

Colorado State Office
Abandoned Mine Land Workplan
Period: FY2007 – FY2013

Summary

Significant non-coal mining areas in Colorado are: the Colorado Mineral Belt (metals) a north-south trend in the central part of the state, the Colorado Plateau (uranium) in the southwest, other small mining districts, and single mines geologically unrelated to the other mines. Commodities mined were primarily gold, silver, lead, copper, zinc, molybdenum, and uranium.

BLM Colorado currently has an inventory of 2,751 known abandoned hard rock mines on public lands, Figure 1. This inventory includes 4,670 features (draining adits and shafts, mine waste, mill tailings) that may impact water resources; and 10,818 features (open adits and shafts, high walls, collapsing structures) that likely pose physical safety hazards. These numbers are based on an inventory conducted in the early 1990s that covered all public lands in the Colorado mining districts. In addition, we encounter on average another 30 mine openings each year in the course of other work, which are added to the inventory. Currently, the AML inventory is undergoing conversion to a new system and another field check of the inventory is being proposed. Therefore the preceding numbers will likely change from new discoveries and field checks.

Priority watersheds for Colorado are shown in Figure 2. This prioritization was completed as part of the national Unified Watershed Assessment completed in 2004. Colorado BLM abandoned mines also are shown on this map to show their relationship to impacted watersheds. Colorado state and federal agencies have further prioritized the abandoned mine impacted watersheds to concentrate and leverage our resources and leverage for maximum effect. The priorities of significance for BLM are the upper Animas River (southwest Colorado), upper Arkansas River (central Colorado), and Lake Fork of the Gunnison River (southwest Colorado). The Gunnison River is shown as a pristine watershed; however, some of its tributaries are dead from mining impacts hence the high priority.

To date, 78 mines impacting water quality have been cleaned up, and 1,456 hazardous mine openings have been closed. In this planning period we are expecting to cleanup another 35 mines, and hopefully close some 560 hazardous mine openings. This may be an overly optimistic projection for as our funding for mine openings has been shrinking and become erratic.

