

CLEANING-UP ABANDONDED AND ORPHANED MINES IN CALIFORNIA

Observations by Tim Vendlinski from Sustainable Conservation
Abandoned Mines Land Forum
18 November 2009

History & Consequences

Digging a Hole

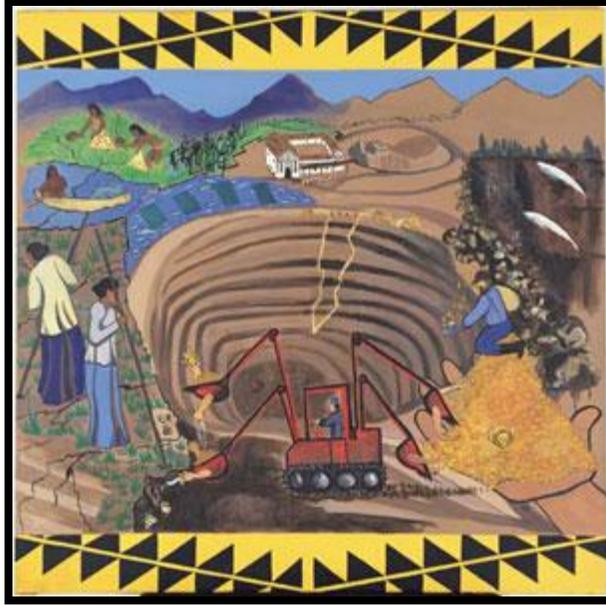
- ➔ Approximately 26 million pounds of mercury were used for gold recovery in California, mostly in the Sierra Nevada and Klamath-Trinity Mountains.
- ➔ Most of the mercury was obtained from deposits in the Coast Range.



Metacinnabar: HgS; Mt. Diablo Mercury Mine, Contra Costa County, CA © Rob Lavinsky.

After the Gold Rush

- ➔ DOC estimates that over 47,000 abandoned mines exist in California.
- ➔ Approximately 5,200 of these present environmental hazards.
- ➔ Approximately 900 are located within the nine county region of the Bay-Delta.
- ➔ 67% of the abandoned mines in California occur on federal lands.
- ➔ 31% of the mines occur on private lands.
- ➔ 2% of the mines occur on State or local properties.
- ➔ Only a fraction will ever be characterized, listed, or cleaned-up by government.



Loss of the Maidu Nation in *Gold, Greed & Genocide*; Denise Davis 1999

Mount Diablo Mining District

- ➔ Located on the eastern side of Mount Diablo (Contra Costa County).
- ➔ Deposits of quicksilver (mercury) occurred the Franciscan formation.
- ➔ 1875-1877, the “Ryne” mine yielded 85 flasks of quicksilver/month (2,975 kg/month).
- ➔ 1937-1939, Bradley Mining Co. extracted 3,149 flasks of quicksilver (109,270 kg).



Rhine Canyon (in Mount Diablo State Park) Named for Charles Rhine.

Marsh Creek and the Mercury Mine

- ➡ Flows for 30 “river miles” into the Western Delta and drains 128 square miles.
- ➡ The mine covers ~14 acres on Dunn Creek, a tributary of Marsh Creek
- ➡ Two drainages from the mine add 95% of the total mercury inputs into Marsh Creek.
- ➡ In the 1950s, SCS built the Marsh Creek Reservoir to manage floodwaters.



This map and aerial picture of the Mt. Diablo Mercury Mine were prepared by the County of Contra Costa.



Marsh Creek Reservoir with Mt. Diablo beyond in a photograph furnished by the County of Contra Costa.

American Fork Mining District

- ➔ Today, the District is encompassed by Uinta-Wasatch-Cache National Forest in Utah.
- ➔ AFC River watershed is located southeast of Salt Lake in the Wasatch Mountains.
- ➔ A remnant population of native Bonneville cutthroat trout persists in the River.



The American Fork Canyon River, Utah, M.Strozewski.

CERCLA (Superfund)

- ➔ Enacted by Congress on 11 December 1980 in response to a nationwide crisis.
- ➔ The most dangerous sites are ranked on the National Priorities List (NPL)
- ➔ CERCLA liability is retroactive and arises when there is a:
 - ◇ *release of a hazardous substance from a facility*
 - ◇ *by past or present owners or operators of the facility, or*
 - ◇ *by any person who arranges for the disposal/treatment of hazardous substance.*
- ➔ EPA or the states can clean-up sites and seek reimbursement from PRPs.
- ➔ EPA or the states can order PRPs to clean-up sites under government supervision



The Valley of the Drums, an infamous 23-acre site in Bullitt County, KY, circa 1979, USEPA.

