


Key EPA Initiatives to Address Hardrock Mining Sites

Shahid Mahmud, Kirby Biggs & Michele Mahoney-1

Federal Remediation Technologies Roundtable

Key EPA Initiatives to Address Hardrock Mining Sites

May 9, 2017



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EPA Office of Superfund Remediation and Technology Innovation


Outline




- OSRTI National Optimization Strategy
- Optimization Events to Date
- California Mine Exposure Based Algorithm (CalMEBA)
- Best Practices and other Technical Resources Development
- EPA Resources for Mining Sites Treatment Technologies

5/9/2017 U.S. Environmental Protection Agency 2

OSRTI National Optimization Strategy



EPA's National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion (2012)




- Systematic site review by a team of independent technical experts...
- Performed at any phase of a cleanup process...
- Identify opportunities to improve remedy protectiveness, effectiveness and cost efficiency...
- Facilitate progress toward site completion.

- ~250 optimization reviews performed since 1997
- Mine Sites Optimization Initiative


U.S. Environmental Protection Agency 4

Overview of Mine Sites Optimization Efforts

All Optimization Events to Date



Optimization Metric	Total to Date
Locations	
Events	52
Sites and Mining Districts	33
Individual Mine Workings and OUs	98
Type of Support	
Optimization Reviews	24
Technical Support	12
Regional Consultation Reviews	16
Activity Status	
Completed	28
In Progress	19
Pending	3



Overview of Mine Sites Optimization Efforts


All Optimization Events - Historical & Active



Site / Event Name	Region	State	Mining Initiative Sites	Optimization Review	Site Technical Support	Regional Consultation Review	Status
Alameda County	9	CA				FY 2017	In Progress
Aspen Mine	8	CO					In Progress
Baldwin Mountain Mining District	8	CO				FY 2017	In Progress
Big Bend/Columbus Mine	7	ND					Completed
Birds Nest Mine	10	OH					Completed
Bonanza Peak Mining District (B-P)	9	CO					In Progress
Boston Hill Mining & Metallurgical Complex - Event 1	9	CA					Completed
Boston Hill Mining & Metallurgical Complex, Event 2, (B-P)	9	CA					Completed
Boston Hill Mining & Metallurgical Complex, Event 3, (B-P)	9	CA					Completed
Boston Hill Mining & Metallurgical Complex, Event 4, (B-P)	9	CA					Completed
Boston Hill Mining & Metallurgical Complex, Event 5, (B-P)	9	CA					In Progress
Boston Hill Mining & Metallurgical Complex, Event 6, (B-P)	9	CA					Completed
Capitol Hill Mine - Event 1	8	CO				FY 2016	Completed
Capitol Hill Mine - Event 2	8	CO				FY 2016	Completed
Champion Mine Mining District - Easting Star Mine	8	WV				FY 2017	Pending
Champion Mine Mining District - Lower McMillan Mine	8	WV				FY 2016	Pending
Champion Mine Mining District - Upper McMillan Mine	8	WV					Completed
Champion Mine Mining District - Upper McMillan Mine	8	WV					In Progress
Central Appalachia Area	8	CO					Completed
Chickadee Mine - Event 1	1	VT					Completed
Chickadee Mine - Event 2 (B-P) & Event 3	1	VT					Completed
Chickadee Mine - Event 4 (B-P) & Event 5	1	VT					In Progress
Chickadee Mine - Event 6 (B-P) & Event 7	1	VT				FY 2016	In Progress
Chickadee Mine - Event 8 (B-P) & Event 9	1	VT				FY 2017	Pending
Chickadee Mine	8	CO					Completed

