**CASE STUDY**

# Big River Mine Tailings Site
# St. Francois County, Missouri

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**Prepared by**
**The Interstate Technology & Regulatory Council**
**Mining Waste Team**

**Acknowledgements**

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## 1. SITE INFORMATION

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### 1.2 Name, Location, and Description

The Big River Mine Tailings/St. Joe Minerals Corp. site is located in Desloge, in a former mining region of southeast Missouri known as the "Old Lead Belt." This site comprises six large areas of mine waste in this rural region, approximately 110 square miles in size (Figure 1-1). The areas included are the Bonne Terre Mine Tailings Site, the Leadwood Mine Tailings Site, the Elvins Mine Tailings Site, the Federal Mine Tailings Site, the Desloge Mine Tailings Site, and the National Mine Tailings Site. Also included are the surrounding residential and recreational areas.

Mining in the area began in the mid-1700s and peaked in 1942 when 197,430 tons of lead was produced. Mining in the area ended in 1972. Approximately 250 million tons of tailings and chat (solid mine waste) was produced from local mills during this time. The residual lead content in the tailings material is about 0.5%; other minerals such as cadmium and zinc are also present. In 1977, heavy rains caused an estimated 50,000 cubic yards of tailings to slump into the Big River. Surface water and various forms of biota in the Big River contain elevated concentrations of lead. Fish in the Big River have shown elevated levels of lead. The state of Missouri advises people not to eat fish from the Big River downstream of this site. In addition, dust created by wind erosion of the mine waste piles contaminates the surrounding area and is a potential hazard to residents. A 1997 human health exposure study by the Missouri Department of Health showed that 17% of the children under seven years old had blood-lead concentrations exceeding the health-based standard of 10 mg/dL.

