0.199	1370	33	29500	194 J	46200	NR
29-061-WR-1	2910	157	72.8 JX	17.4	20.5	160	38200	1.99	1670	33	6200	34 J	4490	NR
29-061-WR-2	9500	30.5	82.3 JX	10.8	5.4	552	61100	1.08	943	22	27500	100 J	9100	NR
29-061-WR-3	11900	30	206 JX	21.7	5.5	870	54600	3.88	2030	23	41200	40 J	9200	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 Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-061-TP-1	1.51	47.2	6.08	-41	1.01	0.19	0.31	5.94	0.14
29-061-TP-2	5.99	187	23.3	-164	<0.01	4.34	2.44	136	-112
29-061-WR-1	0.04	1.25	40.1	38.9	0.03	<0.01	0.01	0	40.1
29-061-WR-2	3.41	107	4.61	-102	1.25	0.78	1.38	24.4	-19.8
29-061-WR-3	0.44	13.7	15.2	1.47	0.41	<0.01	0.05	0	15.2

LEGEND

TP1 - Composite of subsamples TP1B-A, 1A-A, and 1A-B.
TP2 - Composite of subsamples TP1A-C and 1A-D.
WR1 - Composite of subsamples WR1AA, 1B, and 6.
WR2 - Composite of subsamples WR2A, 2B, 2C, 4A, and 4B.
WR3 - Sample of the WR5 subsample.
BACKGROUND - On top of the hill, upgradient of waste rock dump 6. From the Emma Mine (29-061-SS-1).

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

Mine/Site Name: Thistle Mine and Millsite
Legal Description: T 3S R 7W
Mining District: Rochester
Latitude: N 45° 37' 27"
Longitude: W 112° 29' 28"
Land Status: Private
Quad: Twin Bridges
Inspectors: Tuesday, Babits, Belanger, Lasher, Clark/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): SE 1/4, SW 1/4, Sec. 5
Mine Type: Hardrock/Au, Ag, Pb
Primary Drainage: Rochester Creek
USGS Code: 10020004
Secondary Drainage: Rochester Creek
Date Investigated: June 15, 1993
P.A. # 29-073

- The volume of tailings associated with this site was estimated to be approximately 56,950 cubic yards. The following elements were elevated at least three times background:
  Arsenic: 2,730 to 6,850 mg/kg
  Copper: 371 to 887 mg/kg
  Lead: 2,500 to 5,850 mg/kg
  Cadmium: 3.8 to 10.5 mg/kg
  Mercury: 0.255 to 3.51 mg/kg
  Antimony: 27 to 59 mg/kg

- The volume of waste rock associated with this site was estimated to be approximately 6,393 cubic yards. The following elements were elevated at least three times background:
  Arsenic: 275 mg/kg
  Mercury: 0.366 to 2.21 mg/kg
  Lead: 309 to 1,720 mg/kg
  Cadmium: 4.3 to 37.3 mg/kg
  Manganese: 1,610 mg/kg
  Zinc: 1,720 mg/kg

- No discharging adits, filled shafts, seeps, or springs were identified at the site.

- Intermittent Rochester Creek was situated adjacent to the tailings at the site. Sediment samples were collected upstream and downstream from the site. Observed releases to Rochester Creek (sediment) were documented for arsenic, cadmium, mercury, and lead.

- Potentially hazardous mine openings identified at the site included four open shafts and six open adits.

Thistle PA# 29-073
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE:

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)
29-073-SE-1	124	83.1	0.5	4.3	21.8	83.7	12600	0.015	130	11	71	< 3	32	NR
29-073-SE-2	590	49.9	1.6	4.9	14.7	162	19600	0.087	169	13	650	6	64	NR
29-073-SE-3	291	52.7	< 0.6	6.9	18.1	66.7	20400	< 0.024	131	17	204	< 4	43	NR
29-073-TP-1A	2730	39	3.8	3.9	4.5	371	32300	0.255	67.4	6	2500	27	100	NR
29-073-TP-1B	6850	97.9	10.5	6	18.1	887	67300	3.51	122	10	5850	59	117	NR
29-073-WR-1	13	61.3	4.3	13.7	28.4	30.8	36100	0.366	738	26	309	< 3	187	NR
29-073-WR-2	275	68.5	37.3	31.8	38.3	67.7	45900	2.21	1610	53	1720	< 4	1720	NR
BACKGROUND	19	144	0.6	14.1	47.5	32.6	26800	0.02 J	481	29	30	< 3 UJ	74	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-073-TP-1A	1.15	35.9	-6.7	-43	0.85	0.15	0.15	4.69	-11.4
29-073-TP-1B	1.23	38.4	-2.9	-41	1.16	0.01	0.06	0.31	-3.26
29-073-WR-1	0.1	3.12	70.7	67.6	<0.01	0.02	0.1	0.62	70.1
29-073-WR-2	0.14	4.37	74.6	70.2	0.01	0.02	0.11	0.62	74

LEGEND

SE1 - Upstream of tailings in Rochester Creek.
SE2 - At breach where tailings flow into creek.
SE3 - Downstream from tailings impoundment in Rochester Creek.
TP1A - Composite of subsamples TP1C-A, 1C-B, 1C-C, and 1D-A
TP1B - Composite of subsamples TP1A-A. 1A-C, 1B-A, and 1D-B
WR1 - Composite of subsamples WR1A and 12.
WR2 - Composite of subsamples WR1B, 11, 13, 14, and 15
BACKGROUND - Above WR15 From the Thistle Mine (29-073-SS-1).

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

Mine/Site Name: Watseca
Legal Description: T 2S R 7W
Mining District: Rochester
Latitude: N 45° 37' 15"
Longitude: W 112° 30' 15"
Land Status: Private
Quad: Nez Perce Hollow
Inspectors: Bullock, Tuesday, Flammang
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): SW 1/4, NW 1/4, Sec. 32; NE 1/4, SE 1/4, SEC. 31
Mine Type: Hardrock/Ag, Au, Cu, Zn
Primary Drainage: Big Hole River
USGS Code: 10020004
Secondary Drainage: Rochester Creek
Date Investigated: September 20, 1993
P.A. # 29-075

- The site was active, apparently operating under a Small Miner Exclusion.
- The Thistle I tailings (PA# 29-073) and waste rock from the Watseca dumps were being reprocessed in a cyanide vat leach operation. The tailings impoundment was lined with geotextile and process water appeared to be recycled. No samples were collected.
- There were no discharging adits on site.
- There was no surface water on site; no surface water samples were collected. The nearest surface water was Rochester Creek, an intermittent drainage approximately 100 feet from the facility. The drainage was dry at the time of this investigation.
- There was one hazardous open shaft on site. Several other shafts have been grated by the AMRB.

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

Mine/Site Name: Smuggler
Legal Description: T 4S R 4W
Mining District: Sheridan
Latitude: N 45° 28' 57"
Longitude: W 112° 02' 18"
Land Status: Public
Quad: Copper Mountain
Inspectors: Tuesday, Babits, Belanger, Lasher, Clark/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): SE 1/4, SW 1/4, SW 1/4, Sec. 13
Mine Type: Hardrock/Au, Ag
Primary Drainage: Mill Creek
USGS Code: 10020003
Secondary Drainage: Mill Creek
Date Investigated: June 16, 1993
P.A. # 29-010

- The volume of tailings associated with this site was estimated to be approximately 3,000 cubic yards. Approximately 80% of the tailings surface was naturally revegetated. The following elements were elevated at least three times background:
  Cadmium: 3.9J mg/kg Lead: 504 mg/kg
  Mercury: 2.51 mg/kg Zinc: 435 mg/kg

- The volume of waste rock associated with this site was estimated to be approximately 8,500 cubic yards. The following elements were elevated at least three times background:
  Cadmium: 6.6 mg/kg Lead: 514 mg/kg
  Mercury: 0.207J mg/kg Zinc: 1,030 mg/kg

- Four adits were associated with this site; however, only one of the adits (Adit #1) was discharging water. The Adit #1 discharge was very minor (<1 gpm), and eventually seeped into the ground. The discharge did not exceed any MCL/MCLGs; however, the chronic aquatic life criteria for mercury was exceeded.

- Mill Creek was located approximately 200 yards downgradient from the adits and associated waste rock dumps, and approximately 20 yards downgradient from the tailings on the opposite side of the Mill Creek Road. Mill Creek was not sampled during the investigation.

- Adit #4 was open and posed a hazard.

Smuggler PA# 29-010
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/16/93

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)
29-010-TP-1	36	14.8	3.9 J	14.8	30.2	58.4	25700	2.51	703	41	504	4 UJ	435	NR
29-010-WR-1	29	26.1	6.6	22.9	74.6	71.7	37100	0.207 J	1220	78	514	3 UJ	1030	NR
BACKGROUND	20	96.4	1.2 JX	20.2	42.1	35.1	18200	0.017 U	608	59	25	4 UJ	61	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-010-TP-1	0.07	2.19	49.2	47	0.01	0.02	0.04	0.62	48.6
29-010-WR-1	0.31	9.68	115	105	<0.01	0.14	0.24	4.37	111

Cation Exchange Capacity

FIELD ID	milliequivalents/100g
29-010-TP-1	2.8

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29-010-SW-1	1.69 U	7.13	2.55 U	5.99 U	5 U	1.93 J	46.2	0.26	2.6 U	10.5 J	1.55 U	18.3 U	19.6	186

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-010-SW-1	234	< 5.0	19	0.13	NR

LEGEND

TP1 - Composite of the subsamples TP1A and 1B.
WR1 - Composite of the subsamples WR1A through 1C, and 3A, and 3B.
BACKGROUND - From the Uncle Sam Mine (29-383-SS-1).
SW1 - Adit discharge.

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

Mine/Site Name: Goldschmidt/Steiner
Legal Description: T 4S R 4W
Mining District: Sheridan
Latitude: N 45° 27' 10"
Longitude: W 112° 02' 40"
Land Status: Public
Quad: Copper Mountain
Inspectors: Babits, Flammang/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): NE 1/4, SW 1/4, Sec. 25
Mine Type: Hardrock/Au
Primary Drainage: Ramshorn Creek
USGS Code: 10020003
Secondary Drainage: Currant Creek
Date Investigated: August 25, 1993
P.A. # 29-078

- No tailings were observed at this site during the investigation.

- The volume of waste rock associated with this site was estimated to be approximately 6,000 cubic yards. The following elements were elevated at least three times background:

  Arsenic: 164 mg/kg
  Copper: 112 mg/kg
  Manganese: 2,390J to 8,800J mg/kg
  Lead: 403JX to 1,500JX mg/kg
  Zinc: 885J to 8,890J mg/kg
  Cadmium: 7.79J to 74.9J mg/kg
  Mercury: 0.49J to 1.01J mg/kg
  Nickel: 191JX mg/kg
  Antimony: 8.53J to 37.1J mg/kg

- No discharging adits, filled shafts, seeps, or springs were identified at the site during the investigation.

- Currant Creek was flowing through the center of the site during the investigation. Surface water and sediment samples were collected uptream and downstream from the site in Currant Creek. No MCLs were exceeded; however, chronic aquatic life criteria for mercury and lead were exceeded in both the upstream and downstream samples.

- Observed releases to Currant Creek (sediment) were documented for mercury, manganese, nickel, lead, and zinc.

- Eight potentially hazardous open adits were identified at the site.

Goldschmidt-Steiner PA# 29-078
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
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)
29-078-SE-1	7.52 U	129 J	1.4 U	10.3	60.2	20	15000	0.054 U	481	29.6 J	10.3 U	9.95 UJ	67.6	NR
29-078-SE-2	14.7	535 J	1.6	46.2	82.7	55.1	25100	0.208 J	2730	101 J	80.1	6.34 UJ	208	NR
29-078-WR-1	32.9	139 J	10.2	37.2	54.1	78.8	27900	0.557 J	3350	100 J	1150	6.98 UJ	953	NR
29-078-WR-2	19.7	228 J	7.79 J	30.8	72.3 JX	57.6	35000	1.01 J	8800 J	191 JX	403 JX	8.53 J	885 J	NR
29-078-WR-3	164	41.7 J	74.90 J	59.9	45.4 JX	112	39700	0.49 J	2390 J	133 JX	1500 JX	37.1 J	8890 J	NR
BACKGROUND	20	96.4	1.2 JX	20.2	42.1	35.1	18200	0.017 U	608	59	25	4 UJ	61	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 t/1000t	NEUTRAL POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-078-WR-1	<0.01	0	21.4	21.4	<0.01	0.01	<0.01	0.31	21.1
29-078-WR-2	<0.01	0	177	177	<0.01	<0.01	0.01	0	177
29-078-WR-3	0.11	3.44	50.1	46.7	0.05	0.01	0.05	0.31	49.8

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29-078-SW-1	0.96 U	42.8	2.57 U	9.7 U	6.83 U	1.55 U	278	0.14 JX	41.4	19.1	4.53 J	30.7 U	10.7 J	59.2
29-078-SW-2	0.96 U	44.1	2.57 U	9.7 U	6.83 U	1.55 U	501	0.2 JX	45	12.7 U	2.86 J	30.7 U	17.4 J	69.4

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-078-SW-1	107	< 5.0	< 5	0.33	NR
29-078-SW-2	111	< 5.0	< 5	0.31	NR

LEGEND

SE1 - 250' upgradient from cabin in Current Creek.
SE2 - 100' downgradient from waste rock dump 1 in Current Creek.
WR1 - Composite of subsamples WR1, 9A, 9B, and 9C.
WR2 - Composite of subsamples WR4, 7, and 3.
WR3 - Composite of subsamples WR 0A, 10B, 10C, and 13.
BACKGROUND - From Uncle Sam Mine (29-383-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: Red Pine
Legal Description: T 4S R 4W
Mining District: Sheridan
Latitude: N 45° 31' 20"
Longitude: W 112° 05' 05"
Land Status: Public
Quad: Noble Peak
Inspectors: Babits, Flammang/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): NW 1/4, NW 1/4, Sec. 3
Mine Type: Hardrock/Au, Cu
Primary Drainage: Indian Creek
USGS Code: 10020003
Secondary Drainage: Unnamed tributary to Indian Creek
Date Investigated: August 25, 1993
P.A. # 29-079

- The volume of tailings associated with this site was estimated to be approximately 4,450 cubic yards. The following elements were elevated at least three times background:
  Copper: 236 to 298 mg/kg Mercury: 0.432J to 0.442J mg/kg
  Antimony: 11.8J to 30.4J mg/kg

- The volume of waste rock associated with this site was estimated to be approximately 25,000 cubic yards. The following elements were elevated at least three times background:
  Copper: 408 mg/kg Mercury: 0.453J mg/kg
  Antimony: 42.7J mg/kg

- One discharging adit was identified at the site during the investigation. No MCLs were exceeded in the adit discharge; however, chronic aquatic life criteria were exceeded for mercury and lead. This discharge eventually flowed into Indian Creek.