Overview of Mine Sites Optimization Efforts

All Optimization Events - Historical & Active




Site / Event Name	Region	State	Mining Initiative Sites	Optimization Review	Site Technical Support	Regional Consultation Review	Status
Chickadee Mine	8	CO					Completed
Chickadee Mine - Event 1	8	CO					In Progress
Chickadee Mine - Event 2	8	CO				FY 2016	Completed
Chickadee Mine - Event 3	8	CO				FY 2017	In Progress
Chickadee Mine - Event 4	8	CO					Completed
Chickadee Mine - Event 5	8	CO					Completed
Chickadee Mine - Event 6	8	CO					Completed
Chickadee Mine - Event 7	8	CO					Completed
Chickadee Mine - Event 8	8	CO					Completed
Chickadee Mine - Event 9	8	CO					Completed
Chickadee Mine - Event 10	8	CO					Completed
Chickadee Mine - Event 11	8	CO					Completed
Chickadee Mine - Event 12	8	CO					Completed
Chickadee Mine - Event 13	8	CO					Completed
Chickadee Mine - Event 14	8	CO					Completed
Chickadee Mine - Event 15	8	CO					Completed
Chickadee Mine - Event 16	8	CO					Completed
Chickadee Mine - Event 17	8	CO					Completed
Chickadee Mine - Event 18	8	CO					Completed
Chickadee Mine - Event 19	8	CO					Completed
Chickadee Mine - Event 20	8	CO					Completed
Chickadee Mine - Event 21	8	CO					Completed
Chickadee Mine - Event 22	8	CO					Completed
Chickadee Mine - Event 23	8	CO					Completed
Chickadee Mine - Event 24	8	CO					Completed
Chickadee Mine - Event 25	8	CO					Completed
Chickadee Mine - Event 26	8	CO					Completed
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Chickadee Mine - Event 95	8	CO					Completed
Chickadee Mine - Event 96	8	CO					Completed
Chickadee Mine - Event 97	8	CO					Completed
Chickadee Mine - Event 98	8	CO					Completed
Chickadee Mine - Event 99	8	CO					Completed
Chickadee Mine - Event 100	8	CO					Completed

Key EPA Initiatives to Address Hardrock Mining Sites

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California Mine Exposure Based Algorithm (CalMEBA)




- Purpose: Rank 42,000+ mines located in California that are listed in the USGS Mineral Resources Data System (MRDS)
- Algorithm designed to precede CERCLIS entry
 - Applying the HRS will occur in subsequent site assessment activities
- Based on common mining waste exposure scenarios
 - Residential, recreational, ecological
- Uses 25 geo-data sets, focusing on receptor proximity/counts, ore deposit toxicity, past practices
- CalMEBA I and II are Excel tools that execute the algorithm for all 42,000+ sites and allow for rapid, iterative sensitivity checks
- Applications for other Federal Land Management Agency inventories and other State inventories.

5/9/2017 U.S. Environmental Protection Agency 7

Best Practices: Fluid Mining Wastes




- Presents best practices for preventing sudden, uncontrolled releases of mining-influenced water (MIW)
- Applies to investigation, rehabilitation and remedial activities
- Technical review:
 - EPA HQ OSRTI
 - Regions 1, 3, 6, 8, 9, 10
 - BLM, USACE, USFS, OSMRE
 - ASTSWMO
- Peer Review:
 - USGS
 - PADEP, WVDEC
 - NOVAGOLD Resources
 - Colorado School of Mines, U.Nevada-Reno




5/9/2017 U.S. Environmental Protection Agency 8

Best Practices: Impoundments




- Will address technical best practices to prevent impoundment failures
- Best practices to help prevent sudden, uncontrolled releases of fluid and liquefiable mining wastes
- Steps to characterize impoundment stability and minimize risk of a failure
- Incorporates USACE and BOR best practices

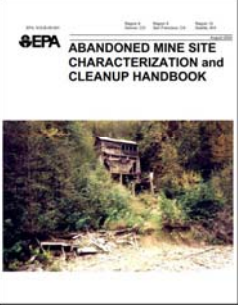


5/9/2017 U.S. Environmental Protection Agency 9

Abandoned Mine Site Characterization and Cleanup Handbook Update



- Addition of best practices content
- Addition of uranium mine and mill tailings content
- Update Characterization and Cleanup Technologies
- Addition of mine sites and mine waste reuse content



