

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

Mine/Site Name: Block "P" Mine  
Legal Description: T 15N R 9E  
Mining District: Hughesville  
Latitude: N 47° 05' 01"  
Longitude: W 110° 37' 56"  
Land Status: Private/Public  
Quad: Barker  
Inspectors: Bullock, Babits, Flammang, Lasher,  
Clark / Pierson  
Organization: Pioneer Technical Services, Inc./  
Thomas, Dean and Hoskins, Inc.

County: Judith Basin  
Section(s): NE 1/4, NW 1/4 Sec. 7  
Mine Type: Hardrock/Pb, Ag, Zn  
Primary Drainage: Dry Fork Belt Creek  
USGS Code: 10030105  
Secondary Drainage: Galena Creek  
Date Investigated: June 7, 1993  
P.A. # 23-001

- There were no mill tailings associated with this site.
- The total volume of waste rock associated with this site was estimated at 125,000 cubic yards. The following elements were elevated at least three times background in previous investigations:

Arsenic: 299 to 1,030 mg/kg	Copper: 32 to 312 mg/kg
Mercury: 0.20 to 1.40 mg/kg	Lead: 4,050 to 24,600 mg/kg
- The waste rock was not contained, and was actively eroding into Galena Creek. The waste rock had a very low pH (2.52), was unvegetated, and had very steep sides along Galena Creek.
- One adit was on site; previous investigations estimated flow at 6 gpm, pH was 6.49, and SC was 375 us/cm. One seep was also associated with this site; flow estimated at 1.5 gpm, pH was 3.45, and SC was 1010 us/cm.
- Surface water samples were collected during the 1993 investigation. Observed releases to surface water were documented for arsenic in water, and arsenic, mercury, and lead in sediment samples. Drinking water standards (MCL's) were exceeded for cadmium, lead, and antimony; acute aquatic life criteria exceedances for cadmium, copper, and zinc were also documented. Upstream samples exceeded MCL's for antimony and lead, and acute aquatic life criteria for copper and zinc; the Hughesville mining district was upstream from the site and contributed to the observed upstream water quality degradation.
- Monitoring wells, sampled previously, indicated that MCL's were exceeded for cadmium, copper, nickel, and lead. These samples also documented an observed release to groundwater for copper and lead. The upgradient well exceeded MCL's for arsenic, cadmium, and nickel, indicating an upgradient source of contaminants.
- There was one open shaft, one open adit and at least five hazardous structures at the site.

Block P. Mine PA# 23-001  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BULLOCK  
 INVESTIGATION DATE: 06/07/93

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-090-SW-8	255	218	3 J	9 J	4.8	215 J	43700	0.161 J	2120 J	19 J	3390	5 U	749 J	NR
07-090-SW-9	43	222	2.6 J	9.4 J	3.6	243 J	21400	0.057 J	2600 J	24 J	432	5 U	632 J	NR
07-090-SW-10	28	88.8	0.6 U	4.4 J	1.8	140 J	13400	0.03 J	653 J	9 J	82	4 U	180 J	NR
07-090-SW-11	101	608	33.3 J	13.8 J	8.5	1450 J	50200	0.178 J	10100 J	78 J	6800	15	7000 J	NR

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

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
07-090-SW-8	29	23.6	30.2	5.99 U	5 U	239	11800	0.038 U	7560	41.5	51.1	38.9	7090	137
07-090-SW-9	0.98 U	25.1	2.55 U	5.99 U	5.6	150	1370	0.038 U	558	8.78 U	37.8	32.1	585	107
07-090-SW-10	2.09	20	2.55 U	5.99 U	5.13	6.77	403	0.038 U	77.4	8.78 U	2.52	33	54.3	85.5
07-090-SW-11	0.98 U	26.5	3.9	5.99 U	5 U	234	1950	0.038 U	840	8.78 U	64	32.9	861	115

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-090-SW-8	274	< 5.0	178	< 0.06	NR
07-090-SW-9	182	< 5.0	86	< 0.07	NR
07-090-SW-10	130	< 5.0	35	< 0.05	NR
07-090-SW-11	218	< 5.0	113	< 0.05	NR

LEGEND

- SE8 - Upstream of Belt Plant Mine, downstream of Block P Mine.
- SE9 - Galena Creek above Block P Mine, approx 20' above old weir
- SE10 - Green Creek before confluence with Galena Creek approx. 610'
- SE11 - Daisy Creek before confluence with Green Creek
- SW8 - Same as sample SE8
- SW9 - Same as sample SE9
- SE10 - Same as sample SE10
- SE11 - Same as sample SE11

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

Mine/Site Name: <u>Marcelline</u>	County: <u>Judith Basin</u>
Legal Description: <u>T 15N R 9E</u>	Section(s): <u>SE 1/4, NW 1/4, Sec. 7</u>
Mining District: <u>Hughesville</u>	Mine Type: <u>Hardrock/Ag, Pb, Zn</u>
Latitude: <u>N 47° 04' 47"</u>	Primary Drainage: <u>Dry Fork Belt Creek</u>
Longitude: <u>W 110° 38' 04"</u>	USGS Code: <u>10030105</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Galena Creek</u>
Quad: <u>Barker</u>	Date Investigated: <u>June 4, 1993</u>
Inspectors: <u>Bullock, Flammang, Clark</u>	P.A. # <u>23-022</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no tailings on site.
- There were approximately 700 cubic yards of waste rock on site. The following elements were elevated at least three times background:  
Copper: 196 mg/kg  
Mercury: 0.464 to 0.87 mg/kg  
Lead: 12,000 mg/kg
- There were no discharging adits on site. There was one filled shaft on site was discharging approximately 4 gpm with a pH 3.08 and a specific conductance of 2190 umhos/cm. Cadmium, nickel, and antimony exceeded MCL/MCLGs. Acute aquatic life criteria were exceeded for cadmium, copper, and zinc. The chronic aquatic life criteria were exceeded for cadmium, copper, iron mercury, lead, nickel, and zinc.
- An adit discharge from the Danny T Mine, up-slope from this site, flowed through Waste Rock #4 prior to discharging into Galena Creek. This discharge exceeded the MCL/MCLGs for arsenic, cadmium, copper, nickel, and antimony. This discharge also exceeded the acute and chronic aquatic life criteria for arsenic, cadmium, copper, and zinc, as well as the chronic aquatic life criteria for iron, lead, and nickel.
- There were no observed releases documented on Galena Creek from the water samples (the creek has upgradient sources). Galena creek exceeded cadmium and antimony MCL/MCLGs both upstream and downstream from this site. The acute aquatic life criteria for cadmium, copper and zinc as well as the chronic aquatic life criteria for cadmium, copper, iron, lead, and zinc were exceeded in both the upstream and downstream Galena Creek samples. Therefore, these exceedances are not directly attributed to this site.
- There were two open adits and one partially open shaft (six feet) on site that were classified as hazardous mine openings.

Marcelline PA# 23-022  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BULLOCK  
 INVESTIGATION DATE: 06/04/93

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)
23-022-WR-2	122	208 J	1.5 J	2.07 J	1.41 J	31.1	23600	0.464	62.2	3.93	938	3.98 UJ	125	NR
23-022-WR-4	334	245 J	14.4 J	1.55 J	2.18 J	196	29700	0.87	145	2.76	12000	10 J	2170	NR
07-090-SE-5	368	213	0.7 U	6.7 J	4.7	146 J	58400	0.214 J	975 J	9 J	1410	5 U	566 J	NR
23-046-SE-6	379	220	2.3 J	11.9 J	7.3	139 J	66400	0.275 J	1800 J	11 J	4040	5 U	562 J	NR
07-090-SE-7	154	59	0.8 J	3.6 J	3.7	106 J	25200	0.177 J	438 J	3 J	584	4 U	152 J	NR
BACKGROUND	122 J	441 J	5.0	9.96	26.5 J	22.7 J	33300	0.071	11900	75	375	4.24 J	1570	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENTIAL		SULFUR ACID BASE POTENTIAL		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR		SULFUR ACID BASE POTENTIAL	
	%	V1000X	%	V1000X	%	V1000X	%	V1000X	%	V1000X	%	V1000X	%	V1000X
23-022-WR-2	1.75	54.7	-0.8	-56	1.71	-56	< 0.01	0	0.04	0	0	0.068 J	183000	-0.83
23-022-WR-4	1.09	34.1	-4.4	-38	0.94	-38	0.03	0.12	0.12	0.94	0.038 U	8940	8090	-5.3

WATER MATRIX ANALYSES

Metals in Water Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	CALC (mg CaClO4/L)
23-022-GW-1	15.1	2.24 U	365	106	5 U	277	51000	0.066 J	183000	981	502	100	79500	781
23-022-GW-2	14.7	2.24 U	369	111	5 U	264	52600	0.051 J	185000	999	539	96	81000	791
23-022-SW-1	1600	2.24 U	512	98.2	14.8	2730	248000	0.1 J	183000	969	137	126	108000	471
23-022-SW-2	1840	5.43	513	86.7	13.3	2950	291000	0.079 J	184000	965	216	125	108000	487
07-090-SW-5	38.7	23	34.4	8.73	5 U	256	12600	0.038 U	8940	45.9	59.6	50	7980	135
23-046-SW-6	13.9	20.6	13.2	5.99 U	5 U	57.8	5150	0.087	869	10.9	14.5	18.3 U	2130	76.9
07-090-SW-7	33	23.7	34.7	6.77	5 U	265	12300	0.038 U	8090	39.4	68.6	50.8	7790	142

Wet Chemistry Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
23-022-GW-1	2220	< 5.0	1370	0.1	NR
23-022-GW-2	2190	< 5.0	1360	< 0.05	NR
23-022-SW-1	2700	< 5.0	1610	< 0.05	NR
23-022-SW-2	2800	< 5.0	1620	< 0.05	NR
07-090-SW-5	308	< 5.0	182	0.06	NR
23-046-SW-6	141	< 5.0	60	< 0.05	NR
07-090-SW-7	320	< 5.0	185	0.07	NR

WR2 - Composite of subsamples WR2A, 2B, 2C, 3A, 3B, and 3C  
 WR4 - Composite of subsamples WR4A and 4B  
 BACKGROUND - From the Ben Ten Mine (07-094-SB-1)  
 07-090-SE5 - Odessa Creek downstream from the site  
 23-046-SE6 - Unnamed Trib. Ben Wright/Edwards at confluence with Galena Cr.  
 07-090-SE7 - Odessa Creek upstream from the site

GW1 - From the Marcelline Shaft  
 GW2 - Duplicate of 23-022-GW-1  
 SW1 - Eastern Tributary drainage @ confluence with Galena Creek  
 SW2 - Eastern tributary drainage as it enters Marcelline property @ toe of the upgradient mine dump  
 07-090-SW5 - Same as 07-090-SE5  
 23-046-SW5 - Same as 23-046-SE6  
 07-090-SW7 - Same as 07-090-SE7

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

Mine/Site Name: <u>Belt Patent</u>	County: <u>Judith Basin</u>
Legal Description: <u>T 15N R 9E</u>	Section(s): <u>NW 1/4, NE 1/4, Sec. 7</u>
Mining District: <u>Hughesville</u>	Mine Type: <u>Hardrock/Au, Pb, Zn</u>
Latitude: <u>N 47° 04' 47"</u>	Primary Drainage: <u>Dry Fork Belt Creek</u>
Longitude: <u>W 110° 38' 00"</u>	USGS Code: <u>10030105</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Galena Creek</u>
Quad: <u>Barker</u>	Date Investigated: <u>June 4, 1993</u>
Inspectors: <u>Tuesday, Belanger, Lasher</u>	P.A. # <u>23-035</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings associated with this site was estimated to be 750 cubic yards. The tailings are actively eroding into Galena Creek. The following elements were elevated at least three times background in the samples collected:

Arsenic: 929 to 3520 mg/kg	Cadmium: 33.9J to 50.4J mg/kg
Copper: 250 to 384 mg/kg	Mercury: 1.4 to 2.1 mg/kg
Lead: 9570 to 17,100 mg/kg	Antimony: 17.4J to 33.5J mg/kg
Zinc: 5440 to 7830 mg/kg	
- The volume of waste rock associated with this site was estimated to be approximately 65 cubic yards. No samples of the dump were collected for laboratory analysis; however, XRF measurements were taken.
- There were no adit discharges, seeps or springs observed at the site at the time of the investigation.
- Galena Creek flowed adjacent to the site on the west side. No observed release to surface water were attributed to the site. Contaminant concentrations measured in the upstream surface water sample were nearly identical to the concentrations measured in the downstream samples. MCLs were exceeded for cadmium and antimony both upstream and downstream of the site. Additionally, the chronic aquatic life criteria for iron, mercury, cadmium, copper, lead and zinc, and the acute aquatic life criteria for cadmium, copper, and zinc were exceeded both upstream and downstream from the site. The upgradient surface water sample indicated the presence of an upgradient contaminant source.

Belt/Grace/Marcelline PA# 23-035  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 06/04/93

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)
07-090-SE-7	154	59	0.8 J	3.6 J	3.7	106 J	25200	0.177 J	438 J	3 J	584	4 U	152 J	NR
07-090-SE-8	255	218	3 J	9 J	4.8	215 J	43700	0.161 J	2120 J	19 J	3390	5 U	749 J	NR
23-035-TP-1A	929	1100 J	33.9 J	1.26 U	1.47 J	384	31200	2.1	77.6	1.85 U	17100	33.5 J	5440	1.128 U
23-035-TP-1B	3520	884 J	50.4 J	1.39 J	0.98 U	250	76000	1.3	31	1.72 U	9570	17.4 J	7830	1.107 U
BACKGROUND	122 J	441 J	5.0	9.66	26.5 J	22.7 J	33300	0.071	11900	75	375	4.24 J	1570	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENTIAL		SULFUR ACID BASE POTENTIAL		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC ACID BASE POTENTIAL	
	%	/10000	%	/10000	%	/10000	%	/10000	%	/10000	%	/10000
23-035-TP1A	1.91	59.7	-4.3	-64	1.01	0.22	0.68	6.87	0.038 U	8090	0.111	
23-035-TP1B	2.84	88.7	-10	-99	0.4	0.76	1.68	23.7	0.038 U	7560	-34	

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn (mg CaCO3/L)	HARDNESS CALC
07-090-SW-7	33	23.7	34.7	6.77	5 U	265	12300	0.038 U	8090	39.4	68.6	50.8	7790	142
07-090-SW-8	29	23.6	30.2	5.99 U	5 U	239	11800	0.038 U	7560	41.5	51.1	38.9	7090	137

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS		CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
	<	<				
07-090-SW-7	320	5.0	185	0.07	NR	NR
07-090-SW-8	274	5.0	178	0.06	NR	NR

LEGEND

SE1 - Downstream in Oulema Creek.  
 SE2 - Upstream in Oulema Creek.  
 TP1A - Composite of subsamples TP1A and 2A.  
 TP1B - Sample of the TP1B subsample  
 BACKGROUND - From the Bon Ton Mine (07-094-SB-1).

SW7 - Same as sample SE7  
 SW8 - Same as sample SE8

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

Mine/Site Name: <u>NE SE S7 (Lucky Strike)</u>	County: <u>Judith Basin</u>
Legal Description: <u>T 15N R 9E</u>	Section(s): <u>NE 1/4, NE 1/4, Sec. 7</u>
Mining District: <u>Hughesville</u>	Mine Type: <u>Hardrock/Ag, Pb, Zn</u>
Latitude: <u>N 47° 04' 28"</u>	Primary Drainage: <u>Dry Fork Belt Creek</u>
Longitude: <u>W 110° 38' 00"</u>	USGS Code: <u>10030105</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Galena Creek</u>
Quad: <u>Barker</u>	Date Investigated: <u>June 4, 1993</u>
Inspectors: <u>Tuesday, Belanger, Lasher</u>	P.A. # <u>23-042</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be approximately 5,000 cubic yards. The following elements were elevated at least three times background:
  - Arsenic: 272 to 368 mg/kg
  - Copper: 85.6 to 146J mg/kg
  - Mercury: 0.214 to 0.458 mg/kg
- A minor discharge from the on site adit was observed at the time of the investigation. No MCLs/MCLGs or Montana Numeric Water Quality Standards were exceeded in the adit discharge. The discharge combined with an unnamed tributary which flowed over and through WR-1 and then discharged to Galena Creek. A second surface water sample was collected from the discharge after flowing through the waste rock dump. There were no MCL exceedances; however, acute aquatic life criteria were exceeded for cadmium, copper, and zinc, and chronic aquatic life criteria were exceeded for copper, lead, and zinc.
- Surface water samples were collected upstream and downstream from the site in Galena Creek. MCLs were exceeded for cadmium and antimony in both the upstream and downstream samples. Chronic aquatic life criteria for iron, cadmium, copper, lead, and zinc were exceeded in the both the upstream and downstream samples. Acute aquatic life criteria were exceeded for cadmium, copper, lead and zinc in both the upstream and downstream samples; additionally, acute aquatic life criteria for cadmium was exceeded in the upstream sample.
- There was little stream bank vegetation observed, and predominant iron oxide staining was evident during the investigation.
- There was a shaft observed above the adit which had caved and poses a safety hazard.

NE SE Sec. 7 (Lucky Strike) PA# 23-042  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 06/04/93

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)
07-090-SE-4	272	147	3.6 J	3.2 J	5.1	107 J	45900	0.097 J	651 J	6 J	1590	4 U	811 J	NR
07-090-SE-5	368	213	0.7 U	6.7 J	4.7	146 J	56400	0.214 J	975 J	9 J	1410	5 U	566 J	NR
23-042-WR-1	283	195 J	1.1 J	1.15 U	0.96 U	85.6	32400	0.458	180	2.75	971	3.5 UJ	135	NR
BACKGROUND	122 J	441 J	5	9.66	26.5 J	22.7 J	33300	0.071	11900	75	375	4.24 J	1570	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	U/1000X	%	U/1000X	%	U/1000X	%	U/1000X	%	U/1000X	%	U/1000X
23-042-WR1	0.63	19.7	-3.5	-3.5	-23	-23	0.57	0.57	<0.01	0.06	0	-3.53

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)	(mg CaCO3/L)
23-042-SW-1	3.24	18	2.55 U	5.99 U	5 U	5.2	512	0.086 J	5220	37.8	2.53	18.3 U	403	164	
23-042-SW-2	2.95	46.8	2.55 U	6.4	5 U	19.2	635	0.054 J	2730	23.6	2.91	18.3 U	208	59.3	
07-090-SW-4	38.8	22.7	36.5	9.03	5 U	246	11600	0.038 U	8670	43.4	121	53.8	7750	131	
07-090-SW-5	38.7	23	34.4	8.73	5 U	256	12600	0.038 U	8940	45.9	59.6	50	7980	135	

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS		CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
	<	<				
23-042-SW-1	279	177	< 5.0	177	< 0.05	NR
23-042-SW-2	115	70	< 5.0	70	0.05	NR
07-090-SW-4	318	181	< 5.0	181	0.05	NR
07-090-SW-5	308	182	< 5.0	182	0.06	NR

LEGEND

- SE4 - Downgradient Chelsea Creek
- SE5 - Upgradient Galena Creek
- WR1 - Composite of subsamples WR1 and 2A through 2C
- BACKGROUND - From Silver Dicks Adz (07-135-SB-1)
- SW1 - Acid discharge
- SW2 - Discharge from bottom of dump
- SW4 - Same as sample SE4
- SW5 - Same as sample SE5

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

Mine/Site Name: <u>Wright Lode</u>	County: <u>Judith Basin</u>
Legal Description: T <u>15N</u> R <u>9E</u>	Section(s): <u>NW 1/4, NW 1/4, Sec. 7</u>
Mining District: <u>Hughesville</u>	Mine Type: <u>Hardrock/Pb, Ag, Zn</u>
Latitude: <u>N 47° 05' 03"</u>	Primary Drainage: <u>Dry Fork Belt Creek</u>
Longitude: <u>W 110° 38' 23"</u>	USGS Code: <u>10030105</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Galena Creek</u>
Quad: <u>Barker</u>	Date Investigated: <u>June 7, 1993</u>
Inspectors: <u>Bullock, Flammang, Clark</u>	P.A. # <u>23-045</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings observed at this site during the investigation.
- The volume of waste rock associated with this site was estimated to be approximately 19,900 cubic yards. The following elements were elevated at least three times background:

Arsenic: 280 to 316 mg/kg	Mercury: 0.427J to 0.649J mg/kg
Cadmium: 3.4J mg/kg	Lead: 8,430 to 14,200 mg/kg
Copper: 83.6J to 246J mg/kg	Zinc: 393J to 640J mg/kg
- There were no mine opening discharges, seeps or springs identified at this site.
- A storm runoff event was occurring during the investigation. An unnamed tributary to Galena Creek flowed directly through the site (over and through WR-3 and WR-4). The MCL/MCLG for antimony was exceeded in both upstream and downstream surface water samples collected from the tributary. Observed releases to surface water were documented for arsenic, cadmium, copper, mercury, lead, and zinc. MCL/MCLGs for arsenic and cadmium were exceeded in the downstream sample and were directly attributable to the site. Acute and chronic aquatic life criteria were exceeded for arsenic, cadmium, and lead in the downstream sample, and chronic aquatic life criteria were exceeded for iron, mercury, and copper in the downstream sample. The acute and chronic aquatic life criteria exceedances for arsenic, cadmium, and lead and the chronic aquatic life criteria exceedances for mercury and copper were directly attributable to the site.
- Several potentially hazardous pits and trenches were scattered throughout the area, ranging to 10 feet deep. Several of the waste rock dumps had very steep and unstable banks.

Wright Lode PA# 23-045  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BULLOCK  
 INVESTIGATION DATE: 06/07/93

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	As (mg/kg)	Ba (mg/kg)	Cd (mg/kg)	Co (mg/kg)	Cr (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Hg (mg/kg)	Mn (mg/kg)	Ni (mg/kg)	Pb (mg/kg)	Sb (mg/kg)	Zn (mg/kg)	CYANIDE (mg/kg)
23-045-WR-2	280	183	3.4 J	1.2 U	2.1	246 J	21400	0.427 J	16.7 J	2 U	8430	4 U	640 J	NR
23-045-WR-4	316	170	1.7 J	1.2 U	1.2	83.6 J	17900	0.649 J	22.6 J	3 J	14200	11	393 J	NR
BACKGROUND	29	270	0.6 U	3.1 J	7	11.6 J	11100	0.053 J	359 J	5 J	241	5 U	28 J	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	U/10000	%	U/10000	%	U/10000	%	U/10000	%	U/10000	%	U/10000
23-045-WR-2	1.42	44.4	-4.8	-49	1.24	-49	0.16	0.62	0.02	0.62	-5.44	-3.33
23-045-WR-4	1.6	50	-3.3	-53	1.55	-53	0.05	0	<0.01	0	0	-3.33

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 CaCO <sub>3</sub> /L)
23-045-SW-1	888	182	79	14.4	5.2	624	79300	1.02	4560	29.8	12700	64.7	14500	47.9
23-045-SW-2	0.98 U	44.1	2.55 U	5.99 U	5 U	1.35 U	26.7	0.038 U	2.6 U	8.78 U	0.48	27.9	75.2	8.6

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	NO <sub>3</sub> NO <sub>2</sub> -N	CYANIDE
23-045-SW-1	486	< 5.0	229	< 0.05	NR
23-045-SW-2	106	< 5.0	11	< 0.05	NR

LEGEND

WR2 - Composite of subsamples WR2A, 2B, and 3  
 WR4 - Composite of subsamples WR4A, 4B, 4D, and 4E  
 BACKGROUND - From the Wright Lode (23-045-SS-1)  
 SW1 - At base of waste rock dump 4  
 SW2 - Above waste rock dump 3

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

Mine/Site Name: <u>Edwards</u>	County: <u>Judith Basin</u>
Legal Description: <u>T 15N R 9E</u>	Section(s): <u>NW 1/4, NW 1/4, Sec. 7</u>
Mining District: <u>Hughesville</u>	Mine Type: <u>Hardrock/Ag, Pb, Zn</u>
Latitude: <u>N 47° 04' 55"</u>	Primary Drainage: <u>Galena Creek</u>
Longitude: <u>W 110° 38' 16"</u>	USGS Code: <u>10030105</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Unnamed tributary to Galena Creek</u>
Quad: <u>Barker</u>	Date Investigated: <u>June 7, 1993</u>
Inspectors: <u>Babits, Lasher/Pierson</u>	P.A. # <u>23-046</u>
Organization: <u>Pioneer Technical Services, Inc/ Thomas, Dean &amp; Hoskins, Inc.</u>	

- There are no tailings on site.
- There are approximately 50,750 cubic yards of uncovered waste rock on site. The following were elevated at least three times background:

Arsenic: 649 mg/kg	Cadmium: 3.3J mg/kg
Copper: 499J mg/kg	Mercury: 1.87J mg/kg
Lead: 24,900 mg/kg	Antimony: 19 mg/kg
Zinc: 827J mg/kg	
- There were no discharging adits on site.
- The creek ran through waste rock. There were no observed releases to downstream surface water (there was an upgradient contaminant source). Arsenic and antimony exceeded MCLs in downstream surface water which were directly attributable to the site. The acute and chronic aquatic life criteria was exceeded for arsenic, copper, lead, and zinc in downstream surface water. The chronic aquatic life criteria was exceeded for iron in downstream surface water.
- There was one open adit on site.

**Edwards PA# 23-046**  
**AMRB HAZARDOUS MATERIALS INVENTORY**  
**INVESTIGATOR: PIONEER - BABITS**  
**INVESTIGATION DATE: 06/07/93**

**SOLID MATRIX ANALYSES**

Metals in soils  
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	Cyanide (mg/Kg)
23-046-SE-2	526	182	3.5 J	1.4 U	1.4	68.4 J	19700	0.187 J	131 J	2 U	4740	4	645 J	NR
23-046-SE-6	379	220	2.3 J	11.9 J	7.3	139 J	66400	0.275 J	1800 J	11 J	4040	5 U	562 J	NR
23-046-WR-2	649	170	3.3 J	1.6 U	2.2	499 J	28400	1.87 J	10.9 J	4 J	24900	19	827 J	NR
BACKGROUND	29	270 J	0.6 U	3.1 J	7	11.6 J	11100	0.053 J	359 J	5 J	241	5 U	28 J	NR

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

**WATER MATRIX ANALYSES**

Metals in Water  
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
23-045-SW-1	888	182	79	14.4	5.2	624	79300	1.02	4560	29.8	12700	64.7	14500	47.9
23-046-SW-2	1020	164	106	15.5	8.13	812	105000	1.05	6640	49.1	12800	48	19400	73.3
23-046-SW-6	13.9	20.6	13.2	5.99 U	5 U	57.8	5150	0.087	869	10.9	14.5	18.3 U	2130	76.9

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

Wet Chemistry

Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2/N	CYANIDE
23-045-SW-1	496	< 5.0	229	< 0.05	NR
23-046-SW-2	730	< 5.0	381	< 0.05	NR
23-046-SW-6	141	< 5.0	60	< 0.05	NR

**LEGEND**

SE2 - Below waste rock dump 1 in tributary  
 SE6 - Unnamed tributary just prior to confluence with Galena Creek  
 WR2 - Composite of subsamples WR2A, 2B, 2C, 2D, and 2E  
 BACKGROUND - From the Wright Lode Mine (23-045-SB-1)

SW1 - At base of waste rock dump 4 from 23-045 site.  
 Upstream sample of the Edwards Mine  
 SW2 - Same as sample SE2  
 SW6 - Same as sample SE6

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

Mine/Site Name: <u>Harrison</u>	County: <u>Judith Basin</u>
Legal Description: T <u>15N</u> R <u>9E</u>	Section(s): <u>SE 1/4, NE 1/4, Sec. 6</u>
Mining District: <u>Hughesville</u>	Mine Type: <u>Hardrock/Ag, Pb, Zn</u>
Latitude: <u>N 47° 05' 24"</u>	Primary Drainage: <u>Galena Creek and Dry Fork Belt Creek</u>
Longitude: <u>W 110° 37' 22"</u>	USGS Code: <u>10030105</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Daisy Creek</u>
Quad: <u>Mixes Baldy</u>	Date Investigated: <u>June 3, 1993</u>
Inspectors: <u>Bullock, Flammang, Clark</u>	P.A. # <u>23-056</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings observed at this site during the investigation.
- The volume of waste rock associated with this site was estimated to be approximately 10,500 cubic yards. The following elements were elevated at least three times background:

Arsenic: 182J mg/kg	Iron: 90,300 mg/kg
Barium: 670J mg/kg	Mercury: 0.75 mg/kg
Cadmium: 9 mg/kg	Manganese: 12,800 mg/kg
Copper: 1,270J mg/kg	Nickel: 68.5 mg/kg
Lead: 10,600 mg/kg	Zinc: 390 mg/kg
- One discharging adit was observed at the site during the investigation. The adit was discharging at 0.25 cfs, with a pH of 6.10 and a specific conductance of 680 umhos/cm. The MCL for cadmium was exceeded in the adit discharge. Acute and chronic aquatic life criteria were exceeded for copper and zinc in the adit discharge, and chronic aquatic life criteria were exceeded for cadmium and lead.
- The surface water samples collected on Daisy Creek did not document an observed release to surface water attributable to this site. The MCL/MCLG for cadmium was exceeded in surface water samples collected both upstream and downstream of the site in Daisy Creek. Acute and chronic aquatic life criteria were exceeded for copper, lead, and zinc, and chronic aquatic life criteria were exceeded for iron and cadmium, in both upstream and downstream samples. The acute and chronic aquatic life criteria for cadmium, and the chronic aquatic life criteria for mercury were exceeded in the upstream sample on Daisy Creek. Observed releases to Daisy Creek were documented in the stream sediment samples collected for arsenic, copper, iron, mercury, and lead; although, the data indicated likely additional upstream contaminant sources.
- One potentially hazardous collapsing cabin was observed at the site, and several of the waste rock dumps were very steep and unstable.

