

MINE SHAFT SUBCOMMITTEE
FINAL REPORT
to
GOVERNOR FRANK KEATING'S
TAR CREEK SUPERFUND TASK FORCE

July 2000

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EXECUTIVE SUMMARY

On January 28, 2000, Governor Frank Keating appointed a Tar Creek Superfund Task Force panel to examine all facts related to the cleanup of the Superfund site in Ottawa County. Eight subcommittees were formed to gather these facts. The Mine Shaft Subcommittee was asked to complete two tasks. **Task 1 was to identify and locate mine shafts and other openings associated with the abandoned lead and zinc mines that pose a threat to public health and safety. Task 2 was to propose solutions and potential funding sources for closing the hazardous underground openings.**

The Subcommittee identified the sources of old mine maps and related information. The Eagle-Picher Mining Company mined more acres than any other company in the Tar Creek Superfund area. Therefore, the 40-acre maps produced by Eagle-Picher should provide the best, most comprehensive information. Other mining maps have also been located. To supplement this information, former miners were interviewed to verify the location of the mine openings and the extent of the mining. Former studies of the mining area also provided valuable information. The best estimate is there are more than 1,320 mine shafts and thousands of drill holes and other related mine openings in the area. Many of the openings are closed, but the stability of the mine closures need to be field verified.

This information, once digitized and geo-referenced in a Geographic Information System (GIS), should be downloaded utilizing Global Positioning System (GPS) equipment. Field staff using GPS can then find the exact location of a mine opening and input all related features. The information for each mine opening can then be evaluated using a Project Selection Matrix developed by the Subcommittee. This matrix provides a mechanism for ranking the mine openings. The openings most hazardous to the public would rank the highest.

The Subcommittee recommends the following to complete Task 1: Use the 40-acre Eagle-Picher maps as the base maps; seek public input in locating mine openings through notices in local newspapers; employ at least two field staff to gather on-site information; utilize the Project Selection Matrix for ranking individual mine openings; identify lands under jurisdiction of the Bureau of Indian Affairs; and begin closure of mine openings as soon as funds become available, even if data gathering has not been completed. Total estimated cost to complete Task 1 is \$250,000. The timeline to complete Task 1 is 11 months.

Upon request, the Subcommittee received numerous mine shaft closure methods from governmental agencies and the private sector. These methods included designs and costs as well as the advantages and disadvantages for each method. The Subcommittee supplemented this data by reviewing existing reports for closing both non-coal and coal underground mine openings. After reviewing all the material, the Subcommittee decided that the preferred closure method is backfilling, if it is economically feasible, because it is a permanent closure. Other recommended, but less permanent, closure methods are a concrete cap, a concrete wedge, or a concrete plug. Open drill holes should also be closed. The estimated average cost of closing an open mine shaft would be about \$10,000 and an open drill hole would be \$200. The

subcommittee identified potential funding sources, including their statutory authority, to close the mine openings.

The Subcommittee recommends the following to accomplish Task 2: Close open mine shafts using backfill as the preferred closure method (if economically feasible); plug all open drill holes that are 10 inches or greater in diameter; and begin discussions with federal agencies to secure funds for mine closures, with special efforts toward securing 9:1 matching funds with the Environmental Protection Agency. Total estimated cost to complete Task 2 is \$10 million. Depending on the amount of funding and the number of closures, it will take 5 years to complete the closure work. It is believed that on-site field investigations will indicate that many of these shafts are sufficiently closed, thus reducing the total time and dollars needed.

INTRODUCTION

The Mine Shaft Subcommittee is one of eight subcommittees established under Governor Frank Keating's Tar Creek Superfund Task Force. The primary objective of this subcommittee is to develop feasible alternatives for plugging the numerous abandoned mine shafts existing in the Tar Creek Superfund area. To accomplish this objective, two tasks have been given to the subcommittee:

Task 1

Develop an effective means for identifying and locating all open mine shafts, and other openings that create a safety hazard, that exist within the immediate vicinity of the Tar Creek Superfund project area. The subcommittee shall identify the resources necessary to complete this effort, the entities responsible for performing the identification, and potential funding sources for the project.

Task 2

Assess the effectiveness and feasibility of current efforts to plug abandoned mine shafts and explore other feasible alternatives to remediate this critical safety concern. The subcommittee shall draft a project proposal for each plugging alternative that includes a scope of work, timeline, resource needs (both capital and personnel), and potential sources of funding for the project.

The subcommittee is co-chaired by James Graves (Grove, Oklahoma) and Mike Kastl (Oklahoma Conservation Commission). The subcommittee members are:

A. L. Suman – Ottawa Reclamation Authority
Sam Freeman – City of Picher
Bill Erdner – U.S. Army Corps of Engineers
Mike Sharp – Oklahoma Conservation Commission
Len Meier – Office of Surface Mining, U.S. Department of the Interior
Dennis Datin – Oklahoma Department of Environmental Quality
John Dalgarn – Bureau of Indian Affairs, U.S. Department of the Interior
Meredith Garvin – Quapaw Tribe
Frank Wood – Metallurgical Consultant
Ed Keheley – Quapaw, Oklahoma
Jo Rainbolt – Office of Congressman Tom Coburn
Joe Crawford – Ottawa County Commissioner, District #1

(Insert "Aerial View of the Picher Field, Ottawa County, Oklahoma" Map)

Picher, Oklahoma

Early day mining with a high concentration of mine shafts



Photo provided by James Graves

● Approximate locations of shafts are marked by symbol.

BACKGROUND INFORMATION

Mining History

Lead and zinc mining in northeastern Oklahoma began in 1891 near Peoria. Several other communities in the area were settled as a result of these mining activities, increasing the area population to approximately 32,000 people in the early 1920s. Estimates state that as many as 250,000 people were directly or indirectly affected by portions of the Tri-State (Kansas, Oklahoma, and Missouri) Mining District activities. At one time the Picher Mining Field was the leading U.S. producer of lead and zinc, supplying approximately 26.3 percent of the nation's lead and zinc products. From 1907 through 1946 more than 1,900,000 tons of lead and zinc were mined in the area, at a value of more than \$202 million.

To reach the underground bodies of ore throughout the Tri-State Mining District, early miners and mining companies excavated hundreds of working and prospective mine shafts. Thousands of drill holes dotted the mining area.

During the early mining era there were more than 200 processing mills operating in the Picher Mining Field. Each mining company had a mill located at its most productive site. An aerial view of the Picher Field taken in 1995 is shown on Map 1 and illustrates the high concentration of mining activity. Water was pumped from underground through the mill and used to separate the ore from the waste rock. The mills had the capacity to pump between 2,000 to 10,000 cubic feet of water per minute to separate between 30 and 70 tons of ore per hour. A mining method known as jigging and tabling was used to extract the ore, but it was not very efficient. Beginning in the 1920s the use of the flotation process ensured the recovery of 80-85 percent of the metal contained in the crude ore.

Between 1920 and 1945, 36 million gallons of water were pumped daily from the mines by 63 major pumping stations in order to keep the mines dry.

In 1934 the Eagle-Picher Mining Company began construction on the Central Mill; the mill was completed in 1935 with a capacity of 500 tons of ore per hour. It was believed that this mill would replace all of the other mill sites; an assumption that did not prove true.

In 1947 there were 65 mining companies operating 135 mines and 46 mills in the Tri-State Mining District. Even with the Central Mill's increased capacity, it was not possible to handle production for all the mines. The mills produced more than three billion tons of waste rock (chat). Mining companies would re-run the chat as many as three times in order to recover all the ore possible. Sludge and mill waste were also recycled from mill sites. Such recycling accounts for some of the variability in the level of lead found in the chat.

In 1946 the Tri-State Zinc and Lead Ore Producers Association lobbied the U.S. Congress for economic assistance to continue the mining of marginal ore deposits remaining in the mining district. Although the Tri-State ore producers were not successful in their lobbying, assistance

was provided by a production subsidy under the *Strategic Minerals Act of 1949*, which paid mining companies a subsidy for tonnage produced regardless of ore content. This provided an economic incentive to remove pillars (support columns). Removal of pillars fulfilled miners' predictions of mines collapsing, water filling mine caverns, and contaminated acid water flowing into Grand Lake.

In 1958 many of the mining companies were shutting their doors and moving out of the field. As each mine closed, the water level rose, and it became more difficult for those remaining to continue in business.

Eagle-Picher, the largest company in the area and the last to shut its doors, began subleasing to gougers in the late 1950s. The gougers would enter the mines and mine out any ore remnants. It was during this era that additional pillars were removed, thereby increasing the potential for subsidence of the surface above the mines.

Eagle-Picher opened up the first incline tunnel at the Swalley Mine northeast of Picher in 1969 through 1970. The Kansas Health Department, due to the heavy iron ore and other minerals draining into Spring River and Lytle Creek, closed this operation. The company invested more than \$1 million trying to contain the water and reduce contamination problems.

The extensive mining in the Tri-State District left abandoned shafts and underground caverns extending from south and west of Commerce, Oklahoma, to Joplin, Missouri. The caverns are not continuous; however, only small parcels of solid land exist in some areas, which could cause potentially hazardous situations.

Mining Method

A standard shaft was 5 feet by 7 feet encased in wood cribbing from hard rock to the top of the ground. A 6 ½-foot round hole was made from the hard rock down to the mining level. As modern equipment became available, larger holes were made (6 ft. by 9 ft. and 7 ft. by 8 ft.). Mining was accomplished by the room and pillar method, which consisted of cutting open stopes with irregularly spaced pillars. Generally, the ore body was crosscut by the shaft; therefore, the problem presented was how to mine the better grade of ore and leave only the lowest grade of ore for pillars to support the roof. The structure and formations of the roof of the stope and the width and height of the ore body controlled the size and spacing of the pillars. If the shaft had been completed in the ore body, stopes were opened up radially for the full height of the ore, with pillars 20 to 50 feet in diameter and properly spaced to support the roof, usually 30 to 100 feet apart. About 15 percent of the ore body was left for pillars. Later when the mine reserves were depleted, as much as 50 percent of the tonnage left in the pillars was recovered by slabbing operations or by complete removal of certain pillars.

The depth of mines varied in the mining fields according to the ore veins. The average depth was 237 feet. Shafts on the Kansas-Oklahoma state line in the central portion of the mining field were deep. They became even deeper further north, with some mines extending down to 458 feet. South of the state line mine shafts were shallower. Shafts in Hockerville, Commerce, Quapaw and Lincolnville were very shallow, from 78 to 120 feet deep. Shafts in Douthat and southwest of Cardin were 200 to 290 feet in depth. (See Map 2 on page 6.)

(Insert "Depth of Mine Workings and Shaft in the Picher Field" Map)

In the shallow mining area ore veins extended close to the surface and no cap rock was present, only shell rock. It is in these areas that large cave-ins have occurred. These areas will be a factor in addressing subsidence and mine shaft closure. There are areas in the Picher Mining Field where large unsupported caverns exist that have shown no outward signs of subsidence. This is due to a 30- to 40-foot solid limestone layer near the ground surface.

Some of the more productive mines had three levels of mining, and in some mines pillars in all three areas were removed leaving little or no support. According to some former miners, a baseball game could be played in the open space and grass roots could be seen growing from the ceiling. In some of these areas subsidence of 80 to 140 feet has already occurred, but the surface ground looks deceptively normal. In other areas where the ceiling is only 15 feet high, subsidence or cave-ins leave only small, sunken areas on the surface. Some of the larger cave-ins reach the surface resulting in as much as a 170-foot subsidence.

Historical Sealing Methods

As the early mines began to close, several methods were initially used to cover the open shafts and protect people, livestock, and pets from falling into them. In some cases old car bodies and railroad ties were used to seal the mine shafts. These were temporary methods of closure. However, these methods have been the only cover on some of the shafts for up to 60 years.

In 1936 Eagle-Picher sealed six mine shafts by drilling into hard rock and using steel bars to anchor a wooden form over which a concrete slab was poured. Between 1956 and 1962 Eagle-Picher poured concrete shaft covers over five additional known mine shafts. The Ottawa Reclamation Authority (ORA) sealed six shafts in the Picher area by building pyramid-shaped wooden forms holding six to seven yards of concrete. After the concrete was poured, the forms were removed and the concrete slab was pushed over the opening to the shaft. The hole was then backfilled to prevent ground water from entering. Later the ORA used old cement mixer bodies instead of the wooden forms to plug three shafts. Filled with concrete, the mixer bodies made adequate seals for the shafts. The Authority also closed additional shafts using Haliburton oil tanks.

In January 2000 the Oklahoma Department of Environmental Quality (DEQ) and Grand Gateway Economic Development Association (GGEDA) sealed three mine shafts as a pilot project for future closure and sealing methods. Each shaft required a different method of sealing – the first used the cement mixer body method, the second was filled with large rocks from a nearby boulder pile, and the third was covered with a cement slab. Total cost for the pilot closure project was \$15,000. Each of the methods is being evaluated for future use.

Previous Studies

The Luza Report, completed in 1986, identified 1064 shafts in northeast Oklahoma. The report did not investigate areas within city limits. However, different mine maps and interviews with former miners indicate there are more mine shafts, particularly within the city limits of each of the mining towns.

In 1998 the DEQ and GGEDA began a program to map and identify shafts, subsidence, chat piles, mill sites, and other mining hazards that exist in the mining field. The mapping utilized old mining area maps, interviews with former miners and area residents, research at area universities and colleges, GPS location data, and fieldwork. To date, the program has identified approximately 85 percent of the shafts in the northeastern Oklahoma mining field on hard copy maps.

Mine Shafts Identified in Previous Studies

| | |
|----------------------|--------------|
| Picher-Carden | 212 |
| Quapaw (city limits) | 4 |
| Commerce area | 36 |
| Peoria | 4 |
| Luza Report | <u>1,064</u> |
| Total | 1,320 |

Analysis

It is the opinion of Dr. Charles Nodler, Jr., archivist at Missouri Southern College (Joplin, Missouri), that there are possibly more than 300 shafts in the Picher-Cardin area alone. And that in the mining district as a whole, which includes Kansas, Oklahoma and Missouri, there are in excess of 2,600 shafts. Missouri Southern College has one of the most extensive collections of data pertaining to the mining district.

TASK 1

Develop an effective means for identifying and locating all open mine shafts, and other large openings that create a safety hazard, that exist within the immediate vicinity of the Tar Creek Superfund project area. The subcommittee shall identify the resources necessary to complete this effort, the entities responsible for performing the identification, and the potential funding sources for the project.

Identifying and Locating Mine Openings

In identifying and locating mine openings that pose a threat to public health and safety, the openings were classified into four major categories – open shafts, sealed shafts, drill holes (open holes 10 inches or greater in diameter), and subsidence-related mine openings. Subsidence-related mine openings are addressed by the Subsidence and Sinkhole Subcommittee.

The Mine Shaft Subcommittee has relied primarily on mine maps, interviews with former miners, aerial photos, and miners' field notes to gather information about the mine shafts and drill holes. In many cases, the miners verified shaft locations and provided valuable information about the depth of the mining, the geology of the mined area (rock cap or shale between the ore and the surface), the number and direction of drifts from a mine shaft, and other pertinent details. There are numerous shafts that have been sealed in past years utilizing a variety of methods. In some cases, the former miners can verify if a mine shaft was closed and the method that was used to close the shaft. Some of the methods, such as using wooden timbers or car bodies to bridge the openings, should be considered temporary at best. These shafts have a high potential for failure and should be re-opened and sealed properly. Additionally, knowledge gained from local citizens and former miners will be used to locate, in the field, as many openings as possible.

Eagle-Picher Mining Company. The company has very extensive mining records of the Tri-State Mining District, particularly of the Picher field, which is the largest mining field within the district. These records include 40-acre detailed mine maps on essentially all land involved in the mining, thousands of drill logs (drilling records of the rock types above a mine roof), information on how the shafts were abandoned and the locations, survey notes to find the shafts, and other valuable mining records. The 40-acre maps are the most up-to-date maps available because Eagle-Picher was the only large company left in the Picher field during the final stages and controlled most of the final mining done earlier by smaller mining companies.

The 40-acre mine maps are vital; because they show the extent of the underground mining in detail, they are ideal for determining the safety of the surface. These maps also show the roof heights of the underground workings; this is extremely important because some of the underground rooms were mined to heights greater than 90 feet. In those areas mined at greater heights, a cave-in could go to the surface causing possible injury/death or destruction of property.

Miners searching for the location of ore bodies below the surface sank hundreds, if not thousands, of drill holes throughout the mining area. The drill logs maintained by the miners catalogue the rock type in the roofs of the mines. The type and thickness of the rock between the roofs of the mines and the surface varies. This information is very significant. If there is a thick limestone cap over a mined-out area, the surface area should be safe unless the underground mining was very high and wide. The most dangerous situation occurs where extensive shale exists between a mine roof and surface. In this case, extreme caution must be maintained when using any equipment on the surface. Open drill holes can pose two hazards. Some of the open drill holes have collapsed and are large enough for a child to enter. The second hazard is that they provide a conduit for surface water to enter the underground workings, thereby contributing to the magnitude of acid mine drainage (AMD) being produced in the region.

The Eagle-Picher records give the condition of abandoned mine shafts in the Picher field and other areas of the Tri-State district, showing the locations and how the shafts were abandoned. Many of the older shafts merely caved-in and as a result were not properly closed. These shafts are even more hazardous because nothing is known about the extent of the cave-ins, which could cause surface hazards at any time.

