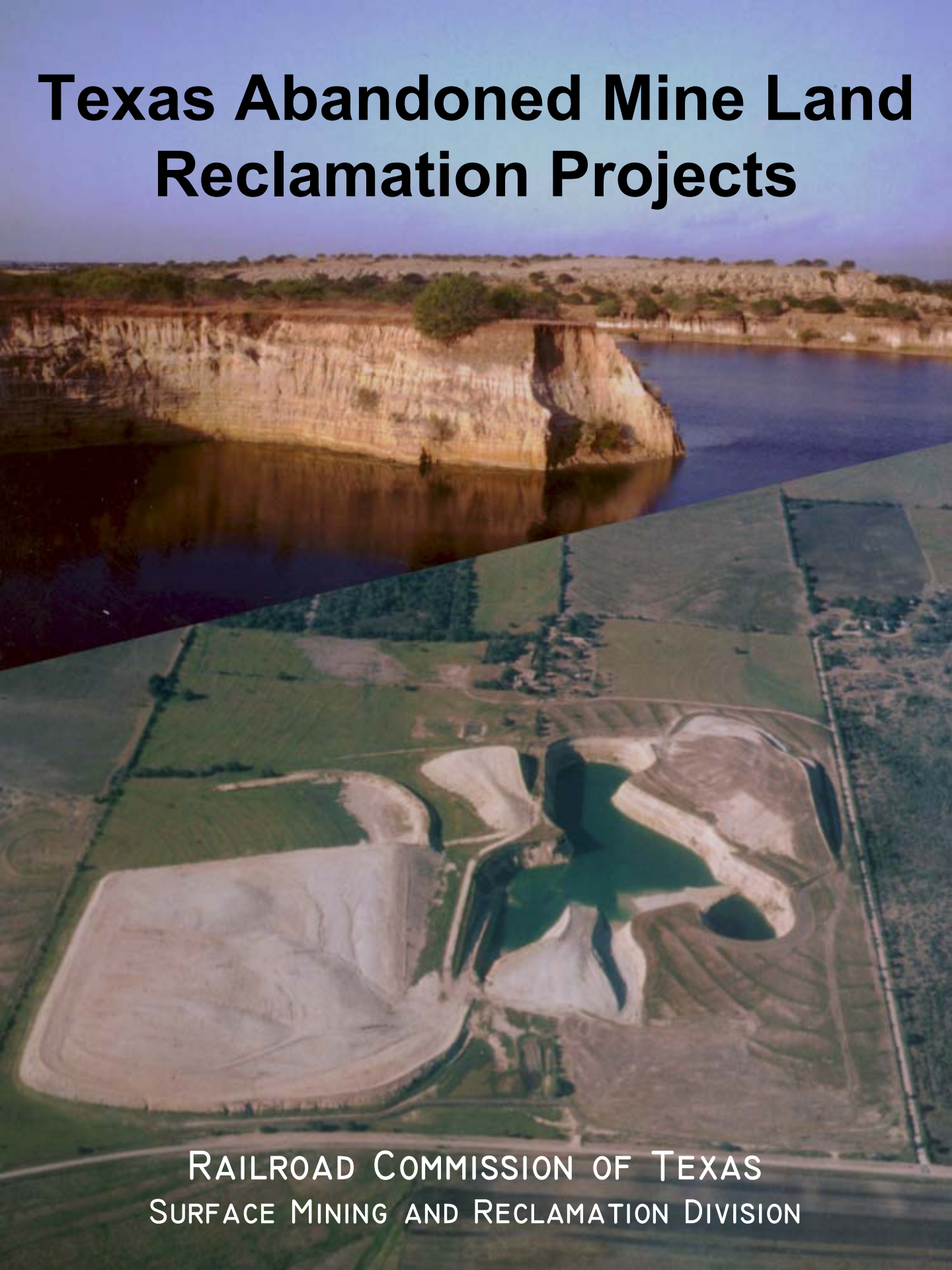
Texas Abandoned Mine Land Reclamation Projects



Railroad Commission of Texas

Surface Mining and Reclamation Division

August 3, 1977, the United States Congress passed the Surface Mining Control and Reclamation Act (SMCRA). This act established national coal mining and reclamation standards and created the Office of Surface Mining Reclamation and Enforcement (OSM) within the U.S. Department of Interior. The Act also established the Abandoned Mine Land Reclamation Fund to reclaim mine lands that had been abandoned and left inadequately reclaimed.

Abandoned mines are eligible for reclamation under the Texas Abandoned Mine Land Reclamation Program, if all mining had ceased and the mine was abandoned prior to June 20, 1975, for coal and uranium and August 3, 1977, for all other types of mining.

Funding for the Texas Abandoned Mine Land Reclamation Program is provided by a federal reclamation fee levied on each ton of coal mined in Texas. These fees are deposited in the Abandoned Mine Land Reclamation Trust Fund maintained by the U.S. Treasury. The U.S. Congress makes a yearly appropriation from the Fund to OSM. Texas receives an annual distribution from OSM's appropriation according to a formula established by OSM. The Texas AML Reclamation Program is currently authorized and funded by the U.S. Congress through 2004.