Harrison/Moulton PA# 23-056  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BULLOCK  
 INVESTIGATION DATE: 06/03/93

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
23-056-SE-1	306 J	1720 J	12.2 J	4.03	5.2 J	2590 J	151000 J	1.1	6610	47.2	13400	14 J	3590	NR
23-056-SE-2	58.6 J	825 J	4.3	5.91	7.46 J	374 J	44000	0.106	4820	35.1	4360	4.24 UJ	2120	NR
23-056-WR-1	182 J	670 J	9.0	3.2	6.24 J	1270 J	90300	0.75	12800	68.5	10600	6.43 J	2330	NR
BACKGROUND	5.1 J	159 J	0.6 U	3.83	8.09 J	9.81 J	13300	0.028	548	7.93	61.4	3.98 UJ	130	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		ACID BASE POTENT		ORGANIC SULFUR		PYRITIC SULFUR		SULFUR ACID BASE POTENT	
	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000
23-056-WR-1	4.26	133	66.4	66.4	-67	-67	1.65	1.65	33.7	33.7	32.6	32.6

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn (mg CaCO3/L)	HARDNESS CALC.
23-056-GW-1	0.98 U	19.8	11.4	5.99 U	5 U	516 J	704	0.038 U	2970	23.9	26.8	18.3 U	2470 JX	355
23-056-SW-1	1.37	32.5	6.37	5.99 U	5 U	325 J	4760	0.038 U	1990	21.9	312	18.3 U	2060 JX	214
23-056-SW-2	0.98 U	19.9	8.3	5.99 U	5 U	133 J	4530	0.043	1600	19.9	369	18.3 U	2340 JX	127

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS		CHLORIDE		SULFATE		NO3/NO2-N		CYANIDE	
	<	<	<	<	<	<	<	<	<	<
23-056-GW-1	495	5.0	217	0.11	NR	NR	NR	NR	NR	NR
23-056-SW-1	307	5.0	178	0.11	NR	NR	NR	NR	NR	NR
23-056-SW-2	200	5.0	129	0.16	NR	NR	NR	NR	NR	NR

LEGEND

- SE1 - Downstream of dump and confluence of edit discharge
- SE2 - Upstream of possible influence from dumps
- WR1 - Composite of subsamples WR1A, 1B, 1C, 2A, 2B, and 2C
- BACKGROUND - From the Tiger Mine (23-059-SS-1)
- GW1 - Adit discharge
- SW1 - Same as sample SE1
- SW2 - Same as sample SE2

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

Mine/Site Name: <u>Moulton</u>	County: <u>Judith Basin</u>
Legal Description: T <u>15N</u> R <u>9E</u>	Section(s): <u>SW 1/4, NW 1/4, Sec. 5</u>
Mining District: <u>Hughesville</u>	Mine Type: <u>Hardrock/Ag, Pb, Zn, Au</u>
Latitude: <u>N 47° 05' 27"</u>	Primary Drainage: <u>Dry Fork Belt Creek</u>
Longitude: <u>W 110° 36' 58"</u>	USGS Code: <u>10030105</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Daisy Creek</u>
Quad: <u>Mixes Baldy</u>	Date Investigated: <u>June 3, 1993</u>
Inspectors: <u>Tuesday, Belanger, Lasher</u>	P.A. # <u>23-058</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be approximately 975 cubic yards. The following elements were elevated at least three times background:

Arsenic: 57.2J mg/kg	Mercury: 0.261 mg/kg
Barium: 794J mg/kg	Manganese: 8,360 mg/kg
Cadmium: 5 mg/kg	Nickel: 52.7 mg/kg
Copper: 618J mg/kg	Lead: 22,400 mg/kg
Iron: 65,300 mg/kg	Zinc: 1,540 mg/kg
- One adit discharge was associated with this site, which flowed across the dump into intermittent Daisy Creek. The adit discharge exceeded the MCL for cadmium. Acute aquatic life criteria were exceeded for cadmium, copper, lead, and zinc. Chronic aquatic life criteria were exceeded for arsenic, cadmium, copper, iron, mercury, copper, lead, and zinc. The adit discharge pH measurement was 4.11 and specific conductance was 1,220 umhos/cm.
- No observed releases to surface water were documented for this site; although, waste rock was observed in the stream channel and vegetation was lacking along the stream bank for more than 50 feet downstream from the adit confluence. The downstream sample in Daisy Creek exceeded the MCL for cadmium; however, the upstream sample in Daisy Creek also exceeded the MCL for cadmium, indicating the presence of an upgradient contaminant source (Tiger Mine). Several acute and chronic aquatic life criteria were exceeded in both the upstream and downstream samples in Daisy Creek.

Moulton PA# 23-058  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 06/03/93

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
23-058-SE-1	89 J	617 J	5.8	5.29	18 J	259 J	108000	0.146	2370	21.5	9670	8.19 J	2440	NR
23-058-SE-2	47.1 J	871 J	2.6	1.45 U	4.69 J	241 J	52300	0.302	674	8.7	6620	4.68 J	1200	NR
23-058-WR-1	57.2 J	794 J	4.7	5.63	8.79 J	618 J	65300	0.261	8360	52.7	22400	8.85 J	1540	NR
BACKGROUND	5.1 J	159 J	0.6 U	3.83	8.09 J	9.81 J	13300	0.028	548	7.93	61.4	3.98 UJ	130	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		SULFUR ORGANIC		PYRITIC SULFUR		PYRITIC ACID BASE POTENT		Fe	Hg	Mn	Ni	Pb	Sb	Zn	CYANIDE	
	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x									
23-058-WR1	2.89	90.3	117	26.8	0.37	1.48	1.04	46.2	70.8												

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)
23-058-SW-1	0.98 U	33.8	20	5.99 U	5 U	186 J	9450	0.038 U	2530	36.3	667	21.9	4950 JX	160
23-058-SW-2	2.42	30.3	22.3	5.99 U	5 U	377	15100	0.079 J	5360	48.1	958	18.3 U	5990	218
23-058-SW-3	3.56	10.8	34.7	11.5	5 U	917	41900	0.068 J	12400	92.8	1660	18.3 U	7980	327

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
23-058-SW-1	265	< 5.0	173	0.28	NR
23-058-SW-2	365	< 5.0	244	0.27	NR
23-058-SW-3	714	< 5.0	470	0.3	NR

LEGEND

SE1 - Upgradient Dairy Creek  
 SE2 - Downgradient Dairy Creek  
 WR1 - Composite of subsamples WR1A and 1B  
 BACKGROUND - From the Tiger Mines (23-059-SS-1)  
 SW1 - Same as sample SE1  
 SW2 - Same as sample SE2  
 SW3 - Acid discharge

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

Mine/Site Name: <u>Tiger</u>	County: <u>Judith Basin</u>
Legal Description: <u>T 15N R 9E</u>	Section(s): <u>SW 1/4, NW 1/4, Sec. 5</u>
Mining District: <u>Hughesville</u>	Mine Type: <u>Hardrock/Pb, Ag, Zn</u>
Latitude: <u>N 47° 05' 29"</u>	Primary Drainage: <u>Dry Fork Belt Creek</u>
Longitude: <u>W 110° 36' 50"</u>	USGS Code: <u>10030105</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Daisy Creek</u>
Quad: <u>Mixes Baldy</u>	Date Investigated: <u>June 3, 1993</u>
Inspectors: <u>Tuesday, Belanger, Lasher</u>	P.A. # <u>23-059</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be approximately 8,200 cubic yards. The following elements were elevated at least three times background:

Arsenic: 41.6J to 61.7J mg/kg	Mercury: 0.177 mg/kg
Cadmium: 5 to 13 mg/kg	Manganese: 5,060 mg/kg
Copper: 221J to 347J mg/kg	Nickel: 32.7 mg/kg
Iron: 183,000 mg/kg	Lead: 15,900 to 16,600 mg/kg
Antimony: 15.3J mg/kg	Zinc: 1,770 to 5,460 mg/kg
- Two adit discharges were associated with this site. Adit #1 had major flow (0.025 cfs); adit #4 had a slight discharge (not sampled) which seeped into the waste rock dump. The discharge from adit #1 exceeded the MCL for cadmium, as well as acute aquatic life criteria for cadmium, copper, lead, and zinc. The discharge from adit #1 also exceeded chronic aquatic life criteria for iron, cadmium, copper, lead, and zinc. The adit #1 discharge pH measurement was 5.9.
- The adit #1 discharge makes up the majority of the flow in intermittent Daisy Creek. Observed releases were documented for arsenic, cadmium, copper, iron, manganese, nickel, lead, and zinc in sediments and water. The MCL for cadmium was exceeded in the downstream Daisy Creek sample, which was directly attributed to the site. Additionally, acute aquatic life criteria were exceeded for copper, lead, and zinc, and chronic aquatic life criteria were exceeded for iron, copper, and zinc, which can all be directly attributed to the site.
- The on-site shaft was open and was potentially hazardous.

**Tiger PA# 23-059**  
**AMRB HAZARDOUS MATERIALS INVENTORY**  
**INVESTIGATOR: PIONEER - TUESDAY**  
**INVESTIGATION DATE: 06/03/93**

**SOLID MATRIX ANALYSES**

Metals in soils  
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
23-059-SE-1	7.17 J	142 J	0.6 U	2.75	4.63 J	21.9 J	11500	0.09	542	7.09	165	4.48 UJ	179	NR
23-059-SE-3	58.3 J	381 J	14.5	4.57	10.8 J	325 J	71200	0.09	3850	29.8	8590	8.52 J	5140	NR
23-059-WR-1	61.7 J	86.5 J	4.6	2.23	5.36 J	347 J	183000	0.051	556	6.46	16600	4.5 J	1770	NR
23-059-WR-2	41.6 J	403 J	12.5	3.84	5.57 J	221 J	32000	0.177	5060	32.7	15900	15.3 J	5460	NR
BACKGROUND	5.1 J	159 J	0.6 U	3.83	8.09 J	9.81 J	13300	0.028	548	7.93	61.4	3.98 UJ	130	NR

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

**Acid/Base Accounting**

FIELD ID	TOTAL SULFUR		NEUTRAL POTENTIAL		SULFUR ACID BASE POTENTIAL		ORGANIC SULFUR		PYRITIC SULFUR		SULFUR ACID BASE POTENTIAL	
	mg/Kg	%	mg/Kg	%	mg/Kg	%	mg/Kg	%	mg/Kg	%	mg/Kg	%
23-059-WR1	27.6	862	-0.1	-862	4.32	2.87	20.4	89.7	89.7	-89.7	5	15.5
23-059-WR2	2.01	62.8	20.5	-42	1.28	0.16	0.57	5	5	15.5		

**WATER MATRIX ANALYSES**

Metals in Water  
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
23-059-SW-1	0.98 U	47.7	2.55 U	5.99 U	5 U	2.7 J	33.3	0.038 U	4.4	8.78 U	4.33	21.8	7.8 JX	57.3
23-059-SW-2	2.33	31.4	14.1	5.99 U	7.53 J	353 J	14300	0.038 U	2160	25.6	657	18.3 U	3610 JX	144
23-059-SW-3	1.64	38	14	5.99 U	5 U	137 J	5630	0.038 U	1920	23.6	343	18.3 U	3460 JX	136

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
23-059-SW-1	80	< 5.0	11	0.09	NR
23-059-SW-2	245	< 5.0	155	0.66	NR
23-059-SW-3	232	< 5.0	126	0.27	NR

**LEGEND**

- SE1 - Upstream.
- SE3 - Downstream.
- WR1 - Composite of subsamples WR1A, 1B, and 1C.
- WR2 - Composite of subsamples WR2A, 2B, and 2C.
- BACKGROUND - South of site across Dairy Creek near clear cut  
 From Tiger Mine (23-059-88-1).
- SW1 - Same as sample SE1.
- SW2 - Audit discharge.
- SW3 - Same as sample SE3.

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

Mine/Site Name: <u>Danny T</u>	County: <u>Judith Basin</u>
Legal Description: <u>T 15N R 9E</u>	Section(s): <u>SE 1/4, NW 1/4, Section 7</u>
Mining District: <u>Hughesville</u>	Mine Type: <u>Hardrock/Ag. Pb, Zn</u>
Latitude: <u>N 47° 04' 39.7"</u>	Primary Drainage: <u>Dry Fork Belt Creek</u>
Longitude: <u>W 110° 38' 0.7"</u>	USGS Code: <u>10030105</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Galena Creek</u>
Quad: <u>Barker</u>	Date Investigated: <u>July 11, 1994</u>
Inspectors: <u>Tuesday, Bisch, West</u>	P.A. # <u>23-500</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- No mill tailings were observed at the site during the investigation.
- The volume of waste rock observed at the site was estimated to be 10,200 cubic yards. The following elements were elevated to at least three times the background concentrations:

Silver: 12.5JX mg/kg	Mercury: 0.15J mg/kg
Arsenic: 200J mg/kg	Lead: 3,140 mg/kg
Copper: 56.3 mg/kg	Zinc: 213 mg/kg
- The waste rock dump was actively eroding down the drainage toward Galena Creek.
- One discharging adit that eventually flowed into Galena Creek was observed at the site. The adit was sampled at its mouth (AD-1) and again after flowing over the waste rock dump (SW-1). At the mouth, the pH was 3.01, and the MCLs for arsenic, cadmium, and antimony and the EPA action level for lead were exceeded. In addition, the acute and chronic aquatic life criteria for cadmium, copper, and zinc and the chronic aquatic life criteria for iron and lead were exceeded. After flowing over waste rock, the pH of the discharge was 3.0, and the MCLs for arsenic, cadmium, and antimony were exceeded. The acute and chronic aquatic life criteria for cadmium, copper, and zinc and the chronic aquatic life criteria for arsenic, iron, and lead were also exceeded.
- Galena Creek was not sampled due to known poor water quality and abundant available data for the stream and the effect of the Marcelline Mine below the Danny T at Galena Creek.
- No hazardous mine openings (the adit was gated) or structures were observed at the site; however, abundant debris was scattered throughout the site.

Danny T. Mine PA# 23-500  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 07/11/94

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)
23-500-WR1	12.5 JX	200 J	125	0.5 U	1.8 U	1.6	56.3	28300	0.15 J	105	1.6 U	3140	5.9 UJ	213	NR
BACKGROUND	0.5 UX	4.5 UJ	150	0.4 U	6.1	8.9	11.2	15100	0.04 J	770	11.1	31.5	5.0 UJ	59.7	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	SULFUR ACID BASE POTENT %	NEUTRAL POTENT %	SULFUR ACID BASE POTENT %	SULFATE SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR ACID BASE POTENT %	PYRITIC SULFUR ACID BASE POTENT %	SULFUR ACID BASE POTENT %
23-500-WR1	1.67	52.2	-7.53	-60	1.29	0.38	<0.01	0.00	0.00	-7.53

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 (mg CaCO <sub>3</sub> L)
23-500-AD1	0.15	133	4.9	257 J	55.0	15.7	1010	142000	0.08 U	119000	40.8	144	96.1	58400
23-500-SW1	0.29	260	4.1	281 J	56.1	9.0	1130	142000	0.08 U	124000	40.7	113	107	62300

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO <sub>3</sub> NO <sub>2</sub> -N	CYANIDE
23-500-AD1	1790	<5	951	<0.05	NR
23-500-SW1	1850	<5	1050	<0.05	NR

LEGEND

WEL - Composite of subsamples WELA through 1C  
 BACKGROUND - From the Danny T. Mine (23-500-SW1)

AD1 - Acid discharge associated with WEL  
 SW1 - Acid discharge after flowing over WEL (see above Materials dump)

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

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

Mine/Site Name: <u>Spring Hill Tailings</u>	County: <u>Lewis and Clark</u>
Legal Description: T <u>9N</u> R <u>4W</u>	Section(s): <u>SE 1/4, SE 1/4, Sec. 4</u>
Mining District: <u>Helena</u>	Mine Type: <u>Hardrock/Au</u>
Latitude: <u>N 46° 33' 29"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 06' 22"</u>	USGS Code: <u>10031101</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Grizzly Gulch</u>
Quad: <u>Helena</u>	Date Investigated: <u>August 30, 1993</u>
Inspectors: <u>Tuesday, Flammang, Pierson</u>	P.A. # <u>25-067</u>
Organization: <u>Pioneer Technical Services, Inc./ Thomas, Dean and Hoskins, Inc.</u>	

- The volume of tailings associated with this site was estimated to be approximately 378,500 cubic yards. The following elements were elevated at least three times background:  
Arsenic: 485 to 4,800 mg/kg      Zinc: 302 mg/kg  
Iron: 182,000 mg/kg              Lead: 121J to 1,180J mg/kg
- Cyanide was present in TP-3 at 758 mg/kg.
- No flowing streams were observed on-site; consequently, no surface water or sediment samples were collected. However, a sample was collected (GW-1) from a spring located near the site which was used as a drinking water source. No MCL/MCLG exceedances were observed in the spring.
- The dam faces on TP-1 and TP-2 were steep and unstable, TP-3 was very steep and unstable; both were actively eroding. An adit located 300 feet west of TP-1 was currently open and potentially hazardous.

Spring Hill Tailings PA# 25-067  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 08/30/83

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-067-TP-1A	711	54.2 JX	3.3 J	6.88	13	36.3	38400	0.109 JX	328	10.4 J	97.4 J	6.7 UJ	196	3.1
25-067-TP-1B	485	58 JX	2.5 J	4.88	15.8	24.5	36700	0.064 JX	337	7.11 J	80.2 J	6.81 UJ	182	0.428
25-067-TP-2A	707	55.9 JX	2.2 J	5.81	13.9	59.6	46400	0.118 JX	323	11.9 J	124 J	6.48 UJ	164	7.15
25-067-TP-2B	887	89.7 JX	2.8 J	5.79	15.4	31.7	41100	0.192 JX	410	7.74 J	121 J	6.71 UJ	195	2.63
25-067-TP-3	4800	44 JX	2.1 J	19.1	12.8	334	182000	0.3 JX	152	10 J	1180 J	7.58 UJ	302	758
BACKGROUND	27.1	165 JX	1.3 J	13.6	17.9	29.7	23300	0.071 JX	672	17.9 J	36.3 J	6.98 UJ	76.4	NR

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENT.	
	%	\$/1000R	%	\$/1000R	%	\$/1000R	%	\$/1000R	%	\$/1000R	%	\$/1000R
25-067-TP-1A	1.39	43.4	126	82.8	0.88	0.28	0.23	8.75	117			
25-067-TP-1B	1.45	45.3	173	127	0.65	0.24	0.56	7.5	165			
25-067-TP-2A	2.02	63.1	111	48	1.24	0.35	0.43	10.9	100			
25-067-TP-2B	1.48	46.2	184	138	0.38	0.49	0.61	15.3	168			
25-067-TP-3DUP	18	561	-36	-597	<0.01	9.71	13.9	303	-339			
25-067-TP-3	17.9	560	-35	-595	<0.01	9.78	13.9	306	-341			

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

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25-067-GW-1	14.1 J	2.5	2.57 U	9.7 U	10.6 J	5.1 J	17.2 JX	0.12 U	4.08 U	12.7 U	2.89 J	30.7 U	7.57 U	205
25-067-GW-2	23 J	2.01 U	2.57 U	9.7 U	8.83 J	17.6 J	15.1 JX	0.15	4.08 U	12.7 U	4.9 J	30.7 U	10.4	212
25-067-GW-3	4.42 J	2.01 U	2.57 U	9.7 U	6.83 U	6.8 J	11.8 UX	0.12 U	4.08 U	12.7 U	1.7 J	30.7 U	7.57 U	0.3

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-067-GW-1	265	< 5	52	0.31	< 0.005
25-067-GW-2	NR	NR	NR	NR	< 0.005
25-067-GW-3	NR	NR	NR	NR	< 0.005

LEGEND

- TP1A - Composite of subsamples TP1A-1, 1A-B, 1B-A, 1C-A, and 1C-B.
- TP1B - Composite of subsamples TP1B-A-C, 1A-D, 1A-E, 1B-C, 1B-B, and 1C-C.
- TP2A - Composite of subsamples TP2A-A, 2A-B, 2A-C, 2B-A, and 2B-B.
- TP3 - Composite of subsamples TP3A, 3B, and 3C.
- BACKGROUND - From the Franklin Mine (25-339-88-1).
- TP3DUP - Duplicate of sample 25-067-TP-3.
- GW1 - Spring which supplies residents.
- GW2 - Duplicate of sample GW1.
- GW3 - QA Blank.

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

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

Mine/Site Name: <u>Joslyn Street Tailings</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 10N R 4W</u>	Section(s): <u>NE 1/4, NE 1/4, SE 1/4, Section 23</u>
Mining District: <u>Helena</u>	Mine Type: <u>N/A</u>
Latitude: <u>N 46° 35' 49.1"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 03' 56"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Tenmile Creek</u>
Quad: <u>Helena</u>	Date Investigated: <u>July 27, 1994</u>
Inspectors: <u>Tuesday, Clark, West</u>	P.A. # <u>25-501</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings observed at the site was estimated to be 4,900 cubic yards. The following elements were elevated to at least three times the background concentrations:  
Arsenic: 8,520 to 29,300 mg/kg      Lead: 557 to 9,230 mg/kg  
Cadmium: 6.4J to 128J mg/kg      Antimony: 54.0 to 238 mg/kg  
Copper: 98.9 to 464 mg/kg      Zinc: 1,010 to 16,400 mg/kg  
Mercury: 0.22 to 0.32 mg/kg
- The tailings were located directly in a residential area and had exceptionally high concentrations of arsenic and lead. On-site residents were concerned about groundwater contamination and child exposure to these contaminants.
- No waste rock dumps, discharging adits, filled shafts, seeps, or springs were observed at the site. A small volume of ponded water was observed on one of the tailings areas. The ponded water was sampled for field parameters only (pH = 2.02, SC = 12,400 uS/cm).
- Groundwater samples were collected upgradient and downgradient from the site. No observed releases to groundwater were documented; and no MCLs were exceeded in either of the groundwater samples.

Joslyn Street Tailings PA# 25-501  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 07/27/94

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	Ag (mg/Kg)	Al (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)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-501-TP1A	36.7 JX	13900	20.2	19.1 J	1.8	3.2 J	98.9	25300	0.22	47.5	3730	56.9	1900	1.522
25-501-TP1B	1.4 JX	8520	129	41.3 J	9.3	19.2 J	407	47200	0.08	1050	557	16.3	6130	0.657
25-501-TP2	59.0 JX	11800	137	6.4 J	1.7 U	27.3 J	432	58000	0.32	108	8650	54.0	1010	2.18
25-501-TP3	72.5 JX	29300	5.5	128 J	9.7	19.5 J	464	59700	0.16	571	9230	238	16400	<0.253
BACKGROUND	NR	27.1	165 JX	1.3 J	13.6	17.9	29.7	23300	0.071 JX	672	36.3 J	6.98 UJ	76.4	NR

U - Not Detected; J - Estimated Quantity; X - Outside the Accuracy of Precision; NR - Not Reported

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	SULFUR ACID BASE POTENTIAL		SULFATE ACID BASE POTENTIAL		PYRITIC ACID BASE POTENTIAL		ORGANIC ACID BASE POTENTIAL	
		1/1000	1/1000	1/1000	1/1000	1/1000	1/1000	1/1000	1/1000
25-501-TP1A	1.68	52.5	-8.08	-61	0.57	0.33	10.3	-18.4	
25-501-TP1B	3.99	125	-7.88	-133	3.74	-0.01	0.00	-7.88	
25-501-TP2	1.83	57.2	0.50	-57	1.80	-0.01	0.00	0.50	
25-501-TP3	5.55	173	-29.7	-203	<0.01	2.15	67.2	-96.8	

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	Ag	Al	Ba	Cd	Co	Cl	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25-501-GW1	0.12 U	9.3	52.3	0.13	8.4 U	6.8 U	5.9 U	14.0	0.18	2.3 U	14.4 U	4.2 J	3.4	15.6 U	343
25-501-GW2	0.12 U	4.5	49.6	0.09	8.4 U	6.8 U	5.9 U	12.3 U	0.11 U	2.3 U	14.4 U	1.1 U	2.4 U	20.3	196

U - Not Detected; J - Estimated Quantity; X - Outside the Accuracy of Precision; NR - Not Reported

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-501-GW1	447	29	81	4.92	<0.005
25-501-GW2	257	<5	36	0.85	<0.005

LEGEND

- TP1A - Composite of subsamples TP1A.1, 1B.1, 1C.1, 1D.1, 1E.1, and 1A.1
- TP1B - Composite of subsamples TP1B.1, 1B.2, 1C.2, 1D.2, and 1B.2
- TP2 - Composite of subsamples TP2A.1 and 2A.2
- TP3 - Composite of subsamples TP3A.1 and 3A.1
- BACKGROUND - From the Franklin Miller 03-139-001 (1991 Data)
- GW1 - GW used for tank supplying water for pulp process operations, probably air or no gradient
- GW2 - Background well investigated (part) of tailings (check out location)

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

Mine/Site Name: <u>Seven-Up Pete</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 14N R 7W</u>	Section(s): <u>NE 1/4, Sec. 29</u>
Mining District: <u>Lincoln</u>	Mine Type: <u>Hardrock/Unknown</u>
Latitude: <u>N 46° 57' 30"</u>	Primary Drainage: <u>Blackfoot River</u>
Longitude: <u>W 112° 30' 00"</u>	USGS Code: <u>17010203</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Seven-Up Pete Creek</u>
Quad: <u>Swede Gulch</u>	Date Investigated: <u>September 7, 1993</u>
Inspectors: <u>M. Babits, S. Babits/Pierson</u>	P.A. # <u>25-020</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- An extremely small volume of tailings was identified at this site; no samples were collected.
- The volume of waste rock associated with this site was estimated to be approximately 20,800 cubic yards. The following elements were elevated at least three times background:  
Arsenic: 71.1J to 309J mg/kg      Mercury: 0.49J to 0.826J mg/kg
- Three discharging adits were identified at the site, one of which directly entered surface water. No MCLs were exceeded in a sample of this discharge; however, the chronic aquatic life criteria for cadmium and mercury were exceeded. The discharge pH measurement was 8.36.
- An unnamed tributary to Seven Up Creek flowed through the center of the site (adjacent to several waste rock piles). Surface water and sediment samples were collected upstream and downstream from the site. No MCLs were exceeded; however, chronic aquatic life criteria were exceeded for mercury both upstream and downstream from the site.
- An observed release to the unnamed tributary (sediment) was documented for arsenic.
- One potentially hazardous open adit and numerous hazardous structures were identified at the site.