Many shafts remain open and present a very serious threat to people, livestock and pets. In addition to the negative impact on public safety, these open shafts and drill holes contribute to environmental degradation of the region's surface and underground water supplies. Surface water flowing into these openings enters the underground mine workings where it picks up pollutants that, when exposed to oxygen, produce AMD. AMD has a very deleterious effect on the aquatic environment, which is feared to be as far reaching as to impact Grand Lake.

Eagle-Picher survey notes are also key pieces of information. Eagle-Picher surveyors were known for their accuracy and professionalism. With these survey notes, it is possible to locate most of the shafts, mine cave-ins, drill hole cave-ins, and other problem areas no longer distinguishable on the surface due to surface activity and weathering in the Picher field.

All the extensive mining records were stored for many decades in a large vault at the Eagle-Picher Mining Company headquarters at Cardin, Oklahoma. In 1970 Eagle-Picher moved its headquarters to Reno, Nevada. Several attempts have been made to gain access to the maps at Eagle-Picher's headquarters. Eagle-Picher officials have indicated that many of the maps were destroyed or heavily damaged by flood water. Those who have sought mining records at the Reno office have verified that little or no maps are available due to the flood damage.

Other sources for mine information include colleges/universities, local, state, and federal agencies, retired miners, and interested citizens. The 40-acre maps will be the most useful because of the detail of the underground mines and should be obtained from other sources.

Luza Report (*Stability Problems Associated with Abandoned Underground Mines in the Picher Field Northeastern Oklahoma*). In 1979 the U.S. Bureau of Mines entered into cooperative agreements with the state geological surveys of Oklahoma, Kansas, and Missouri to investigate the mine-related problems in the Tri-State area. A field-inspection program was initiated in May 1981 and field work was completed in May 1982. The Oklahoma portion of this study was printed in 1986. The principal objectives of the investigation were: (1) compile a series of maps showing the location and extent of past mining activities and the resulting surface

effects of underground and open-pit mine workings, shafts, ground subsidence, accumulations of mine waste, and tailings ponds; (2) identify hazardous areas with potential for future damage to persons or property; and (3) consider methods to protect the public from hazardous and potentially hazardous conditions.

The compiled mine-workings maps and field surveys indicated that at least 1,064 shafts were located in the Oklahoma portion of the Picher Field. However, areas within city limits were not included. The field work consisted of locating the shafts, describing the present condition at each shaft, the presence or absence of water, and the water depth, and measuring or estimating surface-collapse dimensions. The shafts were grouped into seven shaft-status categories. A summary of the shaft inventory is listed in the table below. At the time of the study more than 50 percent of the shafts were concealed or filled. Shafts that were indicated on mine maps but could not be found were classified as concealed. With several shafts, it was not possible to distinguish between the filled and/or concealed condition. Therefore, these shafts were grouped into one category. A shaft was considered open if the original cribbing was still intact and no apparent obstruction could be observed. However, most shafts were nearly full of water, which obscured the condition of the shaft below the water line. Where the shaft collar was undergoing minor collapse (less than 10 feet) and the cribbing was nearly intact, the shaft was classified as open with minor collapse.

| SHAFT-STATUS INVENTORY | | | |
|--------------------------|-----------------|-----------------|---------------------|
| Shaft Status | Diameter Ft. | Number | Percent of Total |
| Open | | 59 | 6 |
| Open with minor collapse | # 10 | 36 | 3 |
| Minor collapse | 2 – 30 | 241 | 23 |
| Moderate collapse | 31 – 94 | 115 | 11 |
| Major collapse | \$ 95 | 30 ^a | 3 |
| Concealed/filled | | 558 | 52 |
| Covered | | 25 | 2 |
| Total | | 1,064 | 100 |

^a At three sites, two shafts were involved in the same collapse; collapse is listed twice for each site. At one site, three shafts were involved in the same collapse; collapse is listed three times. Therefore, 30 shafts are involved in 25 separate collapses

Source: Stability Problems Associated with Abandoned Underground Mines in the Picher Field Northeastern Oklahoma

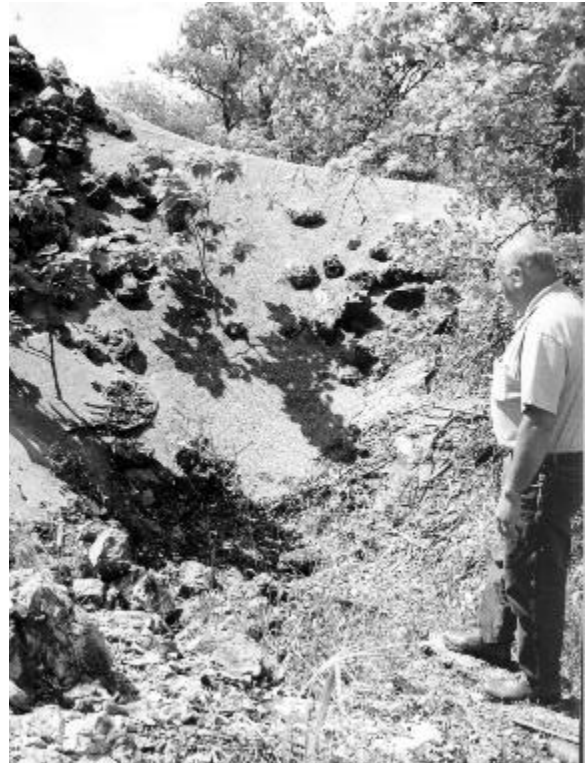
About 25 covered shafts were recognized. Generally, a thin concrete slab was used to cover the shaft. Concrete debris from former shaft covers was observed in the bottoms of a few shaft collapses. Thus, it appears that shaft covers are ineffective in securing shafts. There is high probability that most of the 25 recognized covered shafts will fail in the future.

At the time of the report 481 shafts were either open or in some stage of collapse. Almost 70 percent of the open mine shafts and/or shaft collapses occur in Sections 19, 23, 28, and 29 Township 29 North, Range 23 East. The area with the second-largest concentration of open shafts lies northeast of Lincolnvill in Sections 30, 31, and 32, Township 29 North, Range 24 East. About 65 percent (316) of the sites were recommended for filling as a closure method.

This category includes open shafts, open shafts with minor collapse, minor collapses, and moderate collapses. Chat was not recommended as an initial fill material in the mine shafts. Waste rock from large boulder piles found adjacent to most mine shafts was recommended. No action was recommended for 21 percent (107) of the sites. Generally, the no-action category included collapse features that were nearly full of water and had exhibited no recurring collapse for a number of years. The report recommended the remainder of the sites be fenced, with some being filled if economically feasible.



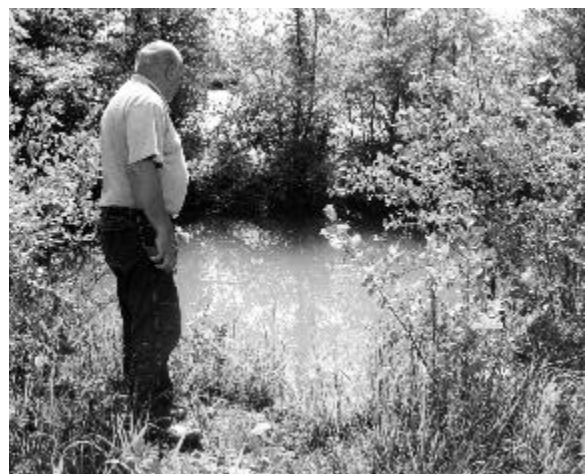
*Open shaft within 1 mile of Picher, Oklahoma.
Photo provided by James Graves.*



*Concealed shaft within 1 mile of Picher, Oklahoma.
Photo by Mike Kastl.*



*Covered shaft within 1 mile of Picher, Oklahoma.
Photo by Mike Kastl.*



*Water-filled shaft within 1 mile of Picher, Oklahoma.
Photo by Mike Kastl.*

Global Positioning System (GPS) and Geographic Information System (GIS). During the mining operations, surveyors located and mapped various features in the field that were associated with the mines. Modern technology allows the exact geographic location of these features to be obtained using a Global Positioning System (GPS) receiver. Using the data entry features of the GPS receiver, various attributes of a mine opening can be entered into a data dictionary. The resulting data becomes a database for use in a Geographic Information System (GIS). The GIS can be used to correlate mine openings and their attributes with other data that is being gathered throughout the mining region and prioritize their closing.

Numerous mine shafts have been sealed with materials that will decay over time, leading to an unstable and unsafe situation. Visually locating these shafts in the field is very difficult. However, locations of shafts and drill holes can be found on virtually all maps as well as the extent of the underground workings. With the tools available today, the location of these features can be calculated using GIS and GPS techniques. First, the old mine maps can be converted into an image that can be viewed on a computer. Once scanned, special computer software can be used to digitize important features, including known survey points. These survey points can then be located in the field and the geographic locations recorded using GPS. These points can be transferred to the GIS where the digitized map survey points are tied to the true GPS survey points using a technique known as rubbersheeting. This process removes distortion that was present in the old paper map and puts the digitized map features in their proper geographic location. The location of various features can now be obtained from the GIS and transferred to the GPS receiver. In the field, one can navigate to the precise location of the map features of interest using the GPS receiver in navigation mode.

However, before any of this equipment can be used on site, each landowner must be contacted, and consent to enter the respective property must be provided by the landowner. Developing a positive relationship with each of the affected landowners is a key factor in the ultimate goal of closing the dangerous mine shafts or holes. A right-of-entry assuring the landowner that the first phase is merely one of investigation and fact-gathering signed by the landowner will be necessary. This developing relationship will make it easier when it comes time to talk about shaft closure.

Project Selection. Once the mine shafts and drill holes have been located, closure priorities must be established. Those sites that pose the highest threat to public health and safety should be addressed first. In order to properly select these sites, a Project Selection Matrix has been developed by the Mine Shaft Subcommittee to rank the abandoned underground mine shafts and abandoned drill holes (see **Appendix A - PROJECT SELECTION MATRIX FORM**). The matrix is divided into three sections - Physical Conditions (80 points), Human Exposure (80 points), and Environmental Factors (50 points). Therefore, the maximum points a hazardous site could receive would be 210 points. A Project Selection Matrix form will be filled out for each mine shaft or drill hole visited. After all the hazardous sites are visited and the forms completed, the sites will be ranked. Those sites with the highest points should be reclaimed first. Final ranking will need to consider such things budget constraints, location of sites (if bidding a group of sites), and availability of construction materials.

Identifying Necessary Resources

Staff and Equipment. Since September 1998 James Graves, as site manager with the Grand Gateway Economic Development Association (GGEDA), has identified and located mine maps and other related information in order to verify the number of open mine shafts and drill holes posing a threat to the public health and safety in the Tar Creek Superfund area. According to Mr. Graves, about 85 percent of the mine shafts have been identified on mine maps. However, most drill holes have not been identified.

The Mine Shaft Subcommittee proposes an accurate digital base map of the mined area that includes the various layers of information to be developed. This base map should consist of a 1:2400 scale digital grayscale orthophoto derived from aerial photography. The photography is available from the U.S. Army Corps of Engineers but needs to be digitally scanned, rectified, and geo-referenced. Development of a detailed inventory and an accurate data layer of the location of mine shafts, drill holes, and extent of mine workings will require the digitization and accurate geo-referencing of the 40-acre Eagle-Picher mine maps and other mine maps. Many of the shafts and virtually all of the drill holes can not be located easily in the field. Their geographic coordinates will need to be established from the accurately referenced mine maps and then GPS used to locate them in the field. Development of the digital orthophoto base map, digitization, and geo-referencing of the mine maps and locating shafts using GPS is estimated to take approximately 11 months and cost around \$250,000. The Mine Shaft Subcommittee recommends that this digital base map and all associated mine shaft and drill hole data be maintained and managed by the Oklahoma Conservation Commission.

Potential Funding. To date the Environmental Protection Agency (EPA) has provided most of the funding for the work coordinated by James Graves through the Oklahoma Department of Environmental Quality, working with the Grand Gateway Economic Development Association and the Ottawa County Conservation District. Potential funding sources for further inventory of mine shafts and open drill holes are discussed under the section “Identifying Agencies for Funding and Closure of Mine Openings” of this report.

Recommendations for Task 1

1. **An accurate digital orthophoto base map needs to be developed to serve as a background for visualization of the various layers of information that have been and are still being gathered. The 40-acre mine maps (Eagle-Picher Mining Company) and other relevant mine maps digitized and geo-referenced will provide the basis of the inventory of the mine shafts and drill holes in the Tar Creek Superfund area. These maps can be supplemented with information gathered from former miners and residents and current landowners with knowledge of these hazards. This information will be used to field verify the location of shafts and open drill holes and should be managed by the Oklahoma Conservation Commission.**
2. **Notices should be published in local newspapers in Ottawa County seeking public input as to the location of these mine shafts and drill holes. The notice would include the address and/or a phone number to send and/or call in the information.**

- 3. Two people are required to do the field work. With the hidden dangers of abandoned mine openings, the two field staff should work as a team in the field, not individually. The field work will use the inventory described in (1) above to verify the location of mine shafts and drill holes and to record various attributes of each feature. The field staff will need GPS and GIS equipment to accomplish this work. Color photos will be taken of each site and added to the information in the inventory.**
- 4. Once the field data has been completed, the sites will be evaluated using the Project Selection Matrix for ranking purposes. The matrix will prioritize shafts and drill holes based primarily on human health and safety considerations. Environmental impacts will also be considered since open shafts and drill holes are a conduit for surface water to enter the mine workings and increase the production of acid mine drainage.**
- 5. Subject to funding availability, closure work will begin immediately on those shafts and drill holes as prioritized by the matrix process.**
- 6. Lands under the jurisdiction of the Bureau of Indian Affairs (BIA) need to be identified. This would enable the proper authorities to know where to close mine shafts and other mine-related openings as soon as funding is available.**
- 7. Funding for identifying and collecting the field information on the mine shafts and drill holes will likely come from one of the sources listed in Appendix C.**

The timeline for completing Task 1: 11 months

The total costs to accomplish Task 1: \$250,000

TASK 2

Assess the effectiveness and feasibility of current efforts to plug abandoned mine shafts and explore other feasible alternatives to remediate this critical safety concern. The subcommittee shall draft a project proposal for each plugging alternative that includes a scope of work, timeline, resource needs (both capital and personnel), and potential sources of funding for the project.

Assessing Closure Methods

Historically, mine openings were either left open or crudely closed. Minimal effort and expense were put into these closures, and often any available on-site materials were used. Fencing was one of the most common techniques, and badly deteriorated examples of the fencing can still be seen around abandoned shafts. Rough cut logs or lumber from a mine was often placed over shafts, but over the years many coverings have decayed and offer little or no protection. The local rail spur or the steel rails from the mines also were used to cover shafts and, if secured properly, provided an effective closure.

Each mine shaft and open drill hole will need to be prioritized using the Project Selection Matrix. Determining the appropriate closure method will involve the evaluation of numerous additional factors such as location, access to a mine, physical site characteristics, landowner needs, and costs. In some cases, historic and cultural resources and environmental and wildlife considerations will need to be assessed also.

A wide range of closure methods have been used by the mining industry and local, state, and federal agencies. Backfilling is one of the oldest and most commonly used methods for closing mine openings. In most cases, this is the preferred closure method. However, if the bottom of a mine shaft opens into a large cavity, then another closure method would have to be used since backfilling would be cost-prohibitive. Such large cavities (20 feet or greater height) are prevalent throughout the Tar Creek Superfund area. In order to determine if a large underground cavity is present, the use of a remote television system will be necessary. Where the cavity is less than 20 feet in height, backfilling will be the preferred closure method.

When backfilling is discussed, someone will suggest using the lead/zinc chat piles as fill for the



Large underground mine cavity. Photo provided by James Graves.

mine shafts. The viability of using chat as fill material in mine shafts is still being debated. Economic and environmental factors will ultimately determine if some of the chat will be used for this purpose. Generally, if chat were used in backfilling a shaft, it would make up a portion of the total backfill. The backfill method utilizes a range of gradations of fill material, with the coarsest material at the bottom and the finest material near the top. Chat, being relatively fine, would be placed in the upper portion of the shaft. The DEQ will determine chat use guidelines based on a risk assessment of its use as a fill material. These guidelines will not be in conflict with current DEQ regulations based on the public nuisance law found in 27A O.S. 2-6-105 (see **APPENDIX C - POTENTIAL FUNDING SOURCES FOR CLEANUP OF THE TAR CREEK SUPERFUND AREA**).

Other closure methods include concrete caps, wedges, concrete plugs, grates, polyurethane foam (PUF), hollow core plugs, and fencing. If backfilling can not be used, concrete caps, wedges, or concrete plugs can be utilized. In 1983 the U.S. Bureau of Mines published a report, *A Study of Stability Problems and Hazard Evaluation of the Kansas Portion of the Tri-State Mining Area*. The report contained suggested methods for closing mine openings. For shafts that dead end into solid bedrock, backfilling was the preferred closure method. For those shafts that entered into rooms of various vertical and/or lateral extents, a concrete plug was chosen. And for shafts that were bridged by rock or concrete foundations, backfilling or a plug were the suggested closure methods.

Several state and federal agencies were contacted and asked to send closure information such as methods used, design and specifications, equipment used, costs, and the pros and cons for each method (see **APPENDIX B - CLOSURE METHODS**).

Developing Closure Proposals

As a part of TASK 2, project proposals have been developed for closing a hypothetical 300-foot open mine shaft. The first 20 feet of the shaft is 5-foot x 7-foot cribbing; the remaining 280 feet is a 7-foot round shaft. The three proposals are backfill, a concrete cap, and a concrete wedge. Each proposal contains a scope of work, timeline, and resource needs (both capital and personnel). However, most of the existing open mine shafts are water-filled even above sound rock. Special considerations may be required for each closure method depending on the depth of water.