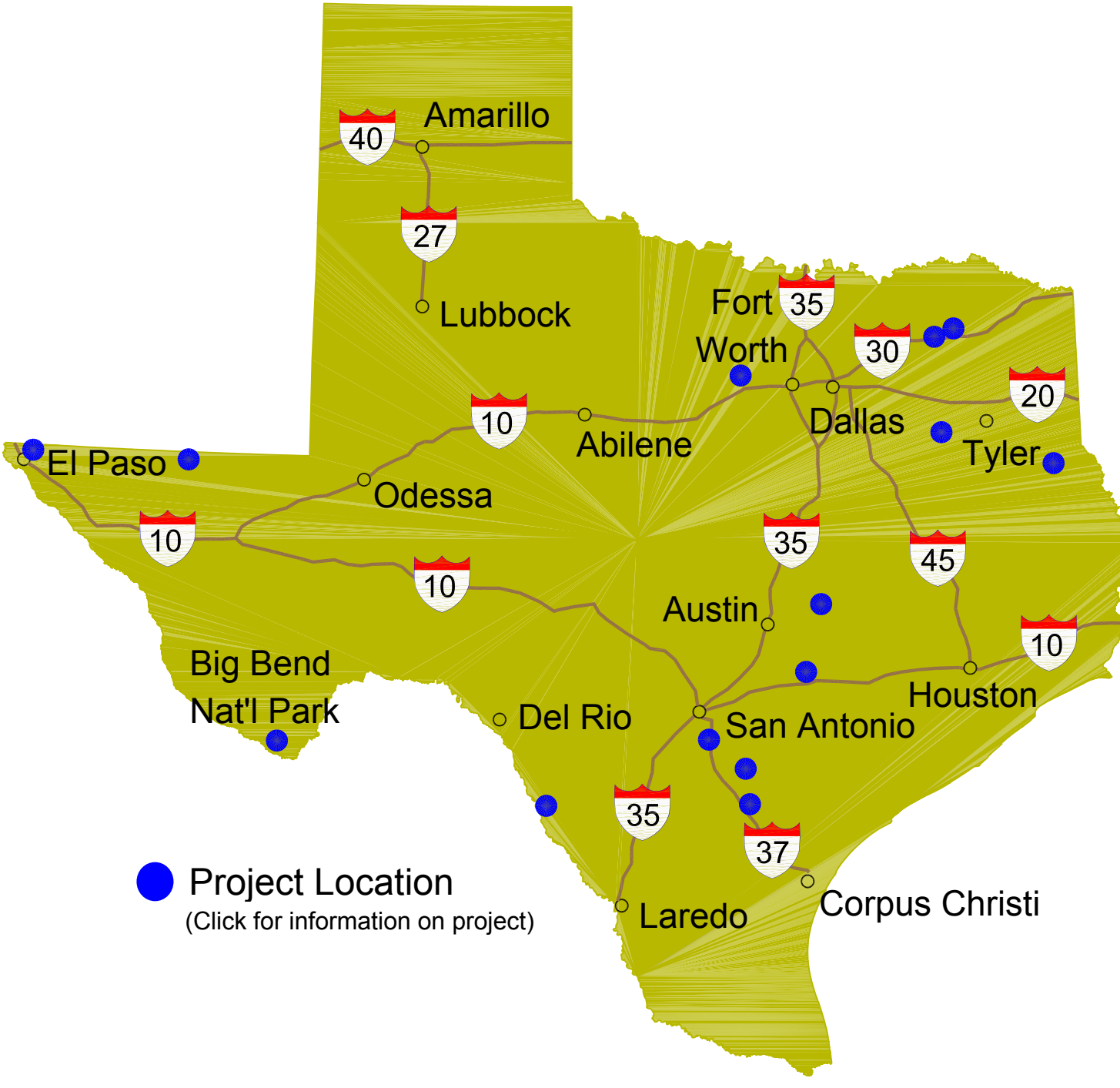
Reclamation projects are selected from the Texas AML Program's prioritized inventory of abandoned mines. The AML staff contacts the landowner of the selected project, describes the AML program and proposed reclamation before securing a right-of-entry. The AML staff prepares reclamation designs and obtains environmental permits and clearances for the proposed AML project.

The AML staff prepares construction bid documents, work specifications, and competitively bids the reclamation work. A contractor is selected and awarded a contract to complete the reclamation. The Texas AML staff then inspects and manages the reclamation and reclamation contractor.

The Texas AML Program has reclaimed 2,160 acres of abandoned surface mined land and closed 400 abandoned dangerous underground mine openings in 13 Texas Counties as of January 1, 2001. The Texas AML Program certified completion of all available coal AML reclamation in 1992 and has since been focusing on abandoned surface uranium mines in south Texas and abandoned hardrock mines in west Texas.

Texas AML reclamation efforts are summarized in the following three sections:

Coal
Uranium
Hardrock


Amarillo
40
27
Lubbock
Fort
Worth
35
30
20
Dallas
Tyler
10
Abilene
El Paso
Odessa
10
10
35
45
Austin
10
Big Bend
Nat'l Park
Houston
Del Rio
San Antonio
35
37
Corpus Christi
Laredo
Project Location
(Click for information on project)

COAL

The two basic types of coal deposits mined in Texas are bituminous coal and lignite. Prior to the 1950s, both types of coal were mined by primarily underground methods. Bituminous coal was mined in 15 north central Texas counties between the late 1800s until the 1920s. Bituminous coal was also mined in south Texas between Laredo and Eagle Pass during roughly the same period.

Lignite was mined from deposits located along a narrow belt from Texarkana to San Antonio. Most of these deposits were mined by underground methods from the late 1800s till the 1920s. In the 1940s and early 1950s, surface lignite mines were developed primarily as boiler fuel for electricity generation.

The Texas AML Reclamation Program has completed nine coal or lignite projects. These range in size from a one-acre subsidence feature backfill to a 1,100 acre abandoned surface mine reclamation project.