- Indian Creek was flowing south of the site during the investigation; however, surface water samples were not collected due to extremely high flow and likely excessive dilution. Indian Creek sediment samples were collected upstream and downstream from the site; metals concentrations were not significantly elevated in the downstream sample.

- One potentially hazardous open adit was identified at the site.

Red Pine PA# 29-079
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 08/25/93

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)
29-079-SE-1	5.96	42.3 J	1.04 UJ	9.92	38.6 JX	39.1	13600	0.039 UJ	460 J	28 JX	7.4 UJX	7.14 UJ	64.9 J	NR
29-079-SE-2	9.58	51.5 J	1.21 UJ	10.4	44.6 JX	43.4	14800	0.032 UJ	931 J	34.4 JX	8.68 UJX	8.38 UJ	58.2 J	<0.334
29-079-TP-1	62.7	193 J	0.97 UJ	17.4	26.5 JX	236	43900	0.432 J	3150 J	48.3 JX	27.8 JX	11.8 J	61.3 J	NR
29-079-TP-2	68.2	125 J	0.99 UJ	17.9	29.9 JX	298	43200	0.442 J	2950 J	42.1 JX	38.1 JX	30.4 J	74.6 J	<0.290
29-079-TP-3	5.18 U	83.6 J	0.99 UJ	10.5	31.6 JX	42.5	19000	0.032 J	1510 J	26.3 JX	7.09 UJX	6.85 UJ	40.3 J	<0.284
29-079-WR-1	64.5	39.2 J	0.80 UJ	19.5	12.6 JX	408	39600	0.453 J	3420 J	35 JX	14 JX	42.7 J	75.4 J	NR
BACKGROUND	26	154	8.6 JX	15.3	26.1	29.6	20200	0.021	1240	43	89	4 UJ	70	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 t/1000t	NEUTRAL POTENT t/1000t	SULFUR ACID BASE POTENT t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT t/1000t
29-079-TP-1	0.7	21.9	346	324	<0.01	0.64	0.31	20	326
29-079-TP-2	0.64	20	184	164	0.21	0.39	0.04	12.2	172
29-079-TP-3	0.06	1.87	32.6	30.7	0.02	0.01	0.03	0.31	32.2
29-079-WR-1	3.8	119	379	260	<0.01	2.39	3.88	74.7	304

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)
29-079-SW-3	1.07	5.73	2.57 U	9.7 U	6.83 U	1.55 U	43.1	0.21 JX	5.47	12.7 U	2.24 J	30.7 U	10.9 J	50.7

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

Wet Chemistry
Results in mg/l

Field I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-079-SW-3	90	< 5.0	< 5	0.07	NR

LEGEND

SE1 - In Indian Creek, 75' up from confluence with adit discharge.
SE2 - In Indian Creek at PPE of tailings pond 3
TP1 - Composite of subsamples TP1AA through 1AC, 1BA, 2AA through 2AC, and 3A through 3C.
TP2 - Composite of subsamples TP1BB through 1BE.
TP3 - Composite of subsamples TP2AD and 3D.
WR1 - Composite of subsamples WR1A through 1C.
BACKGROUND - From NW SE Sec. 26 (29-476-SS-1).
SW3 - Discharging adit at waste rock dump 1.

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

Mine/Site Name: Broadgauge
Legal Description: T 4S R 4W
Mining District: Sheridan
Latitude: N 45° 28' 56"
Longitude: W 112° 08' 04"
Land Status: Private
Quad: Sheridan
Inspectors: Tuesday, Belanger, Clark
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): SE 1/4, SW 1/4, Sec. 17
Mine Type: Hardrock/Au, Ag
Primary Drainage: Mill Creek
USGS Code: 10020003
Secondary Drainage: Spring Park Creek
Date: June 16, 1993
P.A. # 29-293

- There were no mill tailings observed at this site during the investigation.

- The volume of waste rock associated with the site was estimated to be approximately 2,100 cubic yards (WR-1 was located in an intermittent drainage). The following elements were elevated at least three times background:
  Arsenic: 208 to 257 mg/kg
  Iron: 59,400 mg/kg
  Nickel: 73 to 109 mg/kg
  Zinc: 1900 mg/kg
  Cadmium: 9.3J mg/kg
  Manganese: 1620 to 1630 mg/kg
  Lead: 231 to 2660 mg/kg

- There was one adit discharge observed at the site during the investigation. No MCLs or acute or chronic aquatic life criteria were exceeded in the adit discharge sample.

- Three hazardous mine openings (two open shafts and one caved shaft) were observed at the site, two of the openings were surrounded by barbed wire; however, the barbed wire was very loose and did not include any warning signs.

Broad Gauge PA# 29-293
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 07/16/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-293-WR-1	208	33.6	9.3 J	19.5	65	213	59400	0.344	1620	73	2660	4 UJ	1900	NR
29-293-WR-2	257	37.3	0.6 J	26.7	58.4	63.2	31900	0.409	1630	109	231	3 UJ	164	NR
BACKGROUND	16	89.4	0.8 JX	9.4	25.1	21.6	14900	1.1	366	19	36	4 UJ	80	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 t/1000t	NEUTRAL POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-293-WR-1	2.46	76.9	135	58.5	1.6	0.38	0.48	11.9	123
29-293-WR-2	1.53	47.8	169	122	1.1	0.21	0.22	6.56	163

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)
29-293-SW-1	8.65	10.6	2.55 U	5.99 U	5 U	6.9 J	640	0.14	77.3	8.78 U	32.9	18.3 U	190	280

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-293-SW-1	360	< 5.0	106	0.31	NR

LEGEND

WR1 - Composite of subsamples WR1A, 1B, and 1C.
WR2 - Composite of subsamples WR2A, 2B, and 2C.
BACKGROUND - From the Latest Out Mine (29-354-SS-1).
SW1 - Caved flowing adit.

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

Mine/Site Name: Latest Out
Legal Description: T 4S R 4W
Mining District: Sheridan
Latitude: N 45° 26' 35"
Longitude: W 112° 06' 53"
Land Status: Public
Quad: Copper Mountain
Inspectors: Babits, Lasher/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): SE 1/4, NE 1/4, Sec. 32
Mine Type: Hardrock/Unknown
Primary Drainage: Ruby River
USGS Code: 10020003
Secondary Drainage: Sand Coulee
Date Investigated: June 17, 1993
P.A. # 29-354

- No mill tailings were observed at this site during the investigation.

- The volumr of waste rock associated with this site was estimated to be approximately 13,871 cubic yards. The following elements were elevated at least three times background:

Arsenic: 68 mg/kg	Cadmium: 3.3JX to 7JX mg/kg
Cobalt: 31.3 mg/kg	Copper: 166 to 227 mg/kg
Iron: 46,300 mg/kg	Manganese: 1,190 to 1,760 mg/kg
Nickel: 83 mg/kg	Lead: 329 to 671 mg/kg
Zinc: 282 mg/kg	

- A groundwater spring, which flowed into a stock watering trough, was identified at the site. No MCLs were exceeded in the spring; however, the chronic aquatic life criteria for mercury was exceeded. The pH measurement in the spring was 7.42.

- An intermittent drainage was located north of the site. The drainage was dry during the investigation; no surface water or sediment samples were collected.

- Potential safety hazards identified at the site included three open shafts and four open adits.

Latest Out PA# 29-354
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 06/17/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-354-WR-1	32	177	3.3 JX	24.7	15	166	46300	0.015 U	1760	33	671	4 UJ	282	NR
29-354-WR-2	68	151	7 JX	31.3	49	227	37800	0.014 U	1190	83	329	4 J	214	NR
BACKGROUND	16	89.4	0.8 JX	9.4	25.1	21.6	14900	1.1	366	19	36	4 UJ	80	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 t/1000t	NEUTRAL. POTENT t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-354-WR-1	<0.01	0	20.7	20.7	<0.01	<0.01	0.02	0	20.7
29-354-WR-1DUP	0.01	0.31	19.8	19.5	<0.01	<0.01	0.02	0	19.8
29-354-WR-2	0.26	8.12	31.9	23.8	0.24	<0.01	0.03	0	31.9

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)
29-354-GW-1	1.69 U	49.1	2.55 U	5.99 U	5 U	1.53 J	14.6	0.25	17.9	8.78 U	1.55 U	18.3 U	6 U	178

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
29-354-GW-1	279	< 5.0	33	0.68	NR

LEGEND

WR1 - Composite of subsamples WR3, 4, and 5.
WR2 - Composite of subsamples WR1, 2, 6, 7, 8, and 9.
WR2DUP - Duplicate of sample 29-354-WR-2.
BACKGROUND - 300 feet upgradient of waste rock dump 8.
From the Latest Out (29-354-SS-1)

GW1 - Spring below waste rock dump 2 in pipe.

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

Mine/Site Name: Uncle Sam
Legal Description: T 4S R 3W
Mining District: Sheridan
Latitude: N 45° 29' 35"
Longitude: W 111° 59' 15"
Land Status: Public
Quad: Ramshorn Mountain
Inspectors: Babits, Lasher/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): NE 1/4, Sec. 17
Mine Type: Hardrock/Au, Ag, Pb
Primary Drainage: Mill Creek
USGS Code: 10020003
Secondary Drainage: Middle Fork Mill Creek
Date Investigated: June 16, 1993
P.A. # 29-383

- No mill tailings were observed at this site during the investigation.

- The volume of waste rock associated with this site was estimated to be approximately 18,600 cubic yards. The following elements were elevated at least three times background:

Arsenic: 258 mg/kg	Cadmium: 4.9JX mg/kg
Copper: 261 mg/kg	Mercury: 0.473 mg/kg
Lead:443 mg/kg	Zinc: 494 mg/kg

- Two discharging adits were identified at the site. MCLs for cadmium and nickel were exceeded in both discharges; additionally, the MCL for antimony was exceeded in the lower adit (SW-3). Acute and chronic aquatic life criteria were exceeded for cadmium, copper, and zinc in both discharges, and chronic aquatic life criteria were exceeded for iron, mercury, and lead in both discharges. Adit discharge pH measurements were 3.29 and 4.95 for SW-3 and SW-4, respectively.

- Middle Fork Mill Creek was flowing adjacent to the site on the south side. Surface water and sediment samples were collected upstream and downstream from the site in Middle Fork Mill Creek. No MCLs were exceeded; however, acute and chronic aquatic life criteria were exceeded for zinc in the downstream sample. The chronic aquatic life criteria for copper was exceeded in the downstream sample. An observed release to Middle Fork Mill Creek was documented for zinc. Additionally, observed releases to Middle Fork Mill Creek (sediment) were documented for lead and zinc.

- No hazardous mine openings were identified at the site; however, a case of explosives, saturated with water, was located at the site.

Uncle Sam PA# 29-383
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 06/16/93

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)
29-383-SE-1	23	97.7	1 UJX	21.9	71.8	42.3	23000	0.03 U	579	62	20	7 UJ	65	NR
29-383-SE-2	62	28.4	2.5 JX	17.2	42.4	86.9	28700	0.021	456	55	68	4 UJ	216	NR
29-383-WR-1	258	13.8	4.9 JX	28.2	10.8	261	50200	0.473	470	77	443	4 UJ	494	NR
29-383-WR-2	3 U	63.5	0.8 JX	16	62.4	54.6	18100	0.013 U	226	49	15	3 UJ	39	NR
BACKGROUND	20	96.4	1.2 JX	20.2	42.1	35.1	18200	0.017 U	608	58	25	4 UJ	61	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 t/1000t	NEUTRAL. POTENT t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-383-WR-1	1.82	56.9	40.5	-16	0.16	1.01	0.65	31.6	8.91
29-383-WR-2DUP	0.01	0.31	9.59	9.28	<0.01	<0.01	0.01	0	9.59
29-383-WR-2	0.03	0.94	10.1	9.21	0.01	<0.01	0.02	0	10.1

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
29-383-SW-1	1.69 U	6.57	2.55 U	5.99 U	5 U	1.35 U	26.8	0.19	2.6 U	8.78 U	1.55 U	18.3 U	6 U	16.2
29-383-SW-2	1.69 U	7.17	2.55 U	5.99 U	5 U	3.23 J	277	0.2	19.9	8.78 U	1.55 U	18.3 U	37.3	18.2
29-383-SW-3	4.18	3.8	19.3	34.5	5 U	114 J	2550	0.18	869	104 J	16.9	19.2	1240	220
29-383-SW-5	7.34	7.7	22.8	41.9	6.97	69.9 J	5490	0.26	1290	212 J	18.8	18.3 U	2090	163

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-383-SW-1	56	< 5.0	6	0.09	NR
29-383-SW-2	58	< 5.0	8	0.06	NR
29-383-SW-3	306	< 5.0	163	0.15	NR
29-383-SW-5	284	< 5.0	181	< 0.05	NR

LEGEND

SE1 - Upgradient on Middle Fork Mill Creek; 100' above upper adit dump 1.
SE2 - Downgradient of upper adit discharge into Mill Creek; (PPE for upper adit discharge).
WR1 - Composite of subsamples WR1A, 1B, 1C, and 1D.
WR2 - Sample of the subsample WR2.
WR2DUP - Duplicate of sample 29-383-WR-2.
BACKGROUND - From the Uncle Sam Mine (29-383-SS-1).
SW1 - Same as SE1.
SW2 - Same as SE2.
SW3 - Lower adit discharge in Middle Fork Mill Creek above confluence with Mill Creek.
SW5 - Upper adit discharge.

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

Mine/Site Name: Lakeshore
Legal Description: T 3S R 4W
Mining District: Sheridan
Latitude: N 45° 35' 00"
Longitude: W 112° 07' 00"
Land Status: Private/Public
Quad: Noble Peak
Inspectors: Babits, Lasher/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): SE 1/4, SE 1/4, Sec. 8
Mine Type: Hardrock/Au
Primary Drainage: Wisconsin Creek
USGS Code: 10020003
Secondary Drainage: Crystal Lake
Date Investigated: July 21, 1993
P.A. # 29-436

- There were approximately 13,300 cubic yards of uncovered tailings at the site. The following were elevated at least 3 times background:
  Copper: 587 mg/kg
  Mercury: 5.18J mg/kg
  Lead: 1,330 mg/kg
  Zinc: 511 mg/kg

- There were approximately 38,300 cubic yards of uncovered waste rock. The following were elevated at least 3 times background:
  Cadmium: 47.6 mg/kg
  Copper: 379 mg/kg
  Lead: 768 to 3,500 mg/kg
  Zinc: 302 to 8,720 mg/kg

- There were two discharging adits at the site (SW-3 and SW-4) and one (SW-3) entered Crystal Lake. Measured pH's were 7.97 (SW-3) and 7.92 (SW-4). Neither discharge exceeded MCLs or MCLGs or any chronic or acute fresh water aquatic life criteria.

- Crystal Lake contained tailings and was adjacent to waste rock and Wisconsin Creek was adjacent to waste rock. Observed releases of cadmium, copper, mercury, lead, and zinc were documented in downstream sediments; and an observed release of copper was documented in downstream surface water. No MCLs or MCLGs were exceeded, but chronic and acute fresh water aquatic life criteria were exceeded for copper in downstream surface water.

