

Coal slurry impoundment location and warning system

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ABSTRACT: The coal slurry impoundment project has developed an Internet web site to provide citizens, regulators, and industry with information to enhance the safety and efficacy of coal slurry impoundments. In the pilot year this program has provided detailed information on the location, ownership, size, history, and emergency action plans for 110 of the known coal slurry impoundments in West Virginia. Featured on the web site are emergency contacts, instructions for how to proceed in case of an impoundment failure, and detailed interactive maps showing the location of impoundments in relation to communities, roads, and rivers. The information provided includes evacuation routes, and centers. The web site also examines coal impoundment failures and causes, and investigates alternative technologies that minimize or eliminate the need for coal slurry impoundments.

1 INTRODUCTION

On October 11, 2000, Martin County Coal Corporation's Big Branch Slurry Impoundment failed due to a breakthrough into an underground mine. This was the second failure at that site. Although no one was killed, the resulting release of 309 million gallons of coal slurry was deemed the worst environmental disaster in the southeastern United States. In response, the National Academy of Sciences conducted a study and made recommendations to improve safety and reduce environmental impacts of coal waste impoundments.

The Coal Impoundment Location and Warning System is a pilot project designed to address the recommendations of the National Academy's study. This project is being implemented by the Robert C. Byrd National Technology Transfer Center, Wheeling Jesuit University, West Virginia University, the National Energy Technology Laboratory, Erma Ora Byrd Center

for Educational Technologies[®], Clifford M. Lewis S.J. Appalachian Institute at Wheeling Jesuit, and the International Union of Operating Engineers.

The purpose of the coal slurry impoundment project is to provide public awareness of impoundments, especially to those who live downstream. One of the goals of the Internet pilot project is to develop a web site that provides details of: the locations of coal slurry impoundments in West Virginia, the responsible parties and emergency action plans in case of an impoundment failure, the history of coal impoundments and impoundment failures, and the alternatives to impounding coal waste.

Project contributors include the Mine Safety and Health Administration (MSHA), West Virginia Department of Environmental Protection (WVDEP), West Virginia Geological and Economic Survey, West Virginia Highlands Conservancy, Pennsylvania Bureau of Deep Mine Safety, Massey Energy Company, West

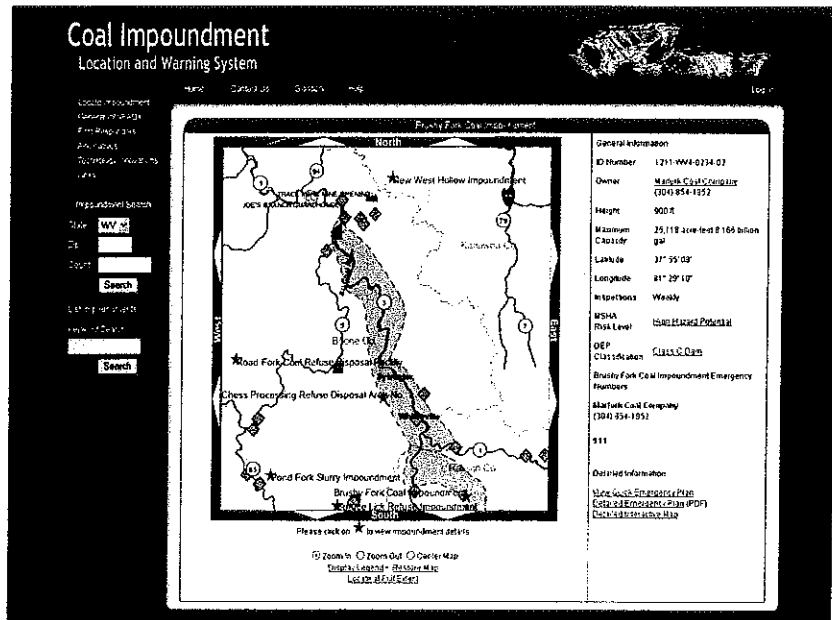


Figure 1. Evacuation map for a coal slurry impoundment in southern West Virginia including the location of roads, road blocks, and evacuation centers.