Health and Safety

Health and safety hazards associated with abandoned underground coal mines include:

•Deep abandoned shafts
•Unstable mine roofs
•Toxic or harmful gases

Health and safety hazards associated with abandoned surface coal mines include:

•Unstable highwalls
•Deep steep-sided pit impoundments
•Unstable spoil piles

Stay out! Stay alive!

Environmental

Abandoned spoil piles and highwalls are often poorly vegetated and severely eroded. Abandoned spoil is often acidic, thereby preventing plant growth and occasionally producing acid mine drainage.

Reclamation

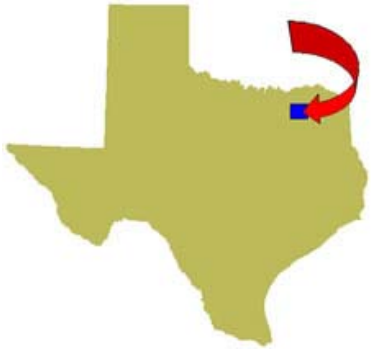
Most underground coal mines are reclaimed by simply backfilling the mine opening or subsidence feature with compacted fill. The disturbance is generally retopsoiled and seeded. Terraces may be constructed to divert water away from the mine closure.

Surface mine reclamation is generally more complex. The components for a typical surface coal AML project are as follows:

- Grade spoil and highwall (dewater pit if necessary).
- Treat graded spoil with lime (crushed limestone)
- Construct water control structures
- Revegetate
    - Plant temporary cover crops (wheat, millet)
    - Plant permanent grass species and sometimes trees
    - Manage vegetation prior to releasing to landowner

Summary of Texas Coal AML Reclamation Project Costs	
Lumsden	$61,240
Wallace	$73,400
Olmos	$4,350
Parker	$52,900
Bastrop	$57,466
Alcoa	$7,242,922
Timpson (OSM Emergency)	$3,800
Somerset (OSM Emergency)	$19,235
Malakoff	$66,890
Total	**$7,582,203**

Lumsden



The Lumsden AML Project, located in Hopkins County, consisted of a 2.8-acre pit and 17 acres of spoil. This project was the Commission's first AML project. It was finished in 1980 at a cost of $61,240.

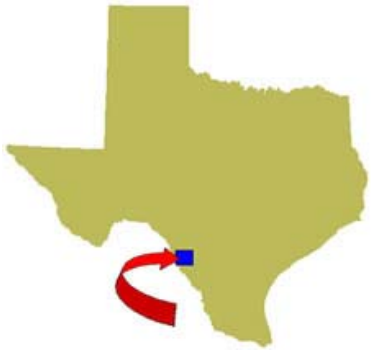
No Photographs Available

Wallace

The Wallace AML Project, located in Hopkins County, consisted of a 2.6-acre pit and 12 acres of spoil. The project was finished in 1980 at a cost of $73,400.

No Photographs Available

Olmos



The Olmos AML Project, located within the city limits of Eagle Pass, in Maverick County, consisted of one abandoned mine shaft. The shaft was located less than 200 feet from a public highway within the city limits of Eagle Pass. The shaft was backfilled in 1985 at a cost of $4,350.

No Photographs Available

Return to Map

Parker

The Parker AML Project, located approximately one mile east of Mineral Wells, in Parker County, consisted of an abandoned mine shaft and 8 acres of gob (materials separated and wasted from the coal during cleaning or other processing of coal). The project was located on the banks of a perennial stream.

The shaft was backfilled. The gob pile was graded to 20% slopes, limed, topsoiled and seeded with perennial grasses. The project was completed in 1989 at a cost of $52,900.

No Photographs Available

Bastrop

The Bastrop AML Project located approximately 7 miles north of Bastrop in Bastrop County consisted of one underground mine opening. A farm pond was built over underground mine workings. The roof of a tunnel collapsed, draining the pond and leaving the tunnel exposed to the surface. The opening was backfilled in 1989 at a cost of $29,000.

Water movement created another opening in 1995, again draining the pond. The opening was excavated and backfilled with compacted clay fill. The project was completed in 1996 at a cost of $28,466.

No Photographs Available

Return to Map

Alcoa

The Alcoa AML Project is an abandoned surface lignite mine adjacent to an active lignite mine owned and operated by Alcoa Inc. (Alcoa), approximately seven miles south of Rockdale, in Milam County. The Alcoa AML Project was mined by surface area mining methods from 1950 to the early 1970s. The project encompassed approximately 1,100 acres of abandoned mine spoil (some as high as 185 feet), and dangerous impoundments as deep as 70 feet.

Earthwork began on the project in 1989 and was finished in 1992. Approximately 6.5 million cubic yards of spoil were moved to achieve the design contours. Revegetation and vegetation management were completed in 1994. Thirteen separate contracts, valued at approximately $7.2 million, were executed to complete the reclamation.

Return to Map

Alcoa Area 12 Pre-Construction

Alcoa Area 12 Post-Construction

Alcoa Area 11 Pre-Construction

Alcoa Area 11 Post-Construction

Alcoa Area 9 Pre-Construction

Alcoa Area 9 Post-Construction

Timpson

The Timpson AML Project, located approximately 2 miles southwest of Timpson in Shelby County, consisted of one underground mine opening. The opening was created when a tunnel roof collapsed. The opening was in the front yard of an occupied farmhouse. The tunnel was excavated and backfilled with rock and compacted clay fill in January 1994.

The tunnel collapsed again in October 1994 after the site received heavy rainfall. The excavation and backfilling procedure was repeated and has been successful to date. The project cost for both backfill efforts was $3,800.

