Montana Abandoned Hardrock Mine Priority Sites

Hazardous Materials Inventory

Montana Department of Environmental Quality
Mine Waste Cleanup Bureau

USDA Forest Service, Region 1

USDOI Bureau of Land Management

Pioneer Technical Services, Inc.
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Inventory Genesis

Vic Andersen

- Coordinated effort by State and Federal Land/Site Managers.

- Standardized Assessment of Priority Sites applying consistent approach and applicable components of the USEPA’s Hazard Ranking System.
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Project Objectives

• To identify and prioritize the abandoned mine sites that presently pose the most threats to public health and safety and the environment

• To consistently collect data on each Priority Site to identify problems associated with each site and to directly compare and rank sites (All sampling and analysis methods strictly follow USEPA protocols to ensure consistent and accurate results).

• To develop a long-term strategy using statutory and financial resources available to systematically reduce the hazards associated with the prioritized abandoned mine sites
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Inventory Timeline

• 1991 – Preparation of the suspect list – MDSL/AMRB, MDNRC, USFS Region 1, USDOI/BLM

• 1992 – Inventory Preparations

• 1993 – 269 Site Investigations/Preliminary Reporting

• 1994 – 62 Additional Site Investigations (identified during 1993 field work), site ranking, report preparation

• 1995 – Final Reporting
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Inventory Preparation

• Contract with Pioneer Technical Services, Inc
• Inventory Form, SAP, LAP, QAPP, and HSP
• Records Search
  o MBMG Well Log Database
  o Montana Rivers Information System
  o MDHES Community Water Supplies Database
  o USGS streamflow monitoring reports
  o Population Estimates
  o Land ownership records
  o Historic Mine/Millsite operations Reports (USBM Circulars/USGS Bulletins/MBMG publications)
• Field Equipment Procurement/Training
• Access Agreements
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Field Work

Sampling

• 3 crews of 3 – staggered rotation 2 weeks field/1 week office
  o 2 new 4wd Field Trucks
  o MDSL Bell Jet Ranger
  o State-of the Art Field Equipment

Sampling performed on waste rock dumps, mill tailings, streams, ponds, adit discharges, flooded shafts, monitoring wells or adjacent domestic wells.

• Mill tailings were characterized spatially and vertically
• Composite waste rock samples were collected based on XRF field analysis results.
• Surface water sampling was performed to help understand overall impacts in drainage as well as document releases from site being investigated
• Site Mapping
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Testing/Analysis

Water
• Field – Flow Rate, pH, Specific Conductance, Alkalinity, Temperature.
• Laboratory - Total Metals (surface water) and Dissolved Metals (groundwater), TDS, Chlorides, Sulfates, Nitrites/Nitrates, Cyanide.

Mine Waste/Sediments
• Field – XRF Metals, pH, Radioactivity
• Laboratory - Total Metals, Acid/Base Accounting

Laboratory Data was validated per EPA requirements
XRF data was also validated per manufacturers specifications and evaluated statistically to demonstrate strong correlation with laboratory data.
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AIMSS
The Abandoned and Inactive Mines Scoring System was developed to systematically score the Priority Sites closely following the logic and algorithm of USEPA’s Hazard Ranking System for inclusion of uncontrolled hazardous waste sites on the CERCLA National Priorities List.

Four pathways or routes of exposure were evaluated:
• Groundwater pathway
• Surface water pathway
• Air pathway
• Direct contact pathway

Three primary factors were evaluated within each pathway:
• Likelihood of release of hazardous constituents to the pathway
• Waste characteristics, including concentrations of hazardous constituents, quantities, and relative toxicity to humans and the ecosystem.
• Potential receptors of exposure to hazardous constituents, both human and ecologic.

Note: the RAIMSS was developed by modifying the AIMSS to evaluate reclaimed sites for effectiveness of the reclamation and de-listing.
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Highlights

1993 – 269 Sites  1994 – 64 Sites

# Removed 55 from list due to negligible risk

145 Field Days/Approx. 850 person-days

1993 – 69 days of measurable precipitation (nearly double the cumulative amount of 40-yr average)

3690 XRF field samples/1963 lab samples – 120,700 data points

Waste Rock – 387 acres/6,983,000 cubic yards

Mill Tailings – 498 acres/8,550,000 cubic yards

Discharging Adits – 198/33 with pH<5.0

87 SDWA MCL exceedances/76 aquatic life criteria exceedances

Flooded Shafts – 13/3 with pH<5.0

6 SDWA MCL exceedances

148 Observed Released to Surface Water/Sediment directly attributable to the Site.

Summary Report is available on MDEQ’s website: [http://deq.mt.gov/Land/AbandonedMines/priority](http://deq.mt.gov/Land/AbandonedMines/priority)

Full Reports available at MDEQ or the Montana State Library.
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Progress to Date

Of the 273 Sites on the Priority List:

• 45 Sites Reclaimed by MDEQ under SMRCA
• 5 Sites Reclaimed by USFS Region 1 under CERCLA
• 18 Sites Reclaimed by USEPA under CERCLA
• 49 Sites scheduled for Remedial Investigation by USEPA
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What would I do different?

• Technology – Tablets with the Inventory Field Form, pre-loaded satellite imagery site maps and blue tooth interfaces with XRF and field meters

• Safety