Fig. 1 COLORADO BLM ABANDONED MINES

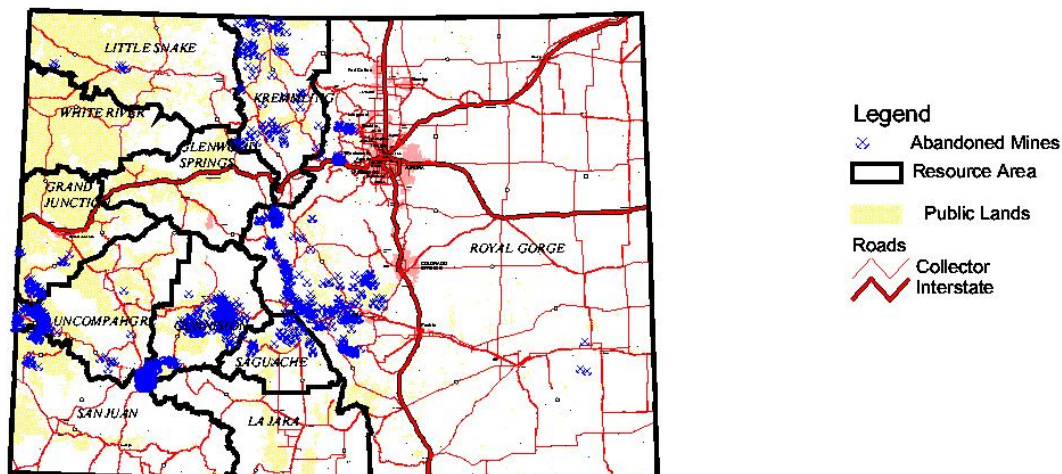
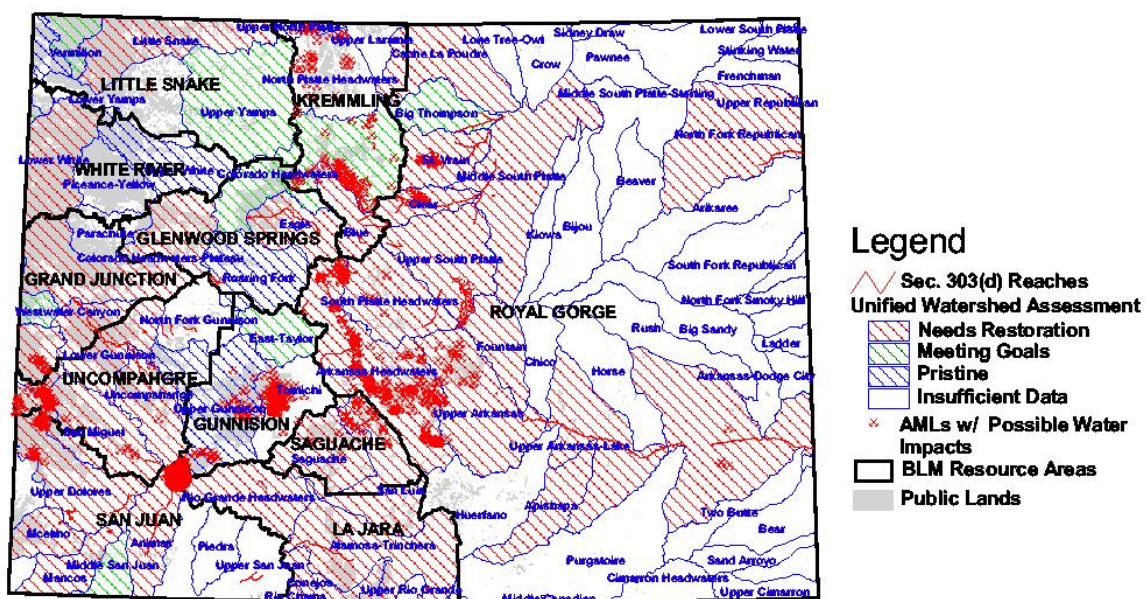


Fig. 2 Impacted Watersheds



AML Watershed Projects

There are 2,751 abandoned mine sites with 4,670 features on public lands in Colorado that have possible impacts on water quality in twenty watersheds. These impacts include acidic metal laden drainage from mine openings and dumps, mine wastes and mill tailings in stream channels, and erosion of mine wastes and mill tailings into waterways.

The 3 highest priority watersheds impacted by abandoned mines on public lands include, in priority order, the upper Animas River [Animas (HUC 14080104)], Arkansas [Arkansas Headwaters (HUC 11020001)] and Lake Fork of the Gunnison [Upper Gunnison (HUC 14020002)]. In the large Arkansas River watershed, Colorado BLM is concentrating cleanup efforts in sub watersheds where there is a high concentration of public lands including the Lake Fork, and the 2 historic mining districts of Cripple Creek and Rosita. Thirty five projects are underway or planned in these priority watersheds, as listed in Table 1. These priority watersheds have another 1,306 low priority mine sites on public lands. Based on extensive watershed assessment these low priority mines have little or no offsite impact on watershed resources, and there are no current plans for their cleanup. On-site cleanup for these low priority mines may follow the high priority mines.

The extent of necessary cleanup in the other lower priority watersheds has not been evaluated except for Kerber Creek. In Kerber Creek only 1 cleanup remains. This watershed is close to being fully cleaned up, and its completion would provide considerable satisfaction.