No Photographs Available

Somerset

The Somerset AML Project, located in Bexar County, approximately 15 miles west of Somerset, reclaimed underground mine workings that had collapsed, causing subsidence of a county road. The workings were excavated and backfilled with compacted clay materials. This project was completed in 1994 at a cost of $19,235.

No Photographs Available

Malakoff

The Malakoff AML Project, located approximately one mile east of Malakoff, in Henderson County, consisted of five underground mine openings. Four adits were sealed by excavating the openings to expose the abandoned tunnels. Clay fill material was placed into the excavated tunnels and compacted. Surface-water runoff was diverted away from the closures. A shaft was also backfilled with clay and compacted. The project was completed in 1995 at a cost of $66,890.

No Photographs Available

Return to Map

URANIUM

Uranium deposits were first discovered in Texas in 1954 along a 300-mile belt that extended from east-central Texas to south Texas. Twenty-five prospects were defined and estimated to contain approximately five percent of the proven U.S. uranium reserves.

Open pit mining of shallow oxidized uranium ore bodies began in 1959. Mining of deeper (90 to 300 feet) unoxidized ore bodies began in 1963. Mining activity increased as a result of the 1970s "energy crisis" and then declined in 1979 when uranium ore prices dropped.

Twenty-three uranium pits were mined and abandoned prior to 1975, when the Texas Surface Mining and Reclamation Act went into effect. These abandoned pits occur in Karnes, Atascosa and Live Oak Counties (Figure 2).

The individual uranium mines usually consist of an open pit and associated spoil piles. The walls of the pit (highwalls) are nearly vertical and range in height from 20 to 120 feet. Groundwater usually collects in the pit to a depth of 20 to 80 feet. Spoil piles generally have a steep slope (33% or greater) and are 20 to 80 feet high.

Health and Safety

Health and safety hazards associated with abandoned surface uranium mines include:

- Unstable highwalls
- Deep steep-sided pit impoundments
- Unstable spoil
- Localized areas of radioactive spoil

Stay out! Stay alive!

Environmental

The highwalls and spoil piles are often poorly vegetated and severely eroded. Mine spoil erosion degrades water quality and causes sedimentation problems on adjacent unmined land. The spoil can contain acidic and saline materials that prevent vegetation establishment. Metals such as molybdenum, arsenic and selenium may be found in concentrations that are toxic to plants and animals.

Reclamation

Abandoned open pit uranium mines are reclaimed in two phases; 1) earthwork and 2) revegetation. The earthwork phase generally includes the following:

- Pit de-watering
- Burial of radioactive and acidic spoil
- Regrading or recontouring highwalls and spoil
- Construction of water control structures
- Topsoiling of all reclamation ground disturbance

The revegetation phase generally includes the following:

- Establishment of temporary cover crops (e.g. wheat or millet)
- Establishment of permanent grass species
- Management of vegetation prior to release to landowner

Summary of Texas Uranium AML Reclamation Project Costs	
E. Brysch	$224,000
Searcy	$350,463
Manka	$896,204
Smith	$1,293,085
Butler-Weddington Chain	
Butler-Weddington Area 1	$1,131,375
Butler-Weddington Area 2A	$1,945,267
Butler-Weddington Area 2B	$1,248,199
Butler-Weddington Area 3	$1,049,028
Butler-Weddington Area 4	$1,996,054
Total	**$10,133,675**

Typical reclamation progression of abandoned uranium mine.

Dozers and scrapers are employed to salvage all topsoil from the disturbance area, prior to any heavy earthwork.

Heavy earthwork equipment is used to place mine spoil back into the abandoned pit.

Low ground pressure dozers are used to construct a stable pit floor.

