

Federal Remediation Technologies Roundtable

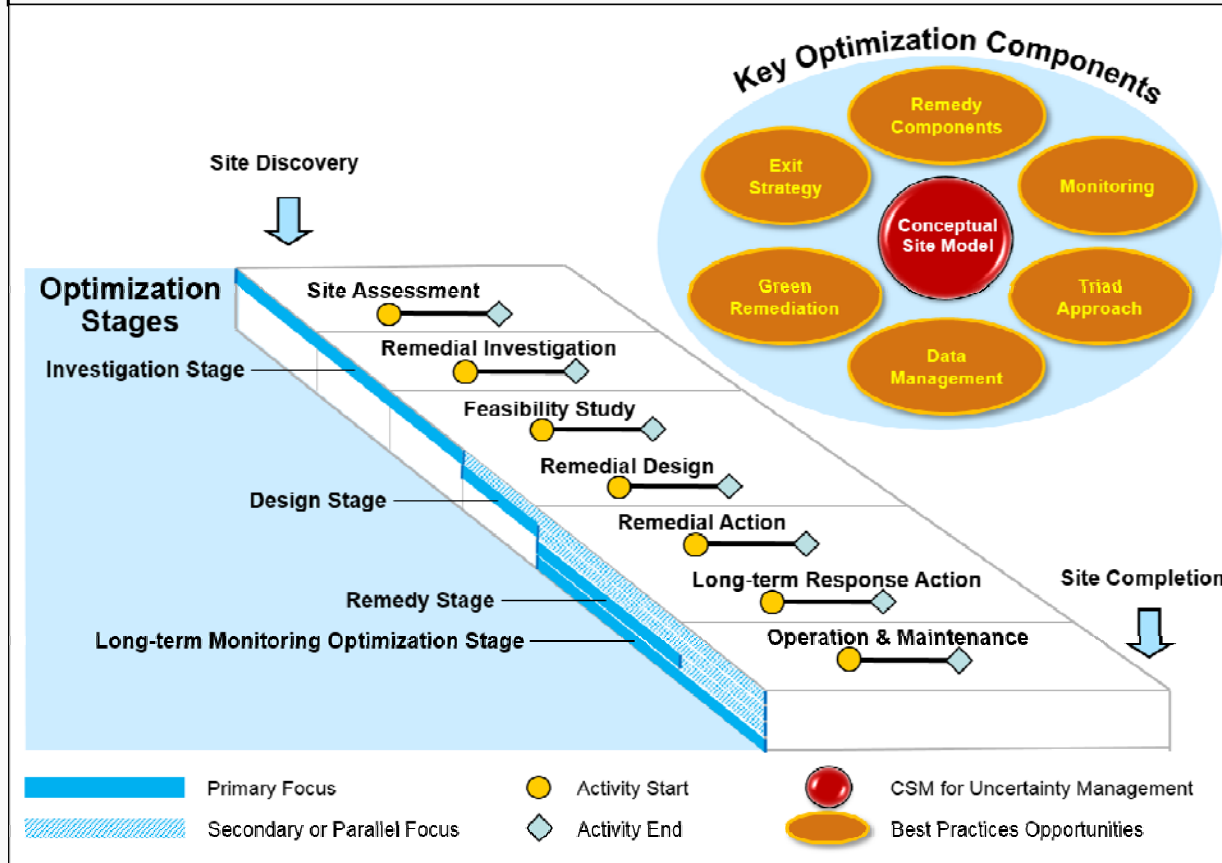
Key EPA Initiatives to Address Hardrock Mining Sites May 9, 2017



Shahid Mahmud, Kirby Biggs, Michele Mahoney
EPA Office of Superfund Remediation and Technology Innovation