Clean Water Act

- ➔ EPA or the States set water quality standards (WQS) -- *fishable* and *swimmable*.
- ➔ Process begins by setting *beneficial use designations* for individual water bodies.
- ➔ EPA or the States set *numeric*, or *non-numeric* WQS to protect beneficial uses.
- ➔ EPA or the States restrict *discharges of pollutants* with NPDES permits.



The Cuyahoga River Fire of 1952 – 30 times larger than the infamous blaze on 22 June 1969.

Discharge of a Pollutant

- ➔ The term discharge of a pollutant means the *addition* of any pollutant into *navigable waters* from any *point source*.
- ➔ A point source is defined as any *discernible, confined, and discrete conveyance* such as a pipe, ditch, channel, tunnel, conduit, well, and discrete fissure.
- ➔ Most abandoned/orphaned mine sites contain a discernible, confined, or discrete conveyance that could be characterized as a point source.
- ➔ Thus, discharges of pollution from abandoned/orphaned mines into a waterbody that is hydrologically connected with navigable waters -- including *point source discharges* from draining adits -- can be regulated under the CWA.

Superfund and the CWA

- ➔ Good Samaritans fear liability under CERCLA and the CWA if their cleanup actions result in the *release of a hazardous substance* under CERCLA, or in the discharge of pollutants under the CWA.

Regulatory Flexibility under Existing Law

- ➔ Superfund's Good Samaritan provision at CERCLA §107(d) allows Good Samaritans to cap waste rock piles without incurring liability.
- ➔ CWA's 1987 amendments and implementing regulations addressed stormwater runoff from industrial and mining sites, and exempted from liability activities that divert the runoff of clean water away from waste materials.
- ➔ Likewise, without a release, or threatened release, of a hazardous substance, there is no liability under CERCLA for diverting clean surface waters away from waste materials.

Mining Laws and the Trouble with Acid Mine Drainage (AMD)

- ➔ 1872 General Mining Law lacks provisions to protect the environment.
- ➔ AMD forms when precipitation, surface-water, or groundwater mixes with sulfur-laden waste rock either above ground, or within the underground workings of a mine.
- ➔ AMD resembles stormwater runoff as they share common characteristics influenced by storm events, i.e., variable rates of discharge and variable mixes of pollutants.
- ➔ Adits: nearly horizontal entrances precipitation enters, and/or AMD exits, a mine.
- ➔ AMD can disrupt ecosystem functions and contaminate water supplies for millennia.
- ➔ Re: *abandoned/orphaned* mines: the discharge of AMD from adits is critical issue.

- ➔ The State Implementation Plan (SIP) for the federal CWA:
 - ◆ identifies as *priority pollutants*: Al, As, Cd, Cu, Pb, Mg, Hg, Ni, and Zn;
 - ◆ requires NPDES permits contain numeric effluent limits for priority pollutants; and
 - ◆ assumes all sources of pollution can be addressed or eliminated.

Good Samaritan Guidance and Model Agreement

- ➔ On 6 June 2007, EPA and DOJ released *Good Samaritan* guidance and a *Model Settlement Agreement* (Guidance and Model Agreement).
- ➔ *Abandoned* mines are inactive but still held by a landowner or company.
- ➔ *Orphaned* mines are inactive and the ownership status cannot be determined.
- ➔ Good Samaritan Initiative uses the terms *abandoned* and *orphaned* interchangeably.
- ➔ Focuses on abandoned *hard rock* mines.
- ➔ Addresses sites not listed or proposed for listing on the NPL, nor the subject of ongoing or planned *removal actions*.
- ➔ Preserves CERCLA's "polluter pays" principle.

➔ Defines a Good Samaritan as:

- ◆ a person rendering care, assistance, or advice in accordance with the NCP or at the direction of an OSC, by volunteering to clean up an abandoned mine site;
- ◆ a person who is not the past or current owner of the property in question, and one who has no intention of purchasing the property in the future;
- ◆ a person who is not potentially liable under any other federal, state, or local law for the remediation of existing contamination;
- ◆ individuals, corporations, non-profit organizations, states, local governments, and municipalities that meet the criteria summarized above.