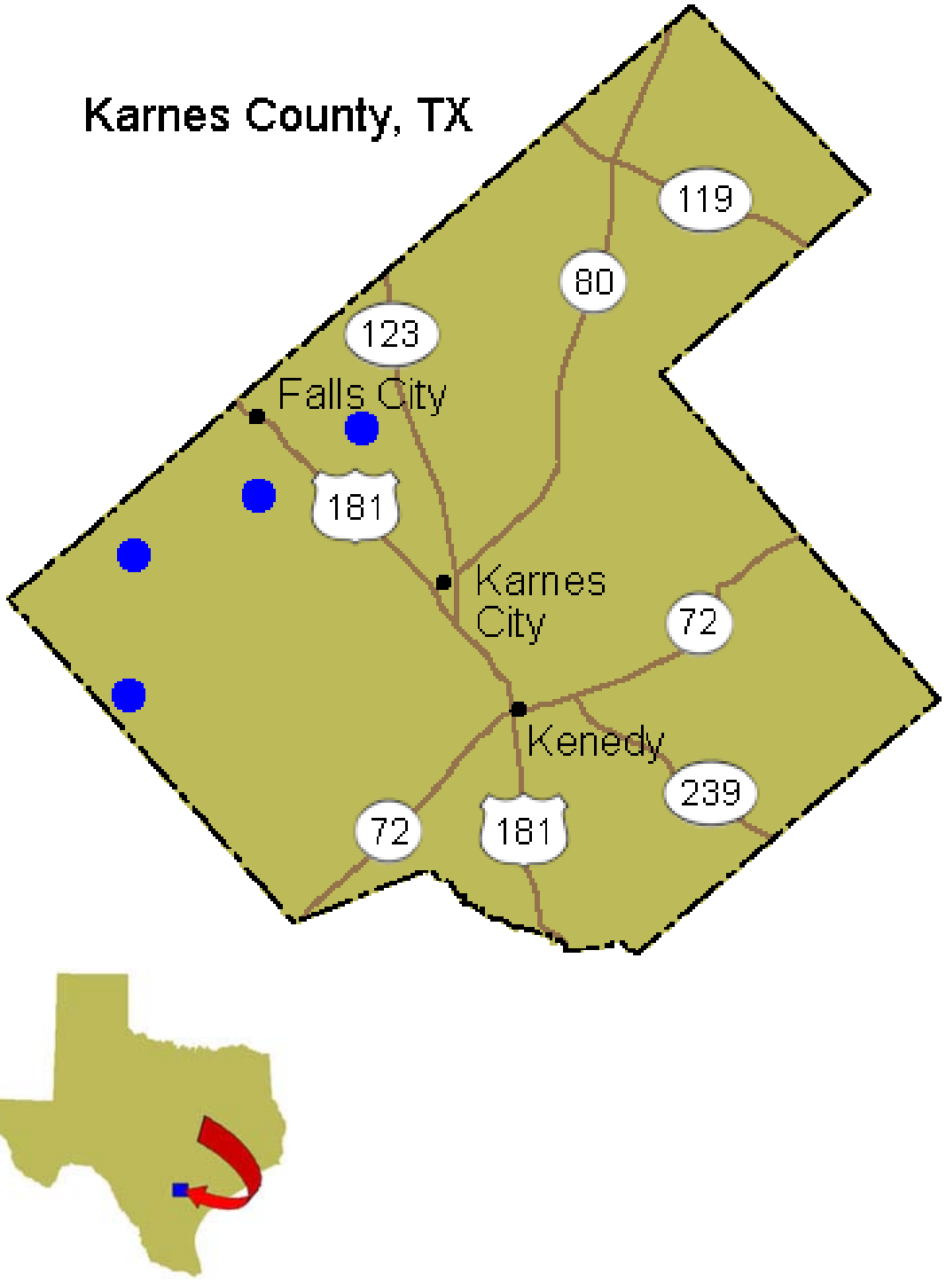
After the pit floor is stabilized, larger excavation equipment is used to flatten the pit walls.

Constructing drainage channels.

Interlocking blocks are sometimes used to armor drainage channels and establish erosion control.

A drainage control network is needed to transport overland flow into the reclaimed pit bottom.

Established grasses hold the soil in place and provide livestock forage.



Return to Map

E. Brysch

The Elias Brysch site was mined prior to 1973. This AML project consisted of a 10-acre abandoned pit and approximately 8 acres of spoil. The pit highwalls were approximately 40 feet high and were 25 feet from a county road.

This project was the Commission's first uranium AML reclamation project. The project was completed in 1988. Approximately 300,000 cubic yards of spoil were moved to totally backfill the existing pit.

E. Brysch Project - Pre-Construction

E. Brysch Project - Reclaimed

Return to Map

Searcy

The Searcy site was mined prior to 1974. The site consisted of a 7-acre pit and approximately 39 acres of spoil. The 80-foot high pit highwalls were less than 100 feet from Farm to Market Road 791. Pit water was approximately 25 feet deep. The pit impoundment water was acidic.

Reclamation was completed in 1990. Approximately 340,000 cubic yards of spoil and highwall were moved to achieve the design contours of 20%.

Searcy Project - Pre-Construction

Searcy Project - Reclaimed

Searcy Project - Reclaimed

Return to Map

Manka

The Manka site was mined between 1973 and 1974. The site consisted of a 14-acre pit and 33 acres of spoil. The pit highwall was 70 to 80 feet high and was less than 100 feet from a county road. The pit water had a maximum depth of 66 feet. Spoil piles were 30 to 50 feet high.

Regrading and recontouring was completed in 1992. Approximately 915,000 cubic yards of spoil and highwall were moved to achieve the design contours of 20% slopes or less. Revegetation and erosion control was completed in 1994 and was released to the landowner that same year.

Manka Project - Pre-Construction

Manka Project - Reclaimed

Manka Project - Reclaimed

Return to Map

Smith

The Smith site was mined from 1972 to 1974. The site consists of a 26-acre pit and 47 acres of spoil. The pit highwalls were 70 to 80 feet high and the impoundment was 45 feet deep. The spoil piles were heavily eroded and contained areas of high radioactivity and elevated trace metal concentrations.

The first phase of reclamation which included grading most of the spoil and about 60% of the highwall, was completed in 1994. Work was suspended when the rising pit water level began to interfere with earthmoving operations.

The second phase of earthwork reclamation was completed in February 2000. Approximately 1,130,000 cubic yards of spoil and highwall were moved to achieve the design contours of 14%. Revegetation of the Phase 2 earthwork was completed in May 2000.

Smith Project - Pre-Construction

Smith Project - Reclaimed

Return to Map

Butler-Weddington Chain

The Butler-Weddington Project, located in Karnes and Atascosa Counties, is a roughly contiguous chain of abandoned uranium mines that cover 1,135 acres and is approximately 4 miles long and 1.5 miles wide. Various portions of the Butler-Weddington Chain were mined from 1971 to 1974.

Area 1

This 95-acre site contained 85 acres of abandoned spoil and a 10-acre pit. The pit highwalls were 65 to 70-feet high and the pit water was 20 feet deep. Spoil piles were about 50 feet high and contained radioactive materials. The spoil also contained acidic materials and elevated levels of arsenic, selenium and molybdenum.