Backfill

Scope of Work -

Fill the bottom portion of the shaft with riprap material from a rock quarry and complete the fill with suitable on-site material (earth fill). Assume that a 5-foot by 7-foot drift extends in two directions at the bottom of the shaft. Fill the shaft with riprap to approximately 10 feet above the top of the drift. In this case, the bottom 17 feet of the shaft requires about 54 tons of riprap. The remaining 283 feet of the shaft requires about 400 cubic yards of fill material.

Timeline -

3 to 5 days

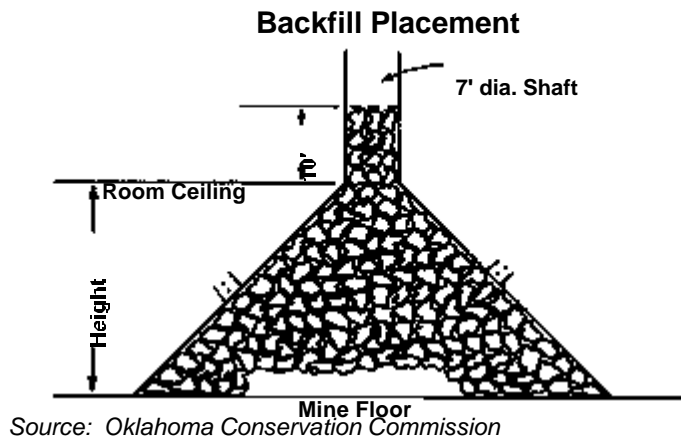
Resource Needs (capital and personnel) -

The contractor needs a front-end loader, a 10-wheel dump truck, and a small dozer.

Total cost to accomplish this work is approximately \$2,500.

Estimates have also been developed for backfilling the 300-foot open mine shaft with a room at the bottom, using varying ceiling heights. Riprap material from a rock quarry is used to form a base from the mine floor to 10 feet above the room ceiling within the shaft. Then, transition materials and earth fill are used to fill the remainder of the shaft. Costs were estimated using \$10 per ton for riprap in place and \$7.13 per foot of shaft depth for earth fill placement. The following table shows ceiling height, tons of riprap based on a 1:1 angle of repose, and estimated cost for filling:

| <u>Ceiling Height (ft.)</u> | <u>Riprap (tons)</u> | <u>Cost</u> |
|-----------------------------|----------------------|-------------|
| 10 | 150 | \$ 3,726 |
| 20 | 803 | 10,185 |
| 30 | 2,330 | 25,154 |
| 40 | 5,105 | 52,833 |
| 50 | 9,500 | 96,711 |
| 100 | 68,800 | \$689,355 |



Concrete Cap

Scope of Work -

Excavate down to sound rock, which is estimated to be 20 feet since the cribbing goes to that depth. Excavation to provide 2:1 side slopes and bottom dimensions of 16 feet by 16 feet to accommodate placement of the concrete slab or cap. The concrete cap is two sections of preformed reinforced concrete with dimensions of 5 feet by 10 feet by 8 inches. Set the cap in place and backfill with the excavated material. Excavation requires removal of approximately 2,692 cubic yards, and backfill will require placement

of approximately 2,718 cubic yards. An access ramp for placement of the concrete cap may be needed.

Timeline -
2 to 3 weeks

Resource Needs (capital and personnel) -
The contractor needs a large trackhoe and a small dozer. Total cost to accomplish this work is approximately \$11,500.



Workers forming concrete cap. Photo provided by Oklahoma Conservation Commission.

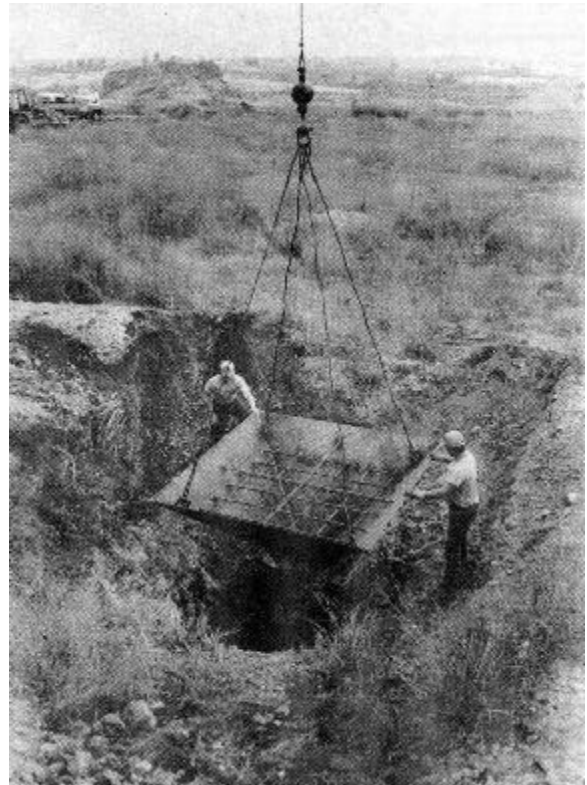
Concrete Wedge

Scope of Work -

Excavate down to sound rock, which is estimated to be 20 feet since the cribbing goes to that depth. Excavation to provide 2:1 side slopes and a bottom diameter of 15 feet at sound rock to accommodate placement of the wedge. The wedge has a 9-foot square top and a height of 4½ feet. Set the wedge in place, fill with concrete, then backfill with the excavated material. Excavation requires removal of approximately 2,044 cubic yards, and backfill requires placement of approximately 2,070 cubic yards. An access ramp for placement of the concrete wedge may be needed.

Timeline -
2 to 3 weeks

Resource Needs (capital and personnel) -
The contractor needs a large trackhoe and a small dozer. Total cost to accomplish this work is approximately \$10,500.



Crewmen maneuver wedge into position before filling with concrete.

Photo source: "Crewmen maneuver Dressel plug into position at Galena," reprinted from a special section of the Sunday edition of The Joplin Globe, entitled "Uncertain Legacy," subtitled "Mining: Yesterday's boom – today's burden," published Jan. 5, 1986.

Plugging Drill Holes

All open drill holes 10 inches in diameter or larger should be plugged with concrete to a depth of 10 feet.

The Luza Report indicated that 481 mine shafts were either open or in some stage of collapse. It would take \$4.8 million to close these shafts at an average cost of \$10,000 per shaft. There are other mine shafts not included in the Luza Report as well as open drill holes and mine shafts that

were covered and/or sealed but in need of a more permanent closure. An additional \$5.2 million would be needed to address these sites. The total cost for closing the open mine shafts and open drill holes is estimated to be \$10 million. A time frame of 5 years is estimated to complete the closure work.

Identifying Agencies for Funding and Closure of Mine Openings

There are several federal, state, and local agencies that have been and continue to be involved with reclamation of abandoned mines that pose a threat to public health and safety in Oklahoma. Their respective laws allow technical, legal, and financial help to be provided to the communities and citizens in the Tar Creek Superfund area. The federal agencies included in this report are the Environmental Protection Agency, the U. S. Department of the Interior's Office of Surface Mining, the U. S. Department of Agriculture's Natural Resources Conservation Service, and the U. S. Army Corps of Engineers. The state agencies/authorities that have been involved with reclamation of abandoned mine shafts are the Oklahoma Department of Environmental Quality, the Oklahoma Conservation Commission, the Oklahoma Department of Mines, and the Ottawa Reclamation Authority. (See **APPENDIX C - POTENTIAL FUNDING SOURCES FOR CLEANUP OF THE TAR CREEK SUPERFUND AREA** for more details concerning specific legislation and funding sources.)

A brief summary for each agency, as well as other possible funding sources, follows:

Environmental Protection Agency. *The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986*, popularly known as the Superfund program, is administered by the Environmental Protection Agency (EPA). This law can be used for enforcement and funding in the Tar Creek Superfund area.

The Clean Water Act (CWA); 33 U.S.S. s/s 121 et seq. (1977), is an amendment to the *Federal Water Pollution Control Act of 1972*, which set the basic structure for regulating discharges of pollutants to waters of the United States. This law gives EPA the authority to set effluent standards on an industry basis (technology-based) and continues the requirements to set water quality standards for all contaminants in surface waters. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a National Pollution Discharge Elimination System permit is obtained under the Act.

The Safe Drinking Water Act (SDWA); 42 U.S.C. s/s 300f et seq. (1974), was established to protect the quality of drinking water in the U.S. This EPA law focuses on all waters actually or potentially designed for drinking use, whether from aboveground or underground sources.

EPA officials have indicated that treatment of mine shafts and drill holes must show a positive impact on water quality before EPA will approve funding.

Oklahoma Department of Environmental Quality. The state of Oklahoma through the Oklahoma Department of Environmental Quality (DEQ) has the *State of Oklahoma Environmental Quality Code*. This law can be used for enforcement and funding in the Tar Creek Superfund area. The Waste Management Division of DEQ has the responsibility of

carrying out the activities as required by the *State of Oklahoma Environmental Quality Code* and the EPA's *CERCLA* laws. In January 2000 DEQ completed a pilot project by closing three mine shafts northeast of Quapaw, Oklahoma. (See **APPENDIX B - CLOSURE METHODS** for more details on the DEQ closures.)

United States Army Corps of Engineers. The Section 22 - Planning Assistance to States (PAS) Program of *The Water Resources Development Act of 1974* authorizes the Corps of Engineers (COE) to use its technical expertise in water and related resource management to help states and Native American tribes with their water resource problems. This is a cost-share program and requires a 50-percent match by the state or tribe. PAS studies do not lead to federal construction projects. A water quality problem would have to be associated with the mine openings before PAS funds could be utilized.

The Section 206 - Aquatic Ecosystem Restoration Program of *The Water Resources Development Act of 1996* authorizes the COE to carry out aquatic ecosystem restoration projects if they improve environmental quality, are in the public interest, and are cost-effective. The program may be applicable where acid mine drainage exists. If the mine shafts and drill holes are contributing to acid mine drainage problems in the area, then funding could be obtained through the Aquatic Ecosystem Restoration Program. This also is a cost-share program requiring a 35- percent, non-federal match.

The *Abandoned Mine Restoration Act of 1999* authorizes the Secretary of the Army through the COE to assist stewards of federal and non-federal lands to address environmental and water quality problems caused by drainage and related activities from abandoned, inactive, and post-production noncoal mines. On non-federal lands, the COE would also require a match of 35 percent from non-federal entities. This is pending legislation that could be used to close mine shafts and drill holes if they were degrading water quality.

Office of Surface Mining. *The Surface Mining Control and Reclamation Act of 1977 (PL 95-87)* provides for the restoration of lands mined and abandoned or left inadequately restored before August 3, 1977. The Surface Mining Act authorizes the Secretary of the Interior to expend Abandoned Mine Reclamation Fund monies for reclamation of high priority problems that present an extreme danger to the public. States and tribes receive annual grants out of this Trust Fund from the U.S. Department of the Interior's Office of Surface Mining (OSM). Both coal and noncoal hazards can be addressed under *PL 95-87*. OSM officials have indicated that Trust Fund monies could be matched with non-CERCLA (Superfund) EPA funds to fill mine shafts, if the mine shafts are contributing to acid mine drainage.

Oklahoma Conservation Commission. The Oklahoma Conservation Commission (OCC) is responsible for reclaiming over 32,000 acres of abandoned surface coal mines and another 40,000 acres of abandoned underground coal mines in a 16-county area of eastern Oklahoma. *The Surface Mining Control Act of 1977 (PL 95-87)* provides the funding to reclaim sites that pose health and safety problems to the public. *PL 95-87* established an AML Trust Fund through a tax on coal producers. The OCC receives an annual grant of \$1.5 million to address these AML hazards. Even though all the funds received to date have been spent on coal AML problems (over \$90 million high priority coal problems are yet to be reclaimed), some of this money may be used for noncoal hazards such as the lead and zinc problems in Ottawa County.

Section 409 of *PL 95-87* states that the Secretary of the Interior, at the request of the governor of any state, is authorized to fill voids, seal open abandoned mine shafts, tunnels, and entryways and reclaim the surface impacts of the underground mines. The Secretary will approve only those sites that could endanger life and property, constitute a hazard to the public health and safety, or degrade the environment. To date no AML funds have been spent in Oklahoma on noncoal hazards.

Natural Resources Conservation Service. The U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) is authorized through Section 406 of *The Surface Mining Control and Reclamation Act of 1977 (PL 95-87)* to reclaim rural lands affected by mining. *PL 95-87* made money available to the Secretary of Agriculture from the AML Trust Fund. This program is known as Rural Abandoned Mine Program (RAMP). RAMP funds could be appropriated by Congress to eliminate noncoal hazards such as lead and zinc in the Tar Creek Superfund area. AML Trust Funds dedicated to RAMP have grown to over \$254 million because there have been no Congressional appropriations to RAMP since 1995.

Oklahoma Department of Mines. The Oklahoma Department of Mines (ODM) regulates all mining activities in Oklahoma. ODM must follow *The Surface Mining Control and Reclamation Act of 1977 (PL 95-87)* when regulating active coal mining. There is a programmatic connection between ODM and OCC. Section 405(c) of *PL 95-87* states that "The Secretary shall not approve, fund, or continue to fund a State abandoned mine reclamation program unless that State has an approved State regulatory program pursuant to section 503 of this Act." In other words, if OSM makes a finding that ODM is not properly administering its coal regulatory program, then AML funding to OCC could be frozen.

All lead/zinc underground mines operated under the Oklahoma State Mining Code. In 1955 the Oklahoma Legislature passed a statute, *Title 45, Sections 436 and 437*, which provides that all open vertical mine shafts should be protected either by fencing or by plugging and filling. It is further provided that any person, firm, or corporation that allows a vertical mine shaft to remain open shall be deemed negligent as a matter of law and shall further be guilty of a misdemeanor. However, the law incorporated no provision or funds for closing and/or sealing those open shafts that were abandoned by companies no longer in business prior to enactment of the law. The State Attorney General ruled that mere ownership of the land upon which there is an open mine shaft does not constitute maintenance, use, or abandonment of an open mine shaft. The present landowner cannot be compelled, therefore, to fill, seal, fence or otherwise take safety measures for the protection of the public.

City and /or State Tax. One funding possibility is for the local and/or state citizens to vote on a tax that would generate revenue for mine shaft closures.

Oklahoma Legislature. The Oklahoma Legislature could appropriate funds to address the safety hazards associated with the underground mines. These funds could be matched with federal funds to maximize the reclamation efforts.

Special Congressional Appropriations/Legislation. Special appropriations could be in the form of a Congressional line-item appropriation that specifically directs the funds to be spent on the abandoned lead and zinc mine hazards. It is also possible for a new law to be passed that would direct an agency to reclaim the lead and zinc mine hazards.

Donations. Individuals or groups could donate to a fund that would be used solely for the purpose of reclaiming the hazards associated with the abandoned lead and zinc mines. These donations could possibly be used to match federal funds.

Recommendations for Task 2

- 1. Investigate thoroughly the underground features of a shaft in order to select the most practical closure method. After reviewing both past and current methods for closing mine shafts, backfilling is the preferred method of sealing shafts which open into cavities that are less than 20 feet high. If the cavity is greater than 20 feet high, other suggested methods are a concrete cap, a concrete wedge, or a concrete plug.**
- 2. Plug all open drill holes 10 inches in diameter or larger with concrete to a depth of 10 feet.**
- 3. Begin discussions with the Environmental Protection Agency (EPA) to approve a Mine Shaft Closure Program that would have federal/state matching funds of 9:1. These matching funds would be approved if the mine closures have a positive effect on water quality.**
- 4. Secure state matching funds from the Legislature at \$200,000 per year for 5 years.**
- 5. Secure additional funding commitments from other agencies, groups, or individuals for closure of mine shafts and mine-related openings. Coordinate a tri-state Congressional effort to help secure funding.**

The timeline for completing Task 2: 5 years

The total cost to accomplish Task 2: \$10 million.

APPENDIX A

PROJECT SELECTION MATRIX Tar Creek Underground Mine Shafts

Total Points: _____

Site Name: _____

Location: _____

The following factors should be considered when prioritizing the closure of mine shafts. The definition of mine shaft shall include drill holes greater than or equal to 10 inches in diameter and partially sealed or improperly sealed shafts. The point values are listed to the right of each item.