- There were three open adits at the site.

Lakeshore PA# 29-436
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 07/21/93

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)
29-436-SE-1	11.9	37.5	1.2	9.41	23.7	20.3	12300	0.064 J	271 J	17.6	14.6	6.66 U	41	NR
29-436-SE-2	102	223	9.7	31	54.9	191	32500	0.825 J	3910 J	42	322	18.9 U	686	0.783 U
29-436-TP-1	186	28.8	1.4	4.8	8.36	587	38200	5.18 J	121 J	9.06	1330	16.4	511	0.326 U
29-436-WR-1	15.1	89.3	0.6	17.2	38.8	87	28600	0.701 J	601 J	40.6	47.8	4.63 U	108	NR
29-436-WR-2	307	24.6	47.6	5.36	7.94	379	62300	0.27 J	72.2 J	7.62	3500	25.6	8720	NR
29-436-WR-3	41.3	45.9	1.3	12.9	26	101	23100	0.127 J	423 J	19.8	768	6.22 U	302	NR
BACKGROUND	103	94	1.8	19.8	100	57.4	34300	1.23 J	606 J	61.4	31.9	16.9	70.6	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-436-WR-1	0.64	20	36.9	16.9	0.05	0.3	0.29	9.37	37.6
29-436-WR-2	1.87	58.4	-1.6	-60	1.58	0.08	0.21	2.5	-4.07
29-436-WR-3	0.04	1.25	3.12	1.87	0.02	<0.01	0.02	0	3.12
29-436-WR-3DUP	0.04	1.25	3.28	2.03	0.02	<0.01	0.02	0	3.28

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)
29-436-SW-1	1.69 U	8.63	2.57 U	9.7 U	6.83 U	1.55 U	14.8	0.038 U	4.08 U	12.7 U	1.55 U	30.7 U	7.57 U	25.5
29-436-SW-2	1.38	11.5 JX	2.57 U	9.7 U	10.5 J	9.23 J	72.9 J	0.038 U	4.08 U	12.9	0.72 U	30.7 U	10.4 J	32.8
29-436-SW-3	2.29	18.4 JX	2.57 U	9.7 U	7.07 J	6 J	72.8 J	0.038 U	4.13	12.7 U	0.72 U	30.7 U	29.2 J	96.6
29-436-SW-4	1.32	2.01 UX	2.57 U	9.7 U	6.83 U	1.55 U	17 J	0.038 U	4.08 U	12.7 U	0.72 U	30.7 U	7.57 U	0.1

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-436-SW-1	93	< 5.0	9	0.08	< 0.01
29-436-SW-2	72	< 5.0	11	< 0.05	< 0.01
29-436-SW-3	150	< 5.0	38	0.1	NR
29-436-SW-4	NR	NR	NR	NR	< 0.01

LEGEND

SE1 - 20 feet upstream from waste rock dump 2.
SE2 - 20 feet downstream from culvert at South end of Crystal Lake
TP1 - Composite of subsamples TP1A, 1B, and 1C.
WR1 - Composite of subsamples WR1A, 1B, 1C, 1E, and 3.
WR2 - Sample of the subsample WR1F.
WR3 - Sample of the subsample WR2
WR3DUP - Duplicate of the sample 29-436-WR-3.
BACKGROUND - Above waste rock dump 3.
From the Lakeshore Mine (29-436-SS-1).

SW1 - Same as SE1
SW2 - Same as SE2.
SW3 - Southern adit discharge at waste rock dump 1.
SW4 - Northern adit discharge at waste rock dump 1.

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

Mine/Site Name: Buckeye
Legal Description: T 4S R 4W
Mining District: Sheridan
Latitude: N 45° 28' 15"
Longitude: W 12° 07' 47"
Land Status: Private
Quad: Sheridan
Inspectors: Babits, Flammang/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): SE 1/4, SE 1/4, Sec. 19
Mine Type: Hardrock/Pb, Zn, Au, Ag, Cu
Primary Drainage: Ruby River
USGS Code: 10020003
Secondary Drainage: Mill Creek
Date Investigated: August 27, 1993
P.A. # 29-451

- There were approximately 6,900 cubic yards of tailings associated with this site. The following elements were elevated at least three times background:
  Arsenic: 58.1J to 90.3J mg/kg
  Cadmium: 5.8J to 7.91J mg/kg
  Copper: 135 to 205 mg/kg
  Lead: 677 to 714 mg/kg
  Zinc: 671 to 823 mg/kg

- There were approximately 4,350 cubic yards of mostly uncovered waste rock at the site. The following were elevated at least three times background:
  Arsenic: 129J to 359J mg/kg
  Manganese: 3,050 mg/kg
  Cadmium: 17.2J to 24.9J mg/kg
  Nickel: 127 mg/kg
  Cobalt: 47.4 mg/kg
  Lead: 427 to 10,300 mg/kg
  Copper: 159 to 1,460 mg/kg
  Antimony: 12.4 mg/kg
  Iron: 45,100 to 58,700 mg/kg
  Zinc: 3,060 to 4,130 mg/kg

- There were no discharging adits at the site.

- Mill Creek was adjacent to waste rock and observed releases of copper, lead and zinc were documented in downstream sediments. No surface water samples were collected because of high flow in Mill Creek.

- Barrels with unknown contents were at the site. There were no hazardous openings; however, there were numerous hazardous structures.

Buckeye PA# 29-451
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 08/27/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-451-SE-1	4.27 U	31.1	0.82 U	4.57	21.5	12.5	8020	0.09 J	158	16.9	6.39	5.64 U	22.2	<0.309
29-451-SE-2	8.47 J	71	1.11 U	12.1	62	40.9	15300	0.174 J	192	40.2	55.5	7.68 U	131	<0.387
29-451-TP-1	90.3 J	101	5.65 J	12.8	24.6	205	25200	0.517 J	978	35.5	677	6.62 U	674	<0.280
29-451-TP-2	58.1 J	121	7.91 J	15.1	18.8	135	25700	1.1 J	1060	28	714	6.87 U	823	<0.283
29-451-WR-1	359 J	98.4	24.90 J	47.4	41.4	159	58700	0.907 J	3050	127	427	6.8 U	4130	NR
29-451-WR-2	129 J	21.4	17.20 J	6.1	3.92	1460	45100	2.64 J	336	7.06	10300	12.4	3060	NR
BACKGROUND	16	89.4	0.8 JX	9.4	25.1	21.6	14900	1.1	366	19	36	4 UJ	80	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 t/1000t	NEUTRAL POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-451-TP-1	0.73	22.8	113	90.6	0.32	0.28	0.13	8.75	105
29-451-TP-2	0.8	25	124	99	0.19	0.54	0.07	16.9	107
29-451-WR-1DUP	1.75	54.7	117	62.6	0.31	0.86	0.58	26.9	90.4
29-451-WR-1	1.72	53.7	119	65.6	0.28	0.86	0.58	26.9	92.5
29-451-WR-2	6.22	194	15.3	-179	2.66	1.48	2.08	46.2	-30.9

LEGEND

SE1 - 500 feet upgradient of waste rock dump 5 in Mill Creek.
SE2 - Downgradient (@ PPE) of waste rock dump 5 in Mill Creek.
TP1 - Composite of subsamples TPA-A,1A-B,2A-A,2A-B,3A-A.
TP2 - Composite of subsamples TP1A-C through 1A-F, TP2A-C, and TP3A-B through3A-E.
WR1 - Composite of subsamples WR1, 2, and 3.
WR1DUP - Duplicate of sample 29-451-WR-1.
WR2 - Composite of subsamples WR4A, 4B, 5A, and 5B.
BACKGROUND - From Latest Out (29-354-SS-1).

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

Mine/Site Name: SE SW S26
Legal Description: T 3S R 5W
Mining District: Sheridan
Latitude: N 45° 32' 30"
Longitude: W 112° 11' 20"
Land Status: Private/Public
Quad: Old Baldy Mountain
Inspectors: Tuesday, Belanger, Clark
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): SE 1/4, SW 1/4, Sec. 26; NW 1/4, NW 1/4, Sec. 35
Mine Type: Hardrock/Unknown
Primary Drainage: Ruby River
USGS Code: 10020003
Secondary Drainage: Wet Georgia Gulch
Date: June 17, 1993
P.A. # 29-474

- There were no mill tailings observed at this site during the investigation.

- There were over 17 waste rock dumps located at the site with the total volume of waste rock estimated to be approximately 14,580 cubic yards. The following elements were elevated at least three times background:

  Arsenic: 726 to 4650 mg/kg
  Copper: 133 to 650 mg/kg
  Nickel: 136 to 142 mg/kg
  Antimony: 12J mg/kg
  Cadmium: 52.4J to 57J mg/kg
  Mercury: 0.544 to 2.92 mg/kg
  Lead: 4360 to 14,400 mg/kg
  Zinc: 2300 to 8210 mg/kg

- There were no adit discharges, filled shafts, seeps, or springs observed at the site during the investigation; consequently, no groundwater or surface water samples were collected.

- Adits #3, #4B, and #5 were open and potentially hazardous.

SE SW Section 26 PA# 29-474
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/16/93

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)
29-474-WR-1	726	156	15.8 J	19.8	63.7	205	24000	2.23	2590	136	14400	7 J	2300	NR
29-474-WR-2	1930	220	0.5 U	37.1	67	133	42600	2.92	1110	142	185	9 J	164	NR
29-474-WR-3	2450	249	57 J	21.8	58.6	650	47100	0.587	3550	83	4360	13 J	8210	NR
29-474-WR-4	4650	168	52.4 J	18.2	20.2	509	57400	0.544	2670	41	5670	10 J	7660	NR
BACKGROUND	26	154	8.6 JX	15.3	26.1	29.6	20200	0.021	1240	43	89	4 UJ	70	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 t/1000t	NEUTRAL POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-474-WR-1	0.03	0.94	75.5	74.6	0.01	<0.01	0.02	0	75.5
29-474-WR-2	<0.01	0	61.6	61.6	<0.01	<0.01	0.01	0	61.6
29-474-WR-3	0.14	4.37	36.3	31.9	0.12	<0.01	0.03	0	36.3
29-474-WR-4	0.51	15.9	24.8	8.9	0.46	0.02	0.03	0.62	24.2

LEGEND

WR1 - Composite of subsamples WR1 through 6E.
WR2 - Composite of subsamples WR7 through 9.
WR3 - Composite of subsamples WR10, 11, and 13.
WR4 - Composite of subsamples WR14 through 17.
BACKGROUND - From NW SE Sec.26 (29-476-SS-11).

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

Mine/Site Name: NW SE S26
Legal Description: T 3S R 5W
Mining District: Sheridan
Latitude: N 45° 32' 50"
Longitude: W 112° 10' 42"
Land Status: Public
Quad: Old Baldy Mountain
Inspectors: Babits, Tuesday, Belanger, Clark, Lasher/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): NW 1/4, SE 1/4, Sec. 26
Mine Type: Hardrock/Au
Primary Drainage: Ruby River
USGS Code: 10020003
Secondary Drainage: Wet Georgia Gulch
Date Investigated: June 17, 1993
P.A. # 29-476

- There were no mill tailings associated with this site.

- There was approximately 5,900 cubic yards of mostly uncovered waste rock at the site. The following were elevated at least 3 times background:
  Arsenic: 169 to 832 mg/kg
  Chromium: 238 mg/kg
  Copper: 98.1 to 187 mg/kg
  Mercury: 0.091 to 0.477 mg/kg
  Nickel: 231 mg/kg
  Lead: 504 to 3,790 mg/kg
  Zinc: 2,240 to 2,250 mg/kg

- There were no discharging adits at the site.

- There was waste rock material in the drainage of intermittent Wet Georgia Gulch. There were no surface water samples collected and there were no observed releases documented.

- There were two open adits at the site.

NW SE Section 26 PA# 29-476
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 06/17/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-476-SE-3	14	83.9	0.6 UJX	10.4	65.1	15.5	16000	0.02 U	140	55	31	4 UJ	84	NR
29-476-SE-4	20	145	1 JX	15.1	83.5	22.1	25700	0.017 U	473	62	66	4 UJ	112	NR
29-476-WR-1	169	262	16 JX	19.5	52.8	48.7	35400	0.334	2260	79	504	4 UJ	2240	NR
29-476-WR-2	832	417	19.6 JX	30.2	238	187	44000	0.091	3670	231	3790	4 UJ	2250	NR
29-476-WR-3	27	139	1.5 JX	33	21.4	98.1	21000	0.477	855	43	2930	3 UJ	201	NR
BACKGROUND	26	154	8.6 JX	15.3	26.1	29.6	20200	0.021	1240	43	89	4 UJ	70	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 t/1000t	NEUTRAL POTENT t/1000t	SULFUR ACID BASE POTENT t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT t/1000t
29-476-WR-1	0.25	7.81	96.4	88.6	0.01	0.07	0.17	2.19	94.2
29-476-WR-2	0.53	16.6	73	56.4	0.11	0.14	0.28	4.37	68.6
29-476-WR-3	0.03	0.94	27.6	26.7	0.02	<0.01	0.02	0	27.6

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29-476-SW-3	1.69 U	75.7	2.55 U	5.99 U	5 U	3.43 J	94.8	0.15	3.97	12.7 J	1.55 U	18.3 U	6 U	191
29-476-SW-4	1.95	75.2	6.07	5.99 U	5 U	1.35 U	309	0.15	6.57	8.78 U	1.55 U	18.3 U	6 U	182

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-476-SW-3	222	< 5.0	9	0.23	NR
29-476-SW-4	207	< 5.0	9	0.25	NR

LEGEND

SE3 - Wet Georgia Gulch at confluence from Argenta.
SE4 - Downstream from ores and workings.
WR1 - Composite of subsamples WR1, 2, and 3.
WR2 - Composite of subsamples WR4 and 5.
WR3 - Composite of subsamples WR6, 7, and 8.
BACKGROUND - From NW SE S26 (29-476-SS-1)
SW3 - Same as SE3.
SW4 - Same as SE4.