- ➔ Allows Good Samaritan cleanups to be funded with federal funds unrelated to CERCLA such as federal grants, or special Congressional appropriations;
- ➔ Provides legal protections (liability coverage) to Good Samaritans -- including a federal covenant not to sue under CERCLA, *and* protection from third-party lawsuits.
- ➔ Allows limited recycling or incidental reprocessing of historic mine tailings directly related to the cleanup.

Conclusions and Recommendations

Conclusions

Pacific Mine/Snowbird

Trout Unlimited Took Risks

- ➔ TU seemed undaunted despite technical, legal, and financial challenges.
- ➔ Potential Good Samaritans in California need to take risks beyond their comfort zones.

Cleanup Costs in Utah

- ➔ NRCS' Rural Abandoned Mine Program (RAMP) = \$150,000
- ➔ Snowbird = in-kind services, earth moving equipment, fuel
- ➔ Tiffany & Co. Foundation = funded the Project Manager position.

The Technical Approach in Utah

- ➔ TU, USFS, and EPA reconfigured waste rock and established a sealed repository.
- ➔ Continuing discharges of AMD from a plugged adit near the Pacific Mine were diverted away from the repository (thereby preventing the mobilization of additional pollutants) and routed to USFS' oxidation ponds.
- ➔ The adit was not plugged under the Good Samaritan Initiative, but it had been previously closed with an earthen plug.
- ➔ The diversion of the AMD prevented its contact with the consolidated waste rock.
- ➔ Factors noted above meant remedial work could proceed without triggering complex, and potentially cumbersome, permitting requirements under CERCLA and CWA.



Pacific Mine Repository Constructed by Trout Unlimited and Snowbird, 2006.
Published in *American Fork Canyon Home Rivers Project*, Ted V. Fitzgerald, TU, 2006.

Hey, Mining Industry – We Miss You ;-)

- ➡ Without federal funding, the Good Samaritan cleanup of Pacific Mine may not have happened -- despite the vision and perseverance of TU, USFS, EPA, and Snowbird.
- ➡ It appears the mining industry did not offer funding nor in-kind services.
- ➡ If “voluntary” cleanups actually depend upon federal funding, then the Good Samaritan Initiative is just a federally-funded alternative to Superfund cleanups.

Mount Diablo Mercury Mine

The CWA's Citizen Suit Provisions

- ➔ It appears Good Samaritans can only be shielded from CWA citizen-suit provisions if they obtain a NPDES permit from the State of California (i.e., one of the Water Boards).
- ➔ Otherwise, the Good Samaritan may be vulnerable to third-party lawsuits -- even if they successfully reduce pollutant discharges into surface waters below baseline levels.
- ➔ Good Samaritans could avoid legal liability by only taking actions that do not result in a *discharge of pollutants* or a *release of a hazardous substance*.

The Catch 22 of Incremental Improvements

- ➔ Any Good Samaritan action that could be characterized as discharging a pollutant from a point source into a navigable water will likely require a discharge permit.
- ➔ From a regulatory perspective, it may be irrelevant whether a Good Samaritan intends to improve, or actually does improve, water quality over baseline conditions if their actions ultimately result in a discharge of pollutants.
- ➔ The Central Valley Water Board has concluded that it might not be practical for regulators to require numeric effluent limits in NPDES permits for every proposed cleanup of every abandoned mine (given the characteristics of AMD).
- ➔ Given the proximity of the Mt. Diablo Mercury Mine to suburban infrastructure, the Water Board may deem it feasible to install and operate a treatment plant at the site, and to impose SIP-based numeric effluent limits on the landowner/Good Samaritan.

Legislative Fix

- ➔ Legislation introduced during the 110th Congressional session (H.R. 4011) sought to decrease or eliminate the legal vulnerability faced by Good Samaritans by amending CWA §402 to allow federal, state, and tribal governments to issue *Good Samaritan discharge permits* to qualified entities.
- ➔ While this bill never became law, TU and their partners proved it was possible to achieve successful voluntary cleanups even in the absence of new legislation.