Regrading and recontouring was completed in March 1995. Approximately 1,000,000 cubic yards of spoil and highwall were moved to achieve design contours of 14% slopes or flatter. Revegetation and erosion control was completed by May 1996, and the site was released to the landowner in 1998.

Butler-Weddington Area 1
Pre-Construction

Butler-Weddington Area 1
Reclaimed

Butler-Weddington Area 1
Reclaimed

Butler-Weddington Area 1
Reclaimed

Return to Map

Area 2A

This 153-acre site consisted of a 41-acre pit and 112 acres of spoil. The pit highwalls were unstable and approximately 60 feet high. The pit contained three impoundments. The smallest was less than one acre and approximately 20 feet deep. The largest was 3.5 acres and was about 45 feet deep.

High radiation levels were associated with low-grade ore that had been stockpiled on portions of the spoil. Other portions of the spoil contained acidic materials and elevated concentrations of arsenic, selenium and molybdenum.

Regrading and recontouring was completed in March 1997. Approximately 1,400,000 cubic yards of spoil and highwall were removed to excavate and bury radioactive spoil and achieve final contours of 14% or flatter. Revegetation and erosion control was completed by June 1997, and the site was released to the landowner in 1998.

Buttler-Weddington Area 2A Pre-Construction

Buttler-Weddington Area 2A Reclaimed

Return to Map

Area 2B

This site consisted of a 25-acre pit and 145 acres of spoil. The pit highwalls were unstable and were approximately 20 to 80 feet high. The pit contained two bodies of water. The smaller of the two ponds was about 5 acres and 35 feet deep. The larger pond was 16 acres and 50 feet deep.

The spoil quality was similar to Area 2A, containing high levels of radioactivity (from low grade ore stockpiles), acidic spoil materials and elevated trace metal concentrations.

Regrading and recontouring was completed in September 1997. Approximately 1,150,000 cubic yards of spoil and highwall were moved to excavate and bury radioactive and acidic spoil and to achieve the design contours of 14%. Revegetation and erosion control were completed in 1999. The site has yet to be released.

Buttler-Weddington Area 2B Pre-Construction

Buttler-Weddington Area 2B Reclaimed

Return to Map

Area 3

This site consisted of a 35-acre pit and 50 acres of spoil. Unstable pit highwalls were less than 100 feet from a county road, and ranged in height from 20 to 100 feet. Spoil piles were approximately 50 feet high. The pit impoundment was 80 feet deep.

The spoil contained only minimal amounts of radioactive, acidic or otherwise toxic materials. The top of the spoil had been revegetated and supported a good stand of grass.

Regrading and recontouring was completed in June 1998. Approximately 350 million gallons of water were pumped out of the pit before grading could begin. Approximately 920,000 cubic yards were moved to achieve the design contours of 14% or flatter. Revegetation and erosion control were completed in 1999. The site has yet to be released.

No Photograph Available

Buttler-Weddington Area 3
Pre-Construction

Buttler-Weddington Area 3
Reclaimed

Area 4

This site consisted of a 40-acre pit and 125 acres of spoil. The pit highwalls were unstable and averaged 90 feet high. Spoil piles averaged 70 feet high. The pit impoundment was 30 feet deep.

The spoil contained areas with elevated radioactivity, and elevated trace metal concentrations. The top of the spoil pile had been revegetated and supported good stands of grass.

Regrading and recontouring was completed in February 2000. Approximately 200 million gallons of pit water were pumped to an adjacent pit before the earthwork could begin. Approximately 2.6 million cubic yards of spoil and highwall were moved to achieve the design contours of 14% or flatter. Revegetation and erosion control is in progress.

Buttler-Weddington Area 4
Pre-Construction

Buttler-Weddington Area 4
Reclaimed

Return to Map

HARD ROCK

The Texas AML Reclamation Program has closed abandoned hard rock mine openings in three west Texas Counties (Brewster, Culberson and El Paso). Cinnabar or mercury ore was mined over a large area in Brewster County. Copper was mined from a small area in the Guadalupe Mountains in Culberson County. Tin was mined from the Franklin Mountains in El Paso County.

The AML Program has closed 374 hardrock mine openings to date.

Efforts to close these mine openings began in 1982, after a teenager fell to his death in one of the openings in the Terlingua Ghost Town.

Health and Safety

Health and safety hazards associated with abandoned hard rock mines include:

- Falling into open shafts
- Roof cave-ins
- Collapse of mine facilities and equipment
- Bad or toxic air

Stay out! Stay alive!