Seven Up Pete PA# 25-020  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BABBITTS  
 INVESTIGATION DATE: 09/07/93

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-020-SE-1	26.3 J	290 J	1.2 U	6.5	11.9	23.7 J	14000	0.238 J	1310 J	34.2 J	22.2 J	14.3 U	132 J	NR
25-020-SE-2	185 J	220 J	0.6	15.7	14.9	52.3 J	25000	0.085 J	462 J	61.8 J	10.1 J	5.79 U	61.6 J	NR
25-020-WR-1	309 J	180 J	0.6 U	3.73	6.27	36.4 J	25000	0.49 J	93.3 J	10.9 J	27.3 J	6.99 U	51 J	NR
25-020-WR-2	71.1 J	228 J	1.0 U	6.73	4.47	21.6 J	16400	0.829 J	292 J	18.2 J	35.1 J	5.9 U	55.7 J	NR
BACKGROUND	19.5 J	168 J	1.0 U	9.67 J	36.5 J	228 JX	12800	0.033 UX	468	30.4 J	34.4	6.95 UJ	66.9 J	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENTIAL		SULFUR ACID BASE POTENTIAL		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENTIAL	
	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000
25-020-WR-1	0.43	13.4	1.3	-12	0.23	0.05	0.15	1.56	0.62	-0.26		
25-020-WR-2	0.17	5.31	0.54	-4.8	0.09	0.02	0.06	0.62	-0.09			

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)
25-020-SW-1	3.97	202	2.57 U	9.7 U	6.83 U	11 J	1300	0.19 JX	130	17.1 JX	3.4	30.7 U	16.6 J	100
25-020-SW-2	5.41	128	2.93 J	9.7 U	6.83 U	11.7 J	395	0.12 UJX	43.1	25.3 JX	3.8	30.7 U	21.4 J	130
25-020-SW-5	9.14	29.1	4.6 J	9.7 U	6.83 U	6.17 J	256	0.15 JX	87.5	24.7 JX	2.17	30.7 U	36.4 J	148

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
25-020-SW-1	191	< 5.0	12	0.22	NR
25-020-SW-2	256	< 5.0	42	< 0.05	NR
25-020-SW-5	276	< 5.0	47	0.37	NR

LEGEND

- SE1 - 200 feet upgradient in unnamed tributary.
- SE2 - Downgradient at toe of waste rock dump 1 in unnamed tributary.
- WR1 - Composite of WR1A and 1B.
- WR2 - Sample of the WR2A sub-sample.
- BACKGROUND - From the Sewerage Tailings (25-208-35-1)
- SW1 - Same as sample SE1.
- SW2 - Same as sample SE2.
- SW5 - Aftir discharge at waste rock dump 2.

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

Mine/Site Name: <u>Blackfoot Tailings</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 14N R 9W</u>	Section(s): <u>E 1/2, NE 1/4, NE1/4, Sec. 29</u>
Mining District: <u>Lincoln</u>	Mine Type: <u>Tailings Dump (Millsite)</u>
Latitude: <u>N 46° 56' 33"</u>	Primary Drainage: <u>Blackfoot River</u>
Longitude: <u>W 112° 45' 10"</u>	USGS Code: <u>17010203</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Lincoln Gulch</u>
Quad: <u>Moose Creek</u>	Date Investigated: <u>September 7 and 8, 1993</u>
Inspectors: <u>M. Babits, S. Babits/Pierson</u>	P.A. # <u>25-322</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- The volume of tailings associated with this site was estimated to be approximately 5,000 cubic yards. The following elements were elevated at least three times background:

Arsenic: 33.7J to 402J mg/kg	Cadmium: 0.9 to 114 mg/kg
Cobalt: 23.6 to 54.3 mg/kg	Chromium: 15.2 to 45.9 mg/kg
Copper: 57.9 to 13,400 mg/kg	Iron: 27,900 to 205,000 mg/kg
Mercury: 0.104J to 2.52J mg/kg	Nickel: 18.4J to 57.9J mg/kg
Lead: 48J to 8,700J mg/kg	Zinc: 157J to 10,500J mg/kg
- No waste rock was observed at this site during the investigation.
- One upgradient (GW-5) and two downgradient (GW-1 and 6) groundwater samples were collected during the investigation. Observed releases to groundwater were documented for arsenic, cadmium, chromium, copper, mercury, nickel, lead, and zinc. MCLs were exceeded for copper, chromium, mercury, and nickel in the downgradient sample, which were attributable to the site.
- No surface water was observed on site. The nearest surface water, the Blackfoot River, was located approximately 180 feet east of the site. No surface water samples were collected due to likely excessive dilution.
- No hazardous mine openings were identified at the site.

Blackfoot Tailings PAs 25-322  
AMRB HAZARDOUS MATERIALS INVENTORY  
INVESTIGATOR: PIONEER - BARBTS  
INVESTIGATION DATE: 06/07/83

SOLID MATRIX ANALYSES

Results per dry weight basis (mg/kg)

FIELD ID	As	Bi	Ca	Co	Cr	Cu	Fe	Mn	Ni	Pb	Se	Zn	CYANIDE
25-322-TP1A-A	87.2 J	74.6 J	7.8	6.43	45100	2.14 J	15.2 J	8.35 J	4380 J	6.02 U	1330 J	0.299 U	
25-322-TP1A-B	196 J	60.5 J	0.9	4.3	27500.0	0.2 J	27.6 J	8.0 J	1170 J	8.0 U	200.0 J	0.328 U	
25-322-TP1A-C	84.0 J	93.9 J	3.0	4.17	34700	0.144 J	58.3 J	10.3 J	253 J	5.53 U	487 J	0.311 U	
25-322-TP1A-D	112 J	203 J	114.0	4.06	27900	0.484 J	56.4 J	19.8 J	213 J	9.44 U	1340 J	0.398 U	
25-322-TP1A-E	14.5 J	94.5 J	2.0	9.12	13000	0.0761 J	59.7 J	27.2 J	33 J	5.96 U	1930 J	0.327 U	
25-322-TP1B-A	70 J	274 J	4.3	1.75	17600	0.837 J	16.2 J	2.23 U	8700 J	5.4 U	842 J	0.269 U	
25-322-TP1B-B	79.2 J	52.9 J	1.3	2.51	28200	0.06082 J	33.7 J	5.84 J	120 J	5.65 U	157 J	0.305 U	
25-322-TP1B-C	256 J	163 J	9.9	0.9	52100	0.763 J	18.6 J	18.6 J	113 J	7.16 U	0.317 U	0.287 U	
25-322-TP1B-D	30.5 J	225 J	70.1	12.3	21400	0.06584 J	275 J	14.00	44 J	10.8 U	7380 J	0.43 U	
25-322-TP1B-E	16.9 J	93.7 J	17.8	4.93	14600	0.0761 J	130 J	14.5 J	74 J	7.78 U	1240 J	0.309 U	
25-322-TP1C-A	402 J	51.2 J	21.5	54.3	205000	0.03165 UJ	60.1 J	57.9 J	3830 J	5.66 U	2970 J	0.307 U	
25-322-TP1C-B	338 J	45.7 J	4.5	4.92	53100	0.369 J	108 J	9.6 J	43.9 J	7.58 U	1860 J	0.323 U	
25-322-TP1C-C	106 J	144 J	40.4	13.6	82400	0.373 J	282 J	22 J	206 J	6.33 U	1560 J	0.411 U	
25-322-TP1C-D	49.4 J	258 J	61.9	13.2	21300	0.104 J	308 J	40.7 J	173 J	8.29 U	10500 J	0.371 U	
25-322-TP1C-E	14.2 J	120 J	3.4	6.35	15400	0.04215 J	149 J	18.4 J	34.8 J	7.77 U	2380 J	0.34 U	
25-322-TP1D-A	97 J	292 J	2.5	6.29	84000	0.59 J	431 J	12.6 J	4950 J	7.39 U	663 J	0.387 U	
25-322-TP1D-B	17.6 J	183 J	7.1	23.6	9990	0.146 J	547 J	37.9	273 J	8.96 UJ	5590 J	0.39 U	
25-322-TP1D-C	5.97 J	96.7 J	0.6 U	6.28	8610	0.101 J	731 J	8.46	193 J	6.63 UJ	79.2 J	0.319 U	
25-322-TP1E-A	56.5 J	115 J	3.0	2.8	13000	2.52 J	2.97 U	2.97 U	2770 J	7.19 UJ	522 J	0.31 U	
25-322-TP1E-B	123 J	74.3	2.7	5.04	37000	0.06243 J	117 J	6.97	143 J	7.02 UJ	318 J	0.363 U	
25-322-TP1E-C	31.1 J	191 J	11.1	10.7	15600	0.141 J	101 J	18.5	32.4	9.26 UJ	507 J	0.385 U	
25-322-TP1E-D	141 J	170 J	63.9	6.28	11700	0.06547 J	85.8	14.5	105	6.39 UJ	691 J	0.639	
25-322-TP1E-A	114 J	130 J	7.4	4.2	38300	0.178 J	64.7	2.9	4310	5.38 UJ	1080 J	0.652	
BACKGROUND	10.9 J	263	0.5 U	6.96	9170	0.03401 U	1100	6.71	15	6.32 UJ	44.1 J	NR	

AcidBase Accounting

FIELD ID	TOTAL SULFUR %	SULFUR ACID BASE POTENTIAL (meq)	NEUTRAL POTENTIAL (meq)	SULFUR ACID BASE POTENTIAL (meq)	ORGANIC SULFUR %	HYDROTIC ACID BASE POTENTIAL (meq)	SULFUR ACID BASE POTENTIAL (meq)	% Clay	% Sand	% SS	% Coarse Material	% Coarse Material (meq)	Carbon Exchange Capacity milliequivalents/100g
25-322-TP1A-A	6.12	191	-7.95	-199	1.1	113	-121	12	57	31.0	0	4.01	
25-322-TP1A-B	1.09	34.1	-10.8	-44.9	0.14	1.56	-12.4	13	61.0	26.0	0	1.84	
25-322-TP1A-C	1.15	35.9	-11.8	-47.7	0.14	1.87	-13.6	15	46	39.0	0	3.72	
25-322-TP1A-D	1.89	59	-37.2	-98.3	0.11	2.19	-39.4	6	50	44.0	0	<0.001	
25-322-TP1A-E	1.55	48.4	-15.3	-63.8	0.14	9.37	-24.7	8	96	36.0	0	5.04	
25-322-TP1C-A	26.9	839	-9.72	-849	11	473	-462	7	52	40	0	1.99	
25-322-TP1C-B	2.15	67.2	-19.7	-69.9	0.11	1.25	-21	5	31	64	0	3.44	
25-322-TP1C-C	1.94	60.6	-29	-88.8	0.26	8.12	-37.2	39	25	36	0	1.1	
25-322-TP1C-D	2.08	65	-39.3	-104	0.23	4.06	-43.4	6	54	40	0	<0.001	
25-322-TP1C-E	1.03	32.2	-15.8	-48	0.09	1.66	-17.4	5	60	30	0	6.55	
25-322-TP1A-C-DUP	1.13	35.3	-11.4	-46.7	0.13	1.87	-13.3	5	65	30	0	6.55	

WATER MATRIX ANALYSES

Results in ug/L

FIELD ID	As	Bi	Ca	Co	Cr	Cu	Fe	Mn	Ni	Pb	Se	Zn	CALC. (mg CaCO3/L)
25-322-GW-1	633	6360	440 J	153	7570 J	5.44 JX	15300	357 JX	26900	30.7 U	33100 J	897	
25-322-GW-1(D)	5.72	7.23	28.1 J	41.2	6.83 U	2.8 J	6840	48.7	6.76	30.7 U	6000	416	
25-322-GW-5	0.96 U	591	10.6	92.1	79.2	0.12 U	217000	65.3	27.2	30.7 UJX	1940	290	
25-322-GW-5(D)	17.4 JX	163	2.57 U	9.7 U	6.83 U	2.13 J	22.3	12.7 U	0.78	30.7 U	19	152	
25-322-GW-6	4.4	92	2.57 U	9.7 U	6.83 U	13.1	2300	12.7 U	3.1	30.7 UJX	43.2	174	
25-322-GW-6(D)	4.4	92	2.57 U	9.7 U	6.83 U	3.07 J	11.8 U	0.12 U	0.89	30.7 U	28.8	200	

Wet Chemistry Results in mg/L

FIELD ID	TOTAL DISSOLVED SOLIDS	CHELATOR	SULFATE	MONOMER-S	CYANIDE
25-322-GW-1	766	18.0	410	0.17	0.008
25-322-GW-5	210	<	5.0	0.2	<
25-322-GW-6	236	<	5.0	0.13	<

LEGEND

TP1A-A - S, end of pond P-7; groundwater within graded dry stack  
 TP1A-B - S-2; brine within graded partially saturated stack  
 TP1A-C - P-7; ash beneath dry and brine being utilized stack  
 TP1A-D - P-7; ash beneath dry and brine being utilized stack  
 TP1A-E - P-7; ash beneath dry and brine being utilized stack  
 TP1B-A - S, end of pond P-7; groundwater within graded dry stack  
 TP1B-B - S-2; brine within graded partially saturated stack  
 TP1B-C - P-7; ash beneath dry and brine being utilized stack  
 TP1B-D - P-7; ash beneath dry and brine being utilized stack  
 TP1B-E - P-7; ash beneath dry and brine being utilized stack  
 TP1C-A - S, end of pond P-7; groundwater within graded dry stack  
 TP1C-B - S-2; brine within graded partially saturated stack  
 TP1C-C - P-7; ash beneath dry and brine being utilized stack  
 TP1C-D - P-7; ash beneath dry and brine being utilized stack  
 TP1C-E - P-7; ash beneath dry and brine being utilized stack  
 TP1D-A - S, end of pond P-7; groundwater within graded dry stack  
 TP1D-B - S-2; brine within graded partially saturated stack  
 TP1D-C - P-7; ash beneath dry and brine being utilized stack  
 TP1D-D - P-7; ash beneath dry and brine being utilized stack  
 TP1D-E - P-7; ash beneath dry and brine being utilized stack  
 TP1E-A - S, end of pond P-7; groundwater within graded dry stack  
 TP1E-B - S-2; brine within graded partially saturated stack  
 TP1E-C - P-7; ash beneath dry and brine being utilized stack  
 TP1E-D - P-7; ash beneath dry and brine being utilized stack  
 TP1E-E - P-7; ash beneath dry and brine being utilized stack  
 BACKGROUND - above table from individual tallies (S-2, S-3, S-4)

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

Mine/Site Name: <u>Drumlummon Mine, Mill, and Tailings</u>	County: <u>Lewis and Clark</u>
Legal Description:	Mine/Mill Section(s): <u>SE 1/4, Section 36 and NW 1/4, N 1/2, Section 1</u>
Mine/Mill T <u>12N R 6W</u> and T <u>11N R 6W</u>	Tailings Section(s): <u>SE 1/4, S 1/2, Section 34 and NE 1/4, NE 1/4, Section 31</u>
Tailings T <u>12N R 5W</u> and T <u>11N R 5W</u>	Mine Type: <u>Hardrock/Cu, Au, Ag, Pb, Zn, Mo</u>
Mining District: <u>Marysville</u>	Primary Drainage: <u>Silver Creek</u>
Latitude: <u>N 46° 44' 36"; N 46° 44' 58"</u>	USGS Code: <u>10030101</u>
Longitude: <u>W 112° 17' 45"; W 112° 15' 28"</u>	Secondary Drainage: <u>Silver Creek</u>
Land Status: <u>Private/Public</u>	Date Investigated: <u>June 23-24, 1994</u>
Quad: <u>Greenhorn Mountain and Canyon Creek</u>	P.A. # <u>25-024</u>
Inspectors: <u>Tuesday, Belanger, Clark, West</u>	
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings observed at the site was estimated to be 178,630 cubic yards. The following elements were elevated to at least three times the background concentrations:

Silver: 27.4 mg/kg	Arsenic: 33.7 to 35.1 mg/kg
Copper: 116 to 149 mg/kg	Mercury: 1.85JX to 1.94JX mg/kg
Lead: 112 to 117 mg/kg	Zinc: 205J to 257J mg/kg
- The volume of waste rock observed at the site was estimated to be 9,020 cubic yards. The following elements were elevated to at least three times the background concentrations:

Silver: 5 mg/kg	Arsenic: 46.2 mg/kg
Cadmium: 2.8J mg/kg	Copper: 55.3 mg/kg
Mercury: 0.41JX to 1.43JX mg/kg	Lead: 119 mg/kg
Zinc: 311J mg/kg	
- One discharging adit was observed at the site. The discharge flowed a short distance to a small pond. No MCLs were exceeded in the adit discharge; however, the chronic aquatic life criteria for iron was exceeded.
- Silver Creek flows adjacent to the site on the northwest side. An observed release to Silver Creek (sediment) was documented for mercury; however, no MCLs or aquatic life criteria were exceeded in the stream.
- Potential safety hazards observed at the site included four open shafts, two highwalls associated with two large open pits, and a collapsing loadout structure.

Drumlumon Mine/Mill PA# 25-024  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 08/23 & 24/94

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)
25-024-SE1	1.9	30.5	148 J	0.8	6.1	13.9 J	38.8	16100	0.18	1050 J	7.7	203	6.2 U	196	NR
25-024-SE2	4.5	19.8	150 J	0.7	6.0	8.7 J	30.6	13100	6.20	490 J	6.4	62.0	7.4 U	73.7	NR
25-024-SE3	18.8	13.5	71.8 J	1.5	3.9	9.0 J	60.7	9120	3.78	742 J	4.9	77.7	5.4 U	123	NR
25-024-TP1	27.4	33.7	99.2	0.7	4.3	12.5	149	11100	1.94 JX	744	8.0	112	16.1 J	257 J	0.401
25-024-TP2	27.4	35.1	61.3	0.7	3.0	10.2	116	9230	1.85 JX	626	5.9	117	12.9 J	205 J	0.219
25-024-WR1	0.4 U	21.7	46.2	0.4 UJ	5.8	16.9	30.1	23300	0.41 JX	491	9.8	12.1	4.3 UJ	59.6 J	NR
25-024-WR2	5	46.2	57.0	2.8 J	4.2	9.3	55.3	13200	1.43 JX	727	6.1	119	5.7 UJ	311 J	NR
BACKGROUND	0.7 U	8.2	312 J	0.6 U	5.6	15.0 J	12.1	14500	0.03 U	454 J	9.8	8.56 U	6.9 U	58.1	NR

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %		SULFUR ACID BASE POTENTIAL v/1000r		PYRITIC SULFUR %		PYRITIC ACID BASE POTENTIAL v/1000r		ORGANIC SULFUR %		PYRITIC ACID BASE POTENTIAL v/1000r		SULFUR ACID BASE POTENTIAL v/1000r	
	SULFUR %	ACID BASE v/1000r	NEUTRAL POTENTIAL v/1000r	ACID BASE POTENTIAL v/1000r	PYRITIC SULFUR %	SULFUR %	PYRITIC ACID BASE POTENTIAL v/1000r	SULFUR ACID BASE POTENTIAL v/1000r	ORGANIC SULFUR %	SULFUR %	PYRITIC ACID BASE POTENTIAL v/1000r	SULFUR ACID BASE POTENTIAL v/1000r	SULFUR ACID BASE POTENTIAL v/1000r	
25-024-TP1	0.01	0.31	72.6	72.3	<0.01	0.01	0.00	72.6	0.01	0.01	0.00	0.00	72.6	
25-024-TP2	0.01	0.31	82.0	81.7	<0.01	0.01	0.00	82.0	0.01	0.01	0.00	0.00	82.0	
25-024-WR1	0.04	1.25	153	152	0.07	0.05	2.19	151	0.05	0.05	2.19	151		
25-024-WR2	0.15	4.69	91.3	86.6	0.07	0.05	0.94	90.4	0.05	0.05	0.94	90.4		

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

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25-024-AD1	0.14	34.9	128	2.6 U	8.7 U	4.7 UX	4.6 U	2140	0.11 U	1640	8.0 U	2.1	29.4 U	6.07	319
25-024-SW1	0.12 U	2.2	94.0	2.6 U	8.7 U	4.9 JX	4.6 U	44.1	0.11 U	8.0	9.8	2.9	29.4 U	6.67	144
25-024-SW2	0.12 U	2.1	81.9	2.6 U	8.7 U	4.7 UX	4.6 U	91.4	0.11 U	21.8	8.0 U	2.3	29.4 U	4.5 U	139
25-024-SW3	0.12 U	3.6	74.4	2.6 U	8.7 U	5.9 JX	7.3	262	0.11 U	41.3	8.0 U	6.8	29.4 U	13.7	188

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-024-AD1	309	<5	24	<0.05	NR
25-024-SW1	137	<5	8.0	0.15	NR
25-024-SW2	148	<5.0	12	0.16	NR
25-024-SW3	177	<5	18	0.14	NR

LEGEND

- SE1 - Ottawa Gold (Silver Creek) systems of mine and mill.
- SE2 - Silver Creek before intake, mill, and TP1.
- SE3 - Silver Creek before intake from TP1, two miles before mill.
- TP1 - Composite of subsamples TP2A-1 through 2A1.
- TP2 - Composite of subsamples TP2B and 2C.
- WR1 - Composite of subsamples WR1 and 2.
- WR2 - Composite of subsamples WR3 and 4A through 4C.
- BACKGROUND - From the Drumlumon Mine/Mill (25-024-SE1).
- AD1 - Air discharge on WR1.
- SW1 - Same as sample 25-024-SE1.
- SW2 - Same as sample 25-024-SE2.
- SW3 - Same as sample 25-024-SE3.

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

Mine/Site Name: <u>Bald Mountain</u>	County: <u>Lewis and Clark</u>
Legal Description: T <u>12N</u> R <u>6W</u>	Section(s): <u>NE 1/4, SW 1/4, Sec. 35</u>
Mining District: <u>Marysville</u>	Mine Type: <u>Hardrock/Au, Ag</u>
Latitude: <u>N 46° 44' 55"</u>	Primary Drainage: <u>Silver Creek</u>
Longitude: <u>W 112° 19' 15"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Jennies Fork</u>
Quad: <u>Greenhorn Mountain</u>	Date Investigated: <u>August 19, 1993</u>
Inspectors: <u>Babits, Flammang, Lasher</u>	P.A. # <u>25-061</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings associated with this site was estimated to be approximately 64,950 cubic yards. The following elements were elevated at least three times background:

Mercury: 0.964 mg/kg	Manganese: 2,200 mg/kg
Lead: 84.5 mg/kg	Antimony: 9.83 mg/kg
Zinc: 256 mg/kg	
- The volume of waste rock associated with this site was estimated to be approximately 23,100 cubic yards; however, metals concentrations were not significantly elevated (<3X) above background concentrations.
- No discharging adits, filled shafts, seeps, or springs were identified at the site.
- No surface water was observed on or near the site during the investigation. The nearest surface water, Jennies Fork, was located approximately 0.5 miles from the site; consequently, no surface water or sediment samples were collected.
- Four potentially hazardous partially collapsed shafts were identified at the site.

Bald Mountain PA# 25-061  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BABITS  
 INVESTIGATION DATE: 08/19/93

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)	Pb (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-061-TP-1	14.3	50.4	0.9 UJ	3.62 J	5.94 J	79.1	9450	0.523	2200	4.55 J	142	6.37 U	256	NR
25-061-TP-2	16.5	117	1.0 UJ	3.68 J	3.73 J	56.4	9870	0.964	1810	4.72 J	84.5	9.83	158	NR
25-061-WR-1	48.8	64.7	0.7 UJ	6.81 J	5.51 J	36.6	14200	0.324	994	7.37 J	41.7	4.7 U	125	NR
BACKGROUND	25 J	650	0.4 UJ	5.6	10.7	32.6	14700	0.187	662	14 J	28	3 UJ	75	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		SULFATE		PYRITIC		ORGANIC		PYRITIC		SULFUR ACID BASE POTENT	
	%	μ/1000x	%	μ/1000x	%	μ/1000x	%	μ/1000x	%	μ/1000x	%	μ/1000x	%	μ/1000x	%	μ/1000x
25-061-TP-1	0.07	2.19	38.7	38.7	0.03	36.6	0.03	0.31	0.01	0.03	0.03	0.01	0.31	0.31	38.4	
25-061-TP-2	0.01	0.31	60.1	60.1	<0.01	59.8	<0.01	0.31	0.01	0.01	0.01	0.01	0.31	0.31	59.8	
25-061-TP-2DUP	<0.01	0	60.3	60.3	<0.01	60.3	<0.01	0.31	0.01	0.01	0.01	0.01	0.31	0.31	60	
25-061-WR-1	0.02	0.62	57.9	57.2	<0.01	57.2	<0.01	0	<0.01	0.03	0.03	0	0	0	57.9	

LEGEND

TP1 - Composite of subsamples TP1A, 1B, 2A-A, 2A-B, 2A-C, and 2B-A.  
 TP2 - Composite of subsamples TP2B-B and 2B-C.  
 WR1 - Composite of subsamples WR1A, 1B, 2A, and 2B.  
 BACKGROUND - From the Big Ox Mine (25-116-SS-1)

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

Mine/Site Name: <u>Big Ox Millsite</u>	County: <u>Lewis and Clark</u>
Legal Description: T <u>12N</u> R <u>6W</u>	Section(s): <u>NW 1/4, SW 1/4, Sec. 24</u>
Mining District: <u>Marysville</u>	Mine Type: <u>Millsite/Au, Ag, Cu, Pb</u>
Latitude: <u>N 46° 47' 33"</u>	Primary Drainage: <u>Little Prickly Pear Creek</u>
Longitude: <u>W 112° 18' 12"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Deer Creek</u>
Quad: <u>Canyon Creek</u>	Date Investigated: <u>June 9, 1993</u>
Inspectors: <u>Bullock, Lasher/Pierson</u>	P.A. # <u>25-115</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- There were approximately 1,500 cubic yards of tailings on site. The following elements were elevated at least three times background:

Arsenic: 285J mg/kg	Cadmium: 221 mg/kg
Copper: 1,130 mg/kg	Mercury: 6.07 mg/kg
Manganese: 2,500 mg/kg	Lead: 10,900 mg/kg
Antimony: 107J mg/kg	Zinc: 24,000 mg/kg
- There was no waste rock on site. The mine was the Big Ox Mine P.A. #25-116.
- There were no discharging mine openings on site.
- Deer Creek was flowing through the tailings at the time of this investigation. There was an observed release of lead in downstream surface water. No MCL/MCLGs were exceeded. The chronic aquatic life criteria for lead was exceeded in downstream surface water. Stream sediment samples also documented releases of arsenic, cadmium, copper, mercury, manganese, lead, antimony, and zinc.
- There were no hazardous openings on site. There were numerous collapsing buildings including the mill that were classified as hazardous, but may be of some historical significance.