The watersheds were prioritized on the basis of assessments undertaken by the Colorado Water Quality Control Division. Prioritization was a multi-agency process performed twice once in 2000 and again in 2004. Prioritization of the water-quality impacted AML sites was accomplished using the Colorado Clean Water Act Section 303(d) list, abandoned mine inventories from land management agencies, and geo-environmental risk mapping performed by the US Geological Survey. Colorado state and federal agencies have agreed to concentrate their cleanup resources on the priority watersheds. Priority watersheds have undergone significant assessment and risk analysis to determine which mines must be cleaned up to meet water quality goals. Watershed assessment and post cleanup monitoring continues. Typically, only 5 to 10 percent of mines require cleanup for their off-site impacts. The remaining mines may need some cleanup work to remediate on-site degradation.

In regard to Table 1, costs shown are for construction only, and do not include overhead, administration, project management, searches for responsible parties, preliminary assessments and site investigations, and watershed scale investigations. In addition, the partnership column significantly understates partner contributions. The table only notes partner contributions on specific projects and does not include contributions on watersheds as a whole where numerous projects have been completed by others without participation by the BLM. The overall partner contributions on a watershed scale are:

- | | |
|--------------------------|----------------------|
| • Upper Animas River - | Partners 90% BLM 10% |
| • Henson Creek - | Partners 61% BLM 39% |
| • Upper Arkansas River - | Partners 99% BLM 1% |
| • Kerber Creek - | Partners 100% BLM 0% |

Table 1. Priority Watershed Projects

WATERSHED	PROJECTS FUNDED/ PLANNED	AMM Sites # (acres)	FY START	FY FINISH	FINAL/EST TOTAL COST	FINAL/EST BLM PORTION	KEY PARTNERS
1. Lake Fork of the Gunnison	Ute Ulay Mine-Mill	1(10)	2003	2013	\$6,900,000	\$1,600,000	EPA, CO DMG, CDPHE, LFWS
2. Lake Fork of the Gunnison	Roy Pray Mine	1(1)	2003	2006	\$273,700	\$238,000	CO DMG
3. Lake Fork of the Gunnison	Wyoming Mine	1(1)	2003	2009	\$324,300	\$282,000	CO DMG
4. Lake Fork of the Gunnison	Palmetto Mine	1(1)	2005	2007	\$109,250	\$95,000	CO DMG
5. Lake Fork of the Gunnison	GNOME Mine	1(1)	2005	2010	\$242,075	\$210,500	CO DMG
6. Lake Fork of the Gunnison	Risorgimento Mine	1(1)	2005	2008	\$119,600	\$104,000	CO DMG
7. Lake Fork of the Gunnison	North Polar Star Mine	1(1)	2007	2012	\$250,000	\$37,500	EPA, CO DMG
8. Lake Fork of the Gunnison	Hough Mine	1(2)	2010	2013	\$350,000	\$52,500	EPA, CO DMG
9. Lake Fork of the Gunnison	Gladiator Mine	1(1)	2010	2013	\$250,000	\$37,500	EPA, CO DMG
10. Lake Fork of the Gunnison	Ilma-Hiwassee Tunnel	1(1)	2010	2013	\$350,000	\$52,500	EPA, CO DMG
11. Lake Fork of the Gunnison	Hanna Mill Tailings	1(1)	2005	2005*	\$23,200	\$20,152	CO DMG
12. Lake Fork of the Gunnison	Hanna Mine Waste	1(1)	2004	2006	\$27,700	\$24,100	CO DMG
13. Lake Fork of the Gunnison	Hidden Treasure Tails	1(1)	2006	2008	\$134,000	\$115,000	CO DMG
14. Upper Gunnison	Vulcan Mine Waste	1(2)	Unk	Unk	Unk	Unk	Unk
15. Lake Fork of the Arkansas	Nelson Tunnel Mine Waste	1 (2)	2001	2004*	\$180,000	\$130,000	DMG, Colo Mtn College.
16. Lake Fork of the Arkansas	Dinero Mine Waste	1 (10)	2004	2005*	\$300,00	\$197,500	DMG, Colo Mtn College.
17. Lake Fork of the Arkansas	Dinero Mine Tunnel	1 (24)	2006	2010	\$750,000	\$300,000	DMG, Colo Mtn College, NRDA settlement possible
18. Lake Fork of the Arkansas	Querida Mill Tailings	1 (8)	2007	2010	\$185,000	\$130,000	Custer County
19. Lake Fork of the Arkansas	Mill Sap Gulch Mill Tailings	1 (65)	2007	2009	\$900,000	\$150,000	Teller County, DMG, Anglo Gold