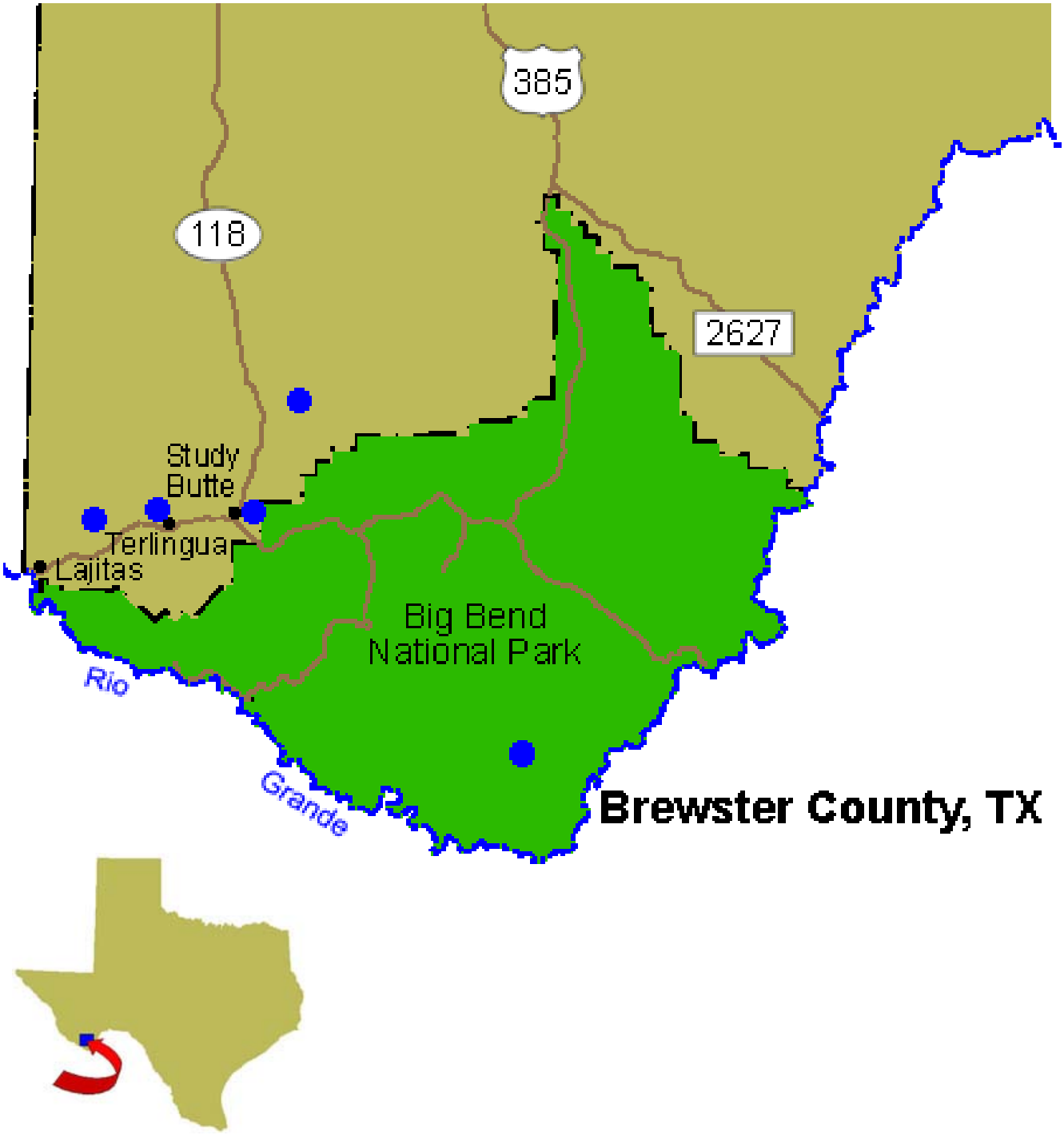
Reclamation

A variety of closure types are employed to remediate safety hazards associated with abandoned hard rock mines. Shallow vertical shafts are generally backfilled. Deeper vertical shafts are closed with steel grating or a steel reinforced concrete cap. Sometimes steel cable netting is used to cover shafts located in difficult terrain. Deeper shafts that may be used as bat entryways are usually closed with an angle-iron bat gate cupola.

Adits or portals (horizontal mine openings) leading to shallow underground workings are generally closed with rock and mortar walls. Adits or portals leading to deeper workings that may contain bat roosting habitat are closed with angle iron bat gates.

The bulk of the Texas AML Reclamation Program's hard rock reclamation efforts have been focused on abandoned cinnabar (mercury ore) mines in the Terlingua Quicksilver Mining District. Cinnabar mining began in the Big Bend area in the late 1800s and peaked during World War I and World War II. Mining essentially ceased in the 1960s. Most of the mining activity was located near Terlingua, Study Butte, in the Christmas Mountains, in Big Bend National Park, and at the Lone Star/Mariposa mines, about halfway between Terlingua and Lajitas.

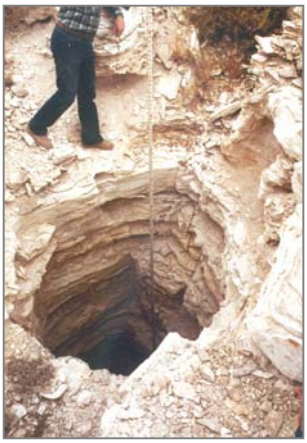
Summary of Texas Hardrock AML Projects	
Terlingua	$223,055
Study Butte	$111,860
Christmas Mountains	$45,530
Big Bend National Park	$174,692
Lone Star-Mariposa	$676,443
Franklin Mountains State Park	$252,057
Guadalupe Mountains National Park	$57,180
Total	**$1,540,817**



Return to Map

Terlingua

Mine openings in and around the “ghost town” of Terlingua were closed as part of four separate contracts from 1984 to 1994. A total of 82 mine openings were closed (64 backfills, and 18 concrete caps or metal grates, costing a total of $223,055.



Terlingua – typical mine shaft openings

Terlingua mine shaft
with concrete cap closure

Terlingua mine backfilled shaft

Terlingua mine shaft
with steel grate closure

Terlingua mine shaft
with steel grate closure

Return to Map

Study Butte

The Study Butte project closed 61 mine openings (60 backfills and 1 concrete cap). The project was completed in 1988 at a cost of $111,860.