**Big Ox Millsite PA# 25-115  
AMFEB HAZARDOUS MATERIALS INVENTORY  
INVESTIGATOR: PIONEER - BULLOCK  
INVESTIGATION DATE: 06/09/83**

**SOLID MATRIX ANALYSES**

Metals in soils  
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-115-SE-1	138 J	42.1	84	4.8	4.8	426	21400	8.84	3280	20 J	6790	54 J	8810	NR
25-115-SE-2	22 J	86.7	0.5 UJ	3.2	10.1	10.8	10300	0.096	209	9 J	18	4 UJ	62	NR
25-115-TP-1	285 J	25.8	221	5.6	3.3	1130	27500	6.07	2500	19 J	10900	107 J	24000	NR
BACKGROUND	25 J	650	0.4 UJ	5.6	10.7	32.6	14700	0.187	662	14 J	28	3 UJ	75	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	ACID BASE POTENTIAL	NEUTRAL POTENTIAL	SULFUR ACID BASE POTENTIAL	SULFUR %	CR	Cu	Fe	ORGANIC SULFUR %	PYRITIC SULFUR %	Fe	Hg	Mn	Ni	Pb	Sb	Zn	CYANIDE	
25-115-TP-1	4.26	133	146	13.9	1.62	0.29	32.6	14700	2.35	1.62	2.35	50.6	95.5						

**WATER MATRIX ANALYSES**

Metals in Water  
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
25-115-SW-1	10.5	52.7	2.55 U	5.99 U	7.7	4.27	22.8	0.19	3.6	12.1	28.9	18.3 U	32.1	212
25-115-SW-2	10.1	73.1	2.87	5.99 U	5 U	2.43	986	0.18	21.8	8.78 U	3.82	18.3 U	18.8	242

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

Wet Chemistry  
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-115-SW-1	223	< 5.0	25	< 0.05	NR
25-115-SW-2	283	< 5.0	24	0.19	NR

**LEGEND**

- SE1 - Deer Creek below tailings @ the dam breach.
- SE2 - Upgradient sample @ the old well casing.
- TP1 - Composite of subsamples TP1-1A, 1-1B, and 1-2A.
- BACKGROUND - From the Big Ox Mine (25-116-SS-1).
- SW1 - Same as sample SE1
- SW2 - Same as sample SE2

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

Mine/Site Name: <u>Big Ox Mine</u>	County: <u>Lewis and Clark</u>
Legal Description: T <u>12N</u> R <u>6W</u>	Section(s): <u>NE 1/4, SE 1/4, Sec. 13</u>
Mining District: <u>Marysville</u>	Mine Type: <u>Hardrock/Au, Ag, Pb, Cu</u>
Latitude: <u>N 46° 47' 28"</u>	Primary Drainage: <u>Little Prickly Pear Creek</u>
Longitude: <u>W 112° 17' 45"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Deer Creek</u>
Quad: <u>Canyon Creek</u>	Date Investigated: <u>June 9, 1993</u>
Inspectors: <u>Babits, Flammang</u>	P.A. # <u>25-116</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- Ore derived from this mine was milled at the Big Ox Mill (P.A.# 25-115), which was investigated in conjunction with this site.
- The volume of waste rock associated with this site was estimated to be approximately 3,000 cubic yards. The following elements were elevated at least three times background:

Arsenic: 77J mg/kg	Cadmium: 9.6 to 11.3 mg/kg
Copper: 111 to 260 mg/kg	Mercury: 1.08 mg/kg
Lead: 596 to 1,680 mg/kg	Antimony: 9J to 16J mg/kg
Zinc: 1,200 to 1,550 mg/kg	
- No discharging adits, filled shafts, seeps, or springs were identified at the site during the investigation.
- No surface water was observed on or near the site. The nearest surface water was located approximately 1,500 feet away; consequently, no surface water or sediment samples were collected.
- One potentially hazardous partially open adit was identified at the site.

Big Ox Mine PA# 25-116  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BABITS  
 INVESTIGATION DATE: 06/09/93

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-116-WR-1	53 J	167	9.6	16.6	11	260	25200	0.247	700	10 J	596	16 J	1200	NR
25-116-WR-2	25 J	232	0.4 UJ	6.8	12.3	19.7	14400	0.147	591	13 J	24	3 UJ	49	NR
25-116-WR-4	77 J	138	11.3	5.4	11.9	111	18400	1.08	827	12 J	1680	9 J	1550	NR
BACKGROUND	25 J	650	0.4 UJ	5.6	10.7	32.6	14700	0.187	662	14 J	28	3 UJ	75	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 POTENT. /10000	SULFUR NEUTRAL. POTENT. /10000	SULFUR ACID BASE POTENT. /10000	SULFUR PYRITIC %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE POTENT. /10000	SULFUR ACID BASE POTENT. /10000
25-116-WR-1	0.69	27.8	203	175	0.96	0.03	30	173

LEGEND

WR1 - Composite of subsamples WR1A and 1B  
 WR2 - Sample of the WR2 subsample.  
 WR3 - Composite of subsamples WR3A, 4B, 7A, and 7B  
 BACKGROUND - SE of mill building on top of hill before mine.  
 From the Big Ox Mine (25-116-SS-1)

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

Mine/Site Name: <u>Belmont</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 12N R 6W</u>	Section(s): <u>SE 1/4, SW 1/4, Sec. 35</u>
Mining District: <u>Marysville</u>	Mine Type: <u>Hardrock/Au</u>
Latitude: <u>N 46° 44' 45"</u>	Primary Drainage: <u>Silver Creek</u>
Longitude: <u>W 112° 19' 05"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Rawhide Gulch</u>
Quad: <u>Greenhorn Mountain</u>	Date Investigated: <u>August 19, 1993</u>
Inspectors: <u>Babits, Flammang, Lasher</u>	P.A. # <u>25-167</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings associated with this site was estimated to be approximately 57,030 cubic yards. The following elements were elevated at least three times background:  
Mercury: 0.464 to 1.93 mg/kg
- The volume of waste rock associated with this site was estimated to be approximately 18,800 cubic yards. The following elements were elevated at least three times background:  
Mercury: 0.723J 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 surface water was located over 1,000 feet from the site; consequently, no surface water or sediment samples were collected.
- Potential safety hazards associated with this site included three open stopes, a collapsing mill building, and several oversteepened and unstable slopes.

Belmont PA# 25-167  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BABITS  
 INVESTIGATION DATE: 08/19/93

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)
25-167-TP-1	28	30.2	1.0 UJ	1.61 J	2.87 J	56.8	6510	1.93	1190	2.38 U	48.4	10	230	NR
25-167-TP-2	32.2	36.2	0.7 UJ	1.85 J	2.61 J	38.1	6840	0.464	1520	3.54 J	38.1	5.74	208	<0.277
25-167-WR-1	19 J	26.5 J	0.4 U	3.07	4.46	35.8 J	10700 J	0.723 J	630 J	5.27	14.6 J	4.97 U	65.6 J	NR
BACKGROUND	38 J	239	0.5 UJ	8.2	14.1	49.7	19500	0.122	1000	15 J	80	4 J	153	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	v/1000K	%	v/1000K	%	v/1000K	%	v/1000K	%	v/1000K	%	v/1000K
25-167-TP-1	<0.01	0	74.3	74.3	<0.01	<0.01	<0.01	0	0.01	0.01	0	74.3
25-167-TP-2	<0.01	0	74.4	74.4	<0.01	<0.01	<0.01	0	<0.01	<0.01	0	74.4
25-167-WR-1	<0.01	0	96.8	96.8	<0.01	<0.01	0.01	0.31	0.01	0.01	0.31	96.5

LEGEND

TP1 - Composite of subsamples TP1A-A, 1A-B, 1A-C, 1A-D, 1A-E, and 1A-F  
 TP2 - Composite of subsamples TP2A-A, 2A-B, 2A-C, 2A-D, and 3  
 T-31 - Composite of subsamples WR1A, 1B, 2, and 3  
 BACKGROUND - From Empire Millite (25-175-SB-1)

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

Mine/Site Name: <u>Piegan Gloster Millsite</u>	County: <u>Lewis and Clark</u>
Legal Description: T <u>12N</u> R <u>6W</u>	Section(s): <u>Sec. 21 and Sec. 27</u>
Mining District: <u>Marysville</u>	Mine Type: <u>Millsite/Unknown</u>
Latitude: <u>N 46° 46' 12"</u>	Primary Drainage: <u>Little Prickly Pear Creek</u>
Longitude: <u>W 112° 20' 43"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Piegan Creek</u>
Quad: <u>Canyon Creek</u>	Date Investigated: <u>September 1, 1993</u>
Inspectors: <u>M. Babits, S. Babits, Flammang, Bullock/Pierson</u>	P.A. # <u>25-172</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- The volume of tailings associated with this site was estimated to be approximately 335,820 cubic yards. The following elements were elevated at least three times background:

Cadmium: 4.3 to 7.7 mg/kg	Copper: 157JX to 272JX mg/kg
Mercury: 1.17JX mg/kg	Manganese: 3,820 to 5,110 mg/kg
Lead: 112 to 1,940 mg/kg	Zinc: 400J to 2,620J mg/kg
- No waste rock was observed at this site during the investigation.
- No discharging adits, filled shafts, seeps, or springs were identified at the site.
- Piegan Creek was flowing directly through the tailings at this site. Surface water and sediment samples were collected upstream and downstream from the site. Observed releases to Piegan Creek were documented for manganese and zinc. The chronic aquatic life criteria for lead was exceeded in the downstream sample, which was directly attributable to the site.
- Observed releases to Piegan Creek (sediment) were also documented for copper and lead.
- No hazardous mine openings were identified at the site; however, the mill building was collapsing and potentially hazardous.

Piegan Gloster Mill PA# 25-172  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BABITS  
 INVESTIGATION DATE: 09/01/93

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Ca (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)
25-172-SE-1	9.34 U	43.1 J	1.8 U	2.82 J	8.39 J	26 JX	9170	6 JX	225	4.26 U	102	12.4 UJ	119 J	0.464 U
25-172-SE-2	33.1 J	148 J	2.5	3.47 J	7.34 J	83 JX	10700	1.62 JX	2670	8.61 J	698	6.44 UJ	865 J	0.339
25-172-TP-1	49 J	59.3 J	0.9 U	3 J	3.24 J	45.7 JX	11100	1.17 JX	537	2.14 U	112	6.21 UJ	400 J	0.919
25-172-TP-2	47.5 J	179 J	4.3	3.39 J	8.52 J	157 JX	11900	0.165 JX	3820	7.71 J	1290	6.38 UJ	1620 J	9.96
25-172-TP-3	66.5 J	271 J	7.7	4.76 J	11.3 J	272 JX	14000	0.274 JX	5110	10.1 J	1940	6.89 J	2620 J	7.92
BACKGROUND	33.3 J	150 J	0.9 U	6.26 J	14.3 J	35.8 JX	14700	0.367 JX	729	10.6 J	34.4	6.4 UJ	83.1 J	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000
25-172-TP-1	<0.01	0	28.6	28.6	<0.01	0	0.01	0	0.01	0	28.6	28.6
25-172-TP-2	0.04	1.25	77.3	76	<0.01	0.02	0.03	0.62	0.03	0.62	76.7	76.7
25-172-TP-3	0.07	2.19	102	99.6	0.02	0.01	0.04	0.31	0.04	0.31	102	102

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn (mg CaCO3/L)	HARDNESS CALC.
25-172-SW-1	5.42 J	36.9	2.57 U	9.7 U	6.83 U	9.87 J	243 JX	0.12 U	10.8	12.7 U	5.06 J	30.7 U	7.57 U	184
25-172-SW-2	6.58 J	53.2	2.57 U	9.7 U	9.57 J	4.6 J	118 JX	0.12 U	50.2	12.7 U	13.6 J	30.7 U	29.3	219

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-172-SW-1	202	< 5	18	0.11	< 0.005
25-172-SW-2	218	< 5	20	< 0.05	< 0.005

LEGEND

- SE1 - Upgradient in Piegan Creek below confluence of 2 tributaries
- SE2 - Downgradient in Piegan Creek below tailings pond 3, before placer
- TP1 - Composite of subsamples TP1A-A, 1A-B, and 1B-A
- TP2 - Composite of subsamples TP2A-A through 2A-D, 2B-A through 2B-C, and 4A through 4C
- TP3 - Composite of subsamples TP3A-A, 3A-B, 3A-C, 3A-D, 3B-A, 3B-B, and 3B-C
- BACKGROUND - From the Piegan Gloster Mill (25-172-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: Empire Millsite  
Legal Description: T 12N R 6W  
Mining District: Marysville  
Latitude: N 46° 45' 25"  
Longitude: W 112° 21' 45"  
Land Status: Private  
Quad: Canyon Creek and Granite Butte  
Inspectors: Bullock, Babits, Flammang, Clark,  
Lasher/Pierson  
Organization: Pioneer Technical Services, Inc.  
/Thomas, Dean and Hoskins, Inc.

County: Lewis and Clark  
Section(s): Sec. 32 and 33  
Mine Type: Millsite/Au, Ag, Pb, Zn  
Primary Drainage: Little Prickly Pear Creek  
USGS Code: 10030101  
Secondary Drainage: Empire Creek  
Date Investigated: June 9, 1993  
P.A. # 25-175

- The volume of mill tailings associated with this site was estimated to be approximately 16,000 cubic yards. The following elements were elevated at least three times background:

Cadmium: 13.4 to 83.7 mg/kg	Copper: 1840 to 6660 mg/kg
Mercury: 0.505 to 0.893 mg/kg	Lead: 7310 to 13,700 mg/kg
Antimony: 15J to 54J mg/kg	Zinc: 5020 to 39,300 mg/kg
- There was no waste rock associated with this site.
- There were no discharging adits or shafts, or seeps or springs associated with this site.
- Empire Creek flowed through the mill tailing for approximately 4000 feet adjacent to and below the mill. Observed releases were documented for copper, lead, and zinc. There were no MCL/MCLGs exceeded during this sampling event. The chronic aquatic life criteria for lead was exceeded and directly attributable to this site. Cyanide was also slightly elevated in the downgradient sample, but did not constitute an observed release.
- The mill building was a hazardous structure, although may be historically significant.
- Other possible hazardous materials on site included a partially full 55-gallon barrel of black petroleum sludge and several barrels of unknown white powdery material; all located inside the mill building.

**Empire Mill PA# 25-175  
AMRB HAZARDOUS MATERIALS INVENTORY  
INVESTIGATOR: PIONEER - BULLOCK  
INVESTIGATION DATE: 06/09/93**

**SOLID MATRIX ANALYSES**

Metals in soils  
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-175-SE-1	32 J	169	1.3 UJ	3.8	13.8	123	13400	0.443	192	5 J	425	9 UJ	501	1.88
25-175-SE-2	66 J	77.9	41.8	5.2	15.7	3350	18900	0.649	1690	15 J	7270	38 J	20000	0.87
25-175-TP-1	88 J	98.7	83.7	8.2	42.6	6660	26300	0.893	2390	27 J	13700	54 J	39300	0.18
25-175-TP-2	30 J	28.8	13.4	1.2	7.5	1840	9700	0.505	1660	11 J	7310	15 J	5020	0.87
25-175-TP-3	47 J	64.9	38.2	5.1	24.1	4160	18800	0.769	2340	17 J	10600	28 J	15600	0.99
BACKGROUND	38 J	239	0.5 UJ	8.2	14.1	49.7	19500	0.122	1000	15 J	80	4 J	153	NR

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

**Acid/Base Accounting**

FIELD ID	TOTAL SULFUR		NEUTRAL POTENTIAL		SULFUR ACID BASE POTENTIAL		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENTIAL	
	%	μ/1000x	%	μ/1000x	%	μ/1000x	%	μ/1000x	%	μ/1000x	%	μ/1000x
25-175-TP-1	0.02	0.62	108	108	<0.01	<0.01	0.02	0.02	0	108		
25-175-TP-2	<0.01	0	110	110	<0.01	<0.01	0.02	0.02	0	110		
25-175-TP-3	0.05	1.56	141	139	<0.01	0.03	0.02	0.02	0.94	140		

**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)
25-175-SW-1	5.62	46.4	3.2	5.99 U	5 U	1.35 U	20.6	0.14	2.6 U	8.78 U	2.2	18.3 U	6 U	173
25-175-SW-2	3.59	94.1	2.55 U	5.99 U	5 U	13.4	22.8	0.14	6.27	8.78 U	13.6	18.3 U	85.5	179

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
25-175-SW-1	195	< 5.0	20	0.27	0.01
25-175-SW-2	201	< 5.0	18	< 0.05	0.02

**LEGEND**

- SE1 - Upgradient Empire Creek, 25' upstream from where creek crosses the road. SW1 - Same as sample SE1.
- SE2 - At the culvert below new dam. SW2 - Same as sample SE2.
- TP1 - Composite of subsamples TP2A and 3-2A.
- TP2 - Composite of subsamples TP3-1C, 3-2B, and 3-2C.
- TP3 - Composite of subsamples TP3-1D and 3-2D.
- BACKGROUND - Same as Empire Mill (25-175-SS-1)

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

Mine/Site Name: <u>Bald Butte Millsite</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 11N R 6W</u>	Section(s): <u>NW 1/4, NE 1/4, Sec. 16</u>
Mining District: <u>Marysville</u>	Mine Type: <u>Millsite/Unknown</u>
Latitude: <u>N 46° 42' 13"</u>	Primary Drainage: <u>Dog Creek</u>
Longitude: <u>W 112° 21' 24"</u>	USGS Code: <u>17010201</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Dago Creek</u>
Quad: <u>Greenhorn Mountain</u>	Date Investigated: <u>August 18, 1993</u>
Inspectors: <u>Babits, Flammang, Lasher</u>	P.A. # <u>25-179</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailingw associated with this site was estimated to be approximately 48,700 cubic yards. The following elements were elevated at least three times background:

Arsenic: 191J to 202J mg/kg	Cadmium: 14.9 to 18.8 mg/kg
Copper: 538J to 852J mg/kg	Mercury: 0.596J to 17.5J mg/kg
Lead: 612J to 2,500J mg/kg	Zinc: 1,940J to 2,750 mg/kg
- The volume of waste rock associated with this site was estimate to be approximately 850 cubic yards. The following elements were elevated at least three times background:

Arsenic: 11,800J mg/kg	Cadmium: 410 mg/kg
Copper: 1,630J mg/kg	Iron: 80,900J mg/kg
Lead: 19,800J mg/kg	Antimony: 72.7 mg/kg
Zinc: 73,500J mg/kg	
- No discharging adits, filled shafts, seeps, or springs were identified at the site during the investigation.
- Dog Creek was flowing directly through the site; surface water and sediment samples were collected upstream and downstream from the site. An observed release to Dog Creek was documented for iron. The chronic aquatic life criteria for lead was exceeded in the downstream sample, which was directly attributable to the site.
- No hazardous mine openings were identified at the site; however, the mill building was collapsing and potentially hazardous.

Bald Butte Millsite PA# 25-179  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BABITS  
 INVESTIGATION DATE: 08/18/93

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	Au (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-179-SE-1	209 J	281 J	34.6	10.4	15.8	928 J	24400 J	6.28 J	8950 J	15.1	3390 J	34.7	4240 J	NR
25-179-SE-2	407 J	209 J	14.7	7.39	10.5	431 J	23100 J	1.39 J	7760 J	7.94	1570 J	13.3	2100 J	NR
25-179-TP-1	216 J	88.7 J	15.5	3.37	10.4	538 J	15500 J	17.5 J	731 J	9.64	1370 J	7.16 U	2470 J	NR
25-179-TP-2	191 J	63.4 J	14.9	2.45	8.34	591 J	11200 J	14.4 J	409 J	7.6	1110 J	6.66 U	1940 J	NR
25-179-TP-3	193 J	117 J	18.8	6.94	13.3	684 J	18000 J	0.596 J	1050 J	11.9	612 J	6.61 U	2280 J	NR
25-179-TP-4	202 J	97.7 J	14.9	5.51	19.4	852 J	16300 J	15 J	1130 J	10.5	2500 J	12.3	2750 J	NR
25-179-WR-1	11600 J	21.7 J	410.0	7.58	10.9	1630 J	80900 J	0.282 J	1670 J	10.5	19800 J	72.7	73500 J	NR
BACKGROUND	51.1 J	290 J	1.9	5.21	8.25	82.4 J	7590 J	0.109 J	2390 J	4.81	139 J	10.2 U	190 J	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	V/10000	%	V/10000	%	V/10000	%	V/10000	%	V/10000	%	V/10000
25-179-TP-1	0.04	1.25	17.3	16.1	<0.01	0.05	0.05	0	17.3			
25-179-TP-2	0.27	8.43	15	6.6	0.11	0.11	0.11	1.56	13.5			
25-179-TP-3	0.07	2.19	8.43	8.24	0.03	0.03	0.03	0.31	8.12			
25-179-TP-4	0.1	3.12	12.6	9.45	0.04	0.05	0.05	0.31	12.3			
25-179-WR-1	7.12	222	183	-39	<0.01	6.84	6.84	132	51.2			

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	Au	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
25-179-SW-1	8.14	36	2.57 U	9.7 U	6.83 U	4.43 J	90.7	0.12 U	31.2	12.7 U	4.31 J	30.7 U	118 J	154
25-179-SW-2	24.3	34	2.57 U	9.7 U	6.83 U	6 J	283	0.12 U	102	12.7 U	7.08 J	30.7 U	71 J	134

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-179-SW-1	188	< 5.0	26	< 0.05	NR
25-179-SW-2	172	< 5.0	21	< 0.05	NR

LEGEND

- SE1 - Upgradient on Dog Creek, 50 feet from mill building.
- SE2 - Downgradient on Dog Creek, 825 feet from breach.
- TP1 - Composite of subsamples TP1A-A, 1B-A, and 2A-B
- TP2 - Composite of subsamples TP1B-B, 1B-C, 1D-C, and 1D-D
- TP3 - Composite of subsamples TP1B-D, and 2B-B
- TP4 - Composite of subsamples TP2A-A and 2B-A
- WR1 - Sample of the WR1 subsample
- BACKGROUND - From the W&M Cat Mine (25-317-88-1)
- SW1 - Same as sample SE1
- SW2 - Same as sample SE2

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

Mine/Site Name: <u>Wild Cat</u>	County: <u>Lewis and Clark</u>
Legal Description: T <u>11N</u> R <u>6W</u>	Section(s): <u>SW 1/4, SW 1/4, Sec. 4</u>
Mining District: <u>Marysville</u>	Mine Type: <u>Millsite/Unknown</u>
Latitude: <u>N 46° 43' 49"</u>	Primary Drainage: <u>Little Prickly Pear Creek</u>
Longitude: <u>W 112° 22' 00"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Lost Horse Creek</u>
Quad: <u>Greenhorn Mountain</u>	Date Investigated: <u>August 18, 1993</u>
Inspectors: <u>Babits, Flammang, Lasher</u>	P.A. # <u>25-317</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings associated with this site was estimated to be approximately 2,000 cubic yards. The following elements were elevated at least three times background:

Arsenic: 455J to 895J mg/kg	Cadmium: 14 to 21 mg/kg
Copper: 813J to 1,080J mg/kg	Iron: 26,400J mg/kg
Mercury: 2.3J to 12.2J mg/kg	Manganese: 9,120J to 11,500J mg/kg
Lead: 2,580J to 3,330J mg/kg	Antimony: 79.7 to 103 mg/kg
Zinc: 3,190J to 5,310J mg/kg	
- The volume of waste rock associated with this site was estimated to be approximately 185 cubic yards. No samples were collected due to the relatively small volume.
- No discharging adits, filled shafts, seeps, or springs were identified at the site.
- Intermittent Lost Horse Creek (dry at the time of the investigation) was situated in the center of the site. Sediment samples were collected upstream and downstream from the site. Observed releases to Lost Horse Creek (sediment) were documented for arsenic, cadmium, copper, manganese, lead, and zinc.
- No hazardous mine openings were identified at the site.

Wild Cat PA# 25-317  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BABITS  
 INVESTIGATION DATE: 08/31/93

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)
25-317-SE-1	32.8 J	77.4 J	1.0	2.97	5.06	41.8 J	8640 J	0.398 J	664 J	6.59	117 J	9.28 U	191 J	0.518 U
25-317-SE-2	171 J	97.5 J	4.6	3.15	6.05	219 J	13300 J	0.916 J	2960 J	6.24	867 J	9.27	997 J	0.314 U
25-317-TP-1	455 J	92.5 J	14	4.7	7.99	813 J	16900 J	2.3 J	9120 J	2.89	2580 J	79.7	3190 J	0.278 U
25-317-TP-2	895 J	148 J	21	6.18	11.5	1080 J	26400 J	12.2 J	11500 J	3.99	3330 J	103	5310 J	0.348 U
BACKGROUND	51.1 J	290 J	1.9	5.21	8.25	82.4 J	7590 J	0.109 J	2390 J	4.81	139 J	10.2 U	190 J	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE		SULFATE		PYRITIC		ORGANIC		PYRITIC		SULFUR ACID BASE	
	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000
25-317-TP-1	0.01	0.31	43.8	50.1	43.5	49.8	0.01	0.01	<0.01	0	<0.01	<0.01	0	43.8	50.1	
25-317-TP-2	0.01	0.31	50.1	50.1	49.8	49.8	0.01	0.01	<0.01	0	<0.01	<0.01	0	50.1	50.1	

LEGEND

SE1 - Upgradient in Lost Horse Creek.  
 SE2 - Downgradient in Lost Horse Creek.  
 TP1 - Composite of subsamples TP1, 2A-A, 2A-C, and 2B-A.  
 TP2 - Composite of subsamples TP2A-B and 2B-B.  
 BACKGROUND - West of creek, From Wild Cat Mine (25-317-SS-1)

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

Mine/Site Name: Goldsil Millsite  
Legal Description: T 12N R 5W  
Mining District: Marysville  
Latitude: N 46° 45' 00"  
Longitude: W 112° 14' 12"  
Land Status: Private  
Quad: Silver City  
Inspectors: Bullock, M. Babits, S. Babits,  
Flammang, Pierson  
Organization: Pioneer Technical Services,  
Inc./Thomas, Dean and Hoskins, Inc.

County: Lewis and Clark  
Section(s): SE 1/4, SE 1/4, Sec. 33  
Mine Type: Millsite/Au  
Primary Drainage: Canyon Creek  
USGS Code: 10030101  
Secondary Drainage: Silver Creek  
Date Investigated: September 2, 1993  
P.A. # 25-365

- The volume of tailings associated with this site was estimated to be approximately 700,000 cubic yards. The following elements are elevated at least three times background:

Arsenic: 84.5J mg/kg	Cadmium: 1 to 3 mg/kg
Copper: 160 to 379 mg/kg	Mercury: 0.69JX to 223J mg/kg
Lead: 205J to 537J mg/kg	Antimony: 10.8J to 66.9J mg/kg
Zinc: 400J to 1010JX mg/kg	Cyanide: 1.97 to 3.13 mg/kg
- There was no waste rock material associated with this site.
- Silver Creek paralleled this site for approximately 1 mile. No observed releases to Silver Creek were documented during this investigation. MCL/MCLGs and aquatic life criteria were not exceeded for this data set. Stream sediment data collected in Silver Creek indicated elevated levels of mercury.
- A variety of hazardous wastes were located in the mill structure, including acids, organic solvents, and other reagents.