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

Mine/Site Name: Broadway/Victoria
Legal Description: T 2S R 6W
Mining District: Silver Star
Latitude: N 45° 41' 55"
Longitude: W 112° 18' 45"
Land Status: Private
Quad: Silver Star
Inspectors: M. Babits, S. Babits, Flammang
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): NW 1/4, Sec. 2
Mine Type: Hardrock/Au, Ag, Pb, Cu
Primary Drainage: Jefferson River
USGS Code: 10020005
Secondary Drainage: Tom Benton Gulch
Date Investigated: September 17, 1993
P.A. # 29-179

- The volume of tailings associated with this site was estimated to be approximately 132,000 cubic yards. The concentration of cyanide measured in the tailings ranged from 1.9 to 6.15 mg/kg. The following elements were elevated at least three times background:

  Arsenic: 223J to 387J mg/kg
  Cobalt: 21.1 mg/kg
  Iron: 60,200JX to 89,000JX mg/kg
  Manganese: 3,240 to 9,620 mg/kg
  Antimony: 51.7J mg/kg
  Cadmium: 17J to 78J mg/kg
  Copper: 547 to 4,010 mg/kg
  Mercury: 0.264J to 2.39J mg/kg
  Lead: 1,380 to 3,760 mg/kg
  Zinc: 3,550J to 32,300 mg/kg

- The volume of waste rock associated with this site was estimated to be approximately 34,575 cubic yards. The following elements were elevated at least three times background:

  Arsenic: 218J mg/kg
  Cobalt: 26.5 mg/kg
  Mercury: 0.694J to 1.56J mg/kg
  Lead: 4,020 mg/kg
  Cadmium: 48 mg/kg
  Copper: 716 to 3,290 mg/kg
  Manganese: 4,690 mg/kg
  Zinc: 7,450 mg/kg

- No discharging adits, filled shafts, seeps, or springs were identified at the site.

- No surface water was observed on or near the site. The nearest water was located approximately 1.5 miles away; consequently, no surface water or sediment samples were collected.

- Potential safety hazards identified at the site included four open adits and one open shaft.

Broadway/Victoria PA# 29-179
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 09/17/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-179-TP-1	74.1 J	234 J	17 J	7.16	10.9 J	547	38100 JX	0.147 J	9620	21.5	1740	11.9 J	5230 J	NR
29-179-TP-2	61.4 J	23.3 J	11 J	10.4	9.34 J	4010	89000 JX	0.306 J	2290	12.7	622	7 UJ	1660 J	NR
29-179-TP-3	223 J	0.237 U	22 J	3.54	5.99 J	300	60200 JX	0.264 J	8040	16.1	1380	7.15 J	3550 J	NR
29-179-TP-4	68.2 J	98.5	78	21.1	28.7	2540	50400	2.39 J	3240	34.9	1870	51.7 J	32300	1.9
29-179-TP-5	387 J	28.1 J	37 J	6.93	12 J	599	60800 JX	0.58 J	4830	25.1	3760	18 J	7230 J	6.15
29-179-WR-1	218 J	62.1	48	9.45	16.9	716	29900	0.694 J	2260	17.2	4020	16.6 J	7450	NR
29-179-WR-2	8.82 J	47.4 J	3 J	26.5	4.88 J	3290	42500 JX	1.56 J	4690	11	18.5	5.97 UJ	330 J	NR
BACKGROUND	48.3 J	93.9	5	6.35	17.7	109	19100	0.087 J	1040	15.1	227	6.39 J	676	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 t/1000t	NEUTRAL POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-179-TP-1	0.06	1.87	2.17	215	0.04	<0.01	0.05	0	217
29-179-TP-2	6.08	190	23.5	-166	<0.01	3.91	2.28	122	-98.6
29-179-TP-3	7.16	224	237	13	<0.01	5.71	2.2	178	58.3
29-179-TP-3	7.14	223	237	13.5	<0.01	5.68	2.21	177	59.2
29-179-TP-4	2.01	62.8	111	47.8	0.84	0.43	0.74	13.4	97.2
29-179-TP-5	5.19	162	190	27.5	<0.01	6.42	1.73	201	-10.8
29-179-WR-1	0.99	30.9	189	158	0.74	<0.01	0.32	0	189
29-179-WR-2	0.06	1.87	135	133	0.05	<0.01	0.01	0	135

LEGEND

TP1 - Composite of subsamples TP1A-A, 1A-B, 1A-C, 1B-A, and 1B-B.
TP2 - Composite of subsamples TP3A-A through 3A-D, and 3B-A
TP3 - Composite of subsamples TP2A-A and 2B-A.
TP4 - Grab from flotation tanks in mill building.
TP5 - Composite of subsamples TP2A-B, 2A-C, 2B-B, 2B-C, and 2B-D.
WR1 - Composite of subsamples WR1, 2A, 2B, and 2C
WR2 - Sample of the WR6 subsample
BACKGROUND - From the Broadway/Victoria (29-179-SS-1)

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

Mine/Site Name: Mammoth
Legal Description: T 2S R 3W
Mining District: South Boulder
Latitude: N 45° 40' 00"
Longitude: W 112° 00' 40"
Land Status: Private/Public
Quad: Manhead Mountain
Inspectors: Babits, Lasher/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): NW 1/4, NW 1/4, Sec. 18
Mine Type: Hardrock/Au, Ag, Cu
Primary Drainage: Missouri River
USGS Code: 10020006
Secondary Drainage: Boulder River
Date Investigated: July 19, 1993
P.A. # 29-008

- The volume of tailings associated with this site was estimated to be approximately 47,950 cubic yards. The following elements were elevated at least three times background:
  Arsenic: 676 to 704 mg/kg
  Cobalt: 26.2 mg/kg
  Mercury: 0.851 mg/kg
  Zinc: 293 mg/kg
  Cadmium: 4.9J mg/kg
  Copper: 220 to 1,860 mg/kg
  Lead: 90 mg/kg

- The volume of waste rock associate with this site was estimated to be approximately 29,350 cubic yards. The following elements were elevated at least three times background:
  Arsenic: 223 to 339 mg/kg
  Mercury: 1.09 mg/kg
  Copper: 225 to 401 mg/kg
  Lead: 87 mg/kg

- One discharging adit was identified at the site. The discharge seeped into waste rock prior to reaching surface water. A sample of this discharge had a pH of 7.45. No MCLs were exceeded in the adit discharge; however, acute and chronic aquatic life criteria were exceeded for copper. The pH measurement in the adit discharge was 7.45.

- An unnamed tributary flowed through the site and discharged into the South Boulder River. Observed releases to the South Boulder River (sediment) were documented for arsenic and copper

- Potential safety hazards identified at the site included one open shaft and two open adits.

Mammoth Mine PA# 29-008
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 07/19/93

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)
29-008-SE-1	5 U	67.2	1.4 J	5.5	12.1	15	9800	0.259	274	12	12	6 U	28	NR
29-008-SE-2	7 U	31.3	1.8 J	12.4	28	64.4	10300	0.287	377	33	16	8 U	107	NR
29-082-SE-3	103 J	131 J	1.7	19.6 JX	39.2 JX	285 J	27200 J	0.594	723 J	39 J	33	8 UJ	214 JX	NR
29-008-TP-1	676	249	2.2 J	2 U	1.9	220	26900	0.372	20.6	3 U	54	6 U	50	NR
29-008-TP-2	704	279	4.9 J	26.2	8	1860	44200	0.851	398	24	90	8 U	293	NR
29-008-WR-1	223	88.3	3.5 J	12.6	16.7	401	38300	1.09	358	20	60	5 U	75	NR
29-008-WR-2	339	143	2.4 J	7	9.6	225	30800	0.474	140	13	87	6 U	66	NR
BACKGROUND	28	174	1.5 J	11	24.3	28.6	15900	0.219	1000	18	23	6 U	47	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-008-TP-1	0.15	4.69	-0.7	-5.4	0.13	0.02	<0.01	0.62	-1.31
29-008-TP-2	1.64	51.2	6.66	-45	0.07	1.36	0.21	42.5	-35.8
29-008-WR-1	0.41	12.8	12.1	-0.7	0.25	0.05	0.11	1.56	10.5
29-008-WR-2	0.71	22.2	1.31	-21	0.51	0.06	0.14	1.87	-0.57

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)
29-008-SW-1	1.69 U	37.9	2.57 U	9.7 U	6.83 U	1.55 U	34.6	0.038 U	4.08 U	12.7 U	1.55 U	30.7 U	7.57 U	44
29-082-SW-1	26.5	18.8	4.77 J	9.7 U	6.83 U	305	2740	0.039	333	16.4	1.85	30.7 U	129	83.1
29-008-SW-3	6.07	33.4	2.57 U	9.7 U	6.83 U	173	420	0.038 U	28.7	12.7 U	1.55 U	30.7 U	24.9	48.9

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-008-SW-1	127	< 5.0	5	0.08	NR
29-082-SW-1	153	5.3	75	0.11	NR
29-008-SW-3	141	< 5.0	15	0.14	NR

LEGEND

SE1 - Upgradient in unnamed tributary.
SE2 - In Boulder Creek above confluence of unnamed tributary with adit discharge.
29-082-SE3 - Downgradient of site on South Boulder River.
TP1 - Composite of subsamples TP1A-A and 1B.
TP2 - Composite of subsamples TP1A-B, 1A-C, 1A-D, and 1A-E.
WR1 - Composite of subsamples WR1, 2A, 2B, 3A, 3B, and 3C.
WR2 - Composite of subsamples WR4A, 5A, 5B, and 6.
BACKGROUND - From Mammoth Mine (29-008-SS-1).
SW1 - Same as sample SE1.
29-082-SW1 - At PPE of adit discharge and unnamed tributary to S. Boulder River.
SW3 - Adit discharge at Level 1.

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

Mine/Site Name: Mammoth Tailings
Legal Description: T 2S R 3W
Mining District: South Boulder
Latitude: N 45° 40' 14"
Longitude: W 112° 00' 48"
Land Status: Private/Public
Quad: Manhead Mountain
Inspectors: Tuesday, Belanger, Clark
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): Sec. 7 and Sec. 18
Mine Type: Hardrock/Au, Ag, Cu
Primary Drainage: Jefferson River
USGS Code: 10020005
Secondary Drainage: South Boulder River
Date Investigated: July 19, 1993
P.A. # 29-082

- The volume of tailings associated with this site was estimated to be approximately 405,500 cubic yards. Evidence of tailings eroding along the bank of the South Boulder River was observed at the time of the investigation. The following elements were elevated at least three times background:
  Arsenic: 289J to 651J mg/kg
  Copper: 434J to 1160J mg/kg
  Lead: 105 mg/kg
  Zinc: 224JX mg/kg

- The volume of waste rock associated with this site was estimated to be approximately 1000 cubic yards. The following elements were elevated at least three times background:
  Arsenic: 244J mg/kg
  Mercury: 1.2 mg/kg

- There was one adit discharge observed at the site during the investigation. No MCLs/MCLGs were exceeded in the adit discharge sample; however, the acute aquatic life criteria for copper and zinc were exceeded, as well as the chronic aquatic life criteria for copper and zinc. No MCLs/MCLGs were exceeded in a surface water sample collected in the unnamed tributary to the South Boulder River; however, chronic aquatic life criteria for iron, copper and zinc were exceeded, and acute aquatic life criteria for cadmium, copper and zinc were exceeded. No MCLs/MCLGs were exceeded in a groundwater sample collected from a monitoring well locted in the northwest section of the site; however, the chronic aquatic life criteria for iron and cadmium were exceeded in the sample.

- Observed releases to the South Boulder River (sediment) were documented for arsenic and copper which were attributable to the site.

- Potential safety hazards observed during the investigation included an open adit and an unstable highwall where tailings were excavated for reprocessing. The chemical building located at the south end of the site contained barrels of sodium sulfide, sodium hypochlorite, caustic soda, sodium cyanide residue, and bags of lime.

Mammoth Tailings PA# 29-082
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 07/19/93

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)
29-082-SE-1	898 J	114 J	2.2	101 JX	24.8 JX	1010 J	55900 J	0.388	2930 J	49 J	35	7 UJ	275 JX	NR
29-008-SE-2	7 U	31.3	1.8 J	12.4	28	64.4	10300	0.287	377	33	16	8 U	107	NR
29-082-SE-3	103 J	131 J	1.7	19.6 JX	39.2 JX	285 J	27200 J	0.594	723 J	39 J	33	8 UJ	214 JX	NR
29-082-TP-1	289 J	224 J	0.7	9.8 JX	7.4 JX	434 J	38300 J	0.368	530 J	11 J	22	7 UJ	94 JX	0.279 U
29-082-TP-2	651 J	263 J	1.9	32.2 JX	5.2 JX	1160 J	43200 J	0.398	441 J	26 J	23	6 UJ	224 JX	0.308 U
29-082-TP-3	515 J	143 J	1.1	6.6 JX	4.2 JX	648 J	28000 J	0.276	173 J	9 J	105	7 UJ	106 JX	0.292 U
29-082-WR-1	244 J	137 J	0.9	5.6 JX	3.9 JX	63.7 J	23000 J	1.2	223 J	9 J	19	5 UJ	74 JX	NR
BACKGROUND	28	174	1.5 J	11	24.3	28.6	15900	0.219	1000	18	23	6 U	47 JX	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-082-TP-1	1.91	59.7	-5	-65	0.91	0.85	0.15	26.6	-31.5
29-082-TP-2	0.4	12.5	16	3.52	0.15	0.2	0.05	6.25	9.77
29-082-TP-3	0.08	2.5	22.7	20.2	<0.01	0.16	0.06	5	17.7
29-082-WR-1	0.31	9.68	11.7	1.97	0.22	0.04	0.05	1.25	10.4

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)
29-082-GW-1	24.5	19	2.83 J	9.9	6.83 U	306	2710	0.038 U	347	19.3	2.27	30.7 U	136	86.3
29-082-GW-2	1.79	31.5	2.57 U	9.7 U	6.83 U	1.55 U	1640	0.038 U	205	13.3	1.83	30.7 U	17.9	127
29-082-SW-1	26.5	18.8	4.77 J	9.7 U	6.83 U	305	2740	0.039	333	16.4	1.85	30.7 U	129	83.1

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-082-GW-1	140	6.3	74	0.17	NR
29-082-GW-2	196	5.8	95	< 0.05	< 0.01
29-082-SW-1	153	5.3	75	0.11	NR

LEGEND

SE1 - At PPE of adit discharge and S. Boulder River, in the tributary.
SE2 - Upgradient sediment sample in the S. Boulder River.
SE3 - Downgradient of site on S. Boulder River.
TP1 - Composite of subsamples TP1A-1 through 1A-3, 1B-1 through 1B-3, 1C-1 through 1C-3.
TP3 - Composite of subsamples TP2A-1 through 2A-3, 2B-1, and 2B-2.
WR1 - Sample of the WR1A subsample.
BACKGROUND - From the Mammoth Mine (29-008-SS-1).
GW1 - Flowing adit.
GW2 - Monitor well, Northwest corner.
SW1 - Same as sample SE1.

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

Mine/Site Name: B & H
Legal Description: T 3S R 4W
Mining District: Tidal Wave
Latitude: N 45° 35' 40"
Longitude: W 112° 07' 45"
Land Status: Private/Public
Quad: Old Baldy Mountain
Inspectors: Babits, Lasher/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): NE 1/4, NE 1/4, Sec. 7
Mine Type: Hardrock/Au, Ag, Pb, Cu
Primary Drainage: Currant Creek
USGS Code: 10020005
Secondary Drainage: Bear Gulch
Date Investigated: July 23, 1993
P.A. # 29-083

- No mill tailings were observed at this site during the investigation.

