National Park Service
U.S. Department of the Interior

Coronado National Memorial
Cochise County, Arizona

Environmental Assessment
Install Bat-Accessible Gates at Crest Trail Mines
May 2007

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Summary

The National Park Service (NPS) has determined that four abandoned mine adits along the Crest Trail (a section of the Arizona Trail) in Coronado National Memorial should be closed to improve visitor and law enforcement safety. We propose closing entrances to three of these mines with steel gates, which will prevent people from entering the mines while still allowing access for bats and other small animals. We propose filling a portion of the broad, shallow, fourth adit with rocks and re-posting a "Danger, Keep Out" sign nearby. This assessment refers to Crest Trail mine adits numbered 21, 22, 23 and 24.

This environmental assessment (EA) examines five alternatives:

A) no action
B) install bat-accessible gates and fill section of adit #22 with rocks (the preferred alternative
C) install bat accessible gates at adits #21, 23 and 24 and install steel grating cover on adit #22
D) install bat-accessible fences and fill section of adit #22 with rocks
E) install steel cable netting for all adits.

The preferred alternative would provide for the safety of visitors and law enforcement officials in the area while protecting bats, small animals and their habitat. Negative impacts will involve some trampling of vegetation near the project areas and helicopter noise. These impacts would be short-term (up to two weeks) and localized to the immediate mine areas. Wildlife would be minimally impacted by the project and construction will take place after the Mexican Spotted Owl breeding season. Installing gates will likely benefit affected species as the memorial has gated and monitored two other memorial mines, which have successfully kept people out while allowing bats and other small animals to use the mines.

Note to reviewers and respondents: If you wish to comment on the Environmental Assessment (EA), you may enter them online at the National Park Service website Planning, Environment, and Public Comment **http://parkplanning.nps.gov/**. This EA will be on public review until June 16, 2007. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment, including your personal identifying information, might be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Please address written comments to:
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I. INTRODUCTION

Purpose

The purpose of the Coronado National Memorial is to permanently commemorate the explorations of Francisco Vásquez de Coronado and preserve and protect the cultural and natural resources within the memorial for public benefit and enjoyment.

Early 17th century mining efforts by the Spaniards were poorly documented. However, they did officially report silver mines in Montezuma Canyon. By the early 1900s, dozens of mining claims had been staked in the canyon. These mining operations, largely for lead and zinc ores, resulted in 62 adits, shafts and test pits. Following an exchange with the Forest Service in 1978, the National Park Service acquired land containing many of those mine features. (See site map on page 20). Mining had a relatively low impact in the memorial, however, because its low quality ores made this location less popular than its southeastern Arizona counterparts: Tombstone, Bisbee and Douglas. Limited archaeological surveys have been performed on the Crest Trail mines and no formal cultural landscape assessment has been completed. None of the mines mentioned in this EA are on the memorial's List of Classified Structures (LCS). The memorial does not expect to encounter or impact significant archaeological or cultural resources in the installation process, but an archaeological survey will be required prior to any action involving disturbance of the mine tailings.

The memorial recognizes the health and safety hazards posed by mine sites within its boundaries. In 1998, the memorial installed 3/8-inch steel cable netting with 6-inch x 6-inch openings at many abandoned mines within the memorial. Although useful at certain sites, time has proven cable nets more prone to vandalism than steel gates. "Danger – Keep Out" signs were posted at Crest Trail mines #22 and #24, but neither of these adits were ever closed. Memorial visitors and undocumented immigrants (UDIs) regularly disregard posted signs, which creates health and safety concerns. UDIs use the mines as lay-up sites – not memorial visitors. Therefore, law enforcement officers or hikers may have surprise encounters with UDIs in the mines, which could lead to violence. Furthermore, visitors and UDIs leave trash and human waste in the mines, which could create biologically hazardous conditions.

Need

The purpose of this project is to develop and execute a plan to provide for the safety of visitors and law enforcement staff while protecting bats, small animals and their habitat. All four adits are visible from the Crest Trail, though adit #21 is partially obscured by shrubs and adit #23 is located above the trail grade, on top of a tailings pile. All four adits have been used by UDIs and the disregard of "Danger – Keep Out" signs continue to concern memorial officials. Drug and human smuggling activity along the U.S. – Mexico border has forced smugglers to select more rugged routes, like the Crest Trail, to evade law enforcement personnel.

Memorial staff and other biologists have occasionally seen individual bats roosting in the Crest Trail mines and noted evidence of other small animals using the mines. A pipistrelle bat (Pipistrellus hesparus), for example, was observed in adit #24 in February 2006. However, no evidence indicates that any sensitive species, such as the lesser long-nosed bat (Leptonycteris curasoae), which is federally listed as endangered, have used the mines.

Abandoned mines serve as important roost sites for several bat species in Arizona. Research suggests that bats show strong fidelity to certain roost sites and suitable roost sites for bats may be limited across a landscape (Tuttle, 1998). Therefore, human disturbance at roost sites may cause bats to abandon preferred sites and flee to less suitable ones. Such stress over time may lead to declines in certain bat populations.

II. ALTERNATIVES

In all alternatives, memorial staff would continue to perform regular patrols of the area to prevent vandalism and monitor human activity. In addition, resource management staff will continue to complete visual surveys for bats on a regular basis, particularly from mid-April through late September when endangered