**Goldsil Millsite PA# 25-365**  
**AMRB HAZARDOUS MATERIALS INVENTORY**  
**INVESTIGATOR: PIONEER - BULLOCK**  
**INVESTIGATION DATE: 09/02/93**

**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)
25-365-SE-1	66.6 J	83.3 J	1.0 U	4.26 J	5.27 J	31.8 JX	11400	0.69 JX	787	6.22 J	16.2	7 UJ	62.4 J	NR
25-365-SE-2	34.2 J	94 J	1.0 U	1.39 J	3.85 J	23.2 JX	6400	3.11 JX	480	3.14 J	12.2	7.06 UJ	64.1 J	NR
25-365-TP-1	41.2 J	51.7 J	2.0	2.35 J	6.07 J	197 JX	8470	81.4 JX	884	3.4 J	237	10.8 J	470 J	2.57
25-365-TP-2	37.1 J	52.5 J	2.0	1.97 J	4.92 J	187 JX	7620	46.4 JX	843	3.43 J	207	11.1 J	400 J	2.4
25-365-TP-3	13 J	58.6 J	1.0 U	3.48 J	6.54 J	53.1 JX	8480	5.42 JX	852	3.82 J	68.5	7.08 UJ	137 J	0.379 U
25-365-TP-4	34.9 J	74.8 J	2.0	4.9	18.6	198	11700 J	21.4 J	827	13 J	245 J	31.2 J	477 J	3.13
25-365-TP-5	84.5 J	117 J	3.5	5.96	15.3	379	18600 J	223 J	1430	14 J	537 J	66.9 J	1010 J	1.97
25-365-TP-6	36.6 J	59.9 J	3.4	4.35	7.86	160	9210 J	86 J	857	8.39 J	205 J	30.3 J	412 J	2.82
BACKGROUND	25 J	650	0.4 UJ	5.6	10.7	32.6	14700	0.187	662	14 J	28	3 UJ	75	NR

**Acid/Base Accounting**

FIELD ID	TOTAL SULFUR		NEUTRAL POTENTIAL		SULFUR ACID BASE POTENTIAL		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENTIAL	
	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000
25-365-TP-1	0.03	0.94	84.1	83.1	0.01	0.01	0.02	0	0	0	84.1	
25-365-TP-2	<0.01	0	68.5	68.5	<0.01	<0.01	0.02	0.62	0.62	67.8		
25-365-TP-3	<0.01	0	49.9	49.9	<0.01	<0.01	<0.01	0	0	49.9		
25-365-TP-4	<0.01	0	78.5	78.5	<0.01	<0.01	0.02	0	0	78.5		
25-365-TP-5	0.05	1.56	124	122	0.01	0.01	0.03	0.31	0.31	123		
25-365-TP-6	0.22	6.87	82.9	76.1	0.09	0.09	0.1	0.94	0.94	82		

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

**WATER MATRIX ANALYSES**

**Metals in Water Results in ug/L**

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
25-365-SW-1	5.29	82.7	4.59 U	5 U	6.24 U	2.33 U	123	0.12 U	21.8	10.9 U	1.13	31.7 U	6.71 U	212
25-365-SW-2	4.35	73.6	4.59 U	5 U	6.24 U	2.33 U	90.8	0.12 U	15.3	10.9 U	1.69	31.7 U	12.3	195
25-365-SW-3	2.56	68.4	4.59 U	5 U	6.24 U	2.33 U	93.3	0.12 U	16.9	10.9 U	1.53	31.7 U	12.4	181

**Wet Chemistry Results in mg/l**

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-365-SW-1	213	< 5	19	< 0.05	< 0.005
25-365-SW-2	212	< 5	18	< 0.005	< 0.005
25-365-SW-3	189	< 5	18	0.09	< 0.005
25-365-SW-5	NR	NR	NR	NR	< 0.005

**LEGEND**

- SE1 - At toe of berm with flow gate in Silver Creek
  - SE2 - At culvert (downgradient) at road
  - TP1 - Composite of subsamples TP1A-A through 1A-C and 1B-A through 1B-E
  - TP2 - Composite TP1D-A, B, and C
  - TP3 - Sample of the TP1C subsample (Argo Mill Tailings)
  - TP4 - Composite of subsamples TP2A-A, B, C, and 2E
  - TP5 - Composite of subsamples TP3A-A and 3A-B
  - TP6 - Composite of subsamples TP4A-A and 4A-B
- BACKGROUND - From the Big Ox Mine (25-116-SS-1)
  - SW1 - Same as sample SE1
  - SW2 - Same as sample SE2
  - SW3 - Upgradient (200') from mill building (Argo) in Silver Creek
  - SW5 - Pregnant pond below mill

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



Victory/Evening Star PA# 25-010  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BULLOCK  
 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)
25-010-SE-1	36 J	52.9	1.9 U	7.1 U	11.2	490 JX	15200	2.91 J	129	9 UJX	31 J	22 UJ	57 J	NR
25-010-SE-2	6 U	72.9	0.7 U	7	13.2	28	10300	0.137	186	17	14	8 UJ	32	NR
25-010-TP-1	566	236	5.2	16.5	38.9	5590	95600	6.07	1060	21	23	15 J	143	NR
25-010-WR-1	163	164	1.9	14.3	42.4	1050	29900	1.08	469	40	8	5 UJ	36	NR
BACKGROUND	71	312	5.6	13	18	224	15800	0.296	1570	15	156	9 UJ	240	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC ACID BASE POTENT.		SULFUR ACID BASE POTENT.	
	%	U/10000	%	U/10000	%	U/10000	%	U/10000	%	U/10000	%	U/10000	%	U/10000
25-010-TP-1	0.12	3.75	132	128	0.09	0.01	0.02	0.31	1.62	426	0.038	0.038	4.08	132
25-010-WR-1DUP	1.63	50.9	456	405	<0.01	0.97	1.54	30.3	1.54	426	0.038	0.038	4.08	426
25-010-WR-1	1.61	50.3	464	414	<0.01	1.37	1.54	42.8	1.54	426	0.038	0.038	4.08	426

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)
25-010-SW-1	1.61 J	19.60	2.57 U	9.70 U	6.83 U	3.57	11.8 U	0.038 U	4.08 U	12.7 U	0.72 U	30.7 U	7.57 U	244
25-010-SW-2	2.11 J	18.90	2.57 U	9.70 U	6.83 U	1.55 U	11.8 U	0.038 U	4.08 U	12.7 U	0.72 U	30.7 U	7.57 U	246

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
25-010-SW-1	255	< 5.0	9	< 0.05	< 0.01
25-010-SW-2	256	< 5.0	8	< 0.05	< 0.01

LEGEND

- SE1 - Downgradient approx. 100' from last tailings pile
- SE2 - Upgradient of site approx. 100'
- TP1 - Composite of subsamples TP1A-A, 1B-A, and 1C-A
- WR1 - Composite of subsamples WR1A, 1B, 1C, 2A, and 2B
- BACKGROUND - From the Victory/Evening Star (25-010-SS-1)
- WR1DUP - Duplicate of the 25-010-WR-1 sample
- SW1 - Same as sample SE1
- SW2 - Same as sample SE2

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

Mine/Site Name: <u>Tenmile Mine</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 8N R 5W</u>	Section(s): <u>SE 1/4, SE 1/4, Sec. 5</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Au, Ag, Pb</u>
Latitude: <u>N 46° 28' 20"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 14' 30"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Tenmile Creek</u>
Quad: <u>Chessman Reservoir</u>	Date Investigated: <u>July 15, 1993</u>
Inspectors: <u>Tuesday, Belanger, Lasher</u>	P.A. # <u>25-005</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be approximately 3,040 cubic yards (not including three reclaimed dumps located in the lower section of the site). The following elements were elevated at least three times background:  
Arsenic: 1,990 to 5,530 mg/kg      Lead: 2,390 to 3,220 mg/kg  
Cadmium: 14.3 mg/kg                  Zinc: 631 to 989 mg/kg  
Copper: 136 to 231 mg/kg          Mercury: 0.231 to 0.634 mg/kg
- Two adit discharges were associated with this site, a minute discharge from Adit #1 disappeared into WR-1 but did not re-emerge and was not sampled for laboratory analyses. The minor discharge from adit #5 (two gpm) exceeded the MCL for arsenic and cadmium. Acute aquatic life criteria were exceeded for cadmium and zinc and chronic aquatic life criteria were exceeded for cadmium, lead, and zinc in the Adit #5 discharge. Adit discharge pH measurements were 8.39 and 6.29 for Adit #5 and Adit #1, respectively.
- The toe of one of the reclaimed dumps was located within the Tenmile Creek floodplain.
- Logs, from a wooden ore loadout bin, were leaning downhill and may be potentially hazardous; also, WR-1 was very steep and was considered unstable. The caved upper adit (#1) blew out after this investigation.

Tenmile PA# 25-005  
 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)	Ca (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)
25-005-WR-1	1990	17.6	5	5.1	2.8	231	19900	0.634	437	3	2390	37 J	631	NR
25-005-WR-2	5530	69.6	14.3	10.6	3.4	136	32000	0.231	2220	2 U	3220	10 J	989	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		ORGANIC SULFUR		PYRITIC SULFUR		SULFUR ACID BASE POTENT	
	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x
25-005-WR-1	0.17	5.31	0.34	0.34	4.97	0.17	0.01	0	0	0.34		
25-005-WR-2DUP	0.48	15	0.22	0.24	-15	0.24	0.14	3.12	0.14	-2.9		
25-005-WR-2	0.47	14.7	0.38	0.27	-14	0.27	0.13	2.19	0.13	-1.81		

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	Ag	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
25-005-GW-1	92.7 J	3.70	10.20 J	9.70 U	6.83 U	10.70	297	0.038 U	858	12.7 U	13 J	30.7 U	2050	209

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
25-005-GW-1	335	< 5.0	157	0.39	NR

LEGEND

WR1 - Composite of subsamples WR1A through 1C.  
 WR2 - Composite of subsamples WR2A, 2B, and 2C.  
 BACKGROUND - From the Red Water Mine (25-007-SS-1)  
 WR2DUP - Duplicate of sample 25-005-WR-2.  
 GW1 - Acid #5 discharge

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

Mine/Site Name: <u>Peerless Jenny/King</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 8N R 5W</u>	Section(s): <u>SE 1/4, NW 1/4, Section 21</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Au, Ag, Pb</u>
Latitude: <u>N 46° 25' 54.7"</u>	Primary Drainage: <u>Banner Creek</u>
Longitude: <u>W 112° 14' 20.9"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Banner Creek</u>
Quad: <u>Chessman Reservoir</u>	Date Investigated: <u>July 26, 1994</u>
Inspectors: <u>Tuesday, Clark, West</u>	P.A. # <u>25-006</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- No mill tailings were observed at the site.
- The volume of waste rock associated with this site was estimated to be 28,030 cubic yards. The following elements were elevated to at least three times the background concentrations:

Silver: 25.2JX to 44.7JX mg/kg	Mercury: 0.18 to 0.84 mg/kg
Arsenic: 65.2J to 91.3J mg/kg	Lead: 431 to 1,150 mg/kg
Copper: 103 to 291 mg/kg	Zinc: 1,050 mg/kg
- Two discharging adits and numerous springs were associated with the site. The MCL for cadmium and the acute and chronic aquatic life criteria for cadmium, copper, and zinc were exceeded in the Adit #2 discharge. The acute aquatic life criteria for silver and the chronic aquatic life criteria for lead were exceeded in the Adit #1 discharge.
- The adit discharges combined to form the flow in a intermittent drainage which ran through the center of the site. The acute and chronic aquatic life criteria for cadmium, copper, and zinc and the chronic aquatic life criteria for lead were exceeded in the drainage downstream from the site.
- Potential safety hazards observed at the site included two large, collapsing cabins/bunkhouses.

Peerless Jenny/King PA# 25-006  
 AMIRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 07/26/94

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	Ag (mg/Kg)	Au (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-006-SE1	2.1	21.6	101	0.8	5.2	4.0	33.0	19700	0.03 UJX	536	3.7	48.6 J	9.4 UJ	52.4	NR
25-006-SE2	13.9	23.0	29.6	0.9	2.9	2.0	112	10100	0.03 UJX	693	3.0 U	401 J	10.9 UJ	209	NR
25-006-SE3	22.3 JX	32.2 J	62.0	5.1	6.2	1.6 U	310	15300	0.03	1240	3.5 U	544	12.4 UJ	528	NR
25-006-WR1	44.7 JX	91.3 J	26.1	1.5	2.0	1.1 U	291	21800	0.18	458	2.3 U	1150	8.2 UJ	302	NR
25-006-WR2	25.2 JX	65.2 J	93.3	8.4	5.8	1.4 U	103	18800	0.84	689	5.7	431	10.8 UJ	1050	NR
25-262-SE4	1 U	7.8 U	35	1.1	3.6	2.0	25.8	3670	0.03 JX	934	3.4 U	23.9 J	12.0 UJ	191	NR
BACKGROUND	0.8 UJX	18.9 J	117	3.5	5.1	1.9	13.5	8300	0.03	1480	4.5	93.2	9.4 UJ	130	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT		SULFUR ACID BASE POTENT	
	%	#/10000	%	#/10000	%	#/10000	%	#/10000	%	#/10000	%	#/10000	%	#/10000
25-006-WR1	0.17	5.31	-0.89	-6.2	0.15	0.31	0.01	0.01	0.01	0.01	0.01	0.01	-1.21	1.51
25-006-WR2	0.34	10.6	1.51	-9.1	0.25	0.00	<0.01	0.09	0.09	0.00	0.00	0.00	1.51	

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Cu	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
25-006-AD1	0.55	3.0	27.7	4.0 UJX	8.4 U	6.8 U	5.9 U	33.2	0.08 U	3.1	14.4 U	3.2 J	51.6 U	15.6 U	18.9 B
25-006-AD2	0.22	4.9	26.6	10.4 JX	8.4 U	6.8 U	104	1090	0.08 U	4810	14.4 U	11.7 J	51.6 U	1230 J	129
25-006-SW2	1.85	1.9	37.7	33.1 JX	8.4 U	6.8 U	349	61.2	0.08 U	3540	14.4 U	47.1 J	51.6 U	3510 J	26.4 B
25-006-SW3	0.30	3.8	27.5	4.2 JX	8.4 U	6.8 U	19.6	38.3	0.08 U	680	14.4 U	3.3 J	51.6 U	867 J	88.0
25-262-SW4	0.13	3.2	25.9	4.0 UJX	8.4 U	6.8 U	5.9 U	268	0.08 U	351	14.4 U	3.8 J	51.6 U	164 J	47.4

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-006-AD1	46	<5	9.0	0.06	NR
25-006-AD2	181	<5	99	0.06	NR
25-006-SW2	99	<5	40	0.06	NR
25-006-SW3	133	<5	71	0.06	NR
25-262-SW4	84	<5	31	0.06	NR

LEGEND

- SE1 - Spectrum of WR1 in dry drainage
- SE2 - Downstream of WR1 in drainage, upstream of WR2
- SE3 - Downstream of WR2 in drainage
- SE4 - Downstream of WR2 in drainage, below Pavilion drainage
- WR1 - Composite of subsamples WR1A through 1D
- WR2 - Composite of subsamples WR2A through 2E
- BACKGROUND - From the Peerless Jenny/King Mine (25-006-BE1)
- AD1 - Upper soil at the Peerless Jenny
- AD2 - Lower soil at the Peerless Jenny
- SW1 - Same as sample 25-006-SE2
- SW2 - Same as sample 25-006-SE3
- SW3 - Same as sample 25-006-SE4

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

Mine/Site Name: <u>Red Water</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 8N R 5W</u>	Section(s): <u>NW 1/4, Sec. 4</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Au, Ag, Pb</u>
Latitude: <u>N 46° 28' 30"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 14' 42"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Tenmile Creek</u>
Quad: <u>Chessman Reservoir</u>	Date Investigated: <u>July 13, 1993</u>
Inspectors: <u>Bullock, Flammanq, Clark</u>	P.A. # <u>25-007</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be approximately 7000 cubic yards. The following elements were elevated at least three times background:

Arsenic: 4010J to 8260J mg/kg	Copper: 79.6J to 96J mg/kg
Mercury: 0.327 to 0.499 mg/kg	Lead: 2140J to 2290J mg/kg
Antimony: 43J mg/kg	Zinc: 678 mg/kg
- There was one adit discharge associated with this site. The discharge flowed at approximately 29 gpm across WR-1 and then flowed into Tenmile Creek. The discharge pH was measured at 6.79 and the specific conductance was 203 umhos/cm. The adit discharge sample exceeded MCL/MCLGs for arsenic, cadmium, and antimony. The sample exceeded acute aquatic life criteria for cadmium and zinc, and chronic aquatic life criteria for cadmium, lead, and zinc.
- There was an occupied residence on the north end of this site. A sample of the residence's domestic water supply well did not exceed any of the MCLs or MCLGs.
- Tenmile Creek flowed along the base of the waste rock dumps, approximately 200 yards above a City of Helena drinking water supply intake. Surface water samples collected did not document any observed releases to the creek. There were no MCLs or MCLGs exceeded at the time of this sampling. No aquatic life criteria were exceeded that could be directly attributed to this site. The stream sediment samples collected in Tenmile Creek did document an observed release of lead.
- The discharging adit was an HMO.

**Red Water PA# 25-007  
AMRB HAZARDOUS MATERIALS INVENTORY  
INVESTIGATOR: PIONEER - BULLOCK  
INVESTIGATION DATE: 07/13/93**

**SOLID MATRIX ANALYSES**

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

FIELD ID	Au (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-007-SE-1	350 J	43.6	5	6.4	3.6 J	31.3 J	9230	0.141	895	6 J	254 J	7 UJ	441	NR
25-007-SE-2	167 J	21.6	2.6	4.8	1.3 U	11.1 J	5390	0.079	478	3 J	54 J	6 UJ	205	NR
25-007-WR-1	8260 J	16	5.5	3.3	1.2 U	96 J	17200	0.327	669	4 J	2140 J	43 J	678	NR
25-007-WR-2	4010 J	36.6	3.5	4.4	1.2 J	79.6 J	22400	0.499	661	4 J	2290 J	17 J	463	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

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

**Acid/Base Accounting**

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x
25-007-WR-1	0.95	29.7	9.27	2.2	-20	0.45	0.17	0.33	0.33	5.31	3.96	0.64
25-007-WR-2	0.57	17.8	2.2	2.2	-16	0.33	0.05	0.19	0.19	1.56	0.64	0.64

**WATER MATRIX ANALYSES**

**Metals in Water  
Results in ug/L**

FIELD ID	Au	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn (mg CaCO3/L)	HARDNESS CALC.
25-007-GW-1	131	41.00	73.90	13.80	6.83 U	16.00	6160	0.038 U	6250 J	12.7 U	1.02 J	33.1	14100 J	190
25-007-GW-2	14.3	46.90	2.57 U	9.70 U	6.83 U	49.30	11.8 U	0.073 U	15 J	12.7 U	0.72 U	30.7 U	11 J	97
25-007-GW-3	12.62 J	39.80	2.57 U	9.70 U	6.83 U	49.40	20.8 JX	0.038 U	23.7	12.7 U	3.71	30.7 U	20.1 J	98.8
25-007-SW-1	3.89 J	11.40	2.57 U	9.70 U	6.83 U	11.80	321 JX	0.160	64.4	12.7 U	6.3	30.7 U	201 J	16.2
25-007-SW-2	3.95 J	11.00	2.90 J	9.70 U	6.83 U	11.30	242 JX	0.160	48.5	12.7 U	3.4	30.7 U	157 J	15.7

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

**Wet Chemistry  
Results in mg/l**

FIELD ID	DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-007-GW-1	315	< 5.0	199	< 0.05	NR
25-007-GW-2	199	< 5.0	50	< 0.05	NR
25-007-GW-3	188	< 5.0	50	< 0.05	NR
25-007-SW-1	69	< 5.0	7	< 0.05	NR
25-007-SW-2	60	< 5.0	7	< 0.05	NR

**LEGEND**

SE1 - Downgradient of site, just across from house and shed.  
 SE2 - Approx. 25 upgradient of SE end of waste rock dump 1.  
 WR1 - Composite of subsamples WR1A through 1E.  
 WR2 - Composite of subsamples WR2A, 2B, and 2C.  
 BACKGROUND - From the Red Water Inflow (25-007-SS-1)

GW1 - Discharge from the mouth of acid #1  
 GW2 - Residential well, 400' downgradient from site  
 GW3 - QA/QC duplicate of 25-007-GW-2  
 SW1 - Same as sample SE1  
 SW2 - Same as sample SE2

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

Mine/Site Name: <u>Valley Forge/Susie</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 9N R 5W</u>	Section(s): <u>NW 1/4, S 1/2, Sec. 33</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Au, Ag, Pb</u>
Latitude: <u>N 46° 29' 40"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 14' 04"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Tenmile Creek</u>
Quad: <u>Chessman Reservoir</u>	Date Investigated: <u>July 13, 1993</u>
Inspectors: <u>Bullock, Flammang, Clark</u>	P.A. # <u>25-008</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- This site was located in the town of Rimini.
- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be 6900 cubic yards. WR-1, the upper dump constitutes approximately 1100 cubic yards of the total volume. WR-1 was reclaimed under the MDSL Abandoned Mine Reclamation Program. WR-2 was partially covered by residential lawns and was bordered by Tenmile Creek. The following elements ere elevated at least three times background:

Arsenic: 21,500J mg/kg	Copper: 167J mg/kg
Mercury: 0.886 mg/kg	Lead: 9870J mg/kg
Antimony: 71J mg/kg	Zinc: 757 mg/kg
- A seep emanated from the base of WR-1 and flowed along the side of WR-2 prior to discharging into Tenmile Creek. This seep was probably an adit discharge. Perforated pipe was installed in the seep area as part of the reclamation project to concentrate the flow. At the time of this investigation, the seep was flowing at approximately 20 gpm with a pH of 5.70 and a specific conductance of 379 umhos/cm. A sample collected at the discharge of the pipe exceeded MCL/MCLGs for arsenic, cadmium, and antimony, as well as acute aquatic life criteria for arsenic, iron, cadmium, and zinc, and chronic aquatic life criteria for arsenic, cadmium, mercury, and zinc.
- There was one domestic water supply well within 100 feet of WR-1. Although the water in this well exhibited a low pH (5.31) and alkalinity (0 mg/l), the sample did not exceed any of the MCLs or MCLGs.
- This site was below the City of Helena drinking water intake. An observed release of arsenic was documented and directly attributable to this site. The MCL/MCLG for cadmium was exceeded and also was attributable to this site. Although Tenmile Creek did exceed several acute and chronic aquatic life criteria, none could be attributed to this site.

Valley Forge/ Susie PA# 25-008  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BULLOCK  
 INVESTIGATION DATE: 07/13/93

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)
25-008-SE-1	212 J	42.5	5.3	7.6	6.3 J	28.1 J	13900	0.024	1040	6 J	181 J	9 UJ	301	NR
25-008-SE-2	151 J	18.8	2.6	5	3.2 J	14.1 J	5480	0.036	619	3 J	158 J	6 UJ	220	NR
25-008-WR-1	21500 J	103	5.1	5.2	2.8 J	167 J	35000	0.896	711	6 J	9870 J	71 J	757	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENTIAL		SULFUR ACID BASE POTENTIAL		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENTIAL	
	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t
25-008-WR-1	1.04	32.5	96.2	96.2	63.7	63.7	0.58	0.58	6.25	6.25	0.2	90

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)
25-008-GW-1	27700 J	2.01 U	91.80 J	64.90	10.20	33.80	171000 JX	0.150	14500	43.6	13.2	53.6	27200 J	921
25-008-GW-2	6.72 J	54.00	2.57 U	9.70 U	6.83 U	11.00	491 JX	0.038 U	31.4	12.7 U	8.98	30.7 U	20.9 J	250
25-008-SW-1	40.74 J	10.00	5.17 J	9.70 U	6.83 U	12.60	425 JX	0.140	79.5	12.7 U	4.87	30.7 U	277 J	17.9
25-008-SW-2	5.61 J	10.60	4.30 J	9.70 U	6.83 U	12.70	233 JX	0.120	64.4	12.7 U	4.55	30.7 U	248 J	17.7

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-008-GW-1	2010	< 5.0	1170	< 0.05	NR
25-008-GW-2	1020	< 5.0	575	1.4	NR
25-008-SW-1	64	< 5.0	11	< 0.05	NR
25-008-SW-2	76	< 5.0	11	< 0.05	NR

LEGEND

SE1 - About 25' below confluence with seep in Tenuite Creek  
 SE2 - Upstream of bridge on Tenuite Creek  
 25' upstream of waste rock dump 2.  
 WR1 - Composite of subsamples WR 2A and 2B.  
 BACKGROUND - From Red Water Mine (25-007-SS-1).  
 GW1 - From mouth of pipe at base of waste rock dump 1.  
 GW2 - Residential well, 100' North (downgradient).  
 SW1 - Same as sample SE1.  
 SW2 - Same as sample SE2.

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

Mine/Site Name: <u>Red Mountain</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 8N R 5W</u>	Section(s): <u>NW 1/4, SE 1/4, Sec. 4, NE 1/4, SW 1/4, Sec. 4</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Pb, Zn, Cu, Ag, Au</u>
Latitude: <u>N 46° 28' 15"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 13' 15"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Tenmile Creek</u>
Quad: <u>Chessman Reservoir</u>	Date Investigated: <u>August 19 and 20, 1993</u>
Inspectors: <u>Bullock, Belanger, Pierson</u>	P.A. # <u>25-019</u>
Organization: <u>Pioneer Technical Services, Inc.</u> <u>/Thomas, Dean and Hoskins, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be approximately 13,300 cubic yards. The following elements were elevated at least three times background:

Arsenic: 3900 to 19,000 mg/kg	Mercury: 0.421 to 1.16 mg/kg
Lead: 2790 to 7860 mg/kg	Antimony: 33 to 164 mg/kg
Zinc: 373 to 489 mg/kg	
- The only potential adit discharge was a seep at the toe of WR-1 that discharges into the man-made flume. The flume supplied water to Chessman reservoir. This seep was discharging at a flow of less than 1 gpm, a pH of 6.67, and a specific conductance of 190 umhos/cm. The sample of this discharge exceeded the MCL for arsenic as well as the acute and chronic aquatic life criteria for cadmium, copper, lead, and zinc.
- A small intermittent tributary to Tenmile Creek contacted several of the waste rock dumps. Observed releases were documented for arsenic, lead, and zinc. No MCL/MCLGs were exceeded that were directly attributed to this site. The acute aquatic life criteria was exceeded for copper and could be directly attributed to this site.
- A water supply flume for the Chessman Reservoir crossed this site. Waste rock from WR-5 and WR-1 sluff or erode into this flume and introduced into the water supply.
- There was one open shaft that was an HMO and one hazardous structure associated with this site.