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20. Lake Fork of the Arkansas	Colorado Gulch Mine Waste	10 (23)	2008	2020	\$2,000,000	\$200,000	various
21. Lake Fork of the Arkansas	Tiger Mine	1 (6)	2007	2011	\$400,000	\$242,500	various
22. Upper Arkansas	Mt Robinson Mine Waste	3 (3)	2001	2005*	\$40,000	\$30,000	DMG
23. Upper Arkansas	Powhatten Mine Waste	3 (9)	2000	2004*	\$70,000	\$40,000	DMG
24. Upper Arkansas	Apache Mill Tailings	1 (10)	2002	2006*	\$2,000,000	0	EPA
25. Upper Arkansas	Various Mine Waste in superfund area	? (?)	1995	2006	\$2,500,000	0	EPA and others
26. Upper Arkansas	Roosevelt Tunnel	1 (2)	2008	2010	\$75,000	\$50,000	DMG
27. Upper Animas	Lakawanna Tailings	1(2)	2000	2001*	\$458,000	\$458,000	
28. Upper Animas	Eureka Channel Restoration	1(100)	2004	2009	\$1,400,000	\$543,750	EPA, CO DMG, San Juan County
29. Upper Animas	Lark/Joe & John Mine Waste	2(2)	2005	2007	\$450,000	\$415,000	CO DMG
30. Upper Animas	Joe & John Mine Drainage	1(2)	2008	2010	\$350,000	\$298,000	CO DMG
31. Upper Animas	Forest Queen Mine Drainage	1(5)	1998	1999*	\$500,000	\$391,000	EPA, Colorado School of Mines
32. Upper Animas	Eveline Mine	1(2)	2004	2007	\$287,000	\$243,750	CO DMG
33. Upper Animas	Kansas City Mine	1(5)	2005	2006	\$43,000	None	Animas River Stakeholders Group
34. Upper Animas	North California Mountain Mine	1(2)	2005	2008	\$100,000	\$85,000	CO DMG
35. Upper Animas	May Day Mine Waste	1(1)	1997	1998*	\$140,000	\$140,000	
36. Upper Animas	Elk Tunnel Drainage	1(3)	2001	2003*	\$115,200	\$115,200	
37. Upper Animas	Heniretta No. 7 & 8 Mine Waste	1(4)	2003	2006*	\$548,000	\$69,000	PanEnergy, EPA
38. Upper Animas	American Tunnel	1(2)	2005	Unk	Unk	Unk	Animas River Stakeholders Group

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39. Upper Animas	Grand Mogul Mine Waste	1(5)	2006	2013	Unk	Unk	Standard Metals, Arava Resources, Sunnyside Gold
40. Upper Animas	Gold Prince Mine Waste	1(3)	1997	1997*	\$151,000	none	Sunnyside Gold
41. Upper Animas	Avalanche Mine	1(1)	Unk	Unk	Unk	Unk	Unk
42. Upper Animas	Highland Mary Mill Tailings	1(3)	Unk	Unk	Unk	Unk	Unk
43. Upper Animas	Silverton Mill Tailings	1(20)	1997	Unk	Unk	Unk	Animas River Stakeholders Group
44. Upper Animas	Kitti Mac Mill Tailings	1(5)	2008	2013	Unk	Unk	Unk
45. Kerber Creek	Elkhorn Gulch Tailings	1(2)	1996	1997*	\$45,000	\$11,500	Asarco, Colorado School of Mines
46. Kerber Creek	Kerber Creek Tailings	1(8)	2004	2008	\$75,000	\$50,000	Various landowners