- The volume of waste rock associated with this site was estimated to be approximately 42,000 cubic yards. The following elements were elevated at least three times background:

Arsenic: 113 mg/kg	Cadmium: 3.8 to 4.2 mg/kg
Cobalt: 42.4J mg/kg	Chromium: 108 to 158 mg/kg
Copper: 215J to 2,930J mg/kg	Iron: 80,100 mg/kg
Mercury: 1.47J mg/kg	Nickel: 196J mg/kg
Lead: 68J to 81J mg/kg	Zinc: 422J mg/kg

- Two discharging adits were identified at the site during the investigation. One of the discharges eventually entered Bear Gulch; this discharge was sampled for laboratory analysis. No MCLs or acute or chronic aquatic life criteria were exceeded in the adit discharge.

- Bear Gulch was flowing adjacent to the site on the north side during the investigation. Surface water and sediment samples were collected upstream and downstream from the site in Bear Gulch. No MCLs or acute or chronic aquatic life criteria were exceeded in Bear Gulch, and no observed releases were documented.

- No hazardous mine openings were identified at the site.

B&H PA# 29-083
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 07/23/93

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)
29-083-SE-1	35	142 J	5.6	18.4 J	116	261 J	31800	0.461 J	927	70 J	679 J	18 U	403 J	NR
29-083-SE-2	80	143 J	4.1	16.5 J	52.9	232 J	35900	0.108 J	3390	58 J	132 J	7 U	436 J	NR
29-083-WR-1	51	289 J	4.2	17.3 J	108	215 J	28200	1.47 J	764	52 J	81 J	5 U	422 J	NR
29-083-WR-2	113	154 J	3.8	42.4 J	158	2930 J	80100	0.093 J	2040	196 J	68 J	6 U	121 J	NR
BACKGROUND	103	94	1.8	19.8	100	57.4	34300	1.23 J	606 J	61.4	31.9	16.9	70.6 JX	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-083-WR-1	0.47	14.7	9.52	-5.2	0.17	0.12	0.18	3.75	5.77
29-083-WR-2	2.6	81.2	61.7	-20	<0.01	1.38	1.33	43.1	18.6

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29-083-SW-1	2.4	24.2 JX	4.2 J	9.7 U	8.87 J	2.63 J	48.6 J	0.038 U	4.08 U	12.7 U	0.95 J	30.7 U	7.57 U	55.4
29-083-SW-2	1.18 U	20.8 JX	2.57 U	9.7 U	7.57 J	2.37 J	117 J	0.038 U	28.1	12.7 U	0.72 U	30.7 U	10 J	95.8
29-083-SW-3	3.76	13.3 JX	2.57 U	9.7 U	9 J	2.63 J	308 J	0.038 U	103	12.7 U	0.72 U	30.7 U	13.6 J	192

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-083-SW-1	97	< 5.0	34	< 0.05	NR
29-083-SW-2	154	< 5.0	50	< 0.05	NR
29-083-SW-3	274	< 5.0	81	< 0.05	NR

LEGEND

SE1 - 200' upgradient from discharging adit in unnamed tributary.
SE2 - 60' downgradient of waste rock dump 1 in unnamed tributary.
WR1 - Composite of subsamples WR1A, 1B, and 1C.
WR2 - Composite of subsamples WR2A, 2B, 3A, and 3B.
BACKGROUND - From Lakeshore (29-436-SS-1).

SW1 - Same as SE1.
SW2 - Same as SE2.
SW3 - Discharging adit at lower site.

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

Mine/Site Name: Dry Gulch (South)
Legal Description: T 3S R 5W
Mining District: Tidal Wave
Latitude: N 45° 34' 40"
Longitude: W 112° 12' 50"
Land Status: Private
Quad: Old Baldy Mountain
Inspectors: Tuesday, Belanger, Clark
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): W 1/2, Sec. 15; E 1/2, Sec. 16
Mine Type: Hardrock/Au, Ag, Pb
Primary Drainage: Jefferson River
USGS Code: 10020005
Secondary Drainage: Dry Gulch/Spring Creek
Date Investigated: July 20, 1993
P.A. # 29-282

- There were no mill tailings associated with this site.

- The volume of waste rock associated with this site was estimated to be approximately 16,930 cubic yards. The waste rock was separated into 23 dumps. The following elements were elevated at least three times background:

  Arsenic: 93 to 145 mg/kg
  Chromium: 71.6JX mg/kg
  Nickel: 65J to 104J mg/kg
  Zinc: 652JX mg/kg
  Cadmium: 5.4 mg/kg
  Mercury: 1.01 mg/kg
  Lead: 469 to 942 mg/kg

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

- The Dry Gulch stream bed extended through the site from east to west. Sediment samples were collected upstream and downstream from the site in Dry Gulch. No observed releases were documented. None of the contaminant concentrations measured in the sediment samples were elevated significantly above background levels.

- One on site adit and one on site shaft represented hazardous openings. Several of the dumps appeared to have been reclaimed and several mine openings had been closed by Department of State Lands.

Dry Gulch South PA# 29-282
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 07/20/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-282-SE-1	31 J	170 J	0.6 U	6.5 JX	14.5 JX	30.1 J	14200 J	0.309	592 J	21 J	38	7 UJ	76 JX	NR
29-282-SE-2	7 J	45.5 J	0.5 U	11.5 JX	37.4 JX	36.6 J	14400 J	0.13	331 J	50 J	7 U	5 UJ	40 JX	NR
29-282-WR-1	93 J	94.7 J	1.3	20.4 JX	71.6 JX	92.6 J	32600 J	0.453	614 J	104 J	469	6 UJ	190 JX	NR
29-282-WR-2	145 J	105 J	5.4	18.5 JX	57.8 JX	80.5 J	27400 J	1.01	1130 J	65 J	942	5 UJ	652 JX	NR
BACKGROUND	25 J	260 J	1.1	6.9 JX	19.9 JX	32.4 J	15900 J	0.246	935 J	18 J	16	8 UJ	105 JX	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT t/1000t
29-282-SS-1	0.03	0.94	136	135	<0.01	0.01	0.03	0.31	136
29-282-WR-1	0.06	1.87	119	118	0.06	<0.01	<0.01	0	119
29-282-WR-1DUP	0.06	1.87	122	120	0.05	0.01	<0.01	0.31	122
29-282-WR-2	0.03	0.94	78	77.1	0.03	<0.01	<0.01	0	78

LEGEND

SE1 - Upgradient in Dry Gulch.
SE2 - Downgradient in Dry Gulch.
WR1 - Composite of subsamples WRJF, KF, LF, GE, IF, FE, HE, HF, GF, EF, QE, and EE.
WR2 - Composite of subsamples WRIE, CF, DE, DF, BE, BF, AE, and I
BACKGROUND - From Dry Gulch South (29-282-SS-1).
WR1DUP - Duplicate of sample 29-282-WR-1

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

Mine/Site Name: U.S. Grant
Legal Description: T 6S R 3W
Mining District: Virginia City
Latitude: N 46° 24' 58.8"
Longitude: W 112° 18' 40.6"
Land Status: Private
Quad: Virginia City
Inspectors: Flammang, Clark, West
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): NW 1/4, SW 1/4, Section 26
Mine Type: Hardrock, Millsite/Au, Ag
Primary Drainage: Granite Creek
USGS Code: 10020003
Secondary Drainage: Alder Gulch
Date Investigated: July 18, 1994
P.A. # 29-095

- The volume of tailings observed at the site was estimated to be 20,930 cubic yards. The following elements were elevated to at least three times the background concentrations:
  Silver: 22.6 to 28.9 mg/kg
  Arsenic: 143 mg/kg
  Copper: 125 to 759 mg/kg
  Iron: 108,000 mg/kg
  Mercury: 0.27J mg/kg
  Lead: 468 to 13,700 mg/kg
  Antimony: 124J mg/kg
  Zinc: 338 to 13,100 mg/kg

- The volume of waste rock observed at the site was estimated to be 3,305 mg/kg. The following elements were elevated to at least three times the background concentrations:
  Silver: 6.8 to 39.9 mg/kg
  Arsenic: 31.6 mg/kg
  Cadmium: 4.9 mg/kg
  Mercury: 0.38J to 0.42J mg/kg
  Lead: 855 to 1,100 mg/kg
  Copper: 74.7 to 127 mg/kg

- One discharging adit was observed at the site. The flow from this adit eventually merged with Alder Gulch. No MCLs were exceeded in the adit discharge; however, the chronic aquatic life criteria for mercury was exceeded.

- Two groundwater wells were sampled during the investigation. The MCL for antimony was exceeded in a monitoring well located at the base of the dam at TP-1. No MCLs were exceeded in a residential well located on-site.

- Alder Gulch flows through the center of the site. An observed release to Alder Gulch was documented for copper. No MCLs were exceeded in Alder Gulch; however, the acute and chronic aquatic life criteria for copper were exceeded in the downstream sample. These exceedances were directly attributable to the site.

- Potential safety hazards observed at the site included five open adits, a collapsing loadout structure, and a pit with a 40-feet tall highwall.

U.S. Grant PA# 29-095
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - FLAMMANG
INVESTIGATION DATE: 07/18/94

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)
29-095-SE1	1.4 U	10.5 U	202	1.3 U	19.8	78.0	45.6	28000	0.35 J	520	60.8	53.6	16.2 UJ	114	NR
29-095-SE2	0.9 U	6.9 U	190	0.8 U	25.6	81.7	36.6	35100	0.31 J	609	90.7	36.7	10.6 UJ	97.9	NR
29-095-TP1	22.6	143	87.8	0.8 U	3.6	10.0	759	108000	0.16 J	680	4.5	13700	124 J	13100	1.715
29-095-TP2	28.9	10.0	123	1.6	6.6	16.9	125	17700	0.27 J	299	14.3	468	10.4 UJ	338	<0.276
29-095-WR1	6.8	31.6	181	1.8	13.2	30.4	74.7	23600	0.42 J	743	23.7	1100	9.2 UJ	224	NR
29-095-WR2	39.9	10.9	73.7	4.9	8.0	10.1	127	15900	0.38 J	421	7.6	855	9.5 UJ	265	NR
BACKGROUND	0.8 U	9.2	210	0.7 U	8.6	37.1 JX	19.5 JX	19700	0.06 J	678	24.6 JX	14.8	9.0 UJ	101 JX	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 t/1000t	NEUTRAL POTENT. t/1000t	SULFUR ACID BASE POTENT t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT t/1000t
29-095-TP1	0.20	6.25	40.4	34.2	0.13	0.02	0.05	0.62	39.8
29-095-TP2	0.04	1.25	19.6	18.3	0.03	<0.01	0.01	0.00	19.6
29-095-WR1	0.01	0.31	19.4	19.0	0.01	<0.01	<0.01	0.00	19.4
29-095-WR2	0.16	5.00	61.3	56.3	0.06	0.01	0.09	0.31	61.0

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)
29-095-AD1	0.12 U	1.4	39.3	4.0 U	8.4 U	6.8 U	5.9 U	12.3 U	0.08	2.3 U	14.4 U	0.7	51.6 U	15.6 U	126
29-095-GW1	0.12 U	2.9	83.1	4.0 U	8.4 U	6.8 U	10.6 JX	26.5	0.16	4.6	14.4 U	1.1 U	55.8	15.6 U	177
29-095-GW2	0.12 U	4.3	83.4	4.0 U	8.4 U	6.8 U	7.2 JX	19.5	0.18	5.2	14.4 U	1.1 U	51.6 U	15.6 U	178
29-095-GW3	0.12 U	1.1	77.1	4.0 U	8.4 U	6.8 U	9.8	196	0.09	4.4	14.4 U	2.3	51.6 U	524	175
29-095-GW4	0.12 U	1.1 U	5.5 U	4.0 U	8.4 U	6.8 U	5.9 U	12.3 U	0.09	2.3 U	14.4 U	0.4 U	51.6 U	15.6 U	0.1
29-095-SW1	0.12 U	1.1 U	76.5	4.0 U	8.4 U	6.8 U	5.9 U	547	0.08	34.1	14.4 U	0.9	51.6 U	16.1	164
29-095-SW2	0.12 U	1.2	78.5	4.0 U	8.4 U	6.8 U	160	384	0.08 U	46.0	14.4 U	0.9	51.6 U	15.9	163

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-095-AD1	244	<5	18	1.1	NR
29-095-GW1	185	<5	11	0.06	<0.005
29-095-GW2	246	<5	10	0.06	<0.005
29-095-GW3	218	<5	14	0.07	<0.005
29-095-GW4	NR	NR	NR	NR	<0.005
29-095-SW1	195	<5	12	0.07	<0.005
29-095-SW2	159	<5	9	0.08	<0.005

LEGEND

SE1 - Upgradient 200' above mill building.
SE2 - Downgradient, across from Fairweather/Memorial, approx. 500' from base of TP1.
TP1 - Composite of subsamples TP1A-1 through 1A-4.
TP2 - Composite of subsamples TP2A, 2B-1, and 2B-2.
WR1 - Composite of subsamples WR1 through 3.
WR2 - Composite of subsamples WR4A and 4B.
BACKGROUND - From the Bulls Mine (29-095-SS1).

AD1 - Collected at portal of Adit #1.
GW1 - Monitoring well at center of base of TP1 dam.
GW2 - Duplicate of GW1.
GW3 - Drinking well sampled from outside faucet.
GW4 - QA/QC sample.
SW1 - Same as sample 29-095-SE1.
SW2 - Same as sample 29-095-SE2.

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

Mine/Site Name: Belle
Legal Description: T 6S R 3W
Mining District: Virginia City
Latitude: N 45° 16' 8.6"
Longitude: W 111° 56' 6.8"
Land Status: Private
Quad: Virginia City
Inspectors: Flammang, Clark, West
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): NE 1/4, SW 1/4, Section 35
Mine Type: Hardrock/Au, Ag
Primary Drainage: Granite Creek
USGS Code: 10020003
Secondary Drainage: Alder Gulch
Date Investigated: July 19 and 20, 1994
P.A. # 29-098

- The volume of tailings observed at the site was estimated to be less than 5 cubic yards. The tailings were located in two separate piles on the mill foundation. The literature indicates that tailings were shipped off-site for processing. No tailings samples were submitted for analysis due to the small volume involved.

- The volume of waste rock observed at the site was estimated to be 7,645 cubic yards. The following elements were elevated to at least three times the background concentrations:

  Silver: 3.0 to 80.5 mg/kg
  Barium: 895 mg/kg
  Cadmium: 2.8 to 8.1 mg/kg
  Cobalt: 26.2 to 34.1 mg/kg
  Copper: 170 to 1,870 mg/kg
  Mercury: 0.24J to 1.31J mg/kg
  Nickel: 83.5 mg/kg
  Lead: 313 to 1,040 mg/kg
  Zinc: 367 to 991 mg/kg

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

- Alder Gulch flows adjacent to the site on the east side, and a tributary to Alder Gulch flows adjacent to the site on the south side. No observed releases to surface water were documented during the investigation. No MCLs were exceeded in either of the streams; however, the chronic aquatic life criteria for mercury was exceeded in both streams upstream and downstream from the site.