Physical Conditions (Maximum points = 80)

A. Is the shaft open?

| | | |
|-----|-------|----|
| Yes | _____ | 40 |
| No | _____ | 0 |

B. If the shaft is open, is it lined or cribbed?

| | | |
|-----|-------|----|
| Yes | _____ | 0 |
| No | _____ | 10 |

C. If the shaft is lined, what is the condition of the lining or cribbing?

| | | |
|-------------------|-------|----|
| Stable | _____ | 0 |
| Moderately stable | _____ | 5 |
| Unstable | _____ | 10 |

D. Is there evidence of instability around the shaft?

| | | |
|--------------------|-------|----|
| None | _____ | 0 |
| Slight to moderate | _____ | 5 |
| Severe | _____ | 10 |

- E. Does the sealed or partially sealed shaft have a high potential for failure based on knowledge of how it was sealed?

| | | |
|-----|-------|----|
| Yes | _____ | 10 |
| No | _____ | 0 |

Human Exposure (Maximum points = 80)

- F. Is the open shaft in a residential or public use area?

| | | |
|-----|-------|----|
| Yes | _____ | 10 |
| No | _____ | 0 |

- G. Number of residences within a one-half mile radius of the opening?

| | | |
|-------|-------|----|
| 0-5 | _____ | 5 |
| 6-10 | _____ | 7 |
| 11-25 | _____ | 10 |
| >25 | _____ | 30 |

- H. Is the mine shaft visible from a road or public access area?

| | | |
|-----|-------|----|
| Yes | _____ | 10 |
| No | _____ | 0 |

- I. Is the open shaft easily accessible (no fence or obstructions)?

| | | |
|-----|-------|----|
| Yes | _____ | 10 |
| No | _____ | 0 |

- J. Are there abandoned buildings or equipment around the open shaft which are an attractive nuisance?

| | | |
|-----|-------|----|
| Yes | _____ | 10 |
| No | _____ | 0 |

- K. Is the sealed or partially sealed shaft in a heavily used area?

| | | |
|-----|-------|----|
| Yes | _____ | 10 |
| No | _____ | 0 |

Environmental (Maximum points = 50)

L. Is the open shaft receiving or can receive surface water?

No _____ 0

Yes _____ 10

Yes and located in the flood plain _____ 15

Yes and located in the stream bed _____ 20

M. Is there polluted water discharging or evidence that it occasionally discharges from the open shaft?

Yes _____ 20

No _____ 0

N. Is the open or partially open shaft used as illegal dump?

Yes _____ 10

No _____ 0

TOTAL POINTS

Comments: _____

Evaluator: _____ Date: _____

Evaluator: _____ Date: _____

Evaluator: _____ Date: _____

APPENDIX B

CLOSURE METHODS

Backfill Method

Definition

On-site or imported soil material, gravel, rock or grout entirely filling the shaft from bottom to top using either dry or wet material placed by gravity or under pressure.

Pros

Life span: Permanent

Degree of hazard elimination: Total

Maintenance: Maintenance-free

Construction safety: With proper equipment, workers' exposure to the mine hazard is low.
Exposure to bad air is low with some conveyance methods.

Environmental concerns: If on-site material is used, spoil piles may be eliminated.

Design concerns: Generally low-tech or standard technology used (grout pumps).

Cost: Can be cheap if on-site material is used.

Cons

Life span: NA

Degree of hazard elimination: NA

Maintenance: NA

Construction safety: Workers must be protected from falling into the shaft. Shaft collars are often unstable.

Environmental concerns: Source material must be reclaimed. Backfill material must be benign.

Design concerns: Backfill material must fill the entire shaft. False plugs must be avoided.
Heavy equipment access is necessary.

Cost: May be expensive if grout or imported material is required.

Backfill Examples with Costs

State of Missouri - DNR Land Reclamation Program(Lead and Zinc Mines)

Logan Shaft #1

On-site "bull rock" was screened (greater than 4" and less than 24") and used to fill the shaft to within 40 feet of the surface. The remainder of the hole was filled with a bull rock/chat mix and then mounded.

Size: 10 x 12 x 160 ft.

Condition: Open, water-filled

Date Completed: April 2000

Cost: \$14,190

Logan Shaft #3

Shot rock (limestone) and crushed stone were brought in from off-site to fill the shaft.

Size: 20 x 30 x 190 ft.

Condition: Open, water-filled

Date Completed: December 1997

Cost: \$15,659

Magers Shaft

The shaft was partially backfilled with rock, but the rock kept settling. Therefore, a reinforced concrete cap was used.

Size: 10 x 10 x 185 ft.

Condition: Open, water-filled

Date Completed: November 1997

Cost: \$24,990

State of Missouri (Coal mine)

Cainsville Shaft

Regarding mine features before closure, the mine shaft was water-filled to within 40 feet of the ground surface. Shot rock (from off-site) was conveyed to the mine opening due to the instability around the shaft. The mine shaft was totally filled using the shot rock.

Size: 15 x 14 x 480 ft.

Condition: Open, water-filled

Date Completed: October 1995

Cost: \$62,991

State of Oklahoma - Oklahoma Conservation Commission (Coal Mines)

Steckelberg Mine Shaft

The open shaft had very stable concrete cribbing. Off-site rock (208 tons) was placed in the bottom of the shaft. On-site fill material was then used to complete the shaft closure.

Size: 11 x 9 x 77 ft.

Condition: Open, dry

Date Completed: July 1999

Cost: \$10,120

Howe Mine Shaft

Several loads of off-site rock were used to establish a base. On-site fill material was then used to fill the shaft. The reason the cost for this closure was lower than others in the area was that the fill material was within 30 feet of the shaft.

Size: 10 x 10 x 292 ft.

Condition: Open, water-filled

Cost: \$3,150

Date Completed: October 1992

Le Fevers (Turnipseed) Mine Shaft

Several loads of off-site rock were used to establish a base. On-site fill material was then used to fill the shaft. The on-site fill material had to be hauled a long distance, therefore the cost is considerably higher than other mine shaft closures.

Size: 6 x 6 x 62 ft.

Condition: Open, water-filled

Date Completed: November 1994

Cost: \$3,900

Witteville Mine Shaft

Several loads of off-site rock were used to establish a base. On-site material was then used to fill the shaft.

Size: 8 x 8 x 30 ft.

Condition: Open, water-filled

Date Completed: October 1992

Cost: \$3,400

State of Wyoming - Abandoned Mine Lands Division of the Department of Environmental Quality (Iron-ore Mines)

Sunrise West Shafts

The 23 vertical shafts were all dry with solid rock bottoms. All the shafts were filled with on-site material.

Size: 4 to 6 ft. x 9½ to 10 ft. x 3½ to 67 ft.

Condition: Open, dry

Date Completed: May - 1997

Cost: \$316.67 (9 shafts that were less than 10 ft. deep)

\$513.33 (6 shafts that were 10 to 20 ft. deep)

\$712.50 (8 shafts that were greater than 20 ft. deep)

Mine Shaft/Subsidence 621 (Project E23-122)

Water was pumped from the shaft. All trash was removed from the shaft. A base was excavated to a depth of 25 feet before the shaft was filled. Off-site riprap was used to fill the shaft. The design of the closure is shown below.

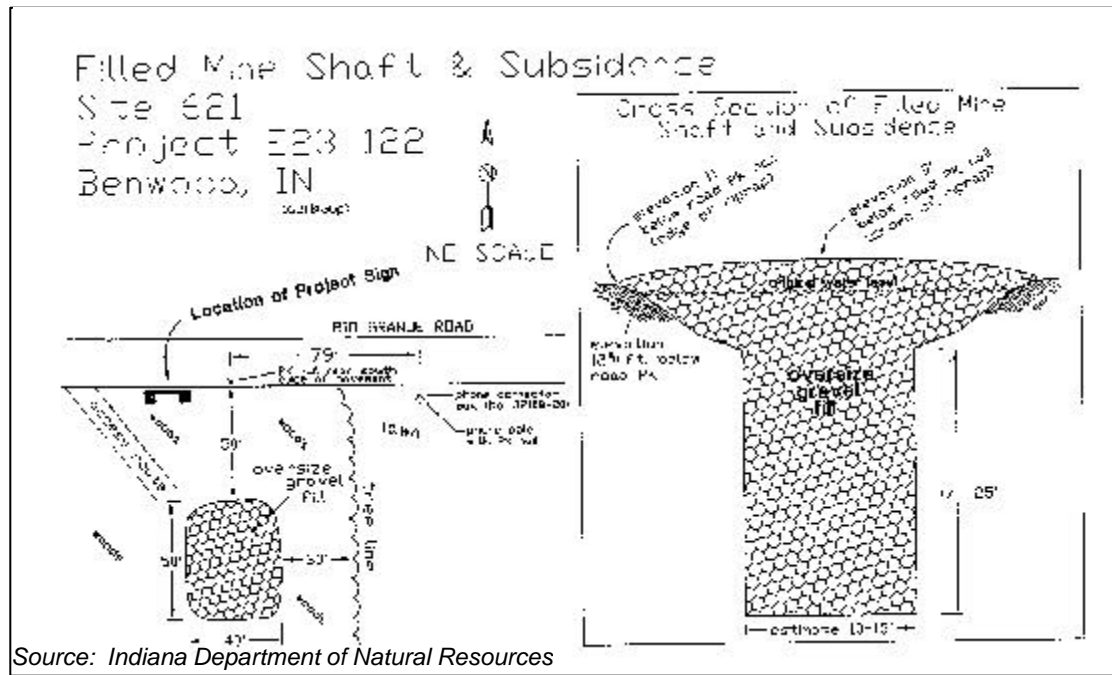
Size: 10 x 15 x 50 to 100 ft.

Condition: Open, water-filled

Date Completed: early 1990s

Cost: \$16,718

Example of Backfill Method



Example of Backfill Method

Mine Shaft/Subsidence Site 570

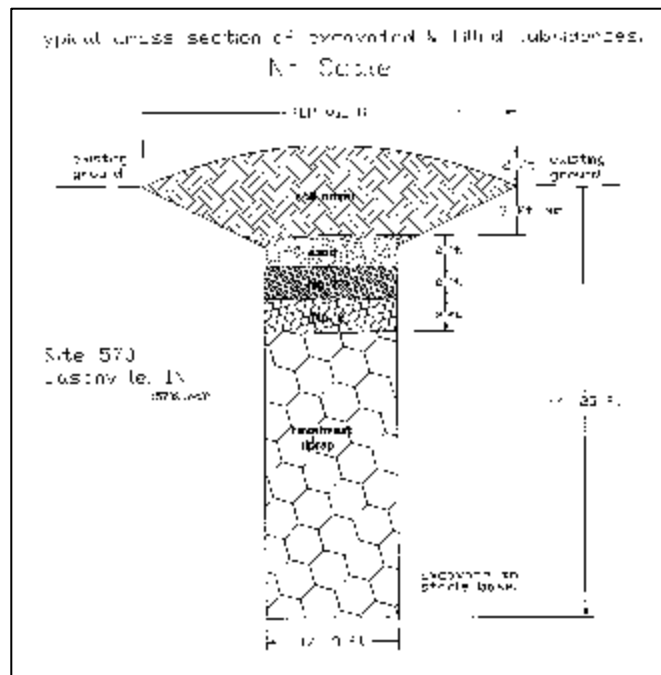
It was intended that the filled openings would continue to accept run-off water, therefore it was important that only revetment riprap be used in the initial filling of the shaft. The riprap fill was left exposed to allow the filled areas to continue to accept run-off water. The design of the closure is shown to the right.

Size: 8 x 8 x 50 to 100 ft.

Condition: Open, water-filled

Date Completed: early 1990s

Cost: \$21,744



Concrete Cap Method

Definition

A structural concrete cap either cast in place or using precast panels and beams.

Pros

Life span: Permanent (100 years)

Degree of hazard elimination: Total

Maintenance: None required

Construction safety: Workers do not need to work in the shaft.

Environmental concerns: Minimal site disturbance.

Design concerns: Can prefab panels for standardized closures. Minimal site-specific engineering required.

Cost: Relatively low cost.

Cons

Life span: NA

Degree of hazard elimination: NA

Maintenance: NA

Construction safety: NA

Environmental concerns: Prevents bat access

Design concerns: Need competent rock to bear slab. Cap must be large enough to overlap all sides of shaft. Doesn't prevent collapse of sidewalls. Need access for concrete trucks or prefab panels.

Cost: NA

Concrete Cap Examples with Costs

State of Oklahoma - Grand Gateway Economic Development Association and the Oklahoma Department of Environmental Quality (Lead and Zinc Mines)

Shaft 00-03

The shaft had concrete cribbing, in good condition, that extended 50 feet below ground surface to just above the water level in the shaft. The water level in the shaft was about 60 feet below ground surface. A re-enforced, precast concrete cap (4,000 psi concrete with ½ inch diameter rebar at 1-foot spacing) was transported to the site and placed over

the shaft using a track hoe. Chat and soil were then placed on the sides of the cap to close any gaps between the cap and the shaft.

Size: 5 x 7 x more than 100 ft.

Condition: Open, water-filled

Date Completed: January 2000

Cost: \$2,000

State of Oklahoma - Oklahoma Conservation Commission (Coal Mines)

Milby-Dow Shaft

A concrete cap (12in. thick x 26ft. x 24ft.) was poured in place using 1 in. rebar on 12in. centers. The concrete cylinder test was 4,000 psi after 28 days.

Size: 12 x 14 x 350 ft.

Condition: Open, dry

Date Completed: March 1984

Cost: \$14,988

State of Colorado - Colorado Abandoned Mine Program (Precast Panels on Coal and Non-coal Mines)

Panels were preconstructed in five different weights and sizes:

- 5 x 5 ft., weighing 2,000 lbs.
- 3 x 12 ft., weighing 3,000 lbs.
- 5 x 10 ft., weighing 4,000 lbs.
- 6 x 12 ft., weighing 6,000 lbs.
- 3 x 18 ft., weighing 6,000 lbs.

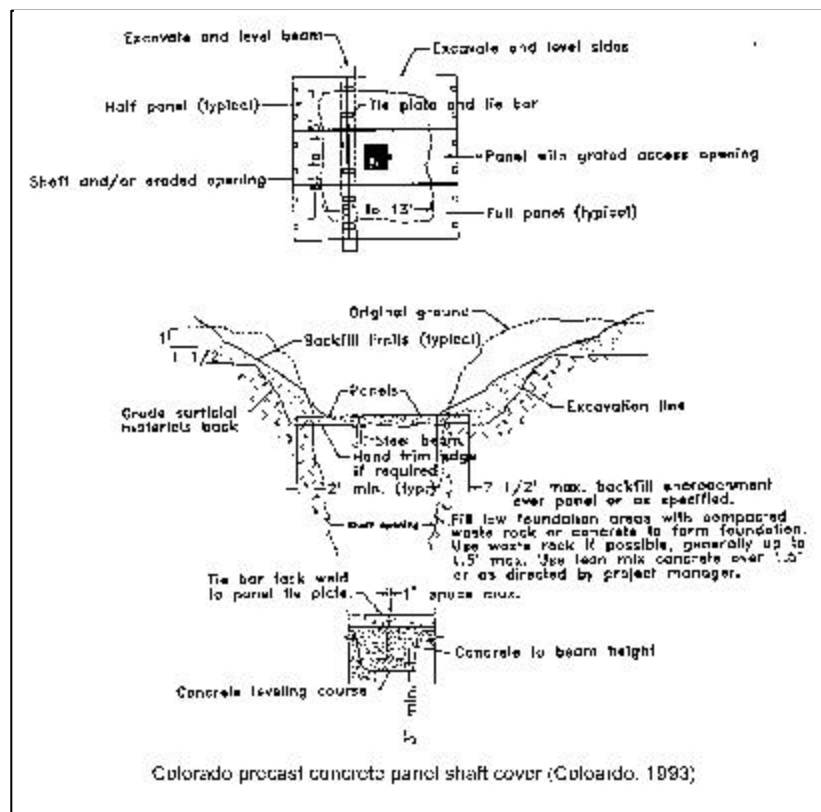
The surface of the ground was excavated to competent bedrock and leveled to form a footing. Low foundation areas, if present, were filled with gravel or waste rock to form a level footing or pad. Concrete footings were constructed for sites where the foundation surface was lacking or was incompetent.

Panels were placed directly on the bedrock, gravel, or concrete footings with at least 2 feet of overlap. For larger openings, the narrower panels were often used as supportive beams. Two of the narrower panels were placed at each end of the opening, and one was placed across the middle of the opening. The wider panels were then placed over the panel beams. Panels were connected to each other using steel tie bars. The weight of the panels was usually sufficient for anchoring. But in situations where the ground is sloped greater than 15 degrees, the panels can be anchored with rebar embedded and grouted into the bedrock (Colorado - 1993).

When shaft openings were large, one or more epoxy resin or tar coated steel beams were placed across the opening and secured to the footings with concrete. Panels were placed over the steel beams perpendicularly with at least 2 feet of overlap beyond the shaft edge to provide a reliable foundation.

Cost for precast panels vary depending on the size of the opening and other site conditions but typically range from about \$3,000 to \$7,000 (1993).

Example of Concrete Cap Method



Source: Colorado Department of Natural Resources

Concrete Plug Method

Definition

Concrete and rock plug formed over caved material or temporary forms.

Pros

Life span: Permanent (100 years)

Degree of hazard elimination: Total

Maintenance: None

Construction safety: No hazard to workers if no form work is required.

Environmental concerns: Disturbs only a small area around shaft.

Design concerns: Provides support of sidewalls of shaft near surface. Plug remains functional should cave material below plug fails.

Cost: Low to moderate cost.

Cons

Life span: NA

Degree of hazard elimination: NA

Maintenance: NA

Construction safety: May require workers to construct a bulkhead inside shaft with unstable sidewalls and hazardous atmospheres.

Environmental concerns: NA

Design concerns: Bulkhead must be constructed in competent rock.

Cost: Can be high if shoring required to safely install bulkhead.

Concrete Plug Examples with Costs

State of Oklahoma - Grand Gateway Economic Development Association and the Oklahoma Department of Environmental Quality (Lead and Zinc Mines)

Shaft 00-01

The water in the mine shaft was 50 feet below the ground surface. Soil around the shaft was excavated to approximately 8 feet in diameter. A MTM 8.5 cubic yard concrete mixing drum (7.52 feet in diameter) was placed in the open shaft using a track hoe. Concrete (8.5 cubic yards of 3,500 psi concrete) was then placed in the drum. Boulders

were placed inside the drum. The sealed shaft was covered with adjacent chat and soil. The area was graded in order for the surface water to drain away from the sealed shaft.

Size: 5 x 7 x greater than 100ft.