- 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

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

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
American Tunnel	8	CO				FY 2017	In Progress
Argonaut Mine	9	CA			■		In Progress
Barker-Hughesville Mining District	8	CO				FY 2017	In Progress
Big River/Columbia Mine	7	MO			■		Completed
Black Butte Mine	10	OR	■	■			Completed
Bonita Peak Mining District (48 sites)	8	CO			■		In Progress
Bunker Hill Mining & Metallurgical Complex - Event 1	9	CA		■			Completed
Bunker Hill Mining & Metallurgical Complex, Event 2, OU-2 (CTP)	9	CA		■			Completed
Bunker Hill Mining & Metallurgical Complex, Event 3, OU-3	9	CA			■		Completed
Bunker Hill Mining & Metallurgical Complex, Event 4, OU-3 (Area =Upper Basin)	9	CA	■	■			Completed
Bunker Hill Mining & Metallurgical Complex, Event 5, OU-3 (East Mission Flats and Big Creek Repository)	9	CA		■			In Progress
Capt. Jack Mill – Event 1	8	CO		■			Completed
Capt. Jack Mill – Event 2	8	CO				FY 2016	Completed
Carpenter Snow Creek Mining District - Evening Star Mine	8	MT				FY 2017	Pending
Carpenter Snow Creek Mining District - Lower Rebellion Mine	8	MT				FY 2018	Pending
Carson River Mercury, OU 02	9	NV	■	■			Completed
Carson River Mercury, OU 00	9	NV			■		In Progress
Central City/Clear Creek	8	CO	■	■			Completed
Elizabeth Mine – Event 1	1	VT		■			Completed
Elizabeth Mine – Event 2 (FMEA Review)	1	VT			■		Completed
Ely Copper Mine - Event 1 (FMEA Review)	1	VT			■		In Progress
Ely Copper Mine - Event 2	1	VT				FY 2016	In Progress
Flat Creek / Iron Mountain Mine	8	MT				FY 2017	Pending
French Gulch	8	CO	■	■			Completed