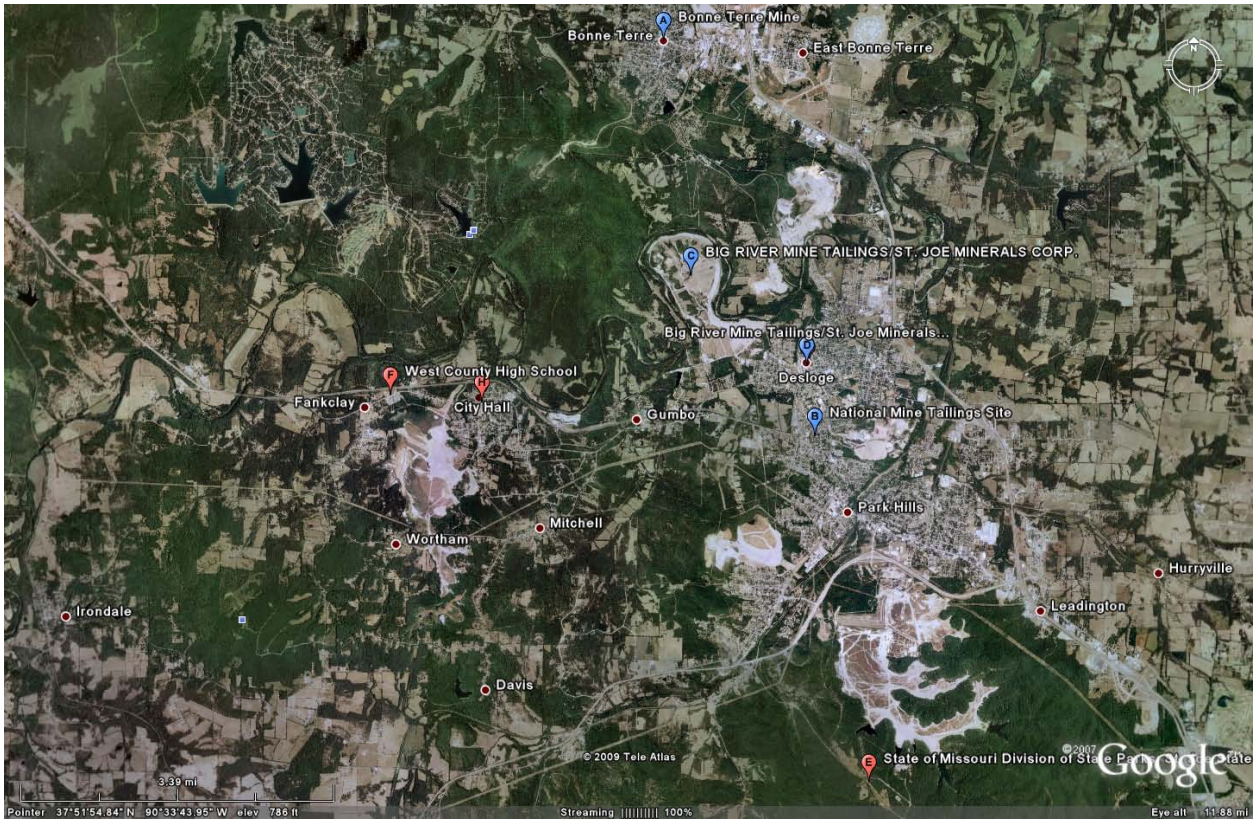


**Figure 1-1. Aerial view of the Big River Mine site.**

## 2. REMEDIAL ACTION AND TECHNOLOGIES

Considering the large volume of solid mine waste left at the site, capping, covers, and grading represent the most feasible and effective remedial action. Work begins with a detailed engineering analysis to determine the geotechnical characteristics (including seismic analysis), concentration of metals, and local hydrology. Grading specifications are then developed based on the results of the analysis. Cover material generally consists of blasted, crushed, screened quarry rock and cover soil. These materials are placed on the solid mine waste based on the specifications of the engineering design. Generally, rock is placed on slopes steeper than 4H:1V, and soil is used to cover flat areas. Seeding of the soil areas ensures the long-term stability of the soils. In some areas of the site, direct vegetation of solid mine waste will provide an effective cover. However, the solid mine waste is nutrient poor and requires a substantial amount of soil amendments to build an organic layer capable of supporting vegetation.

In 1995, a non-time-critical removal action was initiated to regrade the mine wastes at the Desloge pile. The regrading improved the structural stability of the pile, thereby preventing sloughing into the river. Other activities at the site include covering and revegetating to control wind and weather erosion and providing rock slope protection at the waterline to prevent undercutting by the river.

## 3. PERFORMANCE

Effectiveness of the caps and covers are evaluated with regular water sampling and ambient air monitoring. Water samples are collected both upstream of and downstream of the site discharge points. Ambient air monitors measure both lead and dust blowing from the site. Comparison of these results to the action levels allows for some measurement of success. Additionally, routine inspections of remediate areas of the site are required to ensure that the caps and covers remain in place and are not compromised in any way.

## 4. COSTS

Cost of capping, covers, and grading at the site vary depending on specific conditions at each solid mine waste area. Previous actions range in costs from $7,000/acre to $95,000/acre with an average cost of $20,000/acre.

Cost of activities at these site are reported as a total:

- Capital: Varies based on specific site conditions.
- Operation and maintenance: Varies based on type of cap or cover.

## 5. REGULATORY CHALLENGES

Leaving large quantities of solid mine waste in place on site present issues with long-term stewardship (LTS). LTS can include the use of restrictive and/or environmental covenants and implementation of a monitoring and maintenance plan. Restricting site access or allowing continued use of the site for recreational or industrial purposes poses a unique set of challenges. Due to the size of these mine waste sites, it is often not feasible to fence or otherwise block access to the site. Many members of the community do not recognize that the sites are private property and trespass frequently. Resources are not available to police to enforce trespassing laws. Off-road vehicular traffic is of particular concern as the designs of most caps are not intended for this type of use. In some cases, the final design of the cap is intended for future use as a recreation area or as an industrial site. Monitoring and maintenance become the primary regulatory challenge in these instances.

## 6. STAKEHOLDER CHALLENGES

No information available.

## 7. OTHER CHALLENGES AND LESSONS LEARNED

The Doe Run Company uses biosolids (treated sewage sludge) to increase the organic matter and nutrients of the mining areas for the establishment of vegetation. The establishment of vegetation on the tailings areas reduces the amount of lead-contaminated dust blowing off the piles, which is vital to the remedy. The biosolids are tested for hazardous substances and applied at

agronomic rates in areas of the piles not susceptible to runoff. The biosolids provide the substances necessary for vegetation to grow in the nutrient poor conditions of the tailings; however, public perception over biosolids treatment has been an ongoing concern. Although the biosolids are being applied in a safe and legal manner, some members of the public near these piles feel that the treatment is unnecessary.

## 8. REFERENCES

Barr Engineering Company. 2009. *Engineering Evaluation/Cost Analysis Report—Federal Mine Tailings Site, Park Hills, Missouri* (draft). Prepared for the Doe Run Company.

NewFields, Inc. 2006. *Focused Remedial Investigation for Mined Areas in St. Francois County, Missouri.* Prepared for the Doe Run Company.

U.S. Environmental Protection Agency. 2005. *Engineering Evaluation/Cost Analysis Report for National Mine Tailings Site, Park Hills, Missouri.* Prepared by Black and Veatch.