Condition: Open, water-filled, wooden cribbing

Date Completed: January 2000

Cost: \$7,000

State of Oklahoma - Ottawa Reclamation Authority (Lead and Zinc Mines)

In the 1980s several open mine shafts were closed using either wooden, cube-shaped frames filled with concrete or concrete mixer bodies that were also filled with concrete. The plugs were then pushed into the open shafts at an approximate cost of \$2,500 to \$3,500 a piece.

U.S. Department of the Interior - Office of Surface Mining (Coal Mines)

Lawson No. 10 Mine Shaft

This open shaft was located in the state of Washington. Logs were used as a temporary bulkhead. The concrete plug was formed using soil/rock. The depth of the plug and thickness of the concrete was designed to be in competent rock. The design of the closure is shown below.

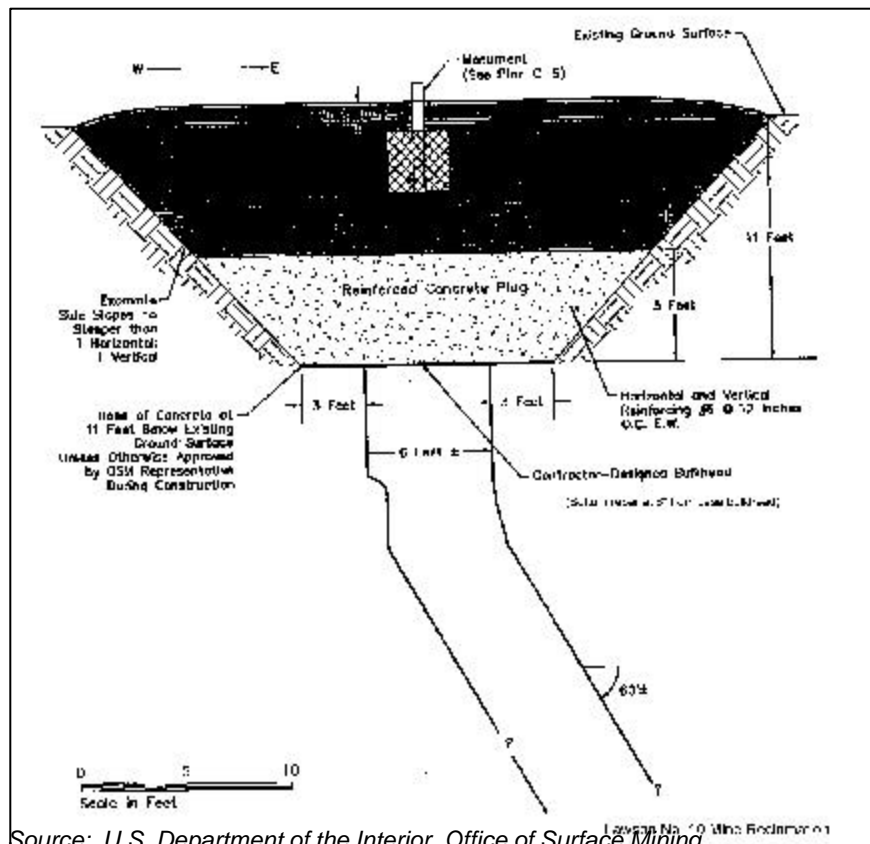
Size: 6 x 6 x more than 400 ft.

Condition: Open, dry

Date Completed: September 1999

Cost: \$29,019.16

Example of Concrete Plug Method



Wedge Method

Definition

Steel cone or wedge fabricated on-site and filled with concrete.

Pros

Life span: Permanent (100 years)

Degree of hazard elimination: Total

Maintenance: None

Construction safety: Wedge can be fabricated remotely and lifted into shaft. No workers in shaft.

Environmental concerns: Small surface disturbance if competent rock near surface.

Design concerns: Concrete and wedge can be placed with helicopter in remote locations.

Cost: NA

Cons

Life span: NA

Degree of hazard elimination:

Maintenance: NA

Construction safety: NA

Environmental concerns: Large excavation if competent rock greater than 15 feet deep.

Design concerns: Need competent rock to bear wedge form or increase size of structure on unconsolidated material. Either need access for steel and concrete trucks, or use helicopters to fly in materials.

Cost: Relatively expensive.

Wedge Examples with Costs

U.S. Department of the Interior - Office of Surface Mining (Coal Mines)

Tiger Mountain/Ravensdale Project

A concrete-filled wedge was used to close the mine shaft in Kings County, Washington. The project manager said this was a maximum size for using a wedge. This cost was low due to several factors. Today's cost would probably be twice as high, unless several closures were bid in one contract. The design of this closure is shown below.

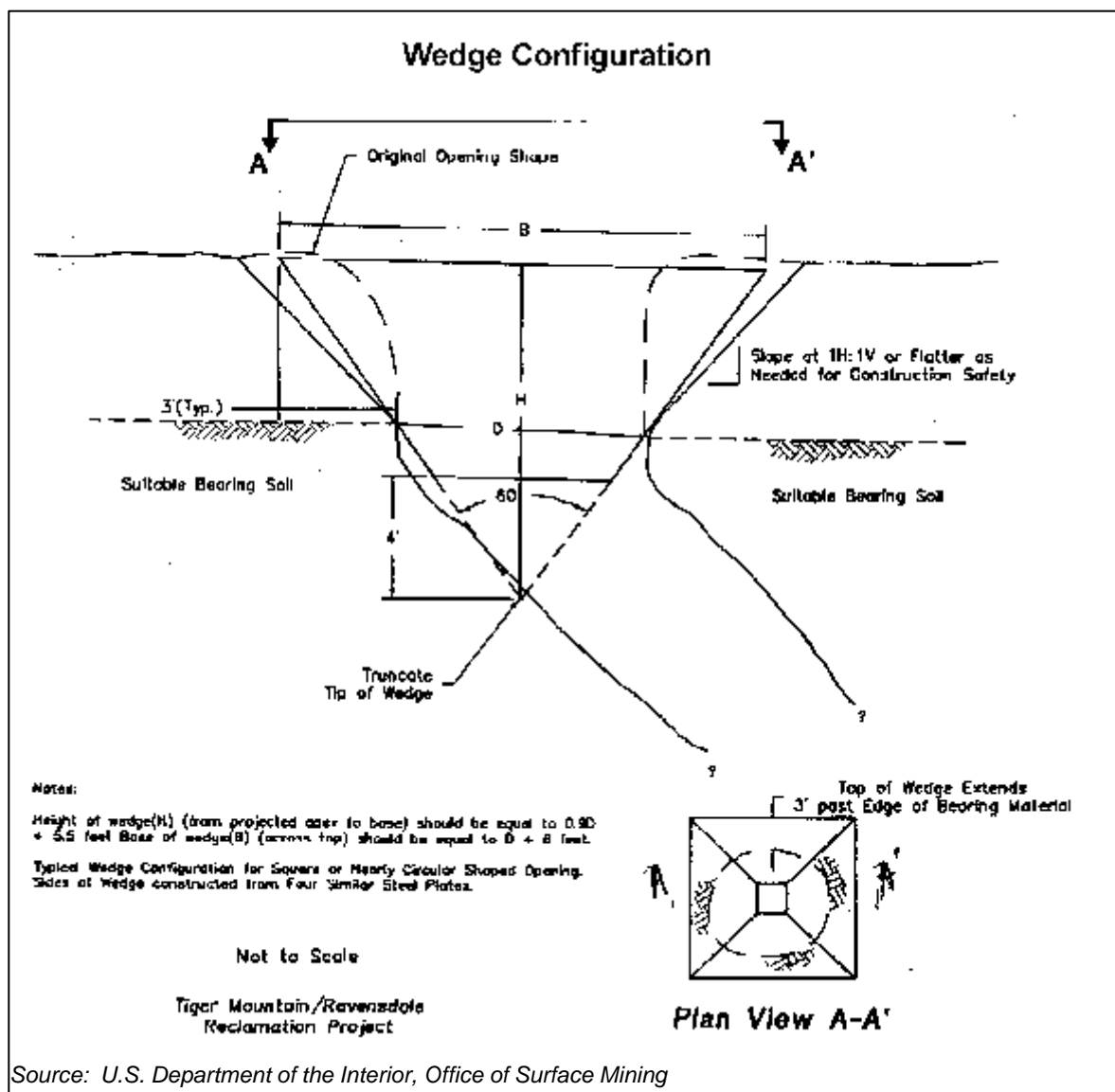
Size: 14 x 14 x more than 400 ft.

Condition: Open, dry

Completed Date: July 1996

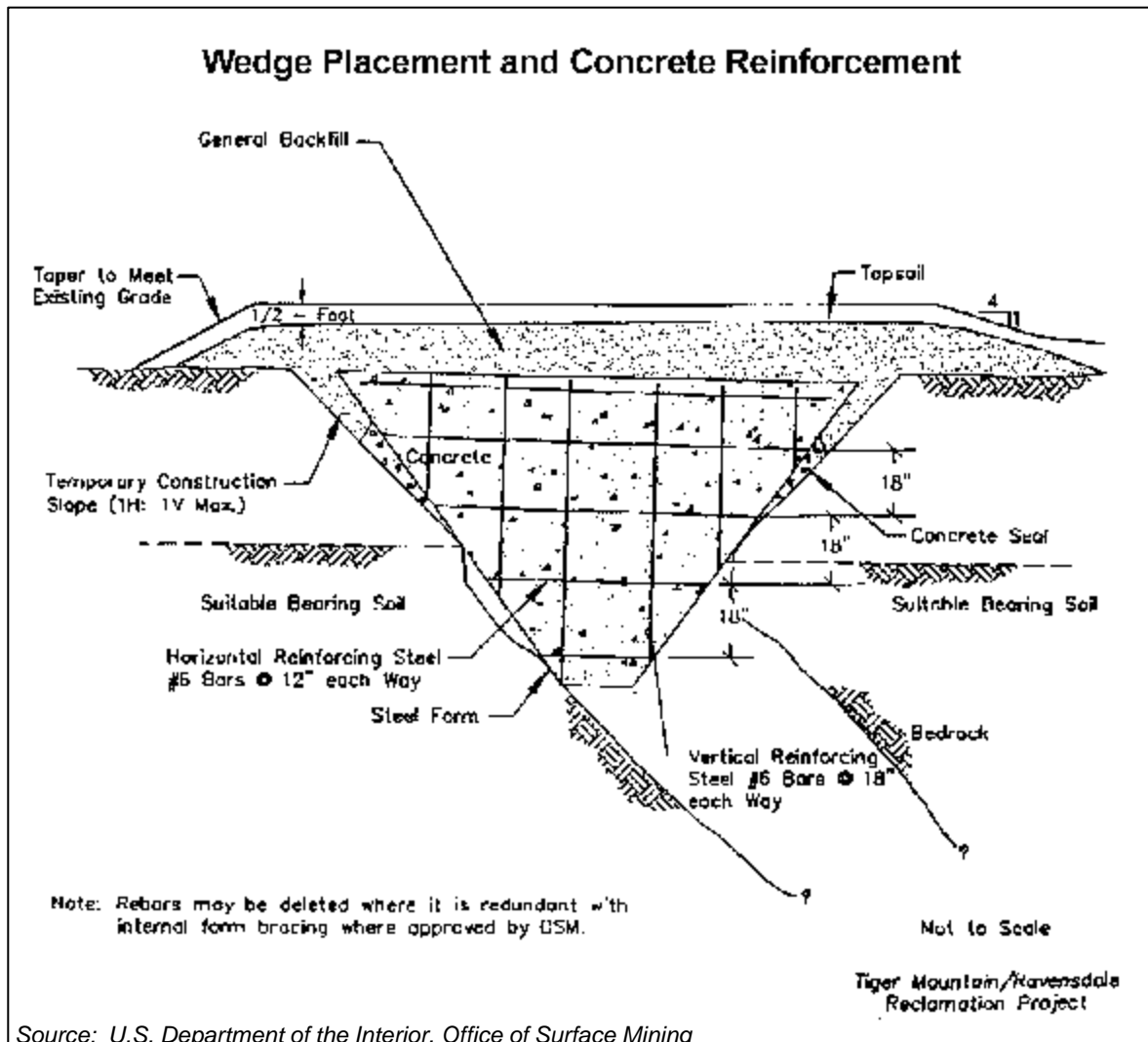
Cost: \$13,000

Example of Wedge Method



Source: U.S. Department of the Interior, Office of Surface Mining

Example of Wedge Method



U.S. Department of the Interior - Bureau of Mines (Lead and Zinc)

Galena, Kansas Demonstration Project

The inverted pyramid-shaped forms, fabricated from steelplate, were designed so that the inverted base would be larger, by 4 feet on a side, than the approximate size of the shaft opening at the surface residuum-solid rock interface. After the surface openings of the shafts were trimmed with a backhoe, the steel forms, complete with reinforcing, were lowered into the openings and filled with concrete. The remaining portions of the openings above the filled wedge were backfilled to slightly above the surrounding surface level with on-site waste rock and soil.

Size: 11 shafts that were roughly square and ranged from 4 to 8 feet.

Condition: Open, water-filled

Completed Date: 1985

Cost: Approximately \$10,000 per shaft

Polyurethane Foam (PUF) Plug Method

Definition

Two-part polyurethane foam plug formed in place and covered with earth or waste rock. A detailed description can be found in “Shaft Closures Using Polyurethane Foam,” *Proceedings: Symposium of Evolution of Abandoned Mine Land Technologies*, Riverton, WY, June 14-16, 1989.

Pros

Life span: Permanent

Degree of hazard elimination: Total

Maintenance: Maintenance-free

Construction safety: Workers can install closure from ground level.

Environmental concerns: Once mixed, PUF is inert. Can be installed in historic structures without damaging them.

Design concerns: Can accommodate poor access situations. Can be used as formwork for concrete closures.

Cost: Installation costs are relatively low.

Cons

Life span: Fairly new technique with only about 10 years of history.

Degree of hazard elimination: NA

Maintenance: Potential for vandalism if cover material removed.

Construction safety: Exposure to falling because of necessity to work around collar of shaft. Exposure to toxic materials and fumes.

Environmental concerns: Unmixed chemicals are toxic. Exposed PUF will support combustion and will degrade in ultraviolet light.

Design concerns: Installation procedures are critical to closure success.

Cost: Material expense is high.

PUF Examples with Costs

State of Wyoming - Abandoned Mine Lands Division of the Department of Environmental Quality (Hardrock Mines)

Red Boy Mine West Shaft

There were two interconnected vertical shafts. One of the shafts had wood cribbing that had to be preserved. The shafts were also inhabited by Townsend's Big Eared Bats. The shaft was closed with approximately 100 cubic yards of polyurethane foam (PUF). Two 36-inch HDPE culverts with bat grates were placed in the shafts and encased in PUF.

Size: 5 x 7 x 70 ft. (Two shafts)

Condition: Open, dry

Date Completed: August 1996

Cost: \$40,045

Red Boy East Shaft

This shaft also had wood cribbing. The shaft was closed with approximately 15.5 cubic yards of PUF, followed by a concrete cap and on-site fill material.

Size: 5 x 7 x 30 ft.

Condition: Open, dry

Date Completed: August 1996

Cost: \$2,725

Red Boy Shaft No. 3

This shaft was closed using approximately 45 cubic yards of PUF, followed by a concrete cap and on-site fill material.

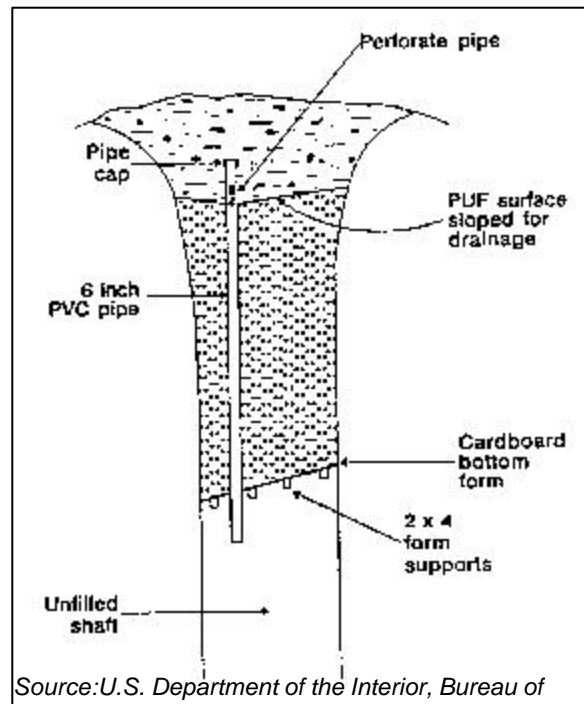
Size: 9 x 13 x 25 ft.

Condition: Open, dry

Date Completed: August 1996

Cost: \$10,530

Example of PUF Plug Method



Hollow Core Plug Method

Definition

Wedge- or cone-shaped concrete plug with a rectangular opening in the center.

Pros

Life span: Permanent

Degree of hazard elimination: Total

Maintenance: Generally maintenance-free

Construction safety: NA

Environmental concerns: Minimal disturbance away from shaft.

Design concerns: Accommodates unstable shaft collars by settling down/jamming as collapse occurs. Allows access to and ventilation of mine workings if necessary.

Cost: NA

Cons

Life span: NA

Degree of hazard elimination: NA

Maintenance: Cap/grate over opening may be vandalized.

Construction safety: Exposure to falling and collapsing shaft collars. Must work down in the shaft to install formwork.

Environmental concerns: NA

Design concerns: Requires reinforced formwork to accommodate massive concrete.