5/9/2017 U.S. Environmental Protection Agency 10

EPA Resources for Mining Sites Treatment Technologies



- www.cluin.org/mining
- Mining Webinar Series
- Mining Site Case Studies
- Handbook on Treatment Technologies for Mining Influenced Water and Mining Waste
- Mining State of Play

11

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12

Key EPA Initiatives to Address Hardrock Mining Sites

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CLUIN Issues | Characterization, Cleanup, and Revitalization of Mining Sites

Mining Sites

Characterization, Cleanup, and Revitalization of Mining Sites

Cleanup Technologies

A range of traditional and innovative technologies may be appropriate for remediation at current and former mining sites. EPA's Office of Research and Development's **Technical Support Center (ETSC)** provides assistance to EPA regional offices, states, and communities on the design, function, and application of these technologies. ETSC scientists and engineers work closely with the Superfund program and other EPA programs that address remediation of mining sites, and also collaborate with state governments, universities, and private entities to develop new approaches and remediation technologies for mining wastes.

EPA's Office of Superfund Remediation and Technology Innovation's 2014 report, **Reference Guide to Treatment Technologies for Mining-Influenced Water**, highlights select mining-influenced water (MIW) treatment technologies used or piloted as part of remediation efforts at mine sites. The report includes short descriptions of treatment technologies and information on the contaminants treated, pre-treatment requirements, long-term maintenance needs, performance, and costs. Sample sites illustrate considerations associated with selecting a technology. Website links and sources for more information on each topic are also included. An online, searchable database lists technologies provided in Appendix A of the guide, which includes summary information for the technologies discussed in the body of the report, as well as additional technologies or products designed as passive or low cost treatment options.

- Home
- Types of Mining Sites
- Characterization
- Cleanup Technologies
- Revitalization and Reuse
- Case Studies
- Resources
- Conference Proceedings and Presentations
- Training and Events
- RSS Feed (RSS feed)
- Issue Areas Home
- Suggest Resource

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13

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CLUIN Issues | Characterization, Cleanup, and Revitalization of Mining Sites

Mining Sites

Characterization, Cleanup, and Revitalization of Mining Sites

Case Studies

Hard Rock Mines | Coal Mines | Uranium Mines

Jump to a Subcategory

- Home
- Types of Mining Sites
- Characterization
- Cleanup Technologies
- Revitalization and Reuse
- Case Studies
- Resources
- Conference Proceedings and Presentations
- Training and Events
- RSS Feed (RSS feed)
- Issue Areas Home
- Suggest Resource

EPA, other government agencies, state, local, and tribal governments, as well as private entities have successfully remediated and restored numerous current, former, and abandoned mining areas throughout the United States. This page presents some of these successfully restored sites as well as sites still in progress. More detailed information about these sites can be found by visiting the links under each case study.

For a more comprehensive list of abandoned mine lands and abandoned mine reclamation projects, visit the EPA **Abandoned Mine Lands** program website.

Hard Rock Mines

MINING CASE STUDY

Silver Mountain Mine, Horse Springs Coal, WA

The Silver Mountain Mine site is an abandoned silver and gold mine that operated from 1920 to the 1950s. In the early 1950s, cyanide was used to extract metals from mine tailings. By 1950, the site was abandoned, and the mine tailings and holding basin, which contained cyanide-contaminated water, were left behind. A leachate collection trench associated with the ore extraction was contaminated with cyanide and arsenic.

The site was added to the NPL in 1980. Sodium hypochlorite was used to neutralize the cyanide in the pond and in the mine tailings. The contaminated water in the leachate collection trench was pumped from the site. The trench was treated with a liner. In the 1990s, approximately 7,000 cubic yards of mine tailings were consolidated and capped. The mine tailings were consolidated, and the site was investigated and found to be closed. Groundwater was sampled and analyzed to protect the cap. The site cleanup was designed to require only little maintenance. The site was listed from the NPL in 1997. As of 2006, the cap is in excellent condition and the mine remains in place. The Washington Department of Ecology will continue to perform annual inspections and maintenance of the cap.