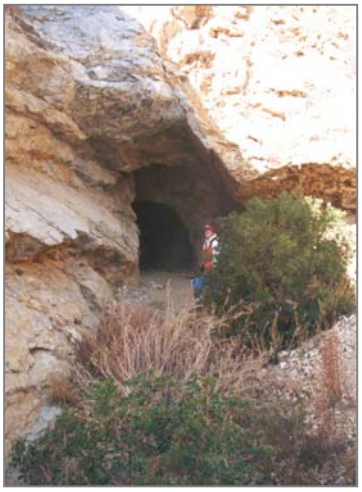
Study Butte – typical mine shaft openings

Study Butte backfilled mine shaft

Return to Map

Christmas Mountains

The Christmas Mountains Project closed 17 mine openings in 1993. Closure types included 12 rebar gates and 7 backfills. The contract cost was $45,530.



Christmas Mountain - typical mine adit & shaft openings

Christmas Mountain open mine shaft

Christmas Mountain
mine shaft being backfilled

Return to Map

Christmas Mountain – typical rebar closures

Big Bend National Park

The Big Bend National Park Project closed 18 mine openings in 1995. Eight adits were closed with angle-iron bat gates, eight shafts were closed with steel grates, and two shafts were closed with angle-iron bat gate cupolas. Total contract cost was $174,692.

Big Bend National Park – typical adit

Big Bend National Park - adit with angle-iron bat gate closure

Big Bend National Park –mine shaft with angle-iron bat cupola closure

Big Bend National Park – mine shaft with steel grate closure

Return to Map

Lone Star-Mariposa

The Lone Star-Mariposa AML Project was completed in three phases:

Phase 1 closed twenty-four of the deeper mine openings and included: 10 angle-iron bat gate adit closures, 10 steel-grated shaft closures, and 4 cable-net shaft closures. Phase 1 was completed in 1997 at a cost of $185,371.

Phase 2 closed 26 mine openings, and utilized: 2 angle-iron bat gate adit closures, 6 rock wall adit closures, 10-steel grated shaft closures, 3 shaft backfills, and 2 portals that were reinforced with corrugated metal pipe. Phase 2 was completed in 1999 at a cost of $249,536.

Phase 3 closed 113 mine openings including: 64 shaft backfills, 39 steel-grate shaft closures, 7 cable-net shaft closures, 2 rock wall adit closures, 1 steel-grate adit closure, and 1 angle-iron bat gate closure. Phase 3 was completed in October 2000 at a cost of $241,536.

Lone Star-Mariposa – open mine adits

Lone Star-Mariposa – open mine shafts

Return to Map

Lone Star-Mariposa adit
with rock mortar wall closure

Lone Star-Mariposa mine shaft
being backfilled

Lone Star-Mariposa adit
with bat gate closure

Lone Star-Mariposa mine shaft
with steel grate closure

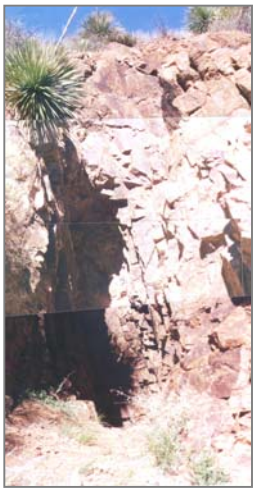
Lone Star-Mariposa portal
with bat gate closure

Lone Star-Mariposa mine shaft
with cable-net closure

Return to Map

Franklin Mountains State Park

Tin ore was mined in the Franklin Mountains, overlooking El Paso, from 1896 till the late 1910s. Mine openings associated with the tin mine at the Franklin Mountains State Park were closed under two separate contracts in 1990 and 1999. A total of 25 mine openings were closed at a cost of $252,057. Fourteen openings were grated and eleven were backfilled.



Franklin Mountains – typical mine shaft openings

Franklin Mountains – steel grate closure

Franklin Mountains – steel grate closure

Franklin Mountains – steel grate closure

Franklin Mountains – steel grate closure

Return to Map

Guadalupe Mountains National Park

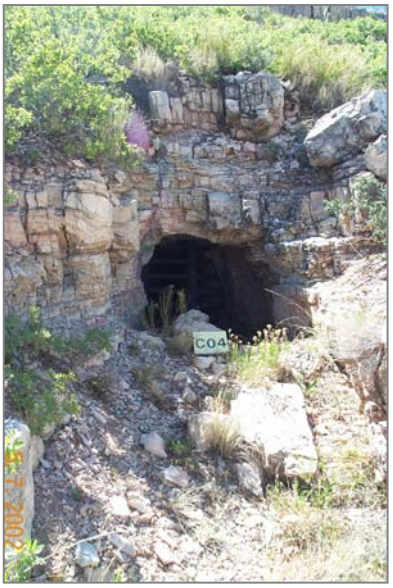
From the late 1800s to the mid 1930s, the Calumet and Texas Copper mines operated intermittently in the Guadalupe Mountains. The Guadalupe Mountains National Park Project in Culberson County closed eight of these mine openings. Closure methods included: four angle-iron bat gate adit closures and four shaft backfills. The project was located within a designated wilderness area; therefore, all materials and equipment had to be lifted into the area by helicopter. The project was completed in 1997 at a cost of $57,180.

Materials being air lifted in

Rock and mortar closure

Backfilled mine shaft

Bat gate closure



Bat gate closure

Return to Map

Mariposa mine with occupying bat colony

Mariposa mine with occupying bat colony

Bat gates – closure structures with openings that allow bats roosting within the mine to enter and exit the mine opening.

Portal with corrugated metal pipe and angle iron bat gate closure

Mine shaft with angle iron bat gate cupola closure

Portal with angle iron bat gate closure