Cost: Fairly high

Hollow Core Plug Examples with Costs

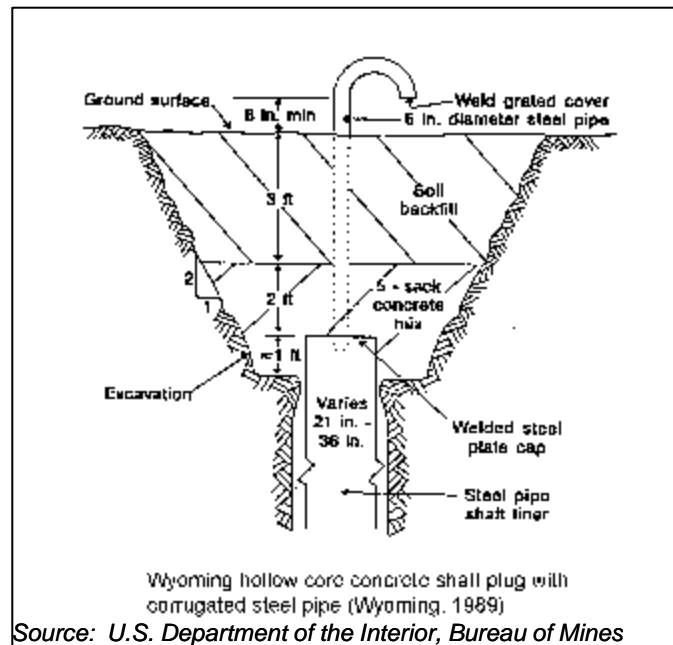
U.S. Department of the Interior - Bureau of Mines

“Closure Methods For Inactive and Abandoned Mine Openings,” December 1995

The U.S. Bureau of Mines report indicated that the states of Colorado and Wyoming construct hollow core concrete shaft plugs. These types of plugs are hollow in the center but use supportive concrete structures or corrugated metal pipes to stabilize shafts located in unconsolidated material or that have unstable shaft walls.

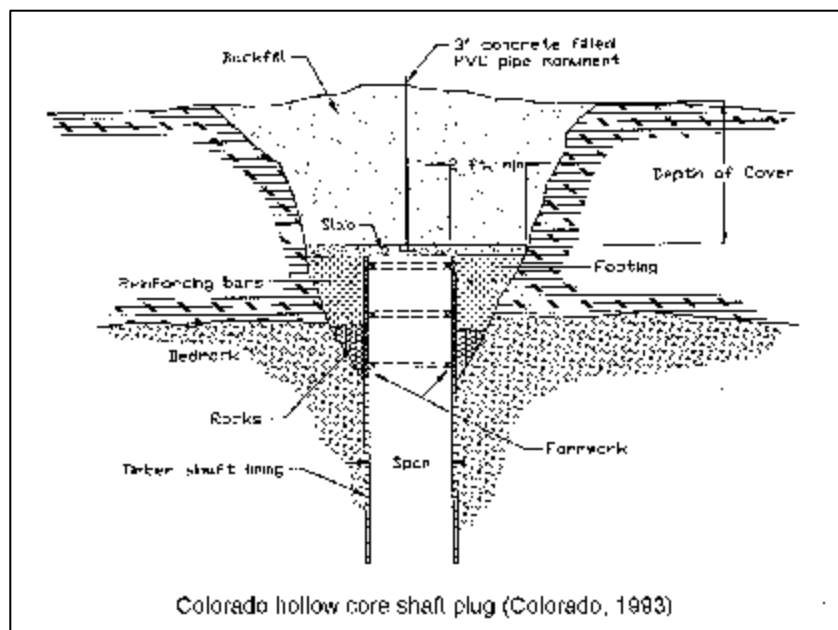
In the Wyoming plug, a corrugated pipe is placed in the shaft to support the shaft walls. A steel plate cap is welded to the top of the pipe, and the plug is poured on top of the pipe. The surface of the plug is backfilled over. A vent pipe can be added to this design if needed. The average cost (1989) for the Wyoming plug with pipe is \$3,800.

Example of Hollow Core Method



Colorado constructs a hollow core plug where permanent wood formworks are placed in the center of the shaft, rocks are placed to hold the formwork steady, and concrete is poured between the form-work and the sides of the shaft walls creating supportive footings. A concrete slab, either precast or poured-in-place, is placed over the footings to close the opening. Average cost (1992) for the Colorado hollow core shaft plug is \$7,800.

Example of Hollow Core Method



APPENDIX C

POTENTIAL FUNDING SOURCES FOR CLEANUP OF THE TAR CREEK SUPERFUND AREA

Environmental Protection Agency (EPA)

The information for most of this review came from the Environmental Protection Agency (EPA) web site located at www.epa.gov/superfund/whatis/cercla.htm.

The mining waste in the site contains lead and other hazardous substances as defined by *the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*, 42 U.S.C. §§9601 to 9675, also known as the Superfund law. Mining waste at the Site contains *CERCLA* hazardous substances, but the waste is not a hazardous waste under the *Resource Conservation and Recovery Act (RCRA)*, Subtitle C. The mining wastes at the site are solid waste from the extraction, beneficiation, and processing of ores and minerals that are excluded from regulation as a hazardous waste under *RCRA*, Subtitle C, according to 40 CFR §261.4(b)(7). This exclusion was based on the Bevill Amendment to *RCRA*. However, chat does fall under the authority of Superfund since it contains *CERCLA* hazardous substances. Although chat is not regulated by federal hazardous waste management laws (i.e., *RCRA*, *Subtitle C*) designed to prevent releases into the environment, Superfund authorizes EPA to cleanup material like chat that is contaminated with hazardous substances. Under Superfund, the term “release” means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant).

CERCLA Overview. Congress enacted *CERCLA*, commonly known as Superfund, on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. Over five years \$1.6 billion was collected and the tax went to a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites. *CERCLA*:

- < Established prohibitions and requirements concerning closed and abandoned hazardous waste sites.
- < Provided for liability of persons responsible for releases of hazardous waste at these sites.
- < Established a trust fund to provide for cleanup when no responsible party could be identified.

The law authorizes two kinds of response actions:

- < Short-term removals where actions may be taken to address releases or threatened releases requiring prompt response.
- < Long-term remedial response actions that permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious but not immediately life threatening. These actions can be conducted only at sites listed on EPA's National Priorities List (NPL).

CERCLA also enabled the revision of the National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan or NCP. The NCP provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants. The NCP also established the NPL.

The National Contingency Plan is the federal government's blueprint for responding to both oil spills and hazardous substance releases. The NCP is the result of efforts to develop a national response capability and promote overall coordination among the hierarchy of responders and contingency plans.

CERCLA was amended by the *Superfund Amendments and Reauthorization Act (SARA)* on October 17, 1986. *SARA* reflected EPA's experience in administering the complex Superfund program during its first six years and made several important changes and additions to the program. *SARA*:

- < Stressed the importance of permanent remedies and innovative treatment technologies in cleaning up hazardous waste sites.
- < Required Superfund actions to consider the standards and requirements found in other state and federal environmental laws and regulations.
- < Provided new enforcement authorities and settlement tools.
- < Increased state involvement in every phase of the Superfund program.
- < Increased the focus on human health problems posed by hazardous waste sites.
- < Encouraged greater citizen participation in making decisions on how sites should be cleaned up.
- < Increased the size of the trust fund to \$8.5 billion.

CERCLA covers all environmental media - air, surface water, ground water, and soils. It also can apply to any type of industrial, commercial, or noncommercial facility regardless of whether there are specific regulations affecting that type of facility or how that facility might affect the environment. These are called applicable or relevant and appropriate requirements (ARARs) of other environmental laws.

CERCLA §104 (42 U.S.C. §9604) authorizes the federal government to respond to releases of hazardous substances and pollutants or contaminants into the environment.

CERCLA §105 (42 U.S.C. §9605) requires EPA identify uncontrolled or abandoned hazardous waste sites and to prioritize them for cleanup. The high priority sites are placed on a NPL, enabling EPA to use Trust Fund monies to clean up the sites. The Tar Creek Superfund Site was placed on the NPL on September 8, 1983.

CERCLA §111 (Title 42 U.S.C. §9611) allows the Hazardous Substances Trust Fund monies to be used for any necessary costs incurred as a result of cleaning up a site. The state must match this with 10 percent.

CERCLA §118 (Title 42 U.S.C. §9618) places a high priority for drinking water supplies where the release of hazardous substances or pollutants or contaminants has resulted in the closing of drinking water wells or has contaminated a principal drinking water supply.

CERCLA §123 (Title 42 U.S.C. §9623) allows for reimbursement to local governments affected by a release or threatened release at any facility. The monies will be paid for any expenses incurred in carrying out temporary emergency measures necessary to prevent or mitigate injury to human health or the environment associated with the release or threatened release of any hazardous substance or pollutant or contaminant. Additional federal environmental laws that the Environmental Protection Agency (EPA) uses to carry out its work are as follows:

1938 Federal Food, Drug, and Cosmetic Act
1947 Federal Insecticide, Fungicide, and Rodenticide Act
1948 Federal Water Pollution Control Act (also known as the Clean Water Act)
1955 Clean Air Act
1965 Shoreline Erosion Protection Act
1965 Solid Waste Disposal Act
1970 National Environmental Policy Act
1970 Pollution Prevention Packaging Act
1970 Resource Recovery Act
1971 Lead-Based Paint Poisoning Prevention Act
1972 Coastal Zone Management Act
1972 Marine Protection, Research, and Sanctuaries Act
1972 Ocean Dumping Act
1973 Endangered Species Act
1974 Safe Drinking Water Act
1974 Shoreline Erosion Control Demonstration Act
1975 Hazardous Materials Transportation Act
1976 Resource Conservation and Recovery Act
1976 Toxic Substances Control Act
1977 Surface Mining Control and Reclamation Act
1978 Uranium Mill-Tailings Radiation Control Act
1980 Asbestos School Hazard Detection and Control Act
1980 Comprehensive Environmental Response, Compensation, and Liability Act
1982 Nuclear Waste Policy Act
1984 Asbestos School Hazard Abatement Act
1986 Asbestos Hazard Emergency Response Act
1986 Emergency Planning and Community Right to Know Act
1988 Indoor Radon Abatement Act
1988 Lead Contamination Control Act
1988 Medical Waste Tracking Act
1988 Ocean Dumping Ban Act
1988 Shore Protection Act
1990 National Environmental Education Act

Oklahoma Department of Environmental Quality (DEQ)

The Waste Management Division of the Oklahoma Department of Environmental Quality has the responsibility to carry out activities as required by *State of Oklahoma Environmental Quality Code* §27 A-2-6-105 and the *CERCLA* laws. These programs provide for the cleanup of contaminated sites when public health or the environment are threatened by improperly handled or abandoned hazardous substances. The following pertinent sections of the *State of Oklahoma Environmental Quality Code* were provided by DEQ.

The creation of the Oklahoma Department of Environmental Quality can be found in §27A-2-3-101 of the *State of Oklahoma Environmental Quality Code*.

§27A-2-3-101.

- A. There is hereby created the Department of Environmental Quality.
- B. Within its jurisdictional areas of environmental responsibility, the Department of Environmental Quality, through its duly designated employees or representatives, shall have the power and duty to:
 - 1. Perform such duties as required by law; and
 - 2. Be the official agency of the State of Oklahoma, as designated by law, to cooperate with federal agencies for point source pollution, solid waste, hazardous materials, pollution, Superfund, water quality, hazardous waste, radioactive waste, air quality, drinking water supplies, waste water treatment and any other program authorized by law or executive order.

The enforcement concerning the restriction of the use of chat is based upon the public nuisance law, which can be found in the water quality section of the *State of Oklahoma Environmental Quality Code* §27A-2-6-105. It is entitled “Pollution of state air, land or waters--Order to cease.”

§27A-2-6-105.

- A. It shall be unlawful for any person to cause pollution of any waters of the state or to place or cause to be placed any wastes in a location where they are likely to cause pollution of any air, land or waters of the state. Any such action is hereby declared to be a public nuisance.
- B. If the Executive Director finds that any of the air, land or waters of the state have been, or are being, polluted, the Executive Director shall make an order requiring such pollution to cease within a reasonable time, or requiring such manner of treatment or of disposition of the sewage or other polluting material as may in his judgment be necessary to prevent further pollution. It shall be the duty of the person to whom such order is directed to fully comply with the order of the Executive Director.

Some of the funding available from the State of Oklahoma can be found in *State of Oklahoma Environmental Quality Code* §27A-2-7-121 and §27A-2-10-802.

§27A-2-7-121.

- E. All fees and other monies received by the Department pursuant to the provisions of this section shall be expended solely for the purposes specified in this section.

1. Ten percent (10%) of the fees collected from an off-site hazardous waste facility pursuant to the provisions of this section shall be deposited to the credit of the Special Economic Development Trust Funds. The funds for the Trusts accruing pursuant to the provisions of this section shall be distributed to each Trust established in proportion to the fees generated by the off-site hazardous waste facilities within the Trust area.
 2. The Department shall expend monies received pursuant to the provisions of this section for one or more of the following purposes:
 - a. the administration of the provisions of the Oklahoma Hazardous Waste Management Act,
 - b. the development of an inventory of hazardous wastes currently produced in Oklahoma and management needs for the identified wastes,
 - c. the implementation of information exchange, technical assistance, public information, and educational programs,
 - d. the development and encouragement of waste reduction plans for Oklahoma waste generators, or
 - e. increased inspection of hazardous waste facilities which may include full time inspectors at off-site hazardous waste facilities.
- F. To the extent that fees received pursuant to this section shall exceed the purposes specified in subsection E of this section, the Department shall only expend such funds for one or more of the following purposes:
1. Contributions required from the state pursuant to the federal Comprehensive Environmental Response, Compensation and Liability Act for remediation or related action upon a site within the state;
 2. Response, including but not limited to containment and removal, to emergency situations involving spillage, leakage, emissions or other discharge of hazardous waste or hazardous waste constituents to the environment where a responsible party cannot be timely identified or found or compelled to take appropriate emergency action to adequately protect human health and the environment;
 3. State-funded remediation of sites contaminated by hazardous waste or hazardous waste constituents so as to present a threat to human health or the environment, to the extent that a responsible party cannot be timely identified or found or compelled to take such action, or is unable to take such action;
 4. Costs incurred in pursuing an enforcement action to compel a responsible party to undertake appropriate response or remedial actions, or to recover from a responsible party monies expended by the state, as described in paragraphs 1 through 3 of this subsection; or
 5. Financial assistance to municipalities or counties for the purposes and under the conditions specified in Section 2-7-305 of this title.

§27A-2-10-802.

- A. 1. Owners or operators of landfill disposal sites which are not generator owned and operated nonhazardous industrial waste monofills shall install scales by January 1, 1996. Such scales shall be installed on or within five (5) miles of the landfill disposal site and shall be tested and certified as required by Section 5-61e of Title 2 of the Oklahoma Statutes relating to the authority of the Board of Agriculture to test annually the standards

of weights and measures used by any city or county within the state and to approve if found to be correct.

- B. 1. Except as otherwise provided by this subsection, on and after January 1, 1996:
 - a. owners and operators of landfill disposal sites which receive an average of less than one hundred (100) tons of solid waste per operating day shall assess a fee of One Dollar and fifty cents (\$1.50) per ton of solid waste received for disposal. A total of fifty cents (\$.50) per ton of such fee shall be retained by the owner or operator and used exclusively for capital improvement to their facilities and for the projects required pursuant to the Oklahoma Solid Waste Management Act or the disposal site's permit for such period of time necessary to recoup a capital investment, plus the interest costs expended in purchasing the scales, of a total of Forty Thousand Dollars (\$40,000.00),
 - b. when the owner or operators have recouped a capital investment of the total specified in subparagraph a of this paragraph, the fee to be assessed shall be One Dollar and twenty-five cents (\$1.25) per ton of solid waste received for disposal. At such time, for a return with remittance filed on or before the due date, the owner or operator may deduct and retain ten percent (10%) of the fees collected, and
 - c. records documenting the projects and use of the funds shall be included with each return.
- 2.
 - a. Owners and operators of landfill disposal sites which receive an average of more than one hundred (100) tons of solid waste per operating day shall assess a fee of One Dollar and fifty cents (\$1.50) per ton of solid waste received for disposal, retaining twenty-five cents (\$0.25) per ton for a period of time necessary to recoup a capital investment, plus the interest costs expended in purchasing the scales, of Forty Thousand Dollars (\$40,000.00). At the end of such period the fee shall revert to One Dollar and twenty-five cents (\$1.25) per ton. For a return with remittance filed on or before the due date, the owner or operator may deduct and retain ten percent (10%) of the fees collected.
 - b. Records documenting the capital investment and the use of the funds shall be included with each return.
- C. 1. The Department shall expend funds collected pursuant to the provisions of this section solely for the administration and enforcement of the provisions of the Oklahoma Solid Waste Management Act and for the development of solid waste technical assistance programs, solid waste public environmental education programs and educational curricula, solid waste studies, development of a statewide solid waste plan, solid waste recycling and litter prevention programs, and other environmental improvements.
- 5.
 - a. The Department, in conjunction with the Corporation Commission, the Oklahoma Energy Resources Board and the Oklahoma Conservation Commission, may develop a plan to use suitable portions of the solid waste stream to reclaim Oklahoma lands damaged by oil and gas exploration and production or by surface mining activities.

