Closing Abandoned Mines:



A Critical and Complex Process



ining of coal deposits and heavy metals has been a significant component of the U.S. economy, providing essential domestic raw materials for heavy industry for over 100 years. Safe operation of coal and heavy metals mines is critical – not only when they are active but also when they are shut down – as they can release hazardous substances. Metal-rich sulfides from mines can adversely affect soil and water quality, and contaminated water and air pose a significant risk of cancer and other ailments.

In an effort to reduce the adverse effects of mining, the U.S. government has implemented several laws establishing acceptable safety and waste handling and processing standards so the mining industry can operate responsibly, including:

• The *1977 Surface Mining Control and Reclamation Act* (SMCRA), which created an Abandoned Mine Land Reclamation Fund.

- The 1980 Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), which implemented regulations and funds for the proper cleanup of hazardous substances.
- The 2021 Infrastructure Investment and Jobs Act (IIJA), which added more than \$11 billion in funds to the Abandoned Mine Land Reclamation Fund. It also created "a program to inventory, assess, decommission, reclaim, respond to hazardous substance releases on, and remediate abandoned hardrock mine land," which includes \$3 billion in funds.

These laws establish safety standards and facilitate the conversion of non-operational mine sites to productive uses, such as harvesting renewable energy (e.g., solar farms).

Safe and effective cleanup and closure of abandoned mines requires precise planning, which is often performed by engineering firms that specialize in

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these activities. Engineers often use geospatial data (such as digital imagery and elevation data) to assist them with the design and build process and also the reclamation process once mining activities are completed. This data enables inclusion of detailed descriptions and specific location information for each task in the cleanup and closure plan.

Surdex Corporation of Chesterfield, Missouri, has completed numerous mapping projects for engineering firms which used geospatial data for this purpose. Several such projects were for Black & Veatch's environmental services business unit, which was acquired by Versar in 2021; Surdex has completed 7 abandoned mine projects for Versar/Black & Veatch in southwestern Missouri within the last 10 years. These projects included some combination of aerial imagery/lidar data acquisition, topographic mapping and/or planimetric mapping. Surdex is also working closely with the Office of Surface Mining Reclamation and Enforcement (OSMRE) to determine requirements and support their ongoing efforts to utilize remote sensing technologies to both monitor and reclaim/restore mine sites.

A custom control and flight plan is designed for each abandoned mines project, ensuring the accuracy requirements and other specifications are met. With accurate geospatial data in hand, engineering firms like Versar can carefully develop plans for successful closure of abandoned mines, mitigating adverse effects on the environment and human health. Given the 2021 IIJA's contribution to the Abandoned Mine Land Reclamation Fund and establishment of a new hardrock mine land program, mine closures and reclamation efforts will continue at a steady pace into the foreseeable future.



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