Cleanup Costs, Missed Opportunities, and Straightforward Approaches

- ➔ U.S. Army Corps of Engineers under the Restoration of Abandoned Mines Sites (RAMS) = \$517,000 (2006)
- ➔ Landowner spent \$250,000 moving 45,000 tons of material at the Mt. Diablo Mine.
- ➔ Landowner's work did not comply with State Clean-up & Abatement Order.
- ➔ UCD recommended actions aimed at reducing the amount of AMD formed at the site and discharging into the Marsh Creek watershed.

Challenges Posed by Underground Workings and Draining Adits

- ➔ Tunnels and shafts, some collapsed, underlay the Mt. Diablo Mercury Mine.
- ➔ Groundwater probably creates a significant fraction of the AMD generated at the site.
- ➔ Theoretically, extraction wells could be installed, and perpetually operated, to intercept and divert clean groundwater before it contacted acid-forming minerals underground, but this would be a complex endeavor for a Good Samaritan.
- ➔ If, due to financial and regulatory constraints, a Good Samaritan focuses only on consolidating and sealing above-ground mine waste, and diverting clean water runoff away from waste materials, a significant source of the pollution would go unabated.

Numeric Limits and a BMP-based Approach

- ➔ Remarkable reductions in the discharges of AMD can be achieved by implementing a comprehensive package of BMPs (the “BMP-based approach”) -- up to 99% (!).
- ➔ While the Water Board has allowed for the BMP-based approach in lieu of numeric effluent limits, these two approaches are not mutually exclusive.
- ➔ Under existing State and federal rules, the Water Board might continue to find it programmatically difficult to allow landowners/Good Samaritans to pursue the BMP-based approach in lieu of numeric effluent limits because the residual, continuing discharges might not comply with the limits derived from the SIP-based approach.

Compliance -- Past and Present

- ➔ Ideally, a landowner/Good Samaritan would possess the wherewithal to pursue a voluntary cleanup of the site, and the Water Board would issue to them a unique NPDES permit -- both consistent with prevailing regulatory programs, and tailored to resolve the outstanding Clean-up and Abatement Order issued to the landowner in 1978.

Strength in Numbers

- ➔ If the landowner/Good Samaritan successfully obtains a NPDES permit from the Water Board for the Mine cleanup, and the permit authorizes some level of residual, *continuous discharges* of AMD, the exposure of all parties to litigation under CWA’s citizen suit provisions might be minimized, but not eliminated.
- ➔ Perhaps no landowner/Good Samaritan can be shielded entirely from the risk of legal liability under CWA, but if they engage and garner support from most or all interest parties, there will be strength in numbers if the proposed project is contested.
- ➔ Good Samaritans must weigh the potential environmental and public health benefits of their remedial activities against unknown, potential legal risks.

Different Approaches = Different Outcomes

- ➔ The federal Coal Re-mining Rule allows companies to excavate coal from old and abandoned coal mines in exchange for mine cleanup once re-mining is completed.
- ➔ The Good Samaritan Initiative allows limited recycling or incidental reprocessing of historic mine tailings necessary for, and directly related to, the cleanup of a hard rock mine, but prevents the extraction of remaining ore deposits.
- ➔ Compared to the Coal Re-mining Rule, the Good Samaritan Initiative lacks economic incentives that would encourage government supervised, voluntary cleanups.
- ➔ The Good Samaritan Initiative appears to rely on altruism – a commodity as rare as any precious metal sought by prospectors.

Recommendations

Mount Diablo Mercury Mine

Refining the Cost Estimates:

- ➔ The Contra Costa County Flood Control and Water Conservation District (District) estimated the planning phase would cost ~\$960,000 (Congress earmarked \$517,000).
- ➔ Originally, the planning phase included the preparation of liability-limiting documents, but the Model Letter and Model Agreement issued by EPA and DOJ in June 2007 addressed most, if not all of the CERCLA-related liability concerns.
- ➔ Given the Pacific Mine/Snowbird cleanup cost \$200,000+, and estimated costs for the planning and implementation of the cleanup at the Mt. Diablo Mercury Mine have been as high as \$4 million, stakeholders should revisit the estimated cleanup costs.