The United States Army Corps of Engineers (COE)

Section 22 - Planning Assistance to States (PAS) Program of *The Water Resources Development Act of 1974*. The PAS Program is part of a group of laws that authorizes the Corps of Engineers' involvement in water resource studies. The program was authorized by the *Water Resources Development Act of 1974* and gives the Corps the authority to use its technical expertise in water and related resource management to help states and Native American tribes with their water resource problems. The program is funded annually (maximum of \$10 million), and funds are distributed on a priority basis. Each state or tribe can receive up to \$500,000 annually. Federal funds are matched equally with non-federal funds provided by the study sponsor. Cost sharing is arranged through letter agreements signed by the Corps District Engineer and the head of the sponsoring agency. In Oklahoma the Corps works through the Oklahoma Water Resources Board and in Kansas through the Kansas Water Office. The Corps also works with Native American tribes but have only had one tribal PAS study to date due to limited PAS funds. Study purposes are varied under the PAS Program and have included evaluations of water and waste-water systems, port development on the navigation system, design studies on water supply lakes, and economic and environmental evaluation of proposed projects. PAS studies do not lead to federal construction projects. An environmental evaluation may be helpful to determine if this project is eligible for funding due to environmental concerns.

Section 206 - Aquatic Ecosystem Restoration of *The Water Resources Development Act of 1996*. The Aquatic Ecosystem Restoration Program may be applicable in areas where acid mine drainage (AMD) exists. This section authorizes the Corps to carry out aquatic ecosystem restoration projects if they will improve environmental quality, are in the public interest, and are cost-effective. To be funded a project must be for restoration of aquatic ecosystem structure and function. This will usually include manipulation of the hydrology in and along bodies of water, including wetlands and riparian areas. No relationship to an existing Corps project is required. To start the process the local sponsor sends the Corps a letter of request. That letter would not obligate the local sponsor to any financial outlay. The Corps' first effort would be the completion of a fully federally-funded preliminary restoration plan. If the environmental restoration project is approved for implementation, the feasibility study, plans and specs, and construction costs would be included as part of the total project modification cost to be shared 65 percent federal and 35 percent non-federal. Usually, the non-federal sponsor would be responsible for the operation, repair, replacement, rehabilitation, and maintenance costs of the project. The local sponsor would provide its share of the project costs prior to the award of a construction contract.

The Abandoned Mine Restoration Act of 1999 (pending legislation).

106th CONGRESS
1st Session

H. R. 2753

To authorize the Secretary of the Army to carry out a program for the restoration of abandoned mine sites.

IN THE HOUSE OF REPRESENTATIVES

August 5, 1999

Mr. GIBBONS introduced the following bill; which was referred to the Committee on Resources, and in addition to the Committee on Transportation and Infrastructure, and Commerce, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned

A BILL

To authorize the Secretary of the Army to carry out a program for the restoration of abandoned mine sites.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the ‘Abandoned Mine Restoration Act of 1999’.

SEC. 2. DEFINITIONS.

In this Act, the following definitions apply:

(1) NON-FEDERAL ENTITIES - The term ‘non-Federal entities’ includes nonprofit and private entities.

(2) PROGRAM - The term ‘program’ means the program authorized under section 3(a).

(3) SECRETARY - The term ‘Secretary’ means the Secretary of the Army.

SEC. 3. RESTORATION OF ABANDONED MINE SITES PROGRAM.

(a) IN GENERAL - Subject to the requirements of this section, the Secretary may carry out a program to assist stewards of lands owned by the United States and non-Federal entities to address environmental and water quality problems caused by drainage and related activities from abandoned, inactive, and post-production noncoal mines. The program shall be managed by the head of the Sacramento District Office of the Corps of Engineers.

(b) CONSULTATION - The Secretary shall coordinate actions taken under the program with appropriate Federal, State, and local agencies. Any project conducted under the program on lands owned by the United States shall be undertaken in consultation with the head of the Federal entity with administrative jurisdiction over the lands.

(c) ASSISTANCE -

(1) TYPES OF ASSISTANCE - In carrying out the program, the Secretary may provide technical, planning, design, restoration, remediation, and construction assistance to Federal and non-Federal entities for the purpose of carrying out projects to address problems described in subsection (a).

(2) REQUIREMENT FOR ASSISTANCE - The Secretary may only provide assistance for a project under the program, if the Secretary determines that the project –

(A) will improve the quality of the environment and is in the public interest; and

(B) is cost-effective.

(d) SPECIFIC MEASURES - Assistance may be provided under the program in support of a Federal or non-Federal project for the following purposes:

(1) Response, control, and remediation of hazardous, toxic, and radioactive waste and improvement of the quality of the environment associated with an abandoned, inactive, or post-production noncoal mine, if the Secretary finds that such activities are integral to carrying out the environmental restoration project.

(2) Restoration and protection of streams, rivers, wetlands, and other waterbodies and all ecosystems degraded, or with the potential to become degraded, by drainage from an abandoned, inactive, or post-production noncoal mine.

(3) Demonstration of treatment technologies, including innovative and alternative technologies, to minimize or eliminate adverse environmental effects associated with an abandoned, inactive, or post-production noncoal mine.

(4) Demonstration of management practices to address environmental effects associated with an abandoned, inactive, or post-production noncoal mine.

(5) Remediation and restoration of an abandoned, inactive, or post-production noncoal mine site for public health or safety purposes.

(6) Expedite the closure, remediation, or restoration of an abandoned, inactive, or post-production noncoal mine to minimize adverse impacts to the environment.

(e) COST-SHARING -

(1) IN GENERAL - Except as provided by paragraph (2), the Federal share of the cost of a project carried out under the program shall be 65 percent of such cost.

(2) PROJECTS ON FEDERAL LANDS - With respect to projects carried out under the program on Federal lands, the Federal share of the cost of the project shall be 100 percent of such cost.

(f) CREDITS - For purposes of subsection (e), a non-Federal entity shall receive credit toward the non-Federal share of the cost of a project -

(1) for all lands, easements, rights-of-way, and relocations, but not to exceed 25 percent of total project cost;

(2) for design and construction services and other in-kind work;

(3) for grants and the value, as determined by the Secretary, of work performed on behalf of the non-Federal entity by State and local agencies; and

(4) for such costs as are incurred by the non-Federal entity in carrying out studies and any preconstruction, engineering, or design activities required for any construction to be conducted under the project, if the Secretary determines that such activities are integral to the project.

(g) GRANTS AND REIMBURSEMENTS -

(1) GRANTS - The Federal share of the cost of a project under the program may be provided in the form of grants to the non-Federal entity or direct reimbursements to the non-Federal entity of project costs.

(2) REIMBURSEMENTS - Subject to the availability of appropriations, the Secretary may reimburse a non-Federal interest an amount equal to the estimate of the Federal share, without interest, of the cost of any work (including work associated with studies, planning, design, and construction) carried out by the non-Federal entity otherwise made eligible for non-Federal assistance under this section.

(3) REIMBURSEMENTS FOR CONSTRUCTION WORK - Reimbursements for construction work by a non-Federal entity as part of a project under the program may be made only -

(A) if, before initiation of construction of the project, the Secretary approves the plans for construction of the project by the non-Federal entity;

(B) if the Secretary finds, after a review of studies and design documents prepared pursuant to this section, that construction of the project meets the requirements in subsection (d); and

(C) if the Secretary determines that the work for which reimbursement is requested has been performed in accordance with applicable permits and approved plans.

(h) OPERATION AND MAINTENANCE - The non-Federal share of operation and maintenance costs for a project carried out under the program shall be 100 percent, except that, in the case of a project undertaken on Federal lands, the Federal agency with management responsibility for the lands shall be responsible for all operation and maintenance costs.

(i) EFFECT ON AUTHORITY OF SECRETARY OF THE INTERIOR - Nothing in this section shall affect the authority of the Secretary of the Interior under the Mining Law of 1872 or title IV of the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1231 et seq.).

(j) COST LIMITATION - Not more than \$10,000,000 of the amounts appropriated to carry out this section may be allotted for projects in a single locality, but the Secretary may accept funds voluntarily contributed by the non-Federal or Federal entity for the purpose of expanding the scope of the services requested by the non-Federal or Federal entity.

(k) LIMITATION ON ACTIONS - Notwithstanding any other provision of law, the Secretary or any State or political subdivision (including any local district) which has implemented or will implement any remedial action which is consistent with a State and Environmental Protection Agency approved remediation plan, and any State approved modification thereof, at an abandoned mine site and adjacent lands to provide water quality protection, shall not be treated, based on actions taken consistent with the plan, to be –

(1) the owner or operator of the site, or arranger or transporter for disposal;

(2) responsible for any discharge or release of pollutants, contaminants, or hazardous substances on or from the abandoned mine site or adjacent lands, including discharges or releases which have been affected by the activities of the remedial action; or

(3) subject to any enforcement action pursuant to Federal law, except for violations involving gross negligence.

In this subsection, the term ‘gross negligence’ means reckless, willful, or wanton misconduct.

(l) WESTERN UNIVERSITIES MINE-LAND RECLAMATION AND RESTORATION CONSORTIUM - The Secretary may provide assistance to the Western Universities Mine-Land Reclamation and Restoration Consortium, which includes the University of Nevada, the New Mexico Institute of Mining and Technology, the University of Idaho, and the University of Alaska, for the purposes of carrying out the purposes of the program.

(m) AUTHORIZATION OF APPROPRIATIONS - There is authorized to be appropriated to carry out this section \$45,000,000 for fiscal years beginning after September 30, 1999.

Office of Surface Mining (OSM)

The Surface Mining Control and Reclamation Act of 1977 (PL 95-87) is the most comprehensive legislation for the elimination of abandoned mine land that affects the health and safety of the public. This law is administered by the U.S. Department of the Interior’s Office of Surface Mining (OSM) through annual grants to states and tribes. Title IV, Abandoned Mine Reclamation (AML), of *PL 95-87* dictates how the AML activities are carried out. Sections 401 through 403 provide information about the AML Trust Fund, reclamation fee, and objectives of the Trust Fund. These sections will provide a basic understanding on how and why the AML program was funded.

TITLE IV – ABANDONED MINE RECLAMATION

ABANDONED MINE RECLAMATION FUND AND PURPOSES

SEC. 401. (a) There is created on the books of the Treasury of the United States a trust fund to be known as the Abandoned Mine Reclamation Fund (hereinafter referred to as the "fund") which shall be administered by the Secretary of the Interior. State abandoned mine reclamation funds (State funds) generated by grants from this title shall be established by each State pursuant to an approved State program.

(b) The fund shall consist of amounts deposited in the fund, from time to time derived from –

- (1) the reclamation fees levied under section 402;
- (2) any user charge imposed on or for land reclaimed pursuant to this title, after expenditures for maintenance have been deducted;
- (3) donations by persons, corporations, associations, and foundations for the purposes of this title;
- (4) recovered moneys as provided for in this title; and
- (5) interest credited to the fund under subsection (e).

(c) Moneys in the fund may be used for the following purposes:

(1) reclamation and restoration of land and water resources adversely affected by past coal mining, including but not limited to reclamation and restoration of abandoned surface mine areas, abandoned coal processing areas, and abandoned coal refuse disposal areas; sealing and filling abandoned deep mine entries and voids; planting of land adversely affected by past coal mining to prevent erosion and sedimentation; prevention, abatement, treatment, and control of water pollution created by coal mine drainage including restoration of stream beds, and construction and operation of water treatment plants; prevention, abatement, and control of burning Sec. 401 coal refuse disposal areas and burning coal in situ; prevention, abatement, and control of coal mine subsidence; and establishment of self-sustaining, individual State administered programs to insure private property against damages caused by land subsidence resulting from underground coal mining in those States which have reclamation plans approved in accordance with section 503 of this Act: Provided, That funds used for this purpose shall not exceed \$3,000,000 of the funds made available to any State under section 402(g)(1) of this Act;

(2) for transfer on an annual basis to the Secretary of Agriculture for use under section 406;

(3) acquisition and filling of voids and sealing of tunnels, shafts, and entryways under section 409;

(4) acquisition of land as provided for in this title;

(5) enforcement and collection of the reclamation fee provided for in section 402 of this title;

(6) studies, research, and demonstration projects by the Department of the Interior to such extent or in such amounts as are provided in appropriation Acts with public and private organizations, conducted in accordance with section 3501 of the Omnibus Budget Reconciliation Act of 1986 conducted for the purposes of this title;

(7) restoration, reclamation, abatement, control, or prevention of adverse effects of coal mining which constitutes an emergency as provided for in this title;

(8) grants to the States to accomplish the purposes of this title;

(9) administrative expenses of the United States and each State to accomplish the

purposes of this title;

(10) for use under section 411;

(11) for the purpose of section 507(c), except that not more than \$10,000,000 shall annually be available for such purpose;

(12) for the purpose described in section 402(h); and

(13) all other necessary expenses to accomplish the purposes of this title.

(d) Moneys from the fund shall be available for the purposes of this title, only when appropriated therefor, and such appropriations shall be made without fiscal year limitations.

(e) The Secretary of the Interior shall notify the Secretary of the Treasury as to what portion of the fund is not, in his judgement, required to meet current withdrawals. The Secretary of the Treasury shall invest such portion of the fund in public debt securities with maturities suitable for the needs of such fund and bearing interest at rates determined by the Secretary of the Treasury, taking into consideration current market yields on outstanding marketable obligations of the United States of comparable maturities. The income on such investments shall be credited to, and form a part of, the fund.

RECLAMATION FEE

SEC. 402. (a) All operators of coal mining operations subject to the provisions of this Act shall pay to the Secretary of the Interior, for deposit in the fund, a reclamation fee of 35 cents per ton of coal produced by surface coal mining and 15 cents per ton of coal produced by underground mining or 10 per centum of the value of the coal at the mine, as determined by the Secretary, whichever is less, except that the reclamation fee for lignite coal shall be at a rate of 2 per centum of the value of the coal at the mine, or 10 cents per ton, whichever is less.

(b) Such fee shall be paid no later than thirty days after the end of each calendar quarter beginning with the first calendar quarter occurring after the date of enactment of this Act, and ending September 30, 2004, after which time the fee shall be Sec. 402 established at a rate to continue to provide for the deposit referred to in subsection (h).

(c) Together with such reclamation fee, all operators of coal mine operations shall submit a statement of the amount of coal produced during the calendar quarter, the method of coal removal and the type of coal, the accuracy of which shall be sworn to by the operator and notarized. Such statement shall include an identification of the permittee of the surface coal mining operation, any operator in addition to the permittee, the owner of the coal, the preparation plant, tippie, or loading point for the coal, and the person purchasing the coal from the operator. The report shall also specify the number of the permit required under section 506 and the mine safety and health identification number. Each quarterly report shall contain a notification of any changes in the information required by this subsection since the date of the preceding quarterly report. The information contained in the quarterly reports under this subsection shall be maintained by the Secretary in a computerized database.

(d)(1) Any person, corporate officer, agent or director, on behalf of a coal mine operator, who knowingly makes any false statement, representation or certification, or knowingly fails to make any statement, representation or certification required in this section shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than one year, or both.

(2) The Secretary shall conduct such audits of coal production and the payment of fees under this title as may be necessary to ensure full compliance with the provisions of this title. For purposes of performing such audits the Secretary (or any duly designated officer, employee, or representative of the Secretary) shall, at the reasonable times, upon request,

have access to, and may copy, all books, papers, and other documents of any person subject to the provisions of this title. The Secretary may at any time conduct audits of any surface coal mining and reclamation operation, including without limitation, tipples and preparation plants, as may be necessary in the judgment of the Secretary to ensure full and complete payment of the fees under this title.

(e) Any portion of the reclamation fee not properly or promptly paid pursuant to this section shall be recoverable, with statutory interest, from coal mine operators, in any court of competent jurisdiction in any action at law to compel payment of debts.

(f) All Federal and State agencies shall fully cooperate with the Secretary of the Interior in the enforcement of this section. Whenever the Secretary believes that any person has not paid the full amount of the fee payable under subsection (a) the Secretary shall notify the Federal agency responsible for ensuring compliance with the provisions of section 4121 of the Internal Revenue Code of 1986.

(g) (1) Except as provided in subsection (h), moneys deposited into the fund shall be allocated by the Secretary to accomplish the purposes of this title as follows:

(A) 50 percent of the reclamation fees collected annually in any State (other than fees collected with respect to Indian lands) shall be allocated annually by the Secretary to the State, subject to such State having each of the following:

(i) An approved abandoned mine reclamation program pursuant to section 405.

(ii) Lands and waters which are eligible pursuant to section 404 (in the case of a State not certified under section 411(a)) or pursuant to section 411(b) (in the case of a State certified under section 411(a)).

(B) 50 percent of the reclamation fees collected annually with respect to Indian lands shall be allocated annually by the Secretary to the Indian tribe having jurisdiction over such lands, subject to such tribe having each of the following:

(i) an approved abandoned mine reclamation program pursuant to section 405.

(ii) Lands and waters which are eligible pursuant to section 404 (in the case of an Indian tribe not certified under section 411(a)) or pursuant to section 411(b) (in the case of a tribe certified under section 411(a)).

(C) The funds allocated by the Secretary under this paragraph to States and Indian tribes shall only be used for annual reclamation project construction and program administration grants.

(D) To the extent not expended within 3 years after the date of any grant award under this paragraph, such grant shall be available for expenditure by the Secretary in any area under paragraph (2), (3), (4), or (5).

(2) 20 percent of the amounts available in the fund in any fiscal year which are not allocated under paragraph (1) in that fiscal year (including that interest accruing as provided in section 401(e) and including funds available for reallocation pursuant to paragraph (1)(D)), shall be allocated to the Secretary only for the purpose of making the annual transfer to the Secretary of Agriculture under section 401(c)(2).