- Potential safety hazards observed at the site included one open adit and several collapsing wooden structures.

Belle Mine PA# 29-098
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - FLAMMANG
INVESTIGATION DATE: 07/20/94

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)
29-098-SE1	1.0 U	7.7 U	45.4	0.9 U	5.6	22.4 JX	12.7 JX	11300	0.05 J	147	17.7 JX	17.2	11.8 UJ	39.1 JX	NR
29-098-SE2	0.8 U	6.2 U	76.8	0.7 U	6.5	36.4 JX	14.6 JX	11400	0.10 J	174	23.7 JX	8.17 U	9.5 UJ	40.5 JX	NR
29-098-SE3	0.9 U	6.9 U	135	0.8 U	9.1	37.8 JX	13.7 JX	21900	0.06 J	549	22.6 JX	10.6	10.7 UJ	39.5 JX	NR
29-098-WR1	2.0	26.6	167	1.1	34.1	86.1	170	35300	0.76 J	713	83.5	313	10.3 UJ	367	NR
29-098-WR2	80.5	24.8	895	8.1	8.1	10.4	1870	26100	1.31 J	679	11.9	1040	8.7 UJ	991	NR
29-098-WR3	3.0	19.4	210	2.8	26.2	64.9 JX	194 JX	33300	0.24 J	945	64.5 JX	607	8.8 UJ	377 JX	NR
BACKGROUND	0.8 U	9.2 B	210	0.7 U	8.6	37.1 JX	19.5 JX	19700	0.06 J	678	24.6 JX	14.8	9.0 UJ	101 JX	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT t/1000t
29-098-WR1	0.10	3.12	30.4	27.3	<0.01	0.02	0.09	0.62	29.8
29-098-WR2	0.25	7.81	25.2	17.4	0.10	0.03	0.12	0.94	24.3
29-098-WR3	0.01	0.31	15.5	15.2	<0.01	<0.01	0.02	0.00	15.5

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)
29-098-SW1	0.12 U	1.1 U	66.2	4.0 U	8.4 U	6.8 U	7.8	188	0.10	9.6	14.4 U	1.0	51.6 U	15.6 U	157
29-098-SW2	0.12 U	1.1 U	70.0	4.0 U	8.4 U	6.8 U	5.9 U	12.5	0.11	3.7	14.4 U	1.3	51.6 U	15.6 U	171
29-098-SW3	0.12 U	1.1 U	60.9	4.0 U	8.4 U	6.8 U	5.9 U	639	0.12	18.5	14.4 U	1.3	51.6 U	16.6	107

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-098-SW1	192	<5	11	0.06	NR
29-098-SW2	188	<5	10	0.06	NR
29-098-SW3	264	<5	7	0.61	NR

LEGEND

SE1 - Downgradient in Alder Gulch, approx. 200' from north end of mill.
SE2 - Upgradient of site and confluence of unnamed trib. with Alder Gulch.
SE3 - Upgradient of WR5, WR6 in unnamed trib., just above where road ends.
WR1 - Composite of subsamples WR1A through 1C.
WR2 - Grab sample of the WR2A subsample.
WR3 - Composite of subsamples WR5A, 5B, and 6A.
BACKGROUND - From the Belle Mine (29-098-SS1).

SW1 - Same as sample 29-098-SE1.
SW2 - Same as sample 29-098-SE2.
SW3 - Same as sample 29-098-SE3.

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

Mine/Site Name: Kearsage
Legal Description: T 7S R 3W
Mining District: Virginia City
Latitude: N 45° 13' 00"
Longitude: W 111° 56' 00"
Land Status: Private
Quad: Cirque Lake
Inspectors: Babits, Lasher/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): NW 1/4, NE 1/4, Sec. 23
Mine Type: Hardrock/Au
Primary Drainage: Alder Gulch
USGS Code: 10020003
Secondary Drainage: Mill Gulch
Date Investigated: July 20, 1993
P.A. # 29-102

- No mill tailings were observed at this site during the investigation.

- The volume of waste rock associated with this site was estimated to be approximately 8,780 cubic yards. The following elements were elevated at least three times background:

  Arsenic: 25 mg/kg
  Chromium: 482 mg/kg
  Nickel: 224 mg/kg
  Zinc: 234 mg/kg
  Cadmium: 6.8J mg/kg
  Copper: 78.1 to 111 mg/kg
  Lead: 41 mg/kg

- No discharging adits, filled shafts, seeps, or springs were identified at the site.

- Mill Gulch was flowing adjacent to the site on the north side during the investigation. Surface water and sediment samples were collected upstream and downstream from the site in Mill Gulch. No MCLs or acute or chronic aquatic life criteria were exceeded in Mill Gulch.

- Observed releases to Mill Gulch (sediment) were documented for cadmium, lead, and zinc.

- Potentially hazardous mine openings identified at the site included one open adit and one open shaft. The shaft was surrounded by a barbed wire fence.

Kearsage PA# 29-102
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 07/20/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-102-SE-1	5 U	54.4	0.9 J	9.1	31.7	17.7	12900	0.244	181	22	16	6 U	41	0.338 U
29-102-SE-2	5 U	111	2.8 J	18.5	83	41.2	26200	0.461	354	49	80	7 U	124	0.338 U
29-102-WR-1	25	122	6.8 J	45	160	78.1	61500	0.392	883	100	41	5 U	234	NR
29-102-WR-2	11	232	4.8 J	46.8	482	111	52200	0.679	452	224	29	5 U	183	NR
BACKGROUND	6 U	155	2.2 J	17	71.1	14.5	24800	0.255	821	46	13	8 U	73	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 t/1000t	NEUTRAL POTENT t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-102-WR-1	0.59	18.4	76.6	58.1	<0.01	0.5	0.16	15.6	60.9
29-102-WR-2	<0.01	0	17.6	17.6	<0.01	<0.01	0.03	0	17.6

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29-102-SW-1	1.69 U	30.5	2.57 U	9.7 U	6.83 U	1.55 U	262	0.038 U	8.53	12.7 U	1.55 U	30.7 U	7.57 U	83.6
29-102-SW-2	1.69 U	31.7	2.57 U	9.7 U	6.83 U	1.55 U	319	0.038 U	9.4	12.7 U	1.55 U	30.7 U	7.57 U	85.3

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-102-SW-1	118	< 5.0	8	< 0.05	NR
29-102-SW-2	126	< 5.0	8	< 0.05	NR

LEGEND

SE1 - 300 feet upgradient from waste rock dump 1 in Mill Gulch.
SE2 - At PPE in Mill Gulch of waste rock dump 1.
WR1 - Composite of subsamples WR1A, 1B, and 1C.
WR2 - Composite of subsamples WR2A, 2B, 3, 4, and 5.
BACKGROUND - From the Apex Mine (29-105-SS-1).
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: Apex
Legal Description: T 7S R 3W
Mining District: Virginia City
Latitude: N 45° 12' 05'
Longitude: W 111° 56' 00
Land Status: Private
Quad: Cirque Lake
Inspectors: Babits, Lasher/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): Center of N 1/2, Sec. 23
Mine Type: Hardrock/Au, Talc
Primary Drainage: Ruby River
USGS Code: 10020005
Secondary Drainage: Alder Gulch
Date Investigated: July 20, 1993
P.A. # 29-105

- No mill tailings were observed at this site during the investigation.

- The volume of waste rock associated with this site was estimated to be approximately 6,960 cubic yards. The following elements were elevated at least three times background:
  Arsenic: 7 to 53 mg/kg
  Cadmium: 7.2J to 14.3J mg/kg
  Copper: 70.2 to 100 mg/kg
  Lead: 210 to 212 mg/kg
  Zinc: 260 to 1,030 mg/kg

- One discharging adit was identified at the site during the investigation. However, the adit was actively being worked and could not be sampled due to inaccessibility.

- Alder Gulch was flowing adjacent to the site on the east side during the investigation. Surface water and sediment samples were collected upstream and downstream from the site in Alder Gulch; no MCLs or acute or chronic aquatic life criteria were exceeded.

- Potentially hazardous mine openings identified at the site included three open adits and one open shaft. The shaft was surrounded by a barbed wire fence.

Apex Mine PA# 29-105
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 07/20/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-105-SE-1	8 U	118	2.1 J	16.7	119	25.9	29400	0.486	408	60	17	10 U	95	NR
29-105-SE-2	9 U	63.3	1.6 J	19.8	51.3	32.5	26600	0.488	403	37	22	11 U	86	NR
29-105-WR-1	7	190	3.1 J	28.5	88.7	70.2	33100	0.345	387	73	12	6 U	66	NR
29-105-WR-2	33	193	7.2 J	36.2	105	83.4	49800	0.502	940	81	210	6 U	260	NR
29-105-WR-3	53	29.7	14.3 J	35.9	80.6	100	54200	0.552	941	92	212	5 U	1030	NR
BACKGROUND	6 U	155	2.2 J	17	71.1	14.5	24800	0.255	821	46	13	8 U	73	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 t/1000t	NEUTRAL POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-105-WR-1DUP	0.22	6.87	72.9	66.1	<0.01	0.16	0.12	5	67.9
29-105-WR-1	0.23	7.19	73.5	66.3	<0.01	0.14	0.13	4.37	69.1
29-105-WR-2	0.26	8.12	60.7	52.6	<0.01	0.16	0.12	5	55.7
29-105-WR-3	1.12	35	75.5	40.5	<0.01	1.11	0.37	34.7	40.8

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29-105-SW-1	1.69 U	32.6	2.57 U	9.7 U	6.83 U	1.55 U	17.3	0.038 U	4.08 U	12.7 U	1.55 U	30.7 U	7.57 U	183
29-105-SW-2	1.69 U	34.6	2.57 U	9.7 U	6.83 U	1.55 U	42	0.038 U	4.08 U	12.7 U	1.55 U	30.7 U	7.57 U	186

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-105-SW-1	244	< 5.0	7	0.17	NR
29-105-SW-2	211	< 5.0	7	0.21	NR

LEGEND

SE1 - Approx 1,000' upgradient from waste rock dump 6 in Alder Gulch.
SE2 - Approx. 50' downgradient from waste rock dump 6.
WR1 - Composite of subsamples WR-1A through 1C.
WR2 - Composite of subsamples WR2A, 2B, 3A, 3B, and 4. (See JTC 29-106 for WR4 information).
WR3 - Composite of subsamples WR5 and 6.
BACKGROUND - From the Apex (29-105-SS-1).
WR1DUP - Duplicate of sample 29-105-WR-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: Pacific
Legal Description: T 7S R 3W
Mining District: Virginia City
Latitude: N 45° 13' 45"
Longitude: W 111° 57' 03"
Land Status: Private
Quad: Cirque Lake
Inspectors: Babits, Flammang/Pierson
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): NW 1/4, Sec. 15
Mine Type: Hardrock/Au, Ag
Primary Drainage: Alder Gulch
USGS Code: 10020003
Secondary Drainage: Browns Gulch
Date Investigated: August 26, 1993
P.A. # 29-118

- No mill tailings were observed at this site during the investigation.

- The volume of waste rock associated with this site was estimated to be approximately 190,000 cubic yards. The following elements were elevated at least three times background:

  Cadmium: 0.88J mg/kg
  Copper: 112 mg/kg
  Nickel: 149JX mg/kg
  Chromium: 286JX mg/kg
  Mercury: 0.071J to 0.253J mg/kg
  Lead: 30.8JX mg/kg

- Three discharging adits were identified at the site during the investigation. Two of the discharges eventually flowed into Brown's Gulch; one of these discharges was sampled for laboratory analyses. No MCLs were exceeded in the adit discharge; however, the chronic aquatic life criteria for mercury was exceeded.

- Brown's Gulch was flowing through the center of the site during the investigation. Surface water and sediment samples were collected upstream and downstream from the site in Brown's Gulch. No MCLs were exceeded; however, the chronic aquatic life criteria for mercury was exceeded in both the upstream and downstream samples. An observed release to Brown's Gulch was documented for lead. Additionally, observed releases to Brown's Gulch (sediment) were documented for mercury and lead.

- Three potentially hazardous open adits and one 200 feet tall highwall were identified at the site.

Pacific PA# 29-118
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
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)
29-118-SE-1	6.99	110 J	1.37 J	11.5	33.8 JX	26.3	24600	0.056 J	444 J	30.9 JX	38.2 JX	6.91 UJ	110 J	NR
29-118-SE-2	7.35	356 J	2.57 J	14.1	18.7 JX	62.6	27200	0.437 J	424 J	24.9 JX	189 JX	6.9 UJ	310 J	NR
29-118-WR-1	7.42	91.2 J	0.88 J	24.2	286 JX	112	34400	0.253 J	494 J	149 JX	20.8 JX	5.86 UJ	74.9 J	NR
29-118-WR-2	4.49 U	100 J	0.86 UJ	11.1	21.2 JX	31.8	25700	0.072 J	490 J	24.2 JX	30.8 JX	5.93 UJ	91.7 J	NR
BACKGROUND	12.8	123 J	1.02 UJ	8.77	22.4 JX	26.4	22400	0.031 UJ	539 J	16.4 JX	7.26 UJX	7.01 UJ	52.4 J	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 t/1000t	NEUTRAL POTENT t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT t/1000t
29-118-WR-1	0.08	2.5	76.4	73.9	<0.01	0.04	0.04	1.25	75.2
29-118-WR-2	0.3	9.37	140	131	0.07	0.04	0.19	1.25	139

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)
29-118-SW-1	1.12 U	32.2	4.59 U	5 U	6.24 U	3.67 J	59.6 J	0.2	7.47	10.9 U	0.94 U	31.7 U	33.5	105
29-118-SW-2	1.08	66.9	2.57 U	9.7 U	6.83 U	1.55 U	251	0.16 JX	55.8	12.7 U	3.66 J	30.7 U	27.8 J	171
29-118-SW-3	1.83	99.3	2.57 U	9.7 U	6.83 U	1.97	900	0.14 JX	174	13.8	1.98 J	30.7 U	36.1 J	233

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-118-SW-1	114	< 5.0	8	NR	NR
29-118-SW-2	1080	< 5.0	2424	0.05	NR
29-118-SW-3	268	< 5.0	38	< 0.05	NR

LEGEND

SE1 - 400 feet upgradient of waste rock dump 2.
SE2 - 50 feet downgradient of culvert where creek crosses road at base of waste rock dump 1.
WR1 - Composite of subsamples WR1A, 1B, and 1C
WR2 - Composite of subsamples WR2A, 2B, 3A, 3B, 4A, and 4B.
BACKGROUND - 275' above waste rock dump 4. From Pacific (29-118-SS-1).

SW1 - Same as sample SE1.
SW2 - Same as sample SE2.
SW3 - Adit discharge across road from waste rock dump 1.