*Completed projects

AML Physical Safety Sites

The most significant types of mine hazards are open adits and shafts, highwalls, and collapsing buildings. As noted above, Colorado public lands have an estimated 2,751 abandoned mines with 10,818 hazardous mine openings. Thus far 1,456 have been closed. Priority areas for mine closures include public lands in and around the towns of Gold Hill, Boulder, Leadville, Cripple Creek, Canyon City, Westcliffe and Rosita; high use recreation areas Colorado River Special Recreation Area, Unaweep National Scenic Byway, Alpine Loop National Scenic Byway, Gold Belt National Scenic Byway, Dolores Wilderness Study Area, Cochetopa, Blue Mesa, Arkansas River Special Recreation Area; and other areas of high public use including secondary roads, trails, and campgrounds. Planned mine closures are guided by focused inventory assessments starting with those mine clusters in closest proximity to sites with high public exposure.

In the past, Colorado BLM had available mine closure funding ranging from \$100,000 to \$150,000 per year, which resulted in closing over 100 openings per year. Recently, the source of these funds was cut-off, and the mine closure program has become minimal and erratic.

Beginning in FY2006, the BLM will propose another inventory to insure that all abandoned mines on public lands located near populated places and high use areas are included in the inventory. The new data base will have abandoned mines within 1 mile of populated places and high use areas, and will be created from the existing AML inventory and other GIS data bases. Because the existing Colorado BLM inventory was comprehensive, additions from any new inventory effort are not expected to significantly add to the above number. In the proposed new inventory, Colorado BLM

will be cross checking entries in the new data base with the existing inventory and local knowledge of populated places and high use areas. In the process, cost estimates will be prepared to field check any uncertainties. In addition, cost estimates will be prepared for closing known high risk mine openings.

Workload Targets

Workload targets projected for Colorado BLM are shown in Table 2 where the key program elements (PE) are JK, restore water quality, and HP, physical safety hazards mitigated/remediated.

Projected workload targets for Colorado BLM include 251 acres of cleanup for water quality impacts, program element JK in Table 2. Many of these cleanup projects are mixed ownership, which means authorization and funding of cleanups by numerous parties. The process of finalizing project approvals and funding has become long and drawn out. Therefore, the project schedule as laid out in Table 1 may unfold much differently than projected.

Currently funding for mine closures, HP, is minimal and erratic. Because there is no reliable funding and when funding is available it is minimal, Colorado BLM projects annual mine closures to drop from over more than 100 per year in recent years to an average of 30 per year for a total of 210 in this planning period.

The inventory of abandoned mines, BH, is essentially complete on public lands in Colorado. However, each year a few more abandoned mines are discovered in the course of other field work.

Generally, there is a 1 to 1 correspondence between water quality projects, JK, and searches for responsible parties, NP. The number of cost recovery actions, NQ, is unpredictable as it depends on the success of searches for responsible parties. Typically Colorado BLM has 1 or 2 underway each year.

Table 2. Workload Targets

PE	FY07	FY08	FY09	FY10	FY11	FY12	FY13	Total
BH	30	30	30	30	30	30	30	210
HP	30	30	30	30	30	30	30	210
JK	5	12	166	37	6	1	24	251
NP	3	4	3	5	1	1	6	26
NQ	1	1	1	1	1	1	1	7

* BH=Inventory/Assessment, HP=Physical Hazard, JK=Environmental Hazard, MG=Monitoring, NP=Evaluate Cost Avoidance/Cost Recovery, NQ=Process Hazmat Cost Avoidance/Cost Recovery Cases

Key AML Contact

Rob Robinson
BLM Colorado State Office
2850 Youngfield St.
Lakewood, CO 80215
303 239-3642
Robert_Robinson@co.blm.gov