**Red Mountain (13) PA# 25-019**  
**AMRB HAZARDOUS MATERIALS INVENTORY**  
**INVESTIGATOR: PIONEER - BULLOCK**  
**INVESTIGATION DATE: 08/19/93**

SOLID MATRIX ANALYSES														
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)
25-019-SE-1	54.5	36.6	1.0 UJ	9.52 J	2.53 J	28.9	8480	0.04 U	1020	7.74 J	62.9	6.73 U	175	NR
25-019-SE-2	67.4	14.1	1.1 UJ	2.33 J	1.46 U	2.56	3300	0.032 U	312	2.56 U	80.8	7.42 U	50.5	NR
25-019-SE-5	5550	13.1	1.0 UJ	1.6 J	1.41 U	119	14000	0.157	176	2.46 U	2330	47.2	194	NR
25-019-SE-6	84.1	21.7	1.0 UJ	2.3 J	1.36 U	4.65	4420	0.058	691	2.37 U	129	6.86 U	73.3	NR
25-019-WR-1	3900	9.22	1.0 UJ	1.17 J	1.31 U	77.5	15400	0.421	49.4	2.3 U	2790	33	192	NR
25-019-WR-2	19000	39.4	0.9 UJ	1.66 J	1.28 U	23.2	20200	1.16	18.5	2.24 U	4080	55.2	189	NR
25-019-WR-3	7010	29.1	0.8 UJ	3.08 J	1.27 J	136	17900	0.84	762	3.17 J	6120	164	489	NR
25-019-WR-4	4190	19	0.7 UJ	0.82 J	0.98 U	304	14000	0.572	33.1	1.71 U	7860	93.8	373	NR
BACKGROUND	103	63.4	0.8 UJ	6.86 J	4.35 J	15.4	9030	0.047	1610	6.69 J	258	9.78	117	NR

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

Acid/Base Accounting			
FIELD ID	TOTAL SULFUR %	NEUTRAL POTENT. v/1000	SULFUR ACID BASE POTENT. v/1000
25-019-WR-1	0.25	-0.7	-8.5
25-019-WR-2	1.92	-3.6	-64
25-019-WR-3	0.56	-1.4	-19
25-019-WR-4	0.62	-2.7	-22

PYRITIC SULFUR ACID BASE POTENT. v/1000				ORGANIC SULFUR %				PYRITIC SULFUR ACID BASE POTENT. v/1000				
FIELD ID	SULFUR %	SULFUR	ACID BASE	POTENT. v/1000	SULFUR	SULFUR	ACID BASE	POTENT. v/1000	SULFUR	SULFUR	ACID BASE	POTENT. v/1000
25-019-WR-1	0.25	7.81	-0.7	-8.5	<0.01	0.01	0.01	-0.67	0	28.7	28.7	-32.3
25-019-WR-2	1.92	60	-3.6	-64	0.92	0.4	0.4	-32.3	0.12	0.12	0.12	-2.63
25-019-WR-3	0.56	17.5	-1.4	-19	0.04	0.18	0.18	-2.63	0.23	0.23	0.23	-3.34
25-019-WR-4	0.62	19.4	-2.7	-22	0.02	0.13	0.13	-3.34	0.2	0.2	0.2	

WATER MATRIX ANALYSES														
Results in ug/L														
FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
25-019-GW-1	71.2	2.27	3.63	9.7 U	6.83 U	14.2 J	489	0.12 U	1020	16.5 J	52.6 J	30.7 U	1470 J	44.4
25-019-SW-1	11.8	3.2	2.57 U	9.7 U	6.83 U	1.55 U	165	0.12 U	20.9	12.7 U	3.36 J	30.7 U	23.2 J	9
25-019-SW-2	13	2.9	2.57 U	9.7 U	6.83 U	1.55 U	159	0.12 U	4.73	12.7 U	2.39 J	30.7 U	18.6 J	7.8
25-019-SW-3	45.8	5.33	15.4	9.7 U	6.83 U	1.99 J	1210	0.23 J	1230	21.8 J	58.2 J	30.7 U	2700 J	27
25-019-SW-4	3.66	4.27	2.57 U	9.7 U	6.83 U	1.63 J	223	0.2 J	7.57	12.7 U	3.49 J	30.7 U	23.2 J	8

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

Wet Chemistry Results in mg/l					
FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-019-GW-1	19	< 5.0	40	< 0.05	NR
25-019-SW-1	56	< 5.0	5	< 0.05	NR
25-019-SW-2	48	< 5.0	5	< 0.05	NR
25-019-SW-3	116	< 5.0	53	0.2	NR
25-019-SW-4	45	< 5.0	5.0	0.51	NR

**LEGEND**

- SE1 - Downgradient of waste rock dump 1, 2, and 3.
- SE2 - Upgradient of waste rock dumps 1, 2, and 3
- SE3 - Downgradient with sample SW3
- SE4 - Downgradient with sample SW4
- SE5 - Downgradient with sample SW3
- SE6 - Upgradient with sample SW4
- WR1 - Composite of subsamples WR1, 2A, and 2B
- WR2 - Sample of the WR3 subsample
- WR3 - Composite of the subsamples WR4A, 4B, 5, 6A, and 6B
- WR4 - Composite of the subsamples WR7A, 7B, 7C, 8A, and 8B
- BACKGROUND - From the Red Mountain Mine (25-019-88-1)
- GW1 - Seepage from waste rock dump 1.
- SW1 - Same as sample SE1
- SW2 - Same as sample SE2
- SW3 - Downgradient at Red Mountain N.
- SW4 - Upgradient, above aqueduct at Red Mountain N.

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

Mine/Site Name: <u>Lower Tenmile</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 9N R 5W</u>	Section(s): <u>SE 1/4, NW 1/4, Sec. 3</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Unknown</u>
Latitude: <u>N 46° 33' 52"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 13' 13"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Tenmile Creek</u>
Quad: <u>Black Mountain</u>	Date Investigated: <u>July 15, 1993</u>
Inspectors: <u>Tuesday, Belanger, Lasher</u>	P.A. # <u>25-030</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings associated with this site could not be accurately determined during the investigation because the area has been completely revegetated. The volume was grossly estimated at 13,500 cubic yards. The following elements were elevated at least three times background:

Arsenic: 3,470 mg/kg	Mercury: 0.242 mg/kg
Cadmium: 10.6 mg/kg	Lead: 2,410 mg/kg
Copper: 21J mg/kg	Zinc: 654 mg/kg
- No MCL/MCLG exceedances were observed in groundwater or surface water samples collected at this site. Surface water, which flowed directly through the reclaimed tailings area, exceeded acute water quality criteria for copper and zinc in both upstream and downstream sample. Chronic water quality criteria were exceeded for copper, lead, and zinc in both upstream and downstream samples, indicated the presence of an upstream contaminant source.
- An observed release to surface water was documented for lead and arsenic in sediment; however, the concentration of arsenic in the surface water did not exceed any established standards. The chronic water quality criteria was exceeded for lead in both upstream and downstream samples. An observed release to groundwater was documented for zinc; however, the concentration of zinc in the groundwater did not exceed any established standards.
- Residences were located on the reclaimed tailings.

Lower Tenmile PA# 25-030  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 7/15/93

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-030-SE-1	111	39.3	4.9	7.2	3.8	53.5	8170	0.141	801	3 U	94	7 UJ	488	NR
25-030-SE-2	715	87.9	3.7	4.8	2.9	30.2	7120	0.111	837	2 U	258	5 UJ	399	NR
25-030-TP-1	3470	27.1	10.6	3.8	2.8	88.3	12300	0.242	313	3 U	2410	17 J	654	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	NEUTRAL POTENT	SULFUR ACID BASE POTENT	ORGANIC SULFUR %	PYRITIC SULFUR %	PYRITIC ACID BASE POTENT	3.08
25-030-TP-1	0.07	2.19	3.39	1.2	0.05	0.01	0.31

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)
25-030-GW-1	25.5 J	2.80	2.57 U	9.70 U	6.83 U	24.80	92	0.038 U	4.08 U	12.7 U	0.86 J	30.7 U	7.57 U	60.6
25-030-GW-2	5.30 J	14.50	2.57 U	9.70 U	6.83 U	1.55 U	765	0.038 U	70.4	12.7 U	0.75 J	30.7 U	82.9	90.5
25-030-SW-1	16.5 J	13.50	2.57 U	9.70 U	6.83 U	5.33	205	0.038 U	4.08 U	12.7 U	2.07 J	30.7 U	126	26.4
25-030-SW-2	20.4 J	13.10	2.57 U	9.70 U	6.83 U	5.33	199	0.038 U	4.08 U	12.7 U	6.15 J	30.7 U	163	27.7

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-030-GW-1	222 <	5.0	46 <	0.05	NR
25-030-GW-2	285	9.3	50 <	0.05	NR
25-030-SW-1	72 <	5.0	11 <	0.05	NR
25-030-SW-2	79 <	5.0	11 <	0.05	NR

LEGEND

- SE1 - Upgradient of tailings
- SE2 - Downgradient of tailings
- TP1 - Composite of subsamples TP1 A and 1B
- BACKGROUND - From the Red Water Mine (25-007-SS-1)
- GW1 - Residential well, upgradient.
- GW2 - Residential well used for irrigation, downgradient.
- SW1 - Same as sample SE1
- SW2 - Same as sample SE2

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

Mine/Site Name: <u>Armstrong</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 8N R 5W</u>	Section(s): <u>NW 1/4, NW 1/4, Sec. 6</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Pb, Ag</u>
Latitude: <u>N 46° 28' 50"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 17' 13"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Minnehaha Creek</u>
Quad: <u>Three Brothers</u>	Date: <u>July 15, 1993</u>
Inspectors: <u>Bullock, Flammang, Clark</u>	P.A. # <u>25-102</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be approximately 15,000 cubic yards. The following elements were elevated at least three times background:

Arsenic: 1750 to 2670 mg/kg	Copper: 300 to 470 mg/kg
Mercury: 0.422J to 0.527J mg/kg	Lead: 14,000 to 15,900 mg/kg
Antimony: 41 to 43 mg/kg	Zinc: 614 to 724 mg/kg
- There was one adit discharge associated with this site. Field parameter measurements indicated unimpaired water quality.
- Minnehaha Creek was located in the drainage approximately 300 feet below the lower mine workings. No water samples were collected because of the distance from the site and lack of surface water runoff. Sampling during early spring snow melt/runoff events could possibly document impacts to the creek. XRF screening of stream sediments indicated no impacts to the creek attributable to this site.
- There was one hazardous mine opening, the upper adit, and five hazardous structures associated with this site. There was one residence on site that appeared to be used occasionally for recreational use.

Armstrong PA# 25-102  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BULLOCK  
 INVESTIGATION DATE: 07/15/93

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	Au (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-102-WR-1	1750	31.3	2	3.5	4.3	470	27700 J	0.527 J	339 J	3 U	15900	43	614	NR
25-102-WR-2	2670	26.5	3	2.1 U	4.1	300	30200 J	0.422 J	181 J	3 U	14000	41	724	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENTIAL		SULFUR ACID BASE POTENTIAL		SULFATE		PYRITIC		ORGANIC		PYRITIC		SULFUR	
	%	U/1000x	U/1000x	U/1000x	U/1000x	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	U/1000x	U/1000x
25-102-WR-1	1.1	34.4	-2.2	-37	0.04	0.12	1.25	-3.43								
25-102-WR-2DUP	1.12	35	-1.3	-36	0.1	0.25	3.12	-4.4								
25-102-WR-2	1.1	34.4	-1.4	-36	0.09	0.29	2.81	-4.22								

LEGEND

WR1 - Composite of subsamples WR1A, 1B, 2A, and 2B  
 WR2 - Composite of subsamples WR3A, 3B, 4A, and 4B  
 BACKGROUND - From the Red Water (25-007-SS-1)  
 WR2DUP - Duplicate of sample 25-102-WR-2

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

Mine/Site Name: <u>Beatrice</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 8N R 6W</u>	Section(s): <u>NW 1/4, NW 1/4, Sec. 1</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Au, Ag</u>
Latitude: <u>N 46° 28' 53"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 18' 10"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Minnehaha Creek</u>
Quad: <u>Three Brothers</u>	Date Investigated: <u>July 13, 1993</u>
Inspectors: <u>Tuesday, Belanger, Lasher</u>	P.A. # <u>25-103</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be approximately 5,185 cubic yards. The following elements were elevated at least three times background:

Copper: 95.8JX to 342JX mg/kg	Lead: 600J to 2230J mg/kg
Mercury: 0.265J to 0.997J mg/kg	Antimony: 65J mg/kg
- Three of the adits had minor discharges which, when combined, made up the majority of the flow in an unnamed tributary to Minnehaha Creek. No MCL/MCLG exceedances were observed. Acute aquatic life criteria were exceeded for iron, mercury, cadmium, copper, lead, and zinc; however, acute aquatic life criteria were exceeded for mercury, copper, and zinc in the upstream sample also. Chronic aquatic life criteria were exceeded for cadmium, copper, and zinc; however, chronic aquatic life criteria were exceeded for copper and zinc in the upstream sample. Adit discharge pH measurements were 4.34, 6.51, and 5.06 for Adit #1, Adit #2 and Adit #3, respectively. pH measurements for WR-1 seepage and WR-2 seepage were 3.81 and 6.11, respectively.
- The unnamed tributary to Minnehaha Creek cut directly through the toes of WR-1 and WR-2. This caused high turbidity and stained the streambed red. Observed releases to surface water were documented for copper and lead. Chronic aquatic life criteria exceedances for lead were attributed to the site; the exceedance for lead persisted in the sample collected farthest downstream (SW-5).
- The open shaft and open adit were accessible and potentially hazardous.

Beatrice PA# 25-103  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 07/13/93

SOLID MATRIX ANALYSES

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)
25-103-SE-1	11 J	30.2	1 J	5.4	4.3	64 JX	9330	0.066 J	608	19 JX	14 J	7 UJ	76 J	NR
25-103-SE-3	33 J	22.5	2 J	8.6	3.2	207 JX	26500	0.095 J	816	9 JX	239 J	14 J	61 J	NR
25-103-SE-4	26 J	25.7	2 J	16.7	2.6	242 JX	24300	0.176 J	1430	3 UJX	183 J	8 UJ	68 J	NR
25-103-SE-5	25 J	11.4	2.4 J	5.4	3.3	127 JX	23400	0.084 J	372	5 JX	340 J	9 J	200 J	NR
25-103-WR-1	44 J	31.3	0.7 J	3.1	3.6	50.2 JX	20000	0.105 J	88.3	3 UJX	247 J	7 UJ	28 J	NR
25-103-WR-2	41 J	10.1	0.7 J	2 U	1.4 U	95.8 JX	16700	0.265 J	86.3	3 UJX	2230 J	14 J	55 J	NR
25-103-WR-3	95 J	17.7	2.8 J	4.6	2.6	342 JX	39100	0.997 J	282	5 JX	600 J	65 J	175 J	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE POTENTIAL	NEUTRAL POTENTIAL	SULFUR ACID BASE POTENTIAL	SULFATE %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE POTENTIAL	SULFUR ACID BASE POTENTIAL
25-103-WR-1	0.31	9.68	-0.9	-11	0.19	0.02	0.1	0.62	-1.49
25-103-WR-2	0.89	27.8	-1.6	-30	0.51	0.08	0.3	2.5	-4.34
25-103-WR-3	0.21	6.56	-0.8	-7.4	0.14	<0.01	0.08	0	-0.84

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

WATER MATRIX ANALYSES

Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
25-103-SW-1	2.99	8.43	2.57 U	9.70 U	6.83 U	9.20	40.1	0.120	7.57 J	12.7 U	0.72 U	30.7 U	23.4 J	13.1
25-103-SW-2	1.80	8.20	2.57 U	9.70 U	6.83 U	121	1970	0.140	307 J	12.7 U	10.4 J	30.7 U	95.5 J	28.8
25-103-SW-3	1.73	7.33	3.07	9.70 U	6.83 U	175	2710	0.170	464 J	12.7 U	10.8 J	30.7 U	119 J	40.9
25-103-SW-4	1.46	7.20	2.57 U	9.70 U	6.83 U	156	2100	0.180	388 J	12.7 U	7.85 J	30.7 U	107 J	41.3
25-103-SW-5	2.13	8.63	2.57 U	9.70 U	6.83 U	14.40	139	0.170	14.1 J	12.7 U	6.16 J	30.7 U	16.3 J	13.8

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

Wet Chemistry

Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-103-SW-1	66	< 5.0	12	< 0.05	NR
25-103-SW-2	113	< 5.0	50	< 0.05	NR
25-103-SW-3	114	< 5.0	52	< 0.05	NR
25-103-SW-4	115	< 5.0	51	< 0.05	NR
25-103-SW-5	64	< 5.0	12	< 0.05	NR

LEGEND

- SE1 - Upgradient of all dump and discharges
- SE2 - Downstream of waste rock dump 1 and adit #1
- SE3 - Downstream of waste rock dump 2 and adit #2
- SE4 - Downstream of waste rock dump 4 and adit #4
- SE5 - Upstream from adit #1, down from waste rock dump 4 and 5
- WR1 - Composite of subsamples WR1A through 1C
- WR2 - Composite of subsamples WR2A and 2B
- WR3 - Composite of subsamples WR3A through 4C
- BACKGROUND - From the Red Water Mine (25-007-BS-1)
- SW1 - Same as sample SE1
- SW2 - Discharge from adit #1
- SW3 - Same as sample SE3
- SW4 - Same as sample SE4
- SW5 - Same as sample SE5

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

Mine/Site Name: <u>Woodrow Wilson</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 8N R 5W</u>	Section(s): <u>SW 1/4, SW 1/4, SW 1/4,</u>
Mining District: <u>Rimini</u>	<u>Section 20</u>
Latitude: <u>N 46° 24' 51"</u>	Mine Type: <u>Hardrock/Au, Ag</u>
Longitude: <u>W 112° 15' 22"</u>	Primary Drainage: <u>Banner Creek</u>
Land Status: <u>Private</u>	USGS Code: <u>10030101</u>
Quad: <u>Three Brothers</u>	Secondary Drainage: <u>West Fork Banner Creek</u>
Inspectors: <u>Tuesday, Clark, West</u>	Date Investigated: <u>July 28, 1994</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	P.A. # <u>25-258</u>

- No mill tailings were observed at the site.
- The volume of waste rock observed at the site was estimated to be 1,085 cubic yards. The following elements were elevated to at least three times the background concentrations:

Silver: 6.5JX mg/kg	Arsenic: 295J mg/kg
Mercury: 1.30 mg/kg	Antimony: 30.0J mg/kg
- One discharging adit was observed at the site. The discharge eventually reached a tributary of the West Fork of Banner Creek downstream from the site. No MCLs were exceeded in the adit discharge; however, the acute and chronic aquatic life criteria for zinc and the chronic aquatic life criteria for lead were exceeded.
- A tributary to the West Fork of Banner Creek flows through the center of the site. An observed release to the tributary was documented for arsenic. No MCLs were exceeded in the tributary; however, the acute and chronic aquatic life criteria for zinc and the chronic aquatic life criteria for lead were exceeded both upstream and downstream from the site.
- Potential safety hazards observed at the site included unstable slopes near the collapsed adit, and a collapsing cabin.

Woodrow Wilson PA# 25-258  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 07/28/94

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)
25-258-SE1	1.3 UJX	163 J	19.9	2.8	4.2	2.0 U	32.7	42500	0.20	70.2	4.2 U	34.7	15.1 UJ	33.4	NR
25-258-SE2	1.7 JX	67.4 J	18.7	1.0 U	3.9	1.7 U	18.0	20300	0.34	247	4.7	35.7	12.6 UJ	50.9	NR
25-258-SE3	7.1 JX	189 J	16.3	3.3 U	6.9 U	5.8 U	27.0	90000	0.58	34.8	11.8 U	49.8	42.1 UJ	20.1	NR
25-258-WR1	6.5 JX	295 J	28.3	0.7 U	1.5 U	1.2 U	12.0	10800	1.30	20.1	2.8 U	49.5	30.0 J	7.04	NR
BACKGROUND	0.8 UJX	18.9 J	117	3.5	5.1	1.9	13.5	8300	0.03	1480	4.5	93.2	9.4 UJ	130	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENTIAL		SULFUR ACID BASE POTENTIAL		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENTIAL	
	%	1/10000	%	1/10000	%	1/10000	%	1/10000	%	1/10000	%	1/10000
25-258-WR1	0.08	2.50	-0.33	-2.8	0.08	0.08	<0.01	<0.01	0.00	0.00	-0.33	-0.33

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	TOTAL DISSOLVED SOLIDS		CHLORIDE		SULFATE		NO3/NO2-N		CYANIDE		HARDNESS CALC.	
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg CaCO3/L	mg CaCO3/L
25-258-AD1	56	<5	24	0.06	NR							
25-258-SW1	5.0	<5	20	0.06	NR							
25-258-SW2	5.0	<5	18	0.06	NR							
25-258-SW3	44	<5	14	0.06	NR							

Wet Chemistry  
 Results in mg/l

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC.
25-258-AD1	0.12 U	5.0	5.8	4.0 UX	8.4 U	6.8 U	5.9 U	762	0.08 U	134	14.4 U	1.5	51.6 U	44.2 J	18.6
25-258-SW1	0.28	7.8	9.5	4.0 UX	8.4 U	6.8 U	5.9 U	1150	0.08 U	160	14.4 U	2.0	51.6 U	40.3 J	16.5
25-258-SW2	0.25	3.7	8.4	4.0 UX	8.4 U	6.8 U	5.9 U	347	0.08 U	118	14.4 U	1.4	51.6 U	38.6 J	14.4
25-258-SW3	0.12 U	2.4	9.7	4.0 UX	8.4 U	6.8 U	5.9 U	490	0.08 U	74.5	14.4 U	2.0	51.6 U	52.2 J	9.4

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

LEGEND

SE1 - Determination of site and soil discharge in West Fork of the West Fork of Blaine Creek.  
 SE2 - Determination of part of dump and upstream of soil discharge.  
 SE3 - Upstream of mine in West Fork of the West Fork of Blaine Creek.  
 WR1 - Composite of the subsurface WELA through LC.  
 BACKGROUND - From the Pioneer Sampling Map (05-258-081).

AD1 - All discharges into WR1.  
 SW1 - Same as sample 25-258-SE1.  
 SW2 - Same as sample 25-258-SE2.  
 SW3 - Same as sample 25-258-SE3.

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

Mine/Site Name: <u>Peter</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 8N R 5W</u>	Section(s): <u>SW 1/4, SW 1/4, Section 20</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Au, Ag, Silica</u>
Latitude: <u>N 46° 25' 27.2"</u>	Primary Drainage: <u>Banner Creek</u>
Longitude: <u>W 112° 15' 42.7"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>West Fork Banner Creek</u>
Quad: <u>Three Brothers</u>	Date Investigated: <u>July 28, 1994</u>
Inspectors: <u>Tuesday, Clark, West</u>	P.A. # <u>25-259</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- No mill tailings were observed at the site.
- The volume of waste rock observed at the site was estimated to be 730 cubic yards. The following elements were elevated to at least three times the background concentrations:  
Arsenic: 142J mg/kg  
Mercury: 0.78 mg/kg
- One discharging adit was associated with the site. The flow from the adit eventually reached a tributary of the West Fork of Banner Creek. The MCL for cadmium and the acute and chronic aquatic life criteria for cadmium and zinc were exceeded in the adit discharge. Additionally, the chronic aquatic life criteria for iron and lead were exceeded in the adit discharge.
- A tributary to the West Fork of Banner Creek flows adjacent to the site on the east side. No observed releases to the tributary were documented; however, the chronic aquatic life criteria for lead was exceeded both upstream and downstream from the site.
- Potential safety hazards observed at the site included an unstable slope on the waste rock dump due to the dump being undercut by the stream.

Peter PA# 25-259  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 07/28/94

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	Ag (mg/Kg)	Au (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-259-SE1	0.9 UJX	93.7 J	20.5	1.5	27.4	1.4 U	20.5	14500	0.07	775	12.8	27.4	10.3 UJ	179	NR
25-259-SE2	1.4 UJX	117 J	46.4	1.3 U	17.2	4.4	43.7	32100	0.06	723	10.0	41.8	16.5 UJ	87.8	NR
25-259-WR1	2.0 JX	142 J	14.2	0.9	2.5	1.1 U	13.1	16500	0.78	225	3.8	22.7	8.5 UJ	23.6	NR
BACKGROUND	0.8 UJX	18.9 J	117	3.5	5.1	1.9	13.5	8300	0.03	1480	4.5	93.2	9.4 UJ	130	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	ACID BASE POTENTIAL	NEUTRAL POTENTIAL	SULFUR POTENTIAL	ORGANIC SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR POTENTIAL	PYRITIC SULFUR POTENTIAL	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)	
25-259-WR1	0.28	8.75	1.32	-7.4	0.25	<0.01	0.03	0.00	1.32	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	Ag	Au	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALCL (mg CaCO3/L)
25-259-AD1	0.12 U	10.2	110	5.5 JX	8.4 U	6.8 U	5.9 U	4870	0.08 U	329	14.4 U	1.6	51.6 U	95.7 J	28.0
25-259-SW1	0.12 U	2.9	5.5 U	4.0 UX	8.4 U	6.8 U	5.9 U	148	0.08 U	17.1	14.4 U	1.3	51.6 U	15.6 U	26.5
25-259-SW2	0.12 U	2.3	5.5 U	4.0 UX	8.4 U	6.8 U	5.9 U	102	0.08 U	9.3	14.4 U	1.6	51.6 U	15.6 U	25.2

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
25-259-AD1	9	<5	39	0.06	NR
25-259-SW1	59	<5	13	0.06	NR
25-259-SW2	60	<5	11	0.06	NR

LEGEND

SE1 - Determinants of risk in East Park of West Park of Barrow Creek  
 SE2 - Upstream of area in East Park of West Park of Barrow Creek  
 WR1 - Composite of WRIA through IC  
 BACKGROUND - From the Pasture Irrigation Mine (21-466-SE1)  
 AD1 - Air discharge on WEL  
 SW1 - Same as sample 25-259-SE1  
 SW2 - Same as sample 25-259-SE2

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

Mine/Site Name: <u>Queensbury</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 8N R 5W</u>	Section(s): <u>SE 1/4, NW 1/4, Section 21</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Au, Ag</u>
Latitude: <u>N 46° 25' 57"</u>	Primary Drainage: <u>Banner Creek</u>
Longitude: <u>W 112° 14' 03"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Banner Creek</u>
Quad: <u>Chessman Reservoir</u>	Date Investigated: <u>July 26, 1994</u>
Inspectors: <u>Tuesday, Clark, West</u>	P.A. # <u>25-262</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- No mill tailings were observed at the site.
- The volume of waste rock observed at the site was estimated to be 3,570 cubic yards of uncovered waste rock on-site. The following elements were elevated to at least three times the background concentrations:  
Silver: 27.8 mg/kg                      Arsenic: 63.6 mg/kg  
Copper: 50.5 mg/kg                      Mercury: 0.37JX to 0.41JX mg/kg  
Lead: 727J mg/kg
- One discharging adit was observed at the site which was routed through two settling ponds before discharging to Banner Creek. No MCLs were exceeded in the adit discharge; however, the acute and chronic aquatic life criteria for lead and zinc were exceeded.
- The adit discharge entered an intermittent drainage which was dry upstream from the site. Downstream from the site, the acute and chronic aquatic life criteria for cadmium and zinc and the chronic aquatic life criteria for lead were exceeded in this drainage.
- Potential safety hazards observed at the site included one collapsing cabin (low hazard potential).