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Site Map
Site Tour
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14

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Mining Sites

Characterization, Cleanup, and Revitalization of Mining Sites

Training and Events

Highlights

- Slides and audio for the December 7, 2016, webinar **Re-imagining the Future of Mining Sites** are now archived for viewing/download on EPA's Cluin.org website. Webinar presentations explored the broad spectrum of safe and productive reuse possible at mining sites and included a case study highlighting several of these reuses in practice at a mining site in Salt Lake City, Utah. The webinar highlighted how EPA works with mining stakeholders to address the serious health and environmental challenges posed by some mining practices, and how EPA supports the reuse of these areas to benefit the surrounding community.
- EPA's Office of Superfund Remediation and Technology Innovation's recent webinar on **Passive Treatment of Mining-Influenced Water From Bench Scale to DAM** has been archived and is available now. Case study presentations included on Dams: Sovereign Consulting, Inc.; Rick Vetter, U.S. Forest Service; Bob Mehn, Health Environmental, and Airy Viable; Trout Unlimited; The November 14, 2016, webinar was the third in TRU's CLUIN Webinar Series on Mining.
- Recordings of select sessions held at the Society of Environmental Toxicology and Chemistry (SETAC) meeting in Salt Lake City, UT (November 2015) are available to view for free at <http://www.setac.org/programs/scetac/program/webinar-recordings/>
- Webinars and audio for the 102th and Mining 103 courses, **Part 1 Mining Fundamentals** and **Part 2 Mining Environmental Concerns and Issues** are now archived at https://cluin.org/content/EPAandMining101-2_952416/

- Home
- Types of Mining Sites
- Characterization
- Cleanup Technologies
- Revitalization and Reuse
- Case Studies
- Resources
- Conference Proceedings and Presentations
- Training and Events
- RSS Feed (RSS feed)
- Issue Areas Home
- Suggest Resource

Contact Us
Site Map
Site Tour
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15

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Overview, Lessons Learned and Best Practices Derived from Independent Optimization Reviews of Superfund Mining Sites

Sponsored by: U.S. EPA Technology Innovation and Field Services Division

Live Webinar: Wednesday, May 24, 2017, 1:00 PM-3:00 PM EDT (17:00-19:00 GMT)

Register

Description | Presenters | Webinar Slides | Related Links | Feedback Form | Tips

Presenters:

Kirby Biggs, U.S. EPA (kirby.biggs@epa.gov)
Kirby Biggs is the National Coordinator for EPA OMT's Technology Innovation and Field Services Division (TFSD). He leads the Superfund National Optimization Strategy Program development and implementation and coordinated development of the Strategy. Kirby leads TFSD's National Optimization Team of HQ and Regional staff, managing multiple site-specific optimization projects. These projects involve EPA, state, and public sector entities conducting Superfund technical support projects through the Superfund Region using targeted investigation technical support, independent design review, remedial system evaluations, and long-term monitoring and optimization studies. Kirby also sponsors development of optimization internet seminars and delivers webinars and classroom optimization courses. He develops and develops new techniques, methods, procedures and practices to facilitate the closure of sites and to return them to production use.

Jody Edwards, EPA (jody.edwards@epa.gov)
Jody Edwards is a Principal Hydrogeologist and Senior Project Manager with Tetra Tech, where he has managed optimization review services support to EPA OMT since 2009. A registered Professional Geologist with 31 years' experience in contaminated site characterization and cleanup, Mr. Edwards specializes in hydro and geology independent.

Live Webinar
May 24, 2017
1-3 PM EDT

Register at:
<https://cluin.org/conf/tto/mining-opt/>

16

Currently Under Development EPA

- Handbook on Treatment Technologies for Mining Influenced Water and Mining Waste
- Mining State of Play
- Case Study Documentation
- FRTR Mining Meeting Webinar Series

17

Questions and Discussion EPA

5/9/2017 U.S. Environmental Protection Agency 18

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