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

Mine/Site Name: Easton
Legal Description: T 7S R 3W
Mining District: Virginia City
Latitude: N 45° 15.0'
Longitude: W 111° 58.1
Land Status: Private
Quad: Virginia City/Cirque Lake
Inspectors: Babits, Flammang/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): SE 1/4, SE 1/4, Sec. 4
Mine Type: Hardrock/Au, Ag
Primary Drainage: Alder Gulch
USGS Code: 10020003
Secondary Drainage: Browns Gulch
Date Investigated: August 26, 1993
P.A. # 29-121

- The volume of tailings associated with this site was estimated to be approximately 1,500 cubic yards. The following elements were elevated at least three times background:

Arsenic: 52.9 mg/kg	Barium: 455J mg/kg
Cadmium: 45.2J mg/kg	Copper: 489 mg/kg
Mercury: 1.47J mg/kg	Lead: 2,670JX mg/kg
Antimony: 107J mg/kg	Zinc: 3,650J mg/kg

- The volume of waste rock associate with this site was estimated to be approximately 7,100 cubic yards. The following elements were elevated at least three times background:

Copper: 111 mg/kg	Mercury: 0.18J mg/kg
Lead: 94.2JX mg/kg	Zinc: 158J mg/kg

- One discharging adit was identified at the site; this discharge eventually entered Mill Creek. No MCLs were exceeded in the adit discharge; however, the chronic aquatic life criteria for mercury was exceeded. The pH measurement in the adit discharge was 7.5.

- Mill Creek was flowing through the center of the site during the investigation. Surface water and sediment samples were collected upstream and downstream from the site in Mill Creek. No MCLs were exceeded in Mill Creek; however, the chronic aquatic life criteria for mercury was exceeded in both the upstream and downstream samples.

- One potentially hazardous partially collapsed adit was identified at the site.

Easton PA# 29-121

AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
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)
29-121-SE-1	4.56 U	33.4 J	0.88 UJ	3.2	9.06 JX	5.67	11200	0.036 J	98.4 J	6.86 JX	7.67 JX	6.04 UJ	38.9 J	NR
29-121-SE-2	5.48 U	23.1 J	1.05 UJ	2.08	6.91 JX	6.93	8320	0.034 J	125 J	5.7 JX	14.3 JX	7.24 UJ	60.2 J	NR
29-121-TP-1	52.9	455 J	45.20 J	6.43	10.6 JX	489	27900	1.47 J	273 J	22.9 JX	2670 JX	107 J	3650 J	<0.306
29-121-WR-1	25	257 J	1.87 J	10.5	10.6 JX	111	30100	0.18 J	406 J	25.6 JX	94.2 JX	11.8 J	158 J	NR
BACKGROUND	12.8	123 J	1.02 UJ	8.77	22.4 JX	26.4	22400	0.031 UJ	539 J	16.4 JX	7.26 UJX	7.01 UJ	52.4 J	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-121-TP-1	1.23	38.4	47.1	8.69	0.48	0.74	0.01	23.1	24
29-121-WR-1	0.66	20.6	62	41.4	0.13	0.34	0.19	10.6	51.4

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)
29-121-SW-1	1.12 U	73	4.59 U	5 U	6.24 U	2.33 U	296 J	0.22	11.8	10.9 U	3.18	31.7 U	8.71 U	129
29-121-SW-2	1.12 U	78.4	4.59 U	5 U	6.24 U	2.33 U	270 J	0.2	11	10.9 U	3.78	31.7 U	19.7	360
29-121-SW-3	1.32	55	4.59 U	5 U	6.24 U	3.8 J	51.9 J	0.27	5	10.9 U	0.99	31.7 U	34.1	814

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-121-SW-1	164	< 5.0	39	< 0.05	NR
29-121-SW-2	403	< 5.0	116	0.16	NR
29-121-SW-3	901	< 5.0	249	< 0.05	NR

LEGEND

SE1 - 50 feet upgradient above last cabin.
SE2 - Downgradient of waste rock dump 2.
TP1 - Composite of subsamples TP1A and 1B.
WR1 - Composite of subsamples WR1A, 1B, 1C, 2A, and 2B.
BACKGROUND - From the Pacific Mine (29-118-SS-1).
SW1 - Same as SE1.
SW2 - Same as SE2.
SW3 - Discharge from adit #1.

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

Mine/Site Name: Prospect Mine and Millsite
Legal Description: T 6S R 3W
Mining District: Virginia City
Latitude: N 45° 17' 30"
Longitude: W 111° 57' 45"
Land Status: Private
Quad: Virginia City
Inspectors: Flammang, Clark, West
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): SE 1/4, Se 1/4, Section 21; NW 1/4, NW 1/4, Section 27
Mine Type: Hardrock; Millsite/Au, Ag, Pb, Zn, Cu
Primary Drainage: Granite Creek
USGS Code: 10020003
Secondary Drainage: Alder Gulch
Date Investigated: July 19, 1994
P.A. # 29-136

- Areas of the mine were being actively re-worked during the investigation.

- The volume of tailings observed at the site was estimated to be 17,440 cubic yards. The following elements were elevated to at least three times the background concentrations:
  Silver: 4.5 to 6.0 mg/kg
  Arsenic: 50.0 to 59.6 mg/kg
  Barium: 2,950 to 3,250 mg/kg
  Mercury: 0.73J to 0.77J mg/kg
  Lead: 467 to 698 mg/kg
  Copper: 76.4 to 80.1 mg/kg

- The volume of waste rock observed at the site was estimated to be 18,590 cubic yards. The following elements were elevated to at least three times the background concentrations:
  Arsenic: 38.4 mg/kg
  Lead: 147 mg/kg

- No discharging adits, filled shafts, seeps, or springs were observed at the site during the investigation.

- Intermittent Barton Gulch (dry during investigation) flows through the center of the site. Tailings make up the majority of the surface sediment in Barton Gulch for at least 1,200 feet downstream from the site. Observed releases to Barton Gulch (sediment) were documented for silver, barium, copper, mercury, and lead.

- Potential safety hazards observed at the site included several undercut banks along tailings piles located near Barton Gulch.

Prospect PA# 29-136
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - FLAMMANG
INVESTIGATION DATE: 07/19/94

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)
29-136-SE1	5.8	19.2	823	0.8	4.7	20.4	47.3	12300	0.27 J	267	16.1	315	9.0 UJ	79.2	NR
29-136-SE2	0.6 U	7.5	92.2	0.6 U	7.0	23.2	12.9	10200	0.07 J	217	17.8	10.8	7.7 UJ	28.9	NR
29-136-TP1	4.5	50.0	2950	0.7 U	3.6	36.7	76.4	20800	0.77 J	200	22.3	467	8.8 UJ	81.6	0.563
29-136-TP2	6.0	59.6	3250	0.9 U	3.9	40.6	80.1	20700	0.73 J	197	24.6	698	11.1 UJ	146	0.699
29-136-WR1	0.8 U	38.4	108	0.7 U	14.6	79.2	38.5	27200	0.12 J	216	59.7	147	9.6 UJ	80.4	NR
BACKGROUND	0.8 U	9.2	210	0.7 U	8.6	37.1 JX	19.5 JX	19700	0.06 J	678	24.6 JX	14.8	9.0 UJ	101 JX	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 t/1000t	NEUTRAL POTENT t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT t/1000t
29-136-TP1	0.07	2.19	10.6	8.38	0.07	<0.01	<0.01	0.00	10.6
29-136-WR1	0.01	0.31	18.9	18.6	0.01	<0.01	<0.01	0.00	18.9

LEGEND

SB1 - Downgradient of breached TP2 dam approx. 50'.
SB2 - Approx. 15' downgradient of monitoring well.
TP1 - Composite of subsamples TP1A-1 and 1A-2.
TP2 - Composite of subsamples TP2A-1, 2A-2, 2B-1, and 2B-2.
BACKGROUND - From the Belle Mine (29-114-SS1).

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

Mine/Site Name: Missouri
Legal Description: T 4S R 2W
Mining District: Washington
Latitude: N 45° 27' 32"
Longitude: W 111° 53' 27"
Land Status: Private/Public
Quad: Ramshorn Mountain
Inspectors: Babits, Lasher/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Madison
Section(s): N 1/2, NE 1/4, Sec. 30; S 1/2, Sec. 29
Mine Type: Hardrock/Au, Ag, Pb, Cu
Primary Drainage: Madison River
USGS Code: 10020007
Secondary Drainage: South Meadow Creek
Date Investigated: July 22, 1993
P.A. # 29-373

- The volume of tailings associated with this site was estimated to be approximately 12,111 cubic yards. The following elements were elevated at least three times background:

  Arsenic: 3,390 to 6,520 mg/kg
  Copper: 364 to 692 mg/kg
  Mercury: 0.791 to 3.68 mg/kg
  Antimony: 76 to 107 mg/kg
  Cadmium: 3.6 to 10.6 mg/kg
  Iron: 79,100 mg/kg
  Lead: 536 to 11,900 mg/kg
  Zinc: 426 to 1,080 mg/kg

- The volume of waste rock associated with this site was estimated to be approximately 5,960 cubic yards. The following elements were elevated at least three times background:

  Arsenic: 1,730 mg/kg
  Copper: 255 mg/kg
  Lead: 3,520 mg/kg
  Zinc: 682 mg/kg
  Cadmium: 9.8 mg/kg
  Mercury: 0.285 to 0.897 mg/kg
  Antimony: 38 mg/kg

- No discharging adits, filled shafts, seeps, or springs were identified at the site.

- South Meadow Creek was flowing adjacent to the site on the south side. Surface water and sediment samples were collected upstream and downstream from the site in South Meadow Creek.No MCLs were exceeded in South Meadow Creek; however, the chronic aquatic life criteria for lead was exceeded in both the upstream and downstream samples.

- Observed releases to South Meadow Creek (sediment) were documented for arsenic and lead.

- Two potentially hazardous open adits were identified at the site.

Missouri PA# 29-373
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 07/22/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-373-SE-1	16	86.7	0.5 U	8.5	38.1	17.6	13000	0.054	362 J	22	42	6 U	57	0.323 U
29-373-SE-2	290	68.6	0.6 U	11	41.2	45.3	20300	0.089	249 J	32	536	9	99	0.397 U
29-373-TP-1	6520	92.7	10.6	8	51.5	692	79100	3.68	138 J	18	11900	107	1080	0.317
29-373-TP-2	3390	35.2	3.6	4.3	24.5	364	44000	0.791	76.1 J	8	6680	76	426	0.308
29-373-WR-1	1730	103	9.8	28.5	34.3	255	47400	0.897	784 J	47	3520	38	682	NR
29-373-WR-2	5	219	0.5 U	34.9	76.2	65.3	30700	0.285	330 J	62	12	5 U	59	NR
BACKGROUND	10	129	0.6 U	16.6	57.6	28.4	21600	0.029	951 J	51	23	7 U	54	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 t/1000t	NEUTRAL POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-373-TP-1	0.31	9.68	5.88	-3.8	0.31	<0.01	<0.01	0	5.88
29-373-TP-2	0.19	5.94	2.73	-3.2	0.19	<0.01	<0.01	0	2.73
29-373-WR-1	0.07	2.19	28.9	26.7	0.07	<0.01	<0.01	0	28.9
29-373-WR-2	0.01	0	7.11	7.11	<0.01	<0.01	<0.01	0	7.11

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)
29-373-SW-1	2.34	12.3 JX	2.57 U	9.7 U	6.97 J	1.63 J	43.7 J	0.038 U	4.08 U	12.7 U	0.72 U	30.7 U	7.57 U	20
29-373-SW-2	3.35	12.3 JX	2.57 U	9.7 U	6.83 U	1.7 J	48.6 J	0.038 U	4.08 U	12.7 U	0.89 J	30.7 U	7.57 U	23.1

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-373-SW-1	75	< 5.0	< 5.0	< 0.05	NR
29-373-SW-2	71	< 5.0	< 5.0	< 0.05	< 0.01

LEGEND

SE1 - 800 feet upgradient of tailings pond 1 in S. Meadow Creek.
SE2 - At PPE of tailings pond 1 in S. Meadow Creek.
TP1 - Composite of subsamples TP1 A-C and 1 A-B
TP2 - Composite of subsamples TP1 A-C and 1 A-D.
WR1 - Composite of subsamples WR1, 2A, 2B, 3A, and 3B.
WR2 - Composite of subsamples WR4, 5, and 6.
BACKGROUND - From the Missouri Mine (29-373-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: SE SE S25
Legal Description: T 4S R 3W
Mining District: Washington
Latitude: N 45° 27' 18"
Longitude: W 111° 54' 20"
Land Status: Public
Quad: Ramshorn Mountain
Inspectors: M. Babits, S. Babits
Organization: Pioneer Technical Services, Inc.

County: Madison
Section(s): SE 1/4, SE 1/4, Sec. 25
Mine Type: Hardrock/Unknown
Primary Drainage: Madison River
USGS Code: 10020007
Secondary Drainage: South Meadow Creek
Date Investigated: September 20, 1993
P.A. # 29-394

- No mill tailings were observed at this site during the investigation.

- The volume of waste rock associated with this site was estimated to be approximately 4,600 cubic yards. The following elements were elevated at least three times background:

Arsenic: 1,110 mg/kg	Cadmium: 7 mg/kg
Cobalt: 52.6 mg/kg	Copper: 525 mg/kg
Mercury: 0.221 mg/kg	Lead: 1,660 mg/kg
Antimony: 23J mg/kg	Zinc: 1,090 mg/kg

- One discharging adit was identified at the site. No MCLs were exceeded in the adit discharge; however, acute and chronic aquatic life criteria for copper and zinc were exceeded. The chronic aquatic life criteria for lead was also exceeded. The adit discharge pH measurement was 7.75.

- No surface water was observed on or near the site. The nearest surface water was located approximately 600 feet away. No surface water or sediment samples were collected due to a lack of a direct runoff route.

- Two potentially hazardous open adits were identified at the site.

SE SE Section 25 PA# 29-394
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 09/20/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-394-WR-1	1110	109	7	52.6	46.5	525	59400	0.221	1700 J	61.3	1660	23 J	1090	NR
BACKGROUND	10	129	0.6 U	16.6	57.6	28.4	21600	0.029	951 J	51	23	7 U	54	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-394-WR-1	0.2	6.25	2.89	-3.4	0.14	<0.01	0.07	0	2.89

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)
29-394-SW-1	32.9 J	3.73	4.59 U	5 U	6.24 U	13.1	20.3 JX	0.12 U	3.76 UJ	10.9 U	2.78 J	31.7 U	59.9	35.9

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-394-SW-1	61	< 5	8	0.11	NR

LEGEND

WR1 - Composite of subsamples WR1A, 1B, 1C, and 2.
BACKGROUND - From the Missouri Mine (29-373-SS-1).
SW1 - Adit discharge at waste rock dump 2.