Queensbury PA# 25-262  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 07/26/94

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)
25-262-SE1	3.1	34.4	90.1	2.1	9.7	5.1	29.6	8710	0.07 JX	897	5.9	156 J	11.7 UJ	140	NR
25-262-SE2	2.3	6.2 U	41.3	1.0 U	2.6	5.2	6.3	3900	0.03 UJX	129	3.5 U	22.4 J	12.6 UJ	61.2	NR
25-262-SE3	1.7	7.7 U	50.2	2.5	4.6	3.7	10.7	4860	0.03 UJX	937	3.3 U	48.1 J	11.7 UJ	156	NR
25-262-SE4	1.0 U	7.8 U	35.0	1.1	3.6	2.0	25.8	3870	0.03 UJX	934	3.4 U	23.9 J	12.0 UJ	191	NR
25-262-WR1	1.5	63.6	104	0.8 U	1.6 U	1.8	4.7	2010	0.41 JX	3.1	2.7 U	96.6 J	9.7 UJ	25.7	NR
25-262-WR2	27.8	31.7	85.9	0.9 U	1.9 U	2.5	50.5	8130	0.37 JX	56.0	3.2 U	727 J	11.5 UJ	86.3	NR
BACKGROUND	0.8 UJX	18.9 J	117	3.5	5.1	1.9	13.5	8300	0.03	1480	4.5	93.2	9.4 UJ	130	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 U/10000	NEUTRAL POTENT. U/10000	SULFUR ACID BASE POTENT. U/10000		SULFATE SULFUR %		PYRITIC SULFUR %		ORGANIC SULFUR %		PYRITIC SULFUR ACID BASE POTENT. U/10000		SULFUR ACID BASE POTENT. U/10000
				POTENT. U/10000	%	SULFUR %	%	SULFUR %	%	POTENT. U/10000	%			
25-262-WR1	0.02	0.62	0.03	-0.6	0.02	0.02	-0.01	0.00	0.03	0.03	0.03	0.03	0.03	-3.56
25-262-WR2	0.25	7.81	-1.69	-9.50	0.14	0.06	0.05	1.87						

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 C.A.L.C. (mg CaCO3/L)
25-262-AD1	0.23	11.7	50.7	4.0 UX	8.4 U	7.1	5.9 U	824	0.08 U	170	14.4 U	21.8 J	51.6 U	106 J	19.9
25-262-SW2	0.16	4.9	31.7	4.0 UX	8.4 U	6.8 U	5.9 U	222	0.08 U	55.1	14.4 U	5.0 J	51.6 U	86.9 J	18.9
25-262-SW3	0.15	2.5	41.5	4.3 JX	8.4 U	6.8 U	5.9 U	528	0.08 U	644	14.4 U	3.3 J	51.6 U	96.4 J	22.4
25-262-SW4	0.13	3.2	25.9	4.0 UX	8.4 U	6.8 U	5.9 U	268	0.08 U	351	14.4 U	3.8 J	51.6 U	164 J	47.4

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-262-AD1	33	<5	11	0.06	NR
25-262-SW2	406	<5	13	0.06	NR
25-262-SW3	54	<5	11	0.06	NR
25-262-SW4	84	<5	31	0.06	NR

LEGEND

- SE1 - Upstream sediment in discharge.
- SE2 - Below upper area of outlet.
- SE3 - Below lower sludge.
- SE4 - Below further discharge.
- WR1 - Composite of subsamples WR1A, WR1B, and WR1C.
- WR2 - Composite of subsamples WR2A, WR2B, WR2C, and WR2D.
- BACKGROUND - From the Pioneer Iron/Steel Mill (25-262-001).
- AD1 - Upper soil discharge (excavated and gated) with in Basin Check.
- SW2 - Same as sample 25-262-SE2.
- SW3 - Same as sample 25-262-SE3.
- SW4 - Same as sample 25-262-SE4.

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

Mine/Site Name: <u>Monte Cristo</u>	County: <u>Lewis and Clark</u>
Legal Description: T <u>8N</u> R <u>5W</u>	Section(s): <u>NW 1/4, NW 1/4, NW 1/4, Section 17</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Au, Ag, Cu, Pb</u>
Latitude: <u>N 46° 27' 4.7"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 15' 59.6"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Ruby Creek</u>
Quad: <u>Three Brothers</u>	Date Investigated: <u>July 25, 1994</u>
Inspectors: <u>Tuesday, Clark, West</u>	P.A. # <u>25-275</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- No mill tailings were observed at the site.
- The volume of waste rock observed at the site was estimated to be 5,935 cubic yards. The following elements were elevated to at least three times the background concentrations:

Silver: 23.6 mg/kg	Iron: 24,900 to 37,100 mg/kg
Arsenic: 243 to 540 mg/kg	Mercury: 0.11JX to 1.13JX mg/kg
Chromium: 6.7 mg/kg	Lead: 1,370J to 3,610J mg/kg
Copper: 61.9 to 121 mg/kg	Antimony: 42.1J to 184J mg/kg
- One discharging adit was observed at the site. The MCL for cadmium and the acute and chronic aquatic life criteria for cadmium, copper and zinc were exceeded in the adit discharge. Additionally, the chronic aquatic life criteria for mercury and lead were exceeded in the adit discharge.
- The adit discharge flows over a waste rock dump and entered a swamp area. The acute and chronic aquatic life criteria for copper and the chronic aquatic life criteria for lead were exceeded in a surface water sample collected from the swamp. An intermittent drainage extended downstream from the swamp; however, the drainage was dry during the investigation.
- Potential safety hazards observed at the site included three open shafts and one open adit.

Monte Cristo PA# 25-275  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 07/26/94

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)	Cu (mg/Kg)	Cr (mg/Kg)	Pb (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-275-WR1	1.9	243	79.4	1.9	61.9	6.7	1370 J	441	6.0	42.1 J	105	NR
25-275-WR2	23.6	540	129	4.2	121	3.3	3610 J	511	2.6 U	184 J	116	NR
BACKGROUND	0.8 UJX	18.9 J	117	3.5	13.5	1.9	93.2	1480	4.5	9.4 UJ	130	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		SULFATE		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000
25-275-WR1	0.02	0.62	3.87	3.25	<0.01	0.02	<0.01	0.02	<0.01	0.62	<0.01	0.62	3.25	
25-275-WR2	0.06	1.87	-0.23	-2.1	0.06	<0.01	0.06	<0.01	<0.01	0.00	<0.01	0.00	-0.23	

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Cu	Cr	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
25-275-AD1	0.51	23.1	21.3	6.4 JX	8.4 U	6.8 U	140	0.09	34.9	14.4 U	11.7 J	51.6 U	93.8 J	56.4
25-275-SW1	0.36	20.5	19.4	4.0 UX	8.4 U	6.8 U	110	0.08 U	25.6	14.4 U	3.4 J	51.6 U	35.8 J	53.4

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-275-AD1	95	<5	12	0.13	NR
25-275-SW1	84	<5	10	0.06	NR

LEGEND

NR1 - Composite of subsamples NR1A, 1B, and 1C  
 NR2 - One sample of the NR2 subsample  
 BACKGROUND - From the Pioneer Sampling Site (05-06-93)  
 AD1 - Add discharge over NR1  
 RW1 - Discharge after flowing through NR1 and into log

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

Mine/Site Name: <u>Upper Valley Forge</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 9N R 5W</u>	Section(s): <u>SW 1/4, NE 1/4, Sec. 33; NE 1/4, SW 1/4, NE 1/4, Sec. 33</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Au, Ag, Pb</u>
Latitude: <u>N 46° 29' 30"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 14' 28"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Tenmile Creek</u>
Quad: <u>Chessman Reservoir</u>	Date Investigated: <u>August 20, 1993</u>
Inspectors: <u>Bullock, Belanger/Pierson</u>	P.A. # <u>25-280 and 25-282</u>
Organization: <u>Pioneer Technical Services, Inc. /Thomas, Dean &amp; Hoskins, Inc.</u>	

- There were no mill tailings associated with this site.
- The volume of waste rock associated with this site was estimated to be approximately 13,000 cubic yards. The following elements were elevated at least three times background:

Arsenic: 5380 to 121,000 mg/kg	Copper: 134 to 645 mg/kg
Iron: 108,000	Mercury: 0.477 to 0.691mg/kg
Lead: 7360 to 48,700 mg/kg	Antimony: 80.1 to 826 mg/kg
Zinc: 685J mg/kg	
- There was one adit in the upper workings that may discharge during a spring snow-melt period. Water accumulated near the adit had a pH of 5.7 and a specific conductance of 560 umhos/cm.
- A small seep emanated from the toe of WR-1 and then flowed into the unnamed tributary to Tenmile Creek. At the time of this investigation, the seep discharge was less than 1 gpm, with a pH of 2.66 and a specific conductance of 2720 umhos/cm. The discharge exceeded MCL/MCLGs for arsenic, cadmium, copper, nickel, and antimony. Acute and chronic aquatic life criteria were exceeded for arsenic, cadmium, copper, lead, and zinc. The acute standard was also exceeded for iron.
- Observed releases were documented in the unnamed tributary for arsenic, cadmium, copper, iron, lead, and zinc. MCL/MCLGs were exceeded for arsenic and cadmium, both attributable to this site. Acute and chronic aquatic life criteria were exceeded for arsenic, cadmium, copper, lead, and zinc; all directly attributable to this site except for the chronic lead exceedance. This unnamed tributary entered Tenmile Creek downstream from the City of Helena drinking water intake.

Upper Valley Forge PA# 25-280 and 25-282  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BULLOCK  
 INVESTIGATION DATE: 08/20/93

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-280-SE-1	6340	38.3 J	29 J	17.9 J	6.32	414	28100	0.192	4040 J	3.95 U	2150	31.1	1610 J	NR
25-280-SE-2	92.6	37.7 J	2.7 J	3.37 J	7.25	14.3	9160	0.031 U	412 J	4.63	98.6	6.41 U	233 J	NR
25-280-WR-1	27200	8.13 J	5.7 J	2.2 J	2.48	134	30900	0.477	575 J	2.47 U	7360	88.2	685 J	NR
25-280-WR-2	5380	16.5 J	0.5 U	1.94 J	3.35	222	21200	0.386	28.7 J	2.38 U	8080	80.1	287 J	NR
25-280-WR-3	121000	1.82 J	1.7 J	3.81 J	1.33 U	645	108000	0.691	7.86 J	2.47 U	48700	826	171 J	NR
BACKGROUND	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR		SULFUR ACID BASE POTENT	
	%	1/1000x	1/1000x	1/1000x	1/1000x	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x
25-280-WR-1	1.82	56.9	4.25	-53	0.86	0.4	0.56	12.5	0.55	27.2	87.2	-8.25	-30.9	-91.8
25-280-WR-2	2.07	64.7	-3.7	-68	0.65	0.87	0.55	27.2	11.8	87.2	-8.25	-30.9	-91.8	
25-280-WR-3	9.29	290	-4.7	295	<0.01	2.79	11.8	87.2						

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS
														CALC (mg CaCO3/L)
25-280-GW-1	23700 J	2.01 U	818	127	24.3 J	3710 J	184000 J	0.12 U	21700	112	2150	33.6	83300	381
25-280-SW-1	609 J	13.3	38.2	9.7 U	6.83 U	160 J	6820 J	0.12 U	1560	15.3	101	30.7 U	5320	116
25-280-SW-2	13.1 J	24.5	2.57 U	9.7 U	6.83 U	1.55 U	72.6 J	0.12 U	7.8	12.7 U	2.07	30.7 U	47.2	67.5

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Reported, ND - No Data

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS		CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
	<	>				
25-280-GW-1	2310	ND	<	1330	< 0.05	< 0.01
25-280-SW-1	235	<	5.0	134	< 0.05	< 0.01
25-280-SW-2	138	<	5.0	28	< 0.05	NR

LEGEND

- SE1 - Approx. 120' downgradient of waste rock dump 1 below confluence with seep
- SE2 - Upgradient of site
- WR1 - Composite of subsamples WR1A, 1B, 1C, 2A, 2B, and 3.
- WR2 - Composite of subsamples WR4 and 5.
- WR3 - Sample of the WR6 subsample.
- BACKGROUND - From the Red Water Mine (25-007-88-1).

(GW) -

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

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

Mine/Site Name: <u>National Extension</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 8N R 5W</u>	Section(s): <u>SE 1/4, SE 1/4, SW 1/4, Section 10</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Unknown</u>
Latitude: <u>N 46° 27' 12"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 12' 34"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Beaver Creek</u>
Quad: <u>Chessman Reservoir</u>	Date Investigated: <u>August 10, 1994</u>
Inspectors: <u>Tuesday, Flammang, West</u>	P.A. # <u>25-287</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- No mill tailings were observed at the site.
- The volume of waste rock observed at the site was estimated to be 7,530 cubic yards. The following elements were elevated to at least three times the background concentrations:

Silver: 31.1 to 58.5 mg/kg	Mercury: 3.07 to 10.7 mg/kg
Arsenic: 2,760 to 2,820 mg/kg	Lead: 5,790 to 12,900 mg/kg
Copper: 83.3 to 419 mg/kg	Antimony: 28.2J mg/kg
- One discharging adit was observed at the site. The discharge eventually merged with an unnamed tributary to Beaver Creek. The MCLs for arsenic and cadmium and the acute and chronic aquatic life criteria for arsenic, cadmium, copper, and zinc were exceeded in the adit discharge. Additionally, the chronic aquatic life criteria for iron and mercury were exceeded in the adit discharge.
- An unnamed tributary to Beaver Creek flows through the center of the site. Observed releases to the tributary (sediment) were documented for arsenic and lead. The MCL for cadmium was exceeded both upstream and downstream from the site; the MCL for arsenic was exceeded upstream from the site. The acute and chronic aquatic life criteria for cadmium, copper, and zinc and the chronic aquatic life criteria for mercury and lead were exceeded both upstream and downstream from the site. The acute aquatic life criteria for lead was exceeded downstream from the site; this exceedance was directly attributable to the site.
- Potential safety hazards observed at the site included an open pit and an unstable slope above a collapsed adit.

National Extension PA# 25-287  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 08/10/84

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)
25-287-SE1	1.5	486	62.5	14.2	9.6	3.3	293	11900	0.13	3320	2.9 U	991	10.4 UJ	716	NR
25-287-SE2	7.2 U	56.1 U	70.2	6.7 U	14.0 U	11.9	104	3910	0.33	2390	24.1 U	120	86.2 UJ	454	NR
25-287-WR1	58.5	2760	40.7	1.6	1.7 U	2.8	419	22500	10.7	781	3.0 U	12900	28.2 J	380	NR
25-287-WR2	31.1	2820	30.3	0.8	1.2 U	1.0	83.3	13300	3.07	21.7	2.1 U	5790	17.3 J	116	NR
BACKGROUND	0.8 UJX	18.9 J	117	3.5	5.1	1.9	13.5	8300	0.03	1480	4.5	93.2	9.4 UJ	130	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %		NEUTRAL POTENT. /10000		SULFUR ACID BASE POTENT. /10000		PYRITIC SULFUR %		ORGANIC SULFUR %		PYRITIC SULFUR ACID BASE POTENT. /10000		SULFUR ACID BASE POTENT. /10000	
	0.71	0.82	22.2	-0.55	-23	0.57	0.02	0.02	0.12	0.62	7.19	-1.17	-10.4	
25-287-WR1														
25-287-WR2														

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)
25-287-AD1	0.29	400	42.4	30.0	8.4 U	6.8 U	173	8300	0.17	2000	14.4 U	395	51.6 U	4490	54.8
25-287-SW1	0.16	45.3	27.2	20.3	8.4 U	6.8 U	76.7	851	0.16	780	14.4 U	91.0	51.6 U	2490	39.9
25-287-SW2	0.12 U	78.8	113	14.6	8.4 U	6.8 U	115	1230	0.29	5940	15.8	80.0	51.6 U	798	109

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-287-AD1	43	<5	44	<0.05	NR
25-287-SW1	68	<5	36	<0.05	NR
25-287-SW2	<4.0	<5	6.0	<0.05	NR

LEGEND

SE1 - 75 divergences of WEL.  
 SE2 - 250' above pond about 4' below spring which has a creek.  
 WR1 - Composite of subsurface WEL1, 1B, and 1C.  
 WR2 - Composite of subsurface WEL2, 2B, and 2C.  
 BACKGROUND - From the Pioneer Heavy/Log Mine (25-286-881).  
 AD1 - Discharge from well associated with WEL2, approx. 6' above emerging from ground.  
 SW1 - Same as sample 25-287-SW1.  
 SW2 - Same as sample 25-287-SW2.

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

Mine/Site Name: <u>Monitor Creek Tailings</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 8N R 6W</u>	Section(s): <u>NW 1/4, SE 1/4, NW 1/4, Section 24</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Millsite/Unknown</u>
Latitude: <u>N 46° 25' 46"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 17' 56"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Monitor Creek</u>
Quad: <u>Three Brothers</u>	Date Investigated: <u>August 3, 1994</u>
Inspectors: <u>Tuesday, Bisch, Flammang, West</u>	P.A. # <u>25-503</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings observed at the site was estimated to be 19,650 cubic yards. The tailings are located in two separate areas with approximately 6,740 cubic yards located directly in or very near the Monitor Creek drainage. The following elements were elevated to at least three times the background concentrations:  
Silver: 4.8J to 4.9J mg/kg  
Mercury: 1.79 mg/kg
- No waste rock dumps were observed at the site during the investigation; however, there was evidence of extensive placer workings in Monitor Creek both upstream and downstream from the site.
- An observed release to Monitor Creek (sediment) was documented for silver. No MCLs were exceeded in Monitor Creek; however, the acute and chronic aquatic life criteria for copper and zinc were exceeded both upstream and downstream from the site. Additionally, the chronic aquatic life criteria for mercury and lead were exceeded both upstream and downstream from the site.
- No hazardous openings or structures were observed at the site during the investigation; however, one tailings pile was being undercut by the stream, thus, creating an unstable bank.

Monitor Creek Tailings PA# 25-503  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 08/03/94

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)
25-503-SE1	3.4 J	30.2	12.3	0.9 U	2.4 J	1.5 U	11.8	10100	1.00	236 JX	3.4	63.2	11.5 UJ	28.2	NR
25-503-SE3	4.2 J	9.6	2.8	0.9 U	1.8 UJ	1.5 U	3.1	3810	0.23	5.6 JX	3.2 U	28.9	11.3 UJ	7.6	NR
25-503-SE4	1.4 J	9.0 U	10.1	1.3	2.2 UJ	1.8 U	6.7	7090	0.08	9.4 JX	3.9 U	50.9	13.8 UJ	12.7	NR
25-503-TP1	4.8 J	15.2	11.4	0.8 U	1.8 UJ	1.4 U	6.2	9250	1.79	18.0 JX	3.0 U	51.9	10.8 UJ	17.9	<0.275
25-503-TP2	4.9 J	7.4 U	4.9	0.9 U	1.8 UJ	1.5 U	4.1	4750	0.38	3.3 JX	3.2 U	35.9	11.3 UJ	7.4	<0.275
BACKGROUND	1.0 U	84.1 J	67.8 J	1.0 UJ	2.5	2.5 J	55.9	7500 JX	0.24 JX	442 J	3.5 U	53.3	12.5 UJ	57.6	

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		SULFUR ACID BASE POTENT		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000
25-503-TP1	0.02	0.62	1.22	0.59	0.02	<0.01	<0.01	<0.01	0.00	1.22
25-503-TP2	0.01	0.31	0.03	-0.3	0.01	<0.01	<0.01	0.00	0.00	0.03

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)
25-503-SW3	0.12 U	1.1 U	29.5	4.0 U	8.4 U	6.8 U	7.4	857	0.17 JX	183	14.4 U	12.2	51.6 U	204	26.5
25-503-SW4	0.12 U	1.1 U	28.2	4.9	8.4 U	6.8 U	9.6	687	0.08 JX	136	14.4 U	10.5	51.6 U	209	17.8

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-503-SW3	67	<5.0	35	0.05	NR
25-503-SW4	58	<5.0	33	0.09	NR

LEGEND

- SE1 - Determination and in Toxicity CR cell, and of TP1 when bench data is Toxicity CR.
- SE3 - Determination of TP2 in Mobile Creek.
- SE4 - Synthesis of TP2 in Mobile Creek, determinations of mobile creek workings.
- TP1 - Composite of TP1-A, 1A-2, 1B-1, 1B-2, 1C-1, and 1C-2.
- TP2 - Composite of TP2-A, 2A-1, 2B-1 through 2B-3, and 2C-1 through 2C-4.
- BACKGROUND - From the Synthesis Mile (22-831-881).
- EW - Same as sample 25-503-883.
- EW - Same as sample 25-503-884.

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

Mine/Site Name: <u>Bear Gulch</u>	County: <u>Lewis and Clark</u>
Legal Description: T <u>9N</u> R <u>5W</u>	Section(s): <u>NW 1/4, NE 1/4, NW 1/4, Section 17</u>
Mining District: <u>Rimini</u>	Mine Type: <u>Hardrock/Au</u>
Latitude: <u>N 46° 32' 32"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 15' 43"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Bear Gulch</u>
Quad: <u>MacDonald Pass</u>	Date Investigated: <u>August 16, 1994</u>
Inspectors: <u>Tuesday, Bisch, West</u>	P.A. # <u>25-504</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- No mill tailings were observed at the site.
- The volume of waste rock observed at the site was estimated to be 4,720 cubic yards. The following element was elevated to at least three times the background concentrations:  
Copper: 129 mg/kg
- One discharging adit was observed at the site. The discharge was contained in a small lined pond after flowing a short distance. The MCL for cadmium and the acute and chronic aquatic life criteria for cadmium and copper were exceeded in the adit discharge. Additionally, the chronic aquatic life criteria for mercury was exceeded in the adit discharge.
- Bear Gulch flows adjacent to the site on the south side. The MCL for cadmium, as well as the acute and chronic aquatic life criteria for cadmium, were exceeded in the downstream sample. The chronic aquatic life criteria for mercury was exceeded both upstream and downstream from the site. None of these exceedances were attributable to the site.
- No hazardous openings or structures were located at the site.

**Bear Gulch Mine PA# 25-504  
AMRB HAZARDOUS MATERIALS INVENTORY  
INVESTIGATOR: PIONEER · TUESDAY  
INVESTIGATION DATE: 08/16/94**

**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)
25-504-SE1	1.4 U	10.7 U	297	1.4	3.2	12.7	54.2	25000	0.13	508 J	13.9	14.1 U	16.5 U	47.9	NR
25-504-SE2	1.8 U	14.1 U	195	1.8	4.9	5.4	29.3	10200	0.16	366 J	7.8	34.6	21.6 U	53.8	NR
25-504-WR1	12.0	81.6	82.4	0.9	2.0	6.4	129	36100	0.11	268 J	3.1	229	7.4 U	44.0	NR
BACKGROUND	NR	87 J	84.6	2.5	11.9	7.4 J	21 J	16200	0.053	1130	8 J	144 J	6 UJ	167	NR

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

**Acid/Base Accounting**

FIELD ID	TOTAL SULFUR %	ACID BASE POTENTIAL	NEUTRAL POTENTIAL	SULFUR ACID BASE POTENTIAL	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)
25-504-WR1	0.45	14.1	10.1	-4	0.43	<0.01	0.02	0.00	10.1							

**WATER MATRIX ANALYSES**

**Metals in Water  
Results in ug/L**

FIELD ID	Ag	As	Ba	Cd	Ca	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO <sub>3</sub> /L)
25-504-AD1	0.12 U	1.1	5.5 U	8.1 JX	11.3	6.8 U	27.3	151	0.21	48.0	14.4 U	0.6	51.8 U	15.6 U	155
25-504-SW1	0.12 U	1.4	28.7	10.6 JX	12.3	6.8 U	5.9 U	149	0.21	4.0	14.4 U	0.8	51.6 U	15.6 U	43.1
25-504-SW2	0.12 U	1.2	30.3	4.0 UX	8.4 U	6.8 U	5.9 U	189	0.22	13.3	14.4 U	0.7	51.8 U	15.6 U	43.0

**Wet Chemistry  
Results in mg/l**

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO <sub>3</sub> NO <sub>2</sub> -N	CYANIDE
25-504-AD1	144	<5	78	<0.05	NR
25-504-SW1	35	<5	11	<0.05	NR
25-504-SW2	36	<5	12	<0.05	NR

**LEGEND**

SE1 - Determination from sample in Bear Gulch

SE2 - Duplicate from site in Bear Gulch

WR1 - Composite of subsurface WS1A, 1B, 1C, and 1D

BACKGROUND - From the Bear Gulch Mine (05-087-051) (0-95) Data

AD1 - All discharge above waste rock dump 1, north of road and Bear Gulch

SW1 - Same as sample 25-504-SE1

SW2 - Same as sample 25-504-SE2

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

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

Mine/Site Name: <u>Franklin</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 10N R 4W</u>	Section(s): <u>SE 1/4, NW 1/4, Sec. 11</u>
Mining District: <u>Scratch Gravel</u>	Mine Type: <u>Hardrock/Ag. Cu, Au, Pb</u>
Latitude: <u>N 46° 38' 22"</u>	Primary Drainage: <u>Tenmile Creek</u>
Longitude: <u>W 112° 04' 25"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Tenmile Creek</u>
Quad: <u>Scratchgravel Hills</u>	Date Investigated: <u>August 31, 1993</u>
Inspectors: <u>Tuesday, Flammang/Pierson</u>	P.A. # <u>25-339</u>
Organization: <u>Pioneer Technical Services, Inc./Thomas, Dean and Hoskins, Inc.</u>	

- The volume of tailings associated with this site was estimated to be 1,100 cubic yards. The following elements were elevated at least three times background:  
Cadmium: 5.22 mg/kg                      Lead: 1,250 mg/kg  
Copper: 199 mg/kg                         Zinc: 832 mg/kg
- The volume of waste rock associated with this site was estimated to be 12,035 cubic yards. The following elements were elevated at least three times background:  
Arsenic: 223 mg/kg                        Lead: 358 to 6,170 mg/kg  
Cadmium: 4.10 mg/kg                      Zinc: 314 mg/kg  
Copper: 128 to 1,190 mg/kg              Mercury: 0.257 to 0.612 mg/kg  
Antimony: 22.6 mg/kg
- The volume of CN heap leach material associated with this site was estimated to be 10,000 cubic yards. The concentration of cyanide in the material was measured at 0.366 mg/kg; additionally, the following elements were elevated at least three times background:  
Cadmium: 3.00 mg/kg                      Zinc: 372 mg/kg  
Copper: 142 mg/kg                         Lead: 502 mg/kg
- There were no adit discharges, seeps, springs, or streams associated with this site. A grate placed over the shaft disallowed sampling of groundwater.
- Five potentially hazardous structures and one caving shaft were located on site. The majority of site was enclosed by barbed wire fences and locked gates.

Franklin Mine PA# 25-339  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER-TUESDAY  
 INVESTIGATION DATE: 8/31/93

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	Au (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-339-LP-1	12.2	75.6	3.00	8.5	3.39	142	25800	0.164	1360	7.8	502	< 6.15	372	0.366
25-339-LP-3	NR	0.666												
25-339-TP-1	71.7	33	5.22	5.86	7.11	199	17500	0.079	617	5.35	1250	< 6.19	832	NR
25-339-WR-1	223	29.6	4.10	4.79	2.91	1190	37200	0.612	689	5.61	6170	22.6	314	NR
25-339-WR-2	13.8	78.4	0.74	6.35	2.64	128	22500	0.257	968	3.31	358	< 5.11	117	NR
BACKGROUND	27.1	165	1.32	13.6	17.9	29.7	23300	0.071	672	17.9	36.3	< 6.98	76.4	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		ACID BASE		SULFATE		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR		ACID/BASE POTENT	
	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x	%	1/1000x
25-339-LP-1	0.45	14.1	22	7.92	0.04	0.04	0.05	0.36	1.56	20.4	0.06	0.06	0.36	1.56	0.05	20.4
25-339-LP-3	0.2	6.25	119	112	0.08	0.08	0.04	0.08	1.25	117	0.04	0.04	0.08	1.25	0.04	117
25-339-TP-1	0.29	9.06	7.03	-2	0.15	0.15	0.03	0.11	0.94	6.09	0.03	0.03	0.11	0.94	0.03	6.09
25-339-WR-1	4.6	144	-5.5	-149	2.23	2.23	1.4	0.97	43.7	-49.2	1.4	1.4	0.97	43.7	1.4	-49.2
25-339-WR-2	1.18	36.9	2.95	-34	0.64	0.64	<0.01	0.56	0	2.95	<0.01	<0.01	0.56	0	<0.01	2.95

LEGEND

LP1 - Composite of subsamples LP1A, 1B, and 2.  
 LP3 - Sample of LP3  
 WR1 - Composite of the subsamples WR1 and 3A through 3D.  
 WR2 - Composite of subsamples 2A through 2C and 5  
 BACKGROUND - On ridge SE of waste rock dump 1 and SW of WR2C.  
 TP1 - Composite of subsamples TP1A and 1B.