Virginia Office of Miners' Health, Safety and Training, Virginia Department of Mines, Minerals and Energy, West Virginia Library Commission, Peabody Energy, Ohio Valley Environmental Coalition, Verizon, Kentucky Department of Mines and Minerals, Nilex Corporation, Raleigh County 9-1-1, Coal River Mountain Watch, Office of Surface Mining, and Consol Energy.

2 LOCATING COAL SLURRY IMPOUNDMENTS

The project team has launched a web site www.coalimpoundment.org. Currently, there is detailed information included for 110 of the known impoundments in West Virginia listed on the site. This work is on-going and will eventually include all active, inactive, and abandoned West Virginia impoundments as they are identified and located. The utility of the web site is being assessed through public meetings and correspondence in order to provide users with the most accurate and useful information possible prior to expanding the web site to the Appalachian coalfield region of the southeastern United States.

Critical information available for each impoundment includes: MSHA identification number, owner contact information, height, maximum capacity, latitude and longitude, inspection schedule, Mine Safety

and Health Administration designated risk level, West Virginia Department of Environmental Protection dam classification, emergency action plans, and evacuation zones (Figure 1).

The web page features an impoundment search field where users can search for an impoundment by typing in their state, county, zip code, or impoundment name. The search feature appears on every page. There is also an A-Z listing of impoundments that can be sorted by impoundment name, county, MSHA identification number, or coal company name.

Interactive mapping is a web site resource specifically for users who are concerned about impoundments near their homes. Users can employ this feature to access topographic maps and infrared aerial photography for impoundments in the state of West Virginia (Figure 2). The opening page displays a map of West Virginia, demonstrating four layers of information that can be accessed at that scale. Layers include the locations of coal impoundments in relation to reference points such as interstate highways, counties, and zip codes. As the user zooms in on the map, more interactive mapping layers appear. At finer scales more information can be added or removed from the map based on the user's preference.

Once an impoundment has been identified the user has the option of adding information layers that show the impoundment in relation to known underground mines, surface mine permit boundaries,

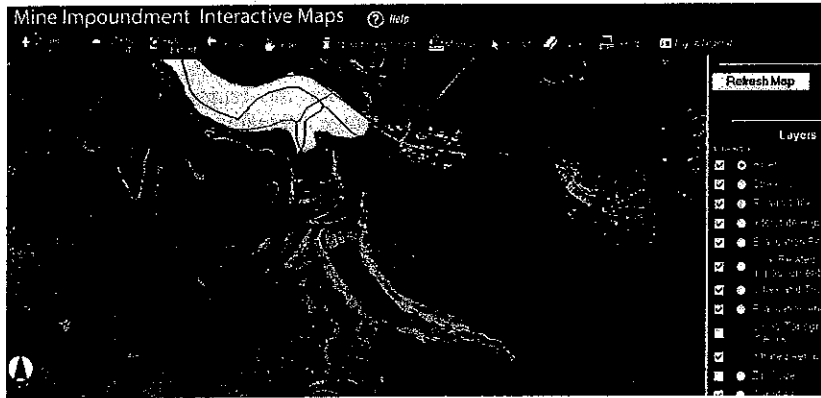


Figure 2. Aerial photography of Shumate Branch Impoundment in West Virginia.

streams, highways, and county roads. The web site also features a help page designed to describe each of the interactive mapping tools and how to operate them. Map features including the location of schools, hospitals, and volunteer fire departments will be added once updated location information becomes available.

3 EMERGENCY ACTION PLANS

Emergency action plans and evacuation maps on this site are taken directly from permit applications on file with the West Virginia Department of Environmental Protection. Emergency action plans are available online in their full-text versions and in summary form with the most pertinent information including: emergency phone numbers, evacuation plan, actions and responsibilities of first responders, and contact phone numbers. This is the first database of its kind that provides public access to impoundment information and their corresponding emergency plans. In addition, by working with the West Virginia Library Commission, emergency information is available through public libraries for those who do not otherwise have access to a computer.