Required Reading

- ➔ Stakeholders should study the State's *Amendment to Water Quality Control Plan and Action Plan for Mining*, and federal rules at 40 CFR 122.44(k)(3) for application to the proposed cleanup of the Mt. Diablo Mercury Mine.
- ➔ Stakeholders should study the ruling in the lawsuit brought by the California Sportfishing Protection Alliance against the Central Valley Water Board regarding Spanish Mine for application to abandoned and orphaned mines.
- ➔ Federal and State regulators should review EPA's regulations for the re-mining of old and/or abandoned coal deposits, and determine whether the underlying logic could be applied to the voluntary cleanup of abandoned hard rock mines.

Finding a Good Samaritan

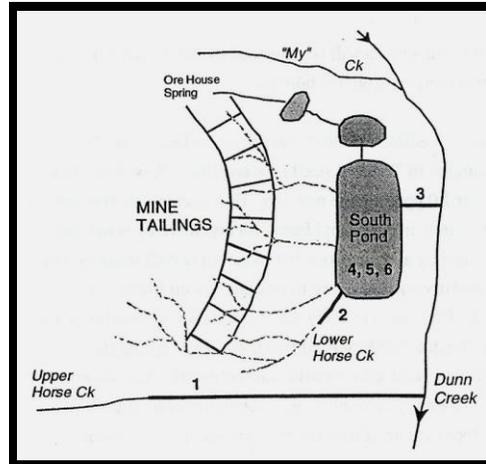
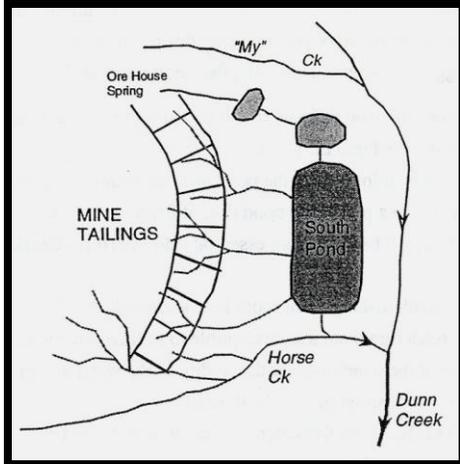
- ➔ While the District should be applauded for its stated desire to serve as a Good Samaritan, it might be impossible for federal and State regulatory agencies to deliver enough certainty to satisfy their lingering liability concerns.
- ➔ Alternatively, if a more immediate cleanup is desired, stakeholders should consider identifying another candidate who could serve as the Good Samaritan.

All of the Above?

- ➡ A comprehensive package of BMPs at the Mt. Diablo Mercury Mine (e.g., the capping of waste in repositories and the diversion of clean water away from waste materials) coupled with the construction and operation of extraction wells (to intercept groundwater and keep it clean) and an on-site treatment plant (to treat AMD) could collectively meet numeric effluent limits and water quality standards.
- ➡ O & M requirements might entail hiring licensed hazardous waste experts to dredge and dispose of mercury-laden sediments from the existing settling pond, or from new detention basins or constructed wetland treatment systems installed during the cleanup.
- ➡ Monitoring requirements might entail the hiring of scientists sample and analyze surface water, sediment, and fish tissue consistent with the prevailing scientific protocols set by the SWRCB.
- ➡ A BMP-based approach could be explored as an alternative to a traditional NPDES permitting approach that specifies numeric effluent limits. This approach would focus on achieving overall decreases in pollutant loading -- and corresponding increases in ambient water quality -- within a relatively small geographical area, e.g., an historic mining district, rather than focusing on reducing individual point-source discharges into specific stream segments.



Two views of the main seep at the Mt. Diablo Mercury Mine from across the settling pond. In both cases, the photographers may have stood on the berm separating the pond from Dunn Creek. At left, the mine as it appeared in 1994 from the archives of R.W. Graymer, D.L. Jones, and E.E. Brabb; USGS Open-File Report 94-622. At right, the mine as it appeared on 31 July 2008 courtesy of John Hillenbrand, US EPA.