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

Mine/Site Name: <u>NE NW S13</u>	County: <u>Lewis and Clark</u>
Legal Description: T <u>13N</u> R <u>7W</u>	Section(s): <u>NE 1/4, NW 1/4, Sec. 13</u>
Mining District: <u>Stemple</u>	Mine Type: <u>Millsite/Unknown</u>
Latitude: <u>N 46° 53' 33"</u>	Primary Drainage: <u>Virginia Creek</u>
Longitude: <u>W 112° 26' 08"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Fool Hen Creek</u>
Quad: <u>Stemple Pass</u>	Date Investigated: <u>August 30, 1993</u>
Inspectors: <u>M. Babits, S. Babits</u>	P.A. # <u>25-197</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings associated with this site was estimated to be approximately 175,000 cubic yards. The following elements were elevated at least three times background:  
Lead: 256J mg/kg
- No waste rock was observed at this site during the investigation.
- One discharging adit was identified at the site. At the time of the site visit, this flowing adit made up the entire flow in Fool Hen Creek. Surface water and sediment samples were collected upstream and downstream from the site in Fool Hen Creek. The MCL for arsenic was exceeded in the downstream sample; however, this exceedance was not attributable to the site. An observed release to Fool Hen Creek was documented for lead. Acute and chronic aquatic life criteria were exceeded for copper in the upstream sample. The chronic aquatic life criteria for lead was exceeded in the downstream sample, which was directly attributable to the site.
- Potential safety hazards identified at the site included an open adit and five collapsing cabins.

NE NW Section 13 PA# 25-197  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BABITS  
 INVESTIGATION DATE: 08/30/93

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)
25-197-SE-2	4.97 U	42.2 JX	1.1 J	1.04 U	6.89	18.9	2680	5.66 JX	239	2.26 U	59.9 J	6.57 UJ	72.3	2.61
25-197-TP-1	10.5	124 JX	1.8 J	2.48	17.5	33.3	6140	1.55 JX	599	7.43 J	87.1 J	5.65 UJ	195	NR
25-197-TP-2	13.7	134 JX	3.5 J	1.55	17.9	78	7250	0.313 JX	1260	8.55 J	256 J	7.12 UJ	317	2.2
BACKGROUND	21.3	145 JX	1.4 J	5.28	8.61	29.6	11900	0.758 JX	889	12.3 J	60.3 J	8.01 UJ	121	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT	
	%	1/1000	1/1000	%	1/1000	%	1/1000	%	1/1000	%	1/1000	
25-197-TP-1	<0.01	0	139	<0.01	139	0.01	0	0.01	0.01	0	139	
25-197-TP-1DUP	<0.01	0	136	<0.01	136	0.01	0	0.01	0.01	0	136	
25-197-TP-2	0.47	14.7	2.58	0.3	-12	0.03	4.37	0.03	0.03	4.37	-1.8	

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)
25-197-SW-1	5.83 J	416	2.57 U	9.7 U	13.3 J	31.3 J	11.8 UX	0.12 U	4.08 U	12.7 U	2.55 J	30.7 U	7.57 U	116
25-197-SW-2	90.8 J	396	2.57 U	9.7 U	6.83 U	4.9 J	73.2 JX	0.12 U	26.8	12.7 U	24.5 J	30.7 U	7.57 U	116

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-197-SW-1	119	< 5	5	0.13	< 0.005
25-197-SW-2	127	< 5	6	0.08	< 0.005

LEGEND

SE2 - Downgradient (7.5') from tailings pond 1 in Fool Hen Creek  
 TP1 - Composite of subsamples TP1A-A, 1A-B, and 1B-A  
 TP2 - Composite of subsamples TP2A-C, 1B-B, and 1B-C  
 BACKGROUND - From SE SW Sec 10 (25-212-SS-1)  
 SW2 - Same as sample SE2



Swansea Tailings PA# 25-208  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BULLOCK  
 INVESTIGATION DATE: 09/01/93

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)
25-208-SE-1	19.1 J	61 J	6.3	3.15 J	13.2 J	1160 JX	5730	0.047 UX	146	7.92 J	863	11.8 J	275 J	NR
25-208-SE-2	4.24 U	67.6 J	0.8 U	4.22 J	16.7 J	15.2 JX	8190	0.031 UX	291	11.6 J	24.2	5.6 UJ	49.3 J	NR
25-208-TP-1	49.5 J	29.5 J	25.0	1.59 J	6.44 J	2010 JX	5230	0.033 UX	183	3.46 J	2510	39.1 J	503 J	4.14
25-208-WR-1	32.8 J	67.9 J	6.4	4.77 J	16.5 J	1050 JX	7760	0.179 JX	285	12.1 J	815	22.5 J	217 J	NR
25-208-WR-2	22.5 J	173 J	13.4	8.38 J	19.4 J	1910 JX	13900	0.318 JX	1130	22.4 J	1610	5.97 UJ	629 J	NR
25-208-WR-3	8.2 J	80.6 J	13.5	4.34 J	14.8 J	361 JX	7230	0.736 JX	425	14.2 J	361	5.86 UJ	239 J	NR
BACKGROUND	19.5 J	168 J	1 U	9.67 J	36.5 J	228 JX	12800	0.033 UX	468	30.4 J	34.4	6.95 UJ	66.9 J	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENTIAL		SULFUR ACID BASE POTENTIAL		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENTIAL	
	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x	%	U/1000x
25-208-TP-1	<0.01	0	3.23	3.23	<0.01	<0.01	<0.01	0	<0.01	<0.01	3.23	3.23
25-208-WR-1	<0.01	0	9.64	9.64	<0.01	<0.01	<0.01	0.31	<0.01	9.33	8.18	8.18
25-208-WR-2DUP	<0.01	0	8.18	8.18	<0.01	<0.01	<0.01	0	<0.01	8.42	8.42	8.42
25-208-WR-2	<0.01	0	8.42	8.42	<0.01	<0.01	<0.01	0	<0.01	8.42	8.42	8.42
25-208-WR-3	<0.01	0	37.3	37.3	<0.01	<0.01	<0.01	0.31	<0.01	37.3	37.3	37.3

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)
25-208-SW-1	7.15 J	62.9	2.57 U	9.7 U	11.9 J	21.3 J	265 JX	0.12 U	17.5	12.7 U	4.32 J	30.7 U	9.5	90.9
25-208-SW-2	3.92 J	88.8	2.57 U	9.7 U	12.6 J	15.2 J	19.4 JX	0.12 U	4.13	12.7 U	2.53 J	30.7 U	7.6	78.2
25-208-SW-3	1.18 U	91.4	4.59 U	5 U	6.24 U	2.33 U	14.7	0.12 U	3.76 U	10.9 U	0.82	31.7 U	11.5	73.6

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CELORIDE	SULFATE	NO3/NO2/N	CYANIDE
25-208-SW-1	117	< 5	10	0.11	NR
25-208-SW-2	106	< 5	9	0.07	NR
25-208-SW-3	77	< 5	5	0.15	NR

LEGEND

- SE1 - Upgradient of mine and confluence, 40' up from road crossing
- SE2 - Swansea Gulch, downgradient of waste rock dump 5
- TP1 - Composite of subsamples TP1A-A through 1A-C
- WR1 - Composite of subsamples WR1, 2A, 2B, 3A, and 3B
- WR2 - Composite of subsamples WR4A through 4D
- WR3 - Composite of subsamples WR5A and 5B
- BACKGROUND - From the Swansea Tailings (25-208-SS-1)
- WR2DUP - Duplicate of the 25-208-WR-2 sample
- SW1 - Same as sample SE1.
- SW2 - Same as sample SE2.
- SW3 - Acid discharge at waste rock dump 5

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

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

Mine/Site Name: <u>SE SW S10</u>	County: <u>Lewis and Clark</u>
Legal Description: T <u>13N</u> R <u>7W</u>	Section(s): <u>SE 1/4, SW 1/4, Sec. 10</u>
Mining District: <u>Stemple</u>	Mine Type: <u>Millsite/Unknown</u>
Latitude: <u>N 46° 53' 38"</u>	Primary Drainage: <u>Canyon Creek</u>
Longitude: <u>W 112° 28' 45"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Virginia Creek</u>
Quad: <u>Stemple Pass</u>	Date Investigated: <u>August 30, 1993</u>
Inspectors: <u>M. Babits, S. Babits</u>	P.A. # <u>25-212</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings associated with this site was estimated to be approximately 2,750 cubic yards. The following elements were elevated at least three times background:  
Copper: 92.8 mg/kg      Mercury: 8.15JX mg/kg  
Lead: 215J mg/kg
- No waste rock was observed at the site during the investigation.
- No discharging adits, filled shafts, seeps, or springs were identified at the site.
- No surface water or sediment samples were collected during the investigation, due to the lack of direct runoff routes to surface water located nearest to the site.
- No hazardous mine openings were identified at the site; however, the mill building was collapsing and potentially hazardous.

SE SW Section 10 PA# 25-212  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - BABITS  
 INVESTIGATION DATE: 08/30/93

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)
25-212-TP-1	47.6	278 JX	2.9 J	5.86	4.24	92.8	14300	8.15 JX	803	11.7 J	215 J	6.28 UJ	190	0.305 U
BACKGROUND	21.3	145 JX	1.4 J	5.28	8.61	29.6	11900	0.758 JX	889	12.3 J	60.3 J	8.01 UJ	121	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE		SULFUR ACID BASE POTENT	
	%	<0.01	%	170	%	170	%	<0.01	%	<0.01	%	0	%	170
25-212-TP-1	<0.01	<0.01	0	170	<0.01	170	<0.01	<0.01	<0.01	<0.01	0	0	<0.01	170

LEGEND

TP1 - Composite of subsamples TP1A-A, 1B-A, and 1B-B  
 BACKGROUND - On East side of Virginia Creek  
 From SE SW Sec 10 (25-212-SS-1)

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

Mine/Site Name: <u>Astor</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 13N R 7W</u>	Section(s): <u>NE 1/4, NE 1/4, Sec. 23</u>
Mining District: <u>Stemple</u>	Mine Type: <u>Hardrock/Unknown</u>
Latitude: <u>N 46° 52' 34"</u>	Primary Drainage: <u>Virginia Creek</u>
Longitude: <u>W 112° 26' 54"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private/Public</u>	Secondary Drainage: <u>Gould Creek</u>
Quad: <u>Stemple Pass</u>	Date Investigated: <u>August 31, 1993</u>
Inspectors: <u>M. Babits, S. Babits</u>	P.A. # <u>25-227</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings associated with this site was estimated to be approximately 2 cubic yards. Due to the extremely small volume, no samples were collected for laboratory analysis.
- The volume of waste rock associated with this site was estimated to be approximately 25,000 cubic yards; however, no metals concentrations were elevated significantly above background.
- One discharging adit was identified at the site; the adit discharge entered Gould Creek after flowing through the waste rock pile located on site. No MCLs were exceeded in the adit discharge; however, the chronic aquatic life criteria for lead. The adit discharge pH measurement was 7.65.
- Surface water and sediment samples were collected upstream and downstream from the site in Gould Creek. No MCLs were exceeded; however, the chronic aquatic life criteria for mercury was exceeded in both upstream and downstream samples. The chronic aquatic life criteria for lead was exceeded in the downstream sample. Concentrations of barium, cobalt, copper, iron, nickel, and lead were elevated (>3X) in the downstream sediment sample, compared to the upstream sediment sample.
- No hazardous mine openings were identified at the site.

**Astor PA# 25-227**  
**AMRB HAZARDOUS MATERIALS INVENTORY**  
**INVESTIGATOR: PIONEER - BABITS**  
**INVESTIGATION DATE: 08/31/93**

**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)
25-227-SE-1	7.15	51.8 JX	1.7 J	2.47	5.41	23	6980	15.1 JX	200	3.06 J	65.7 J	6.26 UJ	103	0.314 U
25-227-SE-2	19	187 JX	3.7 J	9.12	11.4	104	21700	17.7 JX	552	13.2 J	231 J	12.5 UJ	221	0.672 U
25-227-WR-1	48.7	84.1 JX	2.0 J	8.62	3.14	80.5	28500	0.203 JX	946	3.71 J	149 J	4.88 UJ	155	NR
BACKGROUND	21.3	145 JX	1.4 J	5.28	8.61	29.6	11900	0.758 JX	889	12.3 J	60.3 J	8.01 UJ	121	NR

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

**Acid/Base Accounting**

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		ORGANIC SULFUR		PYRITIC SULFUR		PYRITIC SULFUR ACID BASE POTENT.	
	%	/1000x	%	/1000x	%	/1000x	%	/1000x	%	/1000x	%	/1000x
25-227-WR-1	<0.01	0	40.2	40.2	<0.01	<0.01	<0.01	<0.01	0	40.2		

**WATER MATRIX ANALYSES**

**Metals in Water**  
**Results in ug/L**

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn (mg CaCO3/L)	HARDNESS CALC.
25-227-SW-1	7.24 J	76.3	2.57 U	9.7 U	6.83 U	9.3 J	51.7 JX	0.14	11.7	12.7 U	3.01 J	30.7 U	7.57 U	115
25-227-SW-2	13.4 J	61.9	2.57 U	9.7 U	6.83 U	11.7 J	121 JX	0.78	12.6	12.7 U	5.9 J	30.7 U	13.5	115
25-227-SW-3	16.8 J	9.8	2.57 U	9.7 U	6.83 U	1.55 U	101 JX	0.12 U	4.08 U	12.7 U	5.08 J	30.7 U	7.57 U	90.1

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

**Wet Chemistry**  
**Results in mg/l**

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
25-227-SW-1	139	< 5	5	< 0.05	< 0.005
25-227-SW-2	128	< 5	7	< 0.05	< 0.005
25-227-SW-3	120	< 5	6	0.09	NR

**LEGEND**

- SE1 - Upgradient (175') in Gould Creek (mill building)
- SE2 - Downgradient (270') in Gould Creek (cabin)
- WR1 - Composite of subsamples WR1A, 1B, and 1C.
- BACKGROUND - From SE SW Sec 10 (25-212-SS-1).
- SW1 - Same as sample SE1.
- SW2 - Same as sample SE2.
- SW3 - Add discharge at waste rock dump 1.

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

Mine/Site Name: <u>Jay Gould Mine and Millsite</u>	County: <u>Lewis and Clark</u>
Legal Description: <u>T 13N R 7W</u>	Section(s): <u>S 1/2, Section 14</u>
Mining District: <u>Stemple</u>	Mine Type: <u>Hardrock/Au. Ag</u>
Latitude: <u>N 46° 52' 44"</u>	Primary Drainage: <u>Virginia Creek</u>
Longitude: <u>W 112° 27' 19"</u>	USGS Code: <u>10030101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Gould Creek</u>
Quad: <u>Stemple Pass</u>	Date Investigated: <u>June 21, 1994</u>
Inspectors: <u>Tuesday, Belanger, Clark, West</u>	P.A. # <u>25-500</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings observed at the site was estimated to be 1,820 cubic yards. The following elements were elevated to at least three times the background concentrations:  
Cadmium: 9.5J mg/kg                      Zinc: 562J mg/kg  
Copper: 149 mg/kg                         Mercury: 115JX mg/kg  
Lead: 678 mg/kg
- The volume of waste rock observed at the site was estimated to be 7,730 cubic yards; however, no elements were significantly elevated (>3X) above background concentrations.
- One discharging adit was observed at the site. No MCLs or aquatic life criteria were exceeded in the adit discharge.
- Gould Creek flows through the center of the site. Observed releases to Gould Creek (sediment) were documented for mercury and lead. No MCLs or aquatic life criteria were exceeded in Gould Creek.
- Potential safety hazards observed at the site included the collapsed mill building, several collapsed cabins, and a steep highwall located above the adit.

Jay Gould Mine/Mill PA# 25-500  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 06/21/94

SOLID MATRIX ANALYSES

Metals in soils  
 Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
25-500-SE1	18	10.0	29.3 J	0.6 U	2.1 U	2.5 J	19.1	5680	1.13	218 J	2.0 U	48.8	7.2 U	79.8	NR
25-500-SE2	42.7	18.8	41.6 J	0.6 U	2.1 U	5.4 J	26.5	9280	34.6	162 J	4.6	100	7.2 U	80.4	NR
25-500-SE3	1.2 U	11.6 U	93.9 J	1.1 U	3.8 U	7.2 J	11.5	7380	0.21	235 J	5.8	16.1 U	12.9 U	44.3	NR
25-500-TP1	20.9	23.3	92.7	9.5 J	1.6 U	5.8	149	10200	115 JX	941	1.5 U	678	21.2 J	562 J	21.6
25-500-WR1	3	18.6	132	0.8	3.7	5.9	44.3	8480	0.66 JX	547	7.6	47.2	4.6 U	53.6 J	NR
BACKGROUND	NR	21.3	145 JX	1.4 J	5.28	8.61	29.6	11900	0.758 JX	889	12.3 J	60.3 J	8.01 UJ	121	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE POTENT		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR		SULFUR ACID BASE POTENT	
	%	1/10000	1/10000	%	1/10000	%	1/10000	%	1/10000	%	1/10000	%	1/10000	
25-500-TP1	<0.01	0.00	169	<0.01	169	<0.01	0.00	<0.01	<0.01	0.00	169	<0.01	0.00	
25-500-WR1	0.01	0.31	75.8	<0.01	75.5	<0.01	0.31	<0.01	<0.01	0.31	75.5	<0.01	0.31	

WATER MATRIX ANALYSES

Metals in Water  
 Results in ug/L

FIELD ID	Ag	Au	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC (mg CaCO3/L)
25-500-AD1	0.12 U	1.1 U	118	2.6 U	8.7 U	4.7 UX	4.6 U	9.4 U	0.11 U	4.4 U	8.0 U	1.6	29.4 U	13.2	114
25-500-SW1	0.12 U	1.5	78.1	2.6 U	8.7 U	5.7 JX	4.6 U	36.3	0.11 U	7.13	8.0 U	1.8	29.4 U	9.4	119
25-500-SW2	0.12 U	1.3	49.7	2.6 U	8.7 U	4.7 JX	4.6 U	20.5	0.11 U	7.1	8.0 U	1.5	29.4 U	4.67	109
25-500-SW3	0.12 U	1.3	38.4	2.6 U	8.7 U	4.7 UX	4.6 U	64.7	0.11 U	5.2	8.0 U	1.6	29.4 U	4.67	106

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3NO2-N	CYANIDE
25-500-AD1	140	<5	5.0	0.13	NR
25-500-SW1	178	<5.0	<5.0	<0.05	NR
25-500-SW2	126	<5	<5	<0.05	NR
25-500-SW3	110	<5	<5	<0.05	NR

LEGEND

SE1 - Description of fillings in Gault Creek  
 SE2 - Description of mine and openings of mill and fillings in Gault Creek  
 SE3 - Openings of mine in Gault Creek  
 TP1 - Composite of subsamples TP3A and TP3A-1 through 3A-1  
 WR1 - Composite of subsamples WR1A and 1B  
 BACKGROUND - From the SE SW Sec. 18 Mine (25-512-051) (1993 Data)

AD1 - All discharge on WELL  
 SW1 - Same as sample 25-500-SE1  
 SW2 - Same as sample 25-500-SE2  
 SW3 - Same as sample 25-500-SE3

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

Mine/Site Name: <u>Snowshoe</u>	County: <u>Lincoln</u>
Legal Description: T <u>28N</u> R <u>31W</u>	Section(s): <u>NE 1/4, NW 1/4, Sec. 7</u>
Mining District: <u>Libby</u>	Mine Type: <u>Hardrock/Pb, Zn, Ag</u>
Latitude: <u>N 48° 12' 17"</u>	Primary Drainage: <u>Snowshoe Creek</u>
Longitude: <u>W 115° 38' 42"</u>	USGS Code: <u>17010101</u>
Land Status: <u>Private</u>	Secondary Drainage: <u>Snowshoe Creek</u>
Quad: <u>Showshoe Peak</u>	Date Investigated: <u>August 4, 1993</u>
Inspectors: <u>Tuesday, Belanger, Lasher</u>	P.A. # <u>27-005</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings associated with this site was estimated to be approximately 5,000 cubic yards. The tailings were located within the floodplain of Snowshoe Creek. The following elements were elevated at least three times background:

Arsenic: 3,840J mg/kg	Mercury: 0.4 mg/kg
Cadmium: 142 mg/kg	Lead: 44,300 mg/kg
Copper: 664 mg/kg	Antimony: 109 mg/kg
Iron: 98,200 mg/kg	Zinc: 11,700 mg/kg
- The volume of waste rock associated with this site was estimated to be approximately 3,990 cubic yards. Some reclamation had been done on the lower dump (WR4). The following elements were elevated at least three times background:

Arsenic: 3,230 mg/kg	Mercury: 1.11 mg/kg
Cadmium: 81.8 mg/kg	Lead: 59,300 mg/kg
Copper: 545 mg/kg	Antimony: 120 mg/kg
Iron: 64,400 mg/kg	Zinc: 6,530 mg/kg
- There were no adit discharges associated with the site; however, an intermittent tributary to perennial Snowshoe Creek ran through the site. The tributary had a trickle of flow during the investigation which exceeded the MCL for cadmium. The downstream sample in Snowshoe creek also exceeded the MCL for cadmium. Acute aquatic life criteria were exceeded for cadmium, lead, and zinc in the tributary and Snowshoe Creek. Chronic aquatic life criteria were exceeded for cadmium, mercury, lead, and zinc in the tributary and Snowshoe Creek.
- Observed releases to Snowshoe Creek were documented for arsenic, cadmium, iron, lead, and zinc. The aquatic life criteria exceedances and the MCL exceedances for cadmium can be directly attributed to the site.
- The three open adits and several steep, unstable waste piles were accessible and potentially hazardous.

**Snowshoe PA# 27-005**  
**AMRB HAZARDOUS MATERIALS INVENTORY**  
**INVESTIGATOR: PIONEER - TUESDAY**  
**INVESTIGATION DATE: 08/04/93**

**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)
27-005-SE-1	17.2 J	12.5	1.09	5.63	1.46	10.1	15700	0.04	308	5.2	21.4	6.29 U	45.5	NR
27-005-SE-2	1350 J	6.45	115	7.82	1.78	226	78700	0.037	4580	5.4	8320	32.2	9270	NR
27-005-TP-1	3840 J	4.91	142	5.52	1.58 U	664	98200	0.4	1150	2.93 U	44300	109	11700	NR
27-005-WR-1	3230 J	7.58	81.8	8.44	1.73	545	64400	1.11	1120	6.16	59300	120	6530	NR
BACKGROUND	54.2 J	18.5	1.23	9.23	1.59 U	29.4	21400	0.061	475	11.8	196	7.15 U	213	NR

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

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT		SULFUR ACID BASE		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC ACID BASE		SULFUR ACID BASE	
	%	g/1000g	%	g/1000g	%	g/1000g	%	g/1000g	%	g/1000g	%	g/1000g	%	g/1000g
27-005-TP-1	1.62	50.6	3.74	115.5	-46.9	1.23	0.30	38.4	0.98	34.7	17.2	-34.7	-1.67	
27-005-WR-1	1.71	53.4	15.5	475	-37.9	0.55	0.98	17.2	17.2	1.67				

**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 CaCO <sub>3</sub> /L)
27-005-SW-1	0.987 J	2.97	2.57 U	9.7 U	6.83 U	1.67	35.1 J	0.180 JX	4.08 U	12.7 U	1.22 U	30.7 U	7.57 U	39.1
27-005-SW-2	4.43 J	4.63	14	9.7 U	6.83 U	2.77	45.2 J	0.210 JX	48.1	12.7 U	60.7 J	30.7 U	1030 J	41.7
27-005-SW-3	9.06 J	4.47	61.5	9.7 U	6.83 U	4.97	191 J	0.220 JX	175	12.7 U	82.3 J	30.7 U	5940 J	98.5

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

Wet Chemistry  
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO <sub>3</sub> /NO <sub>2</sub> -N	CYANIDE
27-005-SW-1	55	< 5.0	< 5.0	0.07	NR
27-005-SW-2	53	< 5.0	8	0.1	NR
27-005-SW-3	152	< 5.0	42	0.07	NR

**LEGEND**

- SE1 - Upgradient of mine in Snowshoe Creek.
- SE2 - Downstream of mine and most floodplain tailings.
- TP1 - In floodplain near base of mine.
- BACKGROUND - From Snowshoe Mine (27-005-SS-1)
- SW1 - Same as sample SE1
- SW2 - Same as sample SE2
- SW3 - Discharge from pipe under dump

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

Mine/Site Name: <u>Cherry Creek Millsite</u>	County: <u>Lincoln</u>
Legal Description: T <u>29N</u> R <u>31W</u>	Section(s): <u>SE 1/4, NW 1/4, Sec. 27</u>
Mining District: <u>Libby</u>	Mine Type: <u>Millsite/Unknown</u>
Latitude: <u>N 48° 14' 42"</u>	Primary Drainage: <u>Libby Creek</u>
Longitude: <u>W 115° 32' 50"</u>	USGS Code: <u>17010101</u>
Land Status: <u>Public</u>	Secondary Drainage: <u>Big Cherry Creek</u>
Quad: <u>Cable Mountain</u>	Date Investigated: <u>August 4, 1993</u>
Inspectors: <u>Tuesday, Belanger, Lasher</u>	P.A. # <u>27-006</u>
Organization: <u>Pioneer Technical Services, Inc.</u>	

- The volume of tailings associated with this site was estimated to be approximately 4,540 cubic yards. The tailings have been reclaimed and were moderately to well vegetated. The concentration of cyanide measured in the tailings was 0.867 mg/kg; additionally, the following elements were elevated at least three times background:

Arsenic: 546J mg/kg	Lead: 10,500 mg/kg
Cadmium: 22.5 mg/kg	Antimony: 39.2 mg/kg
Copper: 399 mg/kg	Zinc: 5,780 mg/kg
Mercury: 0.89 mg/kg	
- There were no adit discharges or seeps associated with this site. Big Cherry Creek flowed approximately 50 feet east of the site; however, no surface water samples were collected during the investigation. Three sediment samples were collected from Big Cherry Creek corresponding to upstream, probable point of entry, and downstream locations. An observed release to surface water was documented for arsenic in sediments.
- No groundwater samples were collected at this site during the investigation.
- The partially vegetated tailings that contained high concentrations of arsenic and lead were easily accessible by recreationalists.

Cherry Creek Mill PA# 27-006  
 AMRB HAZARDOUS MATERIALS INVENTORY  
 INVESTIGATOR: PIONEER - TUESDAY  
 INVESTIGATION DATE: 08/04/93

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)
27-006-SE-1	143 J	19.3	6.43	5.89	3.19	22.7	20500	0.02	777	9.55	795	6.82	616	NR
27-006-SE-2	470 J	22.4	15.4	7.44	3.49	33.8	62000	0.029	2720	8.07	1740	7.51	1150	NR
27-006-SE-3	199 J	16.7	8.57	5.12	2.79	42.7	40100	0.025	1790	7.11	1180	6.73 U	822	NR
27-006-TP-1	546 J	35.7	22.5	4.12	2.62	399	30300	0.89	384	5.39	10500	39.2	5780	0.867
BACKGROUND	54.2 J	18.5	1.23	9.23	1.59 U	29.4	21400	0.061	475	11.8	198	7.15 U	213	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 POTENTIAL	NEUTRAL POTENTIAL	SULFUR ACID BASE POTENTIAL	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE POTENTIAL	SULFUR ACID BASE POTENTIAL
27-006-TP-1	0.30	9.37	2.09	-7.28	0.14	0.11	0.05	3.44	-1.34

LEGEND

SE1 - Upgradient on Cherry Creek  
 SE2 - PPE to Cherry Creek  
 SE3 - Downgradient on Cherry Creek  
 TP1 - Sample of the subsample TP1A-B  
 BACKGROUND - From the Snowshoe Mine (27-005-SS-1)