(3) Amounts available in the fund which are not allocated to States and Indian tribes under paragraph (1) or allocated under paragraphs (2) and (5) are authorized to be expended by the Secretary for any of the following:

(A) For the purpose of section 507(c), either directly or through grants to the States, subject to the limitation contained in section 401(c)(11).

(B) For the purpose of section 410 (relating to emergencies).

(C) For the purpose of meeting the objectives of the fund set forth in section 403(a) for eligible lands and waters pursuant to section 404 in States and on Indian lands

where the State or Indian tribe does not have an approved abandoned mine reclamation program pursuant to section 405.

(D) For the administration of this title by the Secretary.

(4)(A) Amounts available in the fund which are not allocated under paragraphs (1), (2), and (5) or expended under paragraph (3) in any fiscal year are authorized to be expended by the Secretary under this paragraph for the reclamation or drainage abatement of lands and waters within unreclaimed sites which are mined for coal or which were affected by such mining, wastebanks, coal processing or other coal mining processes and left in an inadequate reclamation status.

(B) Funds made available under this paragraph may be used for reclamation or drainage abatement at a site referred to in subparagraph (A) if the Secretary makes either of the following findings:

(i) A finding that the surface coal mining operation occurred during the period beginning on August 4, 1977, and ending on or before the date on which the Secretary approved a State program pursuant to section 503 for a State in which the site is located, and that any funds for reclamation or abatement which are available pursuant to a bond or other form of financial guarantee or from any other source are not sufficient to provide for adequate reclamation or abatement at the site.

(ii) A finding that the surface coal mining operation occurred during the period beginning on August 4, 1977, and ending on or before the date of enactment of this paragraph, and that the surety of such mining operator became insolvent during such period, and as of the date of enactment of this paragraph, funds immediately available from proceedings relating to such insolvency, or from any financial guarantee or other source are not sufficient to provide for adequate reclamation or abatement at the site.

(C) In determining which sites to reclaim pursuant to this paragraph, the Secretary shall follow the priorities stated in paragraphs (1) and (2) of section 403(a). The Secretary shall ensure that priority is given to those sites which are in the immediate vicinity of a residential area or which have an adverse economic impact upon a local community.

(D) Amounts collected from the assessment of civil penalties under section 518 are authorized to be appropriated to carry out this paragraph.

(E) Any State may expend grants made available under paragraphs (1) and (5) for reclamation and abatement of any site referred to in subparagraph (A) if the State, with the concurrence of the Secretary, makes either of the findings referred to in clause (i) or (ii) of subparagraph (B) and if the State determines that the reclamation priority of the site is the same or more urgent than the reclamation priority for eligible lands and waters pursuant to section 404 under the priorities stated in paragraphs (1) and (2) of section 403(a).

(F) For the purposes of the certification referred to in section 411(a), sites referred to in subparagraph (A) of this paragraph shall be considered as having the same priorities as those stated in section 403(a) for eligible lands and waters pursuant to section 404. All sites referred to in subparagraph (A) of this paragraph within any State shall be reclaimed prior to such State making the certification referred to in section 411(a).

(5) The Secretary shall allocate 40 percent of the amount in the fund after making the allocation referred to in paragraph (1) for making additional annual grants to States and Indian tribes which are not certified under section 411(a) to supplement grants received by such States and Indian tribes pursuant to paragraph (1)(C) until the priorities stated in

paragraphs (1) and (2) of section 403(a) have been achieved by such State or Indian tribe. The allocation of such funds for the purpose of making such expenditures shall be through a formula based on the amount of coal historically produced in the State or from the Indian lands concerned prior to August 3, 1977. Funds allocated or expended by the Secretary under paragraphs (2), (3), or (4) of this subsection for any State or Indian tribe shall not be deducted against any allocation of funds to the State or Indian tribe under paragraph (1) or under this paragraph.

(6) Any State may receive and retain, without regard to the 3-year limitation referred to in paragraph (1)(D), up to 10 percent of the total of the grants made annually to such State under paragraphs (1) and (5) if such amounts are deposited into either – (A) a special trust fund established under State law pursuant to which such amounts (together with all interest earned on such amounts) are expended by the State solely to achieve the priorities stated in section 403(a) after September 30, 1995, or (B) an acid mine drainage abatement and treatment fund established under State law as provided in paragraph (7).

(7)(A) Any State may establish under State law an acid mine drainage abatement and treatment fund from which amounts (together with all interest earned on such amounts) are expended by the State to implement, in consultation with the Soil Conservation Service, acid mine drainage abatement and treatment plans approved by the Secretary. Such plans shall provide for the comprehensive abatement of the causes and treatment of the effects of acid mine drainage within qualified hydrologic units affected by coal mining practices.

(B) The plan shall include, but shall not be limited to, each of the following:

(i) An identification of the qualified hydrologic unit.

(ii) The extent to which acid mine drainage is affecting the water quality and biological resources within the hydrologic unit.

(iii) An identification of the sources of acid mine drainage within the hydrologic unit.

(iv) An identification of individual projects and the measures proposed to be undertaken to abate and treat the causes or effects of acid mine drainage within the hydrologic unit.

(v) The cost of undertaking the proposed abatement and treatment measures.

(vi) An identification of existing and proposed sources of funding for such measures.

(vii) An analysis of the cost-effectiveness and environmental benefits of abatement and treatment measures.

(C) The Secretary may approve any plan under this paragraph only after determining that such plan meets the requirements of this paragraph. In conducting an analysis of the items referred to in clauses (iv), (v), and (vii) the Director of the Office of Surface Mining shall obtain the comments of the Director of the United States Bureau of Mines. In approving plans under this paragraph, the Secretary shall give a priority to those plans which will be implemented in coordination with measures undertaken by the Secretary of Agriculture under section 406.

(D) For purposes of this paragraph, the term ‘qualified hydrologic unit’ means a hydrologic unit -

(i) in which the water quality has been significantly affected by acid mine drainage from coal mining practices in a manner which adversely impacts biological resources; and

(ii) which contains lands and waters which are -

- (I) eligible pursuant to section 404 and include any of the priorities stated in paragraph (1), (2), or (3) of section 403(a); and
- (II) proposed to be the subject of the expenditures by the State (from amounts available from the forfeiture of bonds required under section 509 or from other State sources) to mitigate acid mine drainage.

(8) Of the funds available for expenditure under this subsection in any fiscal year, the Secretary shall allocate annually not less than \$2,000,000 for expenditure in each State, and for each Indian tribe, having an approved abandoned mine reclamation program pursuant to section 405 and eligible lands and waters pursuant to section 404 so long as an allocation of funds to such State or such tribe is necessary to achieve the priorities stated in paragraphs (1) and (2) of section 403(a).

(h)(1) In the case of any fiscal year beginning on or after October 1, 1995, with respect to which fees are required to be paid under this section, the Secretary shall, as of the beginning of such fiscal year and before any allocation under subsection (g), make the transfer provided in paragraph (2).

(2) The Secretary shall transfer from the fund to the United Mine Workers of America Combined Benefit Fund established under section 9702 of the Internal Revenue Code of 1986 for any fiscal year an amount equal to the sum of – (A) the amount of the interest which the Secretary estimates will be earned and paid to the Fund during the fiscal year, plus (B) the amount by which the amount described in subparagraph (A) is less than \$70,000,000.

(3)(A) The aggregate amount which may be transferred under paragraph (2) for any fiscal year shall not exceed the amount of expenditures which the trustees of the Combined Fund estimate will be debited against the unassigned beneficiaries premium account under section 9704(e) of the Internal Revenue Code of 1986 for the fiscal year of the Combined Fund in which the transfer is made.

(B) The aggregate amount which may be transferred under paragraph (2)(B) for all fiscal years shall not exceed an amount equivalent to all interest earned and paid to the fund after September 30, 1992, and before October 1, 1995.

(4) If, for any fiscal year, the amount transferred is more or less than the amount required to be transferred, the Secretary shall appropriately adjust the amount transferred for the next fiscal year.

OBJECTIVES OF FUND

SEC. 403. (a) Expenditure of moneys from the fund on lands and water eligible pursuant to section 404 for the purposes of this title, except as provided for under section 411, shall reflect the following priorities in the order stated:

(1) the protection of public health, safety, general welfare, and property from extreme danger of adverse effects of coal mining practices;

(2) the protection of public health, safety, and general welfare from adverse effects of coal mining practices;

(3) the restoration of land and water resources and the environment previously degraded by adverse effects of coal mining practices including measures for the conservation and development of soil, water (excluding channelization), woodland, fish and wildlife, recreation resources, and agricultural productivity;

(4) the protection, repair, replacement, construction, or enhancement of public facilities such as utilities, roads, recreation, and conservation facilities adversely affected by coal mining practices; and

(5) the development of publicly owned land adversely affected by coal mining practices including land acquired as provided in this title for recreation and historic purposes, conservation, and reclamation purposes and open space benefits.

(b)(1) Any State or Indian tribe not certified under section 411(a) may expend up to 30 percent of the funds allocated to such State or Indian tribe in any year through the grants made available under paragraphs (1) and (5) of section 402(g) for the Sec. 403 purpose of protecting, repairing, replacing, constructing, or enhancing facilities relating to water supply, including water distribution facilities and treatment plants, to replace water supplies adversely affected by coal mining practices.

(2) If the adverse effect on water supplies referred to in this subsection occurred both prior to and after August 3, 1977, or as the case may be, the dates (and under the criteria) set forth under section 402(g)(4)(B) section 404 shall not be construed to prohibit a State or Indian tribe referred to in paragraph (1) from using funds referred to in such paragraph for the purposes of this subsection if the State or Indian tribe determines that such adverse effects occurred predominantly prior to August 3, 1977, or as the case may be, the dates (and under the criteria) set forth under section 402(g)(4)(B).

(c) For the purposes of assisting in the planning and evaluation of reclamation projects pursuant to section 405, and assisting in making the certification referred to in section 411(a), the Secretary shall maintain an inventory of eligible lands and waters pursuant to section 404 which meet the priorities stated in paragraphs (1) and (2) of subsection (a). Under standardized procedures established by the Secretary, States and Indian tribes with approved abandoned mine reclamation programs pursuant to section 405 may offer amendments to update the inventory as it applies to eligible lands and waters under the jurisdiction of such States or tribes. The Secretary shall provide such States and tribes with the financial and technical assistance necessary for the purpose of making inventory amendments. The Secretary shall compile and maintain an inventory for States and Indian lands in the case when a State or Indian tribe does not have an approved abandoned mine reclamation program pursuant to section 405. On a regular basis, but not less than annually, the projects completed under this title shall be so noted on the inventory under standardized procedures established by the Secretary.

Oklahoma Conservation Commission (OCC)

The Oklahoma Conservation Commission (OCC) is responsible for administering the reclamation of abandoned mine land (AML) in Oklahoma that threatens the health and safety of the public. Oklahoma's AML Reclamation Program is in accordance with *Title 45, Sections 740.1 through 740.7 of the Oklahoma Statutes*. The federal legislation that the OCC must adhere to in administering the AML Program is *The Surface Mining Control and Reclamation Act of 1977 (PL 95-87)*. Section 409 of *PL 95-87* would allow the OCC to expend AML Trust Funds to reclaim noncoal mine hazards, such as lead/zinc, if they endanger the life and property of the public. The Governor must request the funds from the Secretary of the Interior.

SEC. 409 (a) The Congress declares that voids, and open and abandoned tunnels, shafts, and entryways resulting from any previous mining operation, constitute a hazard to the public health or safety and that surface impacts of any underground or surface mining operation may

degrade the environment. The Secretary, at the request of the Governor of any State, or the governing body of an Indian tribe, is authorized to fill such voids, seal such abandoned tunnels, shafts, and entryways, and reclaim surface impacts of underground or surface mines which the Secretary determines could endanger life and property, constitute a hazard to the public health and safety, or degrade the environment. State regulatory authorities are authorized to carry out such work pursuant to an approved abandoned mine reclamation program.

(b) Funds available for use in carrying out the purpose of this section shall be limited to those funds which must be allocated to the respective States or Indian tribes under the provisions of paragraphs (1) and (5) of section 402(g).

(c)(1) The Secretary may make expenditures and carry out the purposes of this section in such States where requests are made by the Governor or governing body of an Indian tribe for those reclamation projects which meet the priorities stated in section 403(a)(1), except that for the purposes of this section the reference to coal in section 403(a)(1) shall not apply.

(2) The provisions of section 404 shall apply to this section, with the exception that such mined lands need not have been mined for coal.

(3) The Secretary shall not make any expenditures for the purposes of this section in those States which have made the certification referred to in section 411(a).

(d) In those instances where mine waste piles are being reworked for conservation purposes, the incremental costs of disposing of the wastes from such operations by filling voids and sealing tunnels may be eligible for funding providing that the disposal of these wastes meets the purposes of this section.

(e) The Secretary may acquire by purchase, donation, easement, or otherwise such interest in land as he determines necessary to carry out the provisions of this section.

Natural Resources Conservation Service (NRCS)

The U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) is responsible for the reclamation of rural lands affected by past mining practices. Section 406 of *The Surface Mining Control and Reclamation Act of 1977 (PL 95-87)* established the procedures and funding mechanism.

SEC. 406. (a) In order to provide for the control and prevention of erosion and sediment damages from unreclaimed mined lands, and to promote the conservation and development of soil and water resources of unreclaimed mined lands and lands affected by mining, the Secretary of Agriculture is authorized to enter into agreements of not more than ten years with landowners (including owners of water rights), residents, and tenants, and individually or collectively, determined by him to have control for the period of the agreement of lands in question therein, providing for land stabilization, erosion, and sediment control, and reclamation through conservation treatment, including measures for the conservation and development of soil, water (excluding stream channelization), woodland, wildlife, and recreation resources, and agricultural productivity of such lands. Such agreements shall be made by the Secretary with the owners, including owners of water rights, residents, or tenants (collectively or individually) of the lands in question.

(b) The landowner, including the owner of water rights, resident, or tenant shall furnish to the Secretary of Agriculture a conservation and development plan setting forth the proposed land uses and conservation treatment which shall be mutually agreed by the Secretary of Agriculture and the landowner, including owner of water rights, resident, or tenant to be needed on the lands

for which the plan was prepared. In those instances where it is determined that the water rights or water supply of a tenant, landowner, including owner of water rights, resident, or tenant have been adversely affected by a surface or underground coal mine operation which has removed or disturbed a stratum so as to significantly affect the hydrologic balance, such plan may include proposed measures to enhance water quality or quantity by means of joint action with other affected landowners, including owner of water rights, residents, or tenants in consultation with appropriate State and Federal agencies.

(c) Such plan shall be incorporated in an agreement under which the landowner, including owner of water rights, resident, or tenant shall agree with the Secretary of Agriculture to effect the land uses and conservation treatment provided for in such plan on the lands described in the agreement in accordance with the terms and conditions thereof.

(d) In return for such agreement by the landowner, including owner of water rights, resident, or tenant, the Secretary of Agriculture is authorized to furnish financial and other assistance to such landowner, including owner of water rights, resident, or tenant, in such amounts and subject to such conditions as the Secretary of Agriculture determines are appropriate in the public interest for carrying out the land use and conservation treatment set forth in the agreement. Grants made under this section, depending on the income-producing potential of the land after reclaiming, shall provide up to 80 per centum of the cost of carrying out such land uses and conservation treatment on not more than one hundred and twenty acres of land occupied by such owner, including water rights owners, residents, or tenant, or on not more than one hundred and twenty acres of land which has been purchased jointly by such landowners, including water rights owners, residents, or tenants, under an agreement for the enhancement of water quality or quantity or on land which has been acquired by an appropriate State or local agency for the purpose of implementing such agreement; except the Secretary may reduce the matching cost share where he determines that (1) the main benefits to be derived from the project are related to improving offsite water quality, offsite esthetic values, or other offsite benefits, and (2) the matching share requirement would place a burden on the landowner which would probably prevent him from participating in the program: Provided, however, That the Secretary of Agriculture may allow for land use and conservation treatment on such lands occupied by any such owner in excess of such one hundred and twenty acre limitation up to three hundred and twenty acres, but in such event the amount of the grant to such landowner to carry out such reclamation on such lands shall be reduced proportionately. Notwithstanding any other provision of this section with regard to acreage limitations, the Secretary of Agriculture may carry out reclamation treatment projects to control erosion and improve water quality on all lands within a hydrologic unit, consisting of not more than 25,000 acres, if the Secretary determines that treatment of such lands as a hydrologic unit will achieve greater reduction in the adverse effects of past surface mining practices than would be achieved if reclamation was done on individual parcels of land.

(e) The Secretary of Agriculture may terminate any agreement with a landowner including water rights owners, operator, or occupier by mutual agreement if the Secretary of Agriculture determines that such termination would be in the public interest, and may agree to such modification of agreements previously entered into hereunder as he deems desirable to carry out the purposes of this section or to facilitate the practical administration of the program authorized herein.

(f) Notwithstanding any other provision of law, the Secretary of Agriculture, to the extent he deems it desirable to carry out the purposes of this section, may provide in any agreement hereunder for (1) preservation for a period not to exceed the period covered by the agreement and an equal period thereafter of the cropland, crop acreage, and allotment history applicable to

land covered by the agreement for the purpose of any Federal program under which such history is used as a basis for an allotment or other limitation on the production of such crop; or (2) surrender of any such history and allotments.

(g) The Secretary of Agriculture shall be authorized to issue such rules and regulations as he determines are necessary to carry out the provisions of this section.

(h) In carrying out the provisions of this section, the Secretary of Agriculture shall utilize the services of the Soil Conservation Service.

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