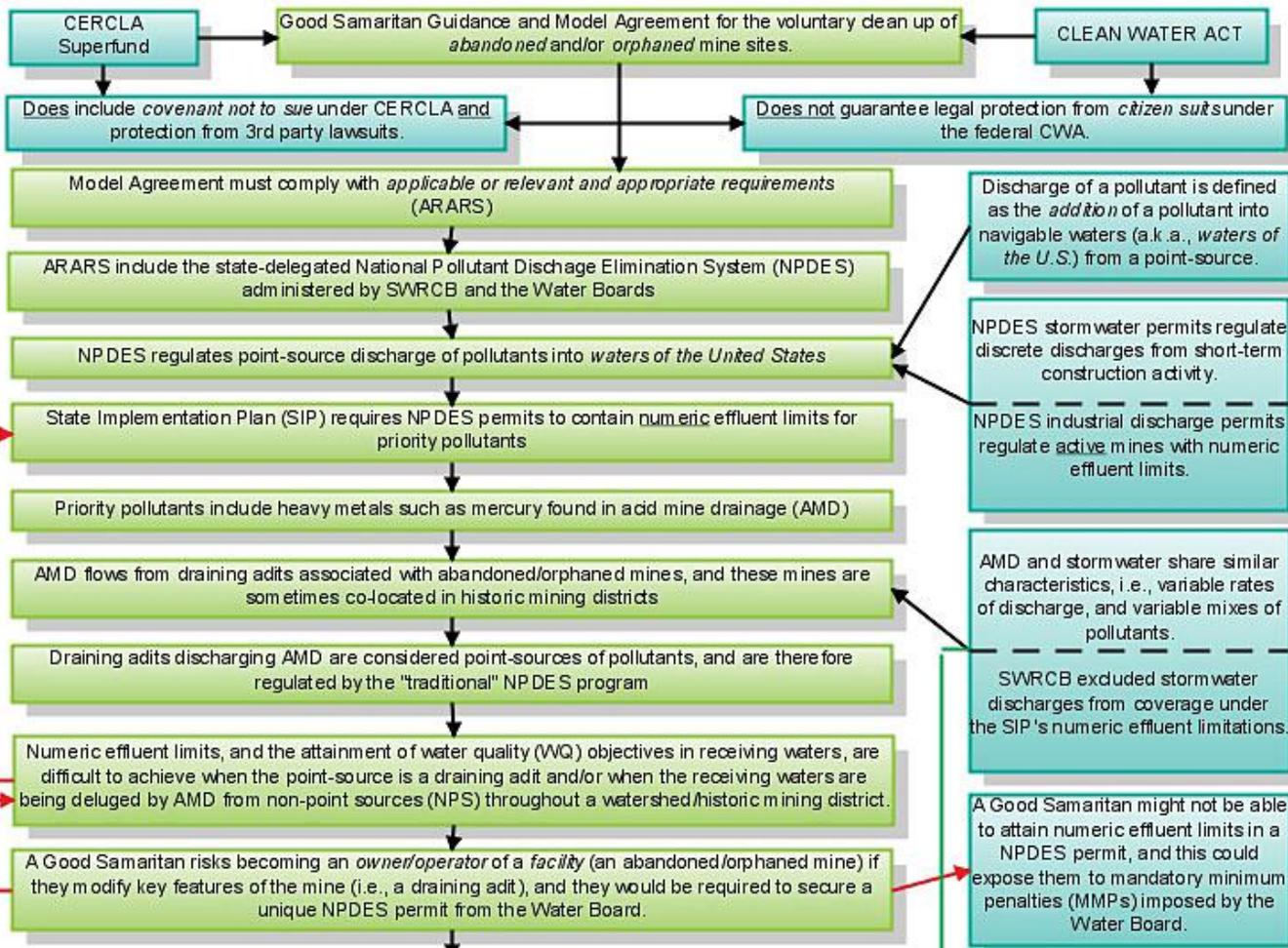


Suggested “before” and “after” illustrations (summarized on page 49) courtesy of Slotten, *et al.* 1996.

Post-Project Monitoring and Site Controls (Stewardship):

- ➡ The District appears unwilling to accept obligations for post-project monitoring and site controls (stewardship), and the landowner may not possess the capacity for this task.
- ➡ Stakeholders should identify candidates for this role, and establish an endowment for perpetual funding of this stewardship role.
- ➡ If a steward cannot be identified, then one might need to be created from scratch.
- ➡ In turn, regulatory agencies might need to issue a BMP-based NPDES permit to the stewardship organization that both recognizes the near inevitability of residual AMD discharges, and permanently shields the steward from legal liability.

Good Samaritan Initiative



Available options for voluntary mine clean-ups under the Good Samaritan Initiative and the existing regulatory framework.