Overview of Mine Sites Optimization Efforts

All Optimization Events – Historical & Active



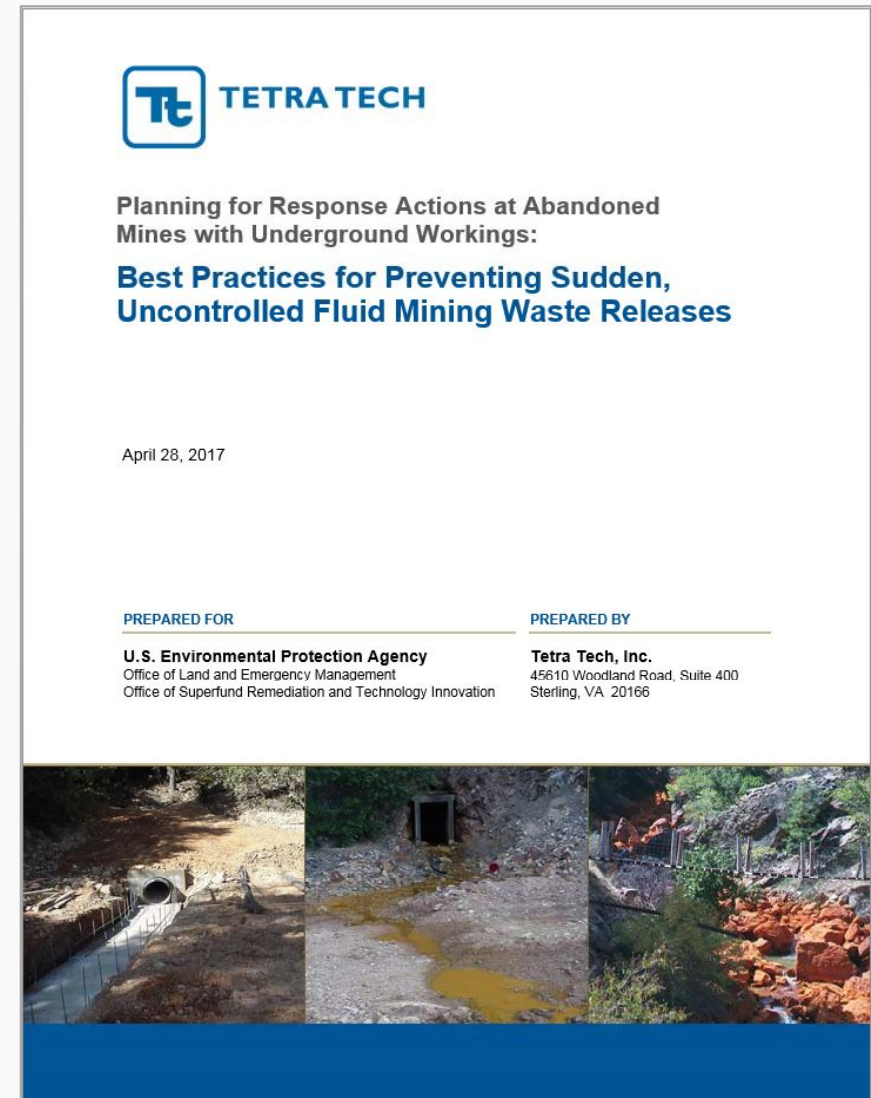
Site / Event Name	Region	State	Mining Initiative Sites	Optimization Review	Site Technical Support	Regional Consultation Review	Status
Gilt Edge	8	SD	■	■			Completed
Gold King Mine - Gladstone WTP	8	CO		■			In Progress
Gold King Mine - Event 1	8	CO				FY 2016	Completed
Gold King Mine - Event 2	8	CO				FY 2017	In Progress
Homestake Mining Co.	6	NM	■	■			Completed
Iron King Mine - Event 1	9	AZ	■	■			Completed
Iron King Mine - Event 2	9	AZ		■			Completed
Iron King Mine - Event 3	9	AZ			■		Completed
Iron Mountain Mine/Shasta Lake Mining District (12 sites)	9	CA			■		In Progress
Jackpile-Paguate Uranium Mine	6	NM		■			In Progress
Klau/Buena Vista Mine - Event 1	9	CA			■		Completed
Klau/Buena Vista Mine - Event 2	9	CA		■			In Progress
Lava Cap Mine (OU03) - Event 1	9	CA		■			Completed
Lava Cap Mine (Site Wide) - Event 2	9	CA	■	■			In Progress
Leviathan Mine	9	CA				FY 2017	Pending
Libby Asbestos Mine	8	MT				FY 2017	Pending
Motherlode	9	CA			■		In Progress
Ore Knob Mine	4	NC				FY 2017	In Progress
Rico Argentine Mine/St. Louis Tunnel	8	CO				FY 2016	Completed
Standard Mine - Event 1	8	CO			■		Completed
Standard Mine – Event 2	8	CO	■	■			Completed
Standard Mine – Event 3	8	CO				FY 2016	Completed
Sulphur Bank Mercury Mine	9	CA	■	■			Completed
Summitville Mine Site – Event 1	8	CO	■	■			Completed
Summitville Mine WTP – Event 2	8	CO		■			In Progress
Tar Creek	7	OK	■	■			Completed
Upper Tenmile Creek Mining District - Lee Mountain	8	MT				FY 2017	Pending
Upper Tenmile Creek Mining District - Susie Tunnel	8	MT				FY 2017	Pending

California Mine Exposure Based Algorithm (CaMEBA)



- 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
- CaMEBA 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.

- 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



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

The logo for Tetra Tech, consisting of a blue square with the letters "Tt" in white, followed by the words "TETRA TECH" in a blue, sans-serif font.