4 COAL IMPOUNDMENT FAILURES DATABASE

The Coal Impoundment Location and Warning System also includes a database of 53 coal slurry release incidents from coal preparation plants and impoundment facilities located in the Appalachians, primarily West Virginia (Figure 3). The information provided is based upon descriptions and reports from sources including the National Academy of Sciences, Mine Safety and

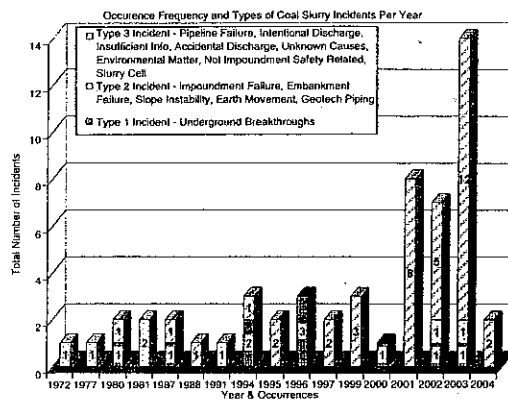


Figure 3. Coal slurry impoundment failures and causes 1972–2003.

Health Administration, Office of Surface Mining, and regional newspapers. Each source is identified with a full bibliographical citation for each incident.

The impoundment failures database provides a complete listing of the 53 incidents that can be sorted by column headings including year, spill volume, mine company, town, county, and state. Details of each incident are provided on separate pages that include company names, subsidiary names, processing plant names, impacted river, stream, and tributaries names, state, county, and nearest town names, lives lost, property damage, and water supply and fisheries impacts, spill cause, and a detailed description of each incident.

The volume of coal slurry released was reported for 70% of coal impoundment failures. Volumes ranged from 1,000 to 309,000,000 gallons. Spills resulting in coal slurry leaving company property appear to be

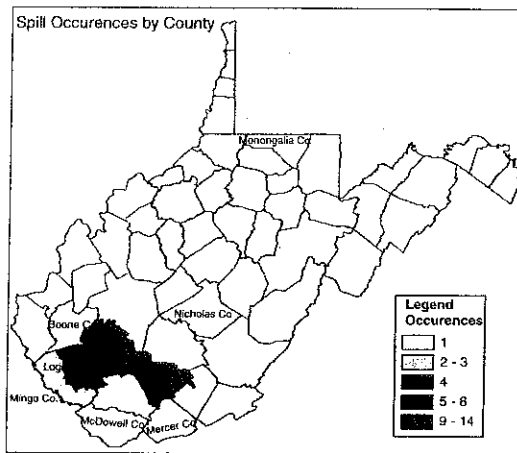


Figure 4. An example map: impoundment failure incidents in West Virginia.

increasing over the past two decades (Figure 3). The apparent increase in spills may be partly the result of more vigilant reporting, and may also be due to the age of the impoundments in relation to their original engineering design.

Maps illustrate the counties where spills have occurred (Figure 4) and the volume of slurry that has been spilled. Continued work with citizens, companies, regulatory agencies, and the media provides updates and enhances the accuracy of the coal impoundment failures database.

5 ALTERNATIVES TO COAL SLURRY IMPOUNDMENTS

Technical aspects of coal waste impoundments are addressed in two sections on the web site: Alternatives

and Technology Innovations. The Alternatives section identifies technologies that reduce the need for coal slurry impoundments, or are remediation techniques used for the removal of existing impoundments. Storage alternatives include technologies that eliminate impoundments by exploring other waste storage locations. Dry coal cleaning methods are technologies that can clean coal without the use of water thereby eliminating the need for impoundments. Remediation techniques examined are waste recycling technologies designed to cleanup impoundments by using existing inactive or abandoned impoundment materials as an energy source.

A section of the web site identifies technology innovations to improve the safety of coal waste dams. Innovative technologies are grouped into three general categories. The first category, impoundment improvements, lists technologies that improve the safety of existing impoundments. The second category, slurry volume reduction, includes technologies that reduce the size of impoundments either by dewatering the slurry or by removing usable coal from the slurry during the coal preparation process. The third category, underground mine void detection, includes technologies such as ground penetrating radar that can sometimes be used to identify underground mine voids. Mine voids may reduce the stability, and thereby the safety, of existing coal slurry impoundments.

6 CONCLUSION

The Coal Slurry Impoundment project web site www.coalimpoundment.org provides citizens, emergency responders, and industry with information to enhance the safety of impoundments and explore alternatives to impounding coal waste.