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

Mine/Site Name: Bigler
Legal Description: T 9N R 4E
Mining District: Beaver Creek
Latitude: N 46° 15' 30"
Longitude: W 111° 15' 30"
Land Status: Public
Quad: Gipsy Lake
Inspectors: Bullock, Clark/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Meagher
Section(s): NE 1/4, SW 1/4, Sec. 28
Mine Type: Hardrock/Au, Ag, Cu
Primary Drainage: Thompson Gulch
USGS Code: 10030103
Secondary Drainage: Thompson Gulch
Date Investigated: July 28, 1993
P.A. # 30-067

- The volume of tailings associated with this site was estimated to be approximately 25 cubic yards. This was a very small volume of tailings in a secure impoundment. The following elements were elevated at least three times background:
  Cadmium: 2.4JX mg/kg
  Copper: 1020J mg/kg
  Iron: 66,400 mg/kg
  Nickel: 25 mg/kg

- The volume of waste rock associated with this site was estimated to be approximately 7500 cubic yards. Copper (262J mg/kg) was the only element elevated at least three times background.

- There were two adit discharges associated with this site. Neither discharge exceed any of the applicable MCLs or MCLGs. The acute aquatic life criteria for cadmium was exceeded in both adits. The pH of both discharges was greater than 8.5 and the specific conductance of both discharges is 160 umhos/cm. Both discharges returned to subsurface prior to discharging into the drainage approximately 1/3 mile below the site.

Bigler PA# 30-067
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
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)
30-067-TP-1	10 J	88.8 J	2.4 JX	11.7 J	13.7 J	1020 J	66400	0.05 J	987 J	25 J	42 J	7 U	52 J	NR
30-067-WR-1	5 J	60.7 J	0.9 JX	10.5 J	9.8 J	262 J	24900	0.029 J	634 J	11 J	31 J	5 U	50 J	NR
BACKGROUND	24 J	116 J	0.8 UX	5.2 J	12.2 J	20.2 J	13400	0.032 J	361 J	7 J	19 J	10 U	39 J	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
30-067-TP-1	0.37	11.6	42.3	30.7	0.37	<0.01	<0.01	0.00	42.3
30-067-WR-1	0.07	2.19	10.5	8.36	0.07	<0.01	<0.01	0.00	10.5
30-067-WR-1DUP	0.07	2.19	11.8	9.62	0.07	<0.01	<0.01	0.00	11.8

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
30-067-GW-1	1.69 U	2.27	2.57 U	9.7 U	6.83 U	4.37 J	34.4 J	0.074	4.08 U	12.7 U	1.55 U	30.7 U	14.9 JX	61.4
30-067-GW-2	1.69 U	3.3	2.57 U	9.7 U	6.83 U	3.77 J	20.7 J	0.048	4.08 U	12.7 U	1.55 U	30.7 U	7.57 UJ	61.8

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
30-067-GW-1	104	< 5.0	9	0.28	NR
30-067-GW-2	103	< 5.0	< 5.0	0.63	NR

LEGEND

TP1 - Composite of subsamples TP1A and 1B.
WR1 - Composite of subsamples WR1A, 1B, 2A, and 4A.
BACKGROUND - From the Lane Mine (30-019-SS-1)
WR1DUP - Duplicate of the 30-067-WR-1 sample
GW1 - Adit #2 discharge.
GW2 - Adit #3 discharge.

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

Mine/Site Name: Cumberland
Legal Description: T 8N R 8E
Mining District: Castle Mountain
Latitude: N 46° 27' 08"
Longitude: W 110° 40' 57"
Land Status: Private
Quad: Castle Town
Inspectors: Babits, Flammang, Lasher
Organization: Pioneer Technical Services, Inc.

County: Meagher
Section(s): NE 1/4, SE 1/4, Sec. 14
Mine Type: Hardrock/Pb, Ag
Primary Drainage: Alabaugh Creek
USGS Code: 10040201
Secondary Drainage: Castle Creek
Date Investigated: July 29, 1993
P.A.# 30-004

- There were no mill tailings associated with this site.

- There was a small amount of slag at the site. The following were elevated at least 3 times background:
  Arsenic: 861J mg/kg
  Cadmium: 7.8JX mg/kg
  Iron: 143,000 mg/kg
  Manganese: 4,740J mg/kg
  Lead: 25,900J mg/kg
  Antimony: 36 mg/kg
  Zinc: 13,000J mg/kg

- There were approximately 20,680 cubic yards of mostly uncovered waste rock on site. The following were elevated at least 3 times background:
  Arsenic: 542J to 574J mg/kg
  Cadmium: 7.2JX to 9.6JX mg/kg
  Mercury: 0.191J to 0.196J mg/kg
  Lead: 15,200J to 52,500J mg/kg
  Antimony: 22 to 40 mg/kg
  Zinc: 990J to 2,000J mg/kg

- There were no discharging adits at the site.

- Castle Creek flows 60 feet from the slag. Observed releases of manganese and lead to downstream surface water were documented. No MCL/MCLGs were exceeded, but the chronic fresh water aquatic life criteria for mercury and lead were exceeded in downstream surface water.

- There were two open shafts at the site (one had been fenced but the fence was down).

Cumberland PA# 30-004
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 07/29/93

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)
30-004-SE-1	37 J	136 J	1.9 JX	6.6 J	11.9 J	15.5 J	13300	0.083 J	924 J	11 J	409 J	7 U	108 J	NR
30-004-SE-2	61 J	191 J	2 JX	7.2 J	21.5 J	28.7 J	19200	0.106 J	975 J	17 J	1130 J	10 U	265 J	NR
30-004-SL-1	861 J	406 J	7.8 JX	6.2 J	11.6 J	298 J	143000	0.009 UJ	4740 J	3 J	25900 J	36	13000 J	NR
30-004-WR-1	542 J	48.4 J	9.6 JX	3.4 J	13.1 J	133 J	22800	0.191 J	566 J	12 J	52500 J	40	990 J	NR
30-004-WR-2	574 J	58.4 J	7.2 JX	2.1 U	9.6 J	160 J	34600	0.196 J	1480 J	5 J	15200 J	22	2000 J	NR
BACKGROUND	63	154 J	2.2	21.9 J	21.4	396 J	46600	0.062 J	878	21 J	52 J	6 U	135 J	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 t/1000t	NEUTRAL POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
30-004-SL-1	1.62	50.6	150	99.0	<0.01	<0.01	3.33	0.00	150
30-004-WR-1	0.21	6.56	578	572	<0.01	0.17	0.39	5.31	573
30-004-WR-2	2.02	63.1	419	356	<0.01	1.55	1.53	48.4	370

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)
30-004-SW-1	3.69	19	2.57 U	9.7 U	6.83 U	1.55 U	60.1 J	0.097	4.08 U	12.7 U	1.14 J	30.7 U	7.57 U	40.2
30-004-SW-2	3.77	24.8	2.57 U	9.7 U	6.83 U	1.55 U	178 J	0.11	16.1	12.7 U	6.5 J	30.7 U	7.57 U	53.1

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
30-004-SW-1	79	< 5.0	5	< 0.05	NR
30-004-SW-2	92	< 5.0	< 5	0.08	NR

LEGEND

SE1 - Upgradient (approx. 100' from site) in Castle Creek.
SE2 - 50 feet downgradient of slag pile in Castle Creek.
SL1 - Small waste rock pile near middle
WR1 - Composite of subsamples WR2A, 2B, 2C, 2D, 2E, and 2F.
WR2 - Composite of subsamples WWR1A, 1B, 3, and 4.
BACKGROUND - From the Belle of the Castles (30-007-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: Belle of the Castle
Legal Description: T 8N R 8E
Mining District: Castle Mountain
Latitude: N 46° 28' 55"
Longitude: W 110° 41' 32"
Land Status: Private/Public
Quad: Castle Town
Inspectors: July 29, 1993
Organization: Pioneer Technical Services, Inc.

County: Meagher
Section(s): NE 1/4, SW 1/4, SW 1/4, Sec. 2
Mine Type: Hardrock/Pb, Cu, Fe, Ag
Primary Drainage: Alabaugh Creek
USGS Code: 10040201
Secondary Drainage: Hensley Creek
Date Investigated: July 29, 1993
P.A. # 30-007

- No mill tailings were observed at this site during the investigation.
- The volume of waste rock associated with this site was estimated to be 5,500 cubic yards. The following elements were elevated at least three times background:
  Copper: 1,810J to 2,210J mg/kg Lead: 402 mg/kg
- One discharging adit was observed at the site during the investigation. The MCL and the acute and chronic aquatic life criteria for copper were exceeded in the adit discharge. The chronic aquatic life criteria for iron, mercury, and lead were also exceeded in the adit discharge.
- Hensley Creek was flowing through the site. An observed release to Hensley Creek was documented for copper in water and sediment samples. Acute and chronic aquatic life criteria were exceeded for copper in the downstream sample; these exceedances were attributable to the site.
- One potentially hazardous adit opening was observed at the site.

Belle of the Castles PA# 30-007
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 07/29/93

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)
30-007-SE-1	20 J	192 J	3.6 JX	20.4 J	12 J	55.9 J	24800	0.026 UJ	533 J	20 J	107 J	15 U	344 J	NR
30-007-SE-2	69 J	860 J	4.1 UX	74.5 J	25.5 J	5510 J	90200	0.08 J	1220 J	20 J	105 J	48 U	265 J	NR
30-007-SE-3	17 J	173 J	2 JX	22.7 J	10.6 J	248 J	40000	0.029 J	989 J	15 J	124 J	11 U	231 J	NR
30-007-WR-1	61 J	238 J	2.6 JX	38.5 J	9.4 J	1810 J	45800	0.024 J	2100 J	16 J	402 J	7 U	145 J	NR
30-007-WR-2	25 J	127 J	2.4 JX	28.8 J	20.7 J	2210 J	48400	0.101 J	375 J	18 J	35 J	5 U	46 J	NR
BACKGROUND	63	154 J	2.2	21.9 J	21.4	396 J	46600	0.062 J	878	21 J	52 J	6 U	135 J	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 t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
30-007-WR-1	0.01	0.31	8.39	8.08	0.01	<0.01	0.01	0.00	8.39
30-007-WR-2	0.10	3.12	6.88	3.76	0.07	<0.01	0.03	0.00	6.88

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)
30-007-SW-1	2.5	33.9	2.57 U	9.7 U	6.83 U	1.55 U	46.2 J	0.12	5.6	12.7 U	0.72 U	30.7 U	18.9	11
30-007-SW-2	2.7	40.9	2.57 U	9.7 U	6.83 U	42.2	171 J	0.072	10.5	12.7 U	0.72 U	30.7 U	20.6	11.8
30-007-SW-3	3.63	33.4	2.57 U	9.7 U	6.83 U	3.6	55.4 J	0.063	5.6	12.7 U	0.72 U	30.7 U	18.8	14.2
30-007-SW-4	11.9	22.2	2.57 U	13	6.83 U	3320	18900 J	0.11	384	14.4	9.28 J	30.7 U	51.9	65.4

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
30-007-SW-1	49	< 5.0	6	< 0.05	NR
30-007-SW-2	48	< 5.0	7	< 0.05	NR
30-007-SW-3	51	< 5.0	6	< 0.05	NR
30-007-SW-4	150	< 5.0	50	< 0.05	NR

LEGEND

SE1 - Upgradient of discharging adit in Hensley Creek.
SE2 - Immediatly downgradient of adit discharge in Hensley Creek.
SE3 - Downgradient below confluence with unnamed tributary of Hensley Creek.
WR1 - Composite of subsamples WR1A and 1B.
WR2 - Composite of subsamples WR2A, 2B, 3A, 3B, and 3C.
BACKGROUND - Approx. 100' NW of upper, 50' above road. From Belle of the Castles (30-007-SS-1).

SW1 - Same as sample SE1.
SW2 - Same as sample SE2.
SW3 - Same as sample SE3.
SW4 - Adit discharge of waste rock dump 1.

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

Mine/Site Name: SW NE S10
Legal Description: T 11N R 7E
Mining District: Smith River
Latitude: N 46° 48' 01"
Longitude: W 110° 49' 42"
Land Status: Private/Public
Quad: Charcoal Gulch
Inspectors: Bullock, Clark/Pierson
Organization: Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.

County: Meagher
Section(s): SW 1/4, NE 1/4, Sec. 10
Mine Type: Hardrock/Unknown
Primary Drainage: Newland Creek
USGS Code: 10030103
Secondary Drainage: Newland Creek
Date Investigated: July 28, 1993
P.A. # 30-078

- 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 10,000 cubic yards. The following elements were elevated at least three times background:

  Arsenic: 57J mg/kg
  Cadmium: 4.8JX to 6.6JX mg/kg
  Copper: 70.5J to 104J mg/kg
  Mercury: 4.35J mg/kg
  Lead: 757J to 3,640J mg/kg
  Antimony: 116 mg/kg
  Zinc: 512J mg/kg

- No discharging adits, seeps, or springs were observed at the site during the investigation. One shaft containing water was identified on site and was sampled for field parameters; two very small precipitation ponds located on the waste rock dumps were also sampled for field parameters. A residential well located downgradient from the site was sampled for laboratory analyses. No MCLs were exceeded in the well sample.

- A potentially hazardous flooded shaft (reportedly up to 100 feet deep) was identified at the site. Potential hazards observed on-site included a 40 feet tall highwall and two collapsing wooden cabins.

SW NE Section 10 PA# 30-078
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
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)
30-078-WR-1	23 J	40.1 J	4.8 JX	2.1 U	1.5 U	104 J	3640	4.35 J	0.9 U	3 U	3640 J	116	324 J	NR
30-078-WR-2	57 J	177 J	6.6 JX	6.4 J	11.1 J	70.5 J	29600	4.35 J	195 J	23 J	757 J	12	512 J	NR
BACKGROUND	18 J	121 J	1.4 JX	8.1 J	9.2 J	19.3 J	24100	0.038 J	579 J	19 J	68 J	7 U	125 J	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 t/1000t	NEUTRAL POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
30-078-WR-1	0.86	26.9	-3.34	-30.2	0.43	0.03	0.40	0.94	-4.27
30-078-WR-2	0.45	14.1	-0.95	-15.0	0.42	<0.01	0.03	0.00	-0.95

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)
30-078-GW-1	1.69 U	81.8	2.57 U	9.7 U	6.83 U	5.77 J	45.9 J	0.096	4.08 U	12.7 U	1.55 U	30.7 U	15.9 JX	334
30-078-GW-2	3.21	90.7	2.57 U	9.7 U	6.83 U	3.73	34.7 J	0.13	4.08 U	12.7 U	1.01 J	30.7 U	7.9	370

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

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
30-078-GW-1	387	< 5.0	87	0.15	NR
30-078-GW-2	374	< 5.0	90	0.16	NR

LEGEND

WR1 - Sample of the subsample WR1.
WR2 - Composite of subsamples WR2A, 2B, and 2C
BACKGROUND - From the SW NE Sec. 10 (30-078-SS-1).
GW1 - Residential well in drainage below mine.
GW2 - QA/QC duplicate of 30-078-GW-1.