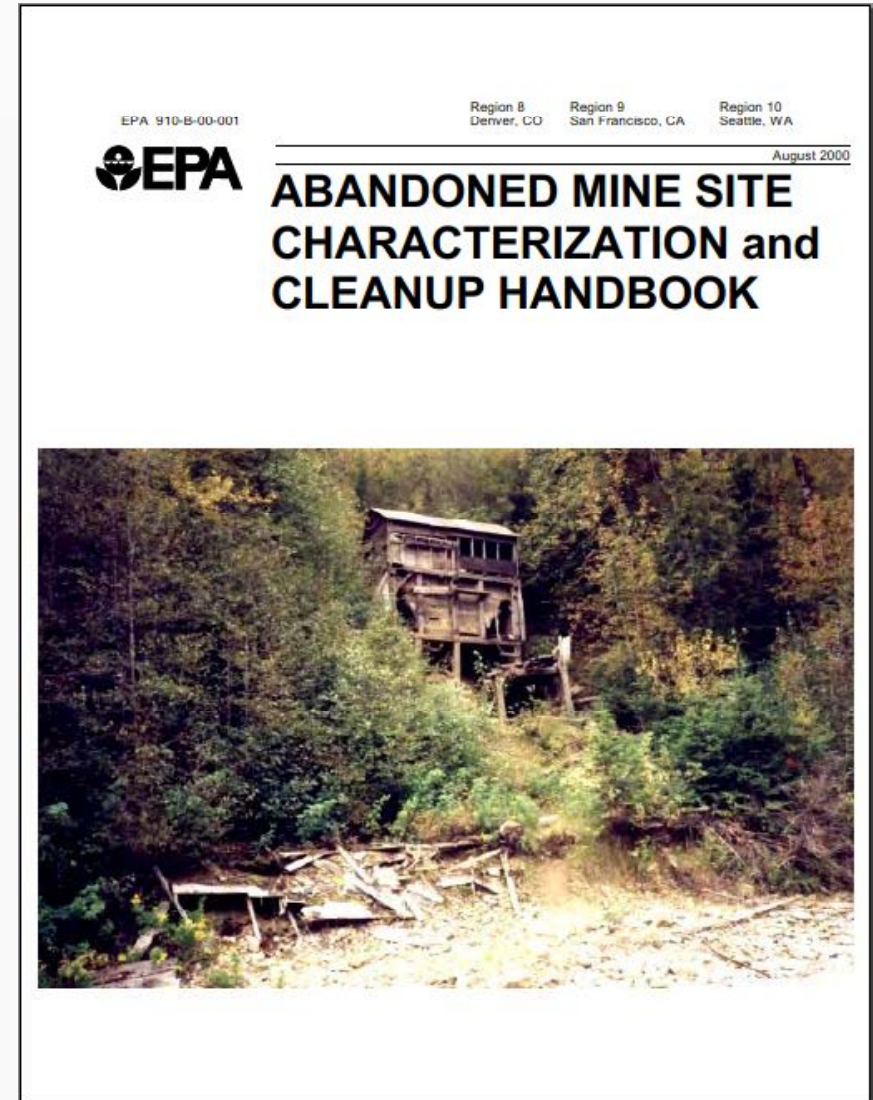
Draft Best Practices and Approaches Report:
Planning for Response Actions at Abandoned Mine Impoundments: Best Practices for Preventing Sudden, Uncontrolled Fluid and Liquefiable Mining Waste Releases

DRAFT – May 2017

PREPARED FOR	PREPARED BY
U.S. Environmental Protection Agency Office of Land and Emergency Management Office of Superfund Remediation and Technology Innovation	Tetra Tech, Inc. 45610 Woodland Road Suite 400 Sterling, VA 20166

A row of three photographs showing different types of mining waste impoundments. The first shows a large, yellowish-brown mound of waste in a valley. The second shows a steep, light-colored waste pile with a fence in the foreground. The third shows a large, multi-colored waste pile with a fence and some vegetation in the foreground.

- 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





- 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



CLU-IN | United States Environmental Protection Agency | Technology Innovation and Field Services Division | Search

Clean-Up Information

Contaminated Site

- Technologies
- Contaminants
- Issues
- Strategies & Initiatives
- Vendors & Developers
- Training & Events
- Additional Resources

CLU-IN | Issues | [Characterization, Cleanup, and Revitalization of Mining Sites](#)

Mining Sites



Characterization, Cleanup, and Revitalization of Mining Sites

This website provides site managers, regulatory agencies, consultants, and the general public with information on technologies and resources related to the assessment, characterization, cleanup, and revitalization of current and former (active, closed, and abandoned¹) mining sites.

MINING SITES SPOTLIGHT

- FPA recently produced the video "Coeur D'Alene Basin: Partnering with Community for a Successful Cleanup" to document EPA's work with Silver Valley residents and officials to obtain their input on the cleanup of the river basin, which was contaminated from decades of lead and silver mining at the Bunker Hill Mine. Hyperlink the name of the video to: <https://www.youtube.com/watch?v=ZBITaxahAcw>
- On December 1, 2016, EPA Administrator, Gina McCarthy, signed the proposed rule, **Financial Responsibility Requirements Under CERCLA Section 108(b) For Classes of Facilities in the Hardrock Mining Industry**. It will be published in the *Federal Register* in the coming weeks. A public comment period will begin after publication in the *Federal Register*.

This proposed rule would establish financial responsibility requirements under section 108(b) of CERCLA, as amended. View the [pre-publication version of the proposed rule](#).
- On March 29, 2016, Assistant Administrator OLEM, Mathy Stanislaus issued a memorandum on **EPA Work Activities at Abandoned Hardrock Mining and Mineral Processing Sites in Preparation for the Fiscal Year 2016 Construction Season**. The memorandum assists the EPA Regions in planning for removal and remedial activities at sites with fluid hazards and shares the Agency's expectations for the work that is done at these sites.
- EPA awarded \$465,000 to Navajo Nation for water monitoring in the San Jan River. Monitoring will include sediment sampling and a fish tissue contaminant study to focus on potential human health risks associated with fish consumption, following the **Gold King Mine Release**.

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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.

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Mining Sites



Characterization, Cleanup, and Revitalization of Mining Sites

Case Studies

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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 restoration projects, visit the [EPA Abandoned Mine Lands](#) program website.

Hard Rock Mines

MINING CASE STUDY

Silver Mountain Mine, Horse Springs Coule, WA

The Silver Mountain Mine site is an abandoned silver and gold mine that operated from 1928 to the 1960s. In the early 1980s, cyanide was used to extract metals from mine tailings. By 1983, 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.

This site was added to the NPL in 1986. 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 then removed from the site. The trench was covered with a liner. In the 1990s, approximately 7,000 cubic yards of mine tailings were consolidated and capped, the mine entrance was closed, and the site was revegetated and fenced. Deed restrictions were implemented to protect the cap. The site cleanup was designed to require very little maintenance. The site was deleted from the NPL in 1997. As of 2008, the cap is in excellent condition and the fence remains in place. The Washington Department of Ecology will continue to perform annual inspections and maintenance of the cap.

[View Silver Mountain Mine Case Study](#)

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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 Clu-In.org website. Webinar presentations explored the broad spectrum of safe and productive reuses 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 O&M** has been archived and is available now. Case study presenters included Jim Gusek, Sovereign Consulting, Inc., Rick Weaver, U.S. Forest Service, Bob Hedin, Hedin Environmental, and Amy Wolfe, Trout Unlimited. The November 14, 2016, webinar was the latest in TIFSD's CLU-IN 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://slc.setac.org/program/scientific-program/session-recordings/>
- Slides and audio for the NEPA and Mining 101 courses, **Part 1 Mining Fundamentals** and **Part 2 Mining Environmental Concerns and Issues** are now archived at https://clu-in.org/conf/tio/NEPAandMining101-2_052416/.

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Upcoming Internet Seminars | Upcoming Meetings | Archived Internet Seminars, Videos, and Courses

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(biggs.kirby@epa.gov)

Kirby Biggs is the National Optimization Coordinator for EPA OSRTI's Technology Innovation and Field Services Division (TIFSD). He leads the Superfund National Optimization Strategy Program development and implementation and co-lead development of the Strategy. Kirby leads TIFSD's National Optimization Team of HQ and Regional staff, managing multiple site-specific optimization projects. These projects involve EPA, states, and public sector entities conducting Superfund technical support projects throughout the Superfund Pipeline using targeted investigation technical support, independent design reviews, 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 identifies and develops new techniques, methods, procedures and practices to facilitate the closeout of sites and to return them to productive use.



Jody Edwards, Tetra Tech(jody.edwards@tetratech.com)

Jody Edwards is a Principal Hydrogeologist and Senior Project Manager with Tetra Tech, where he has managed optimization review services support to EPA OSRTI since 2009. A registered Professional Geologist with 31 years' experience in contaminated site characterization and cleanup, Mr. Edwards specializes in leading and performing independent



Live Webinar May 24, 2017 1-3 PM EDT

Register at:

<https://clu-in.org/conf/tio/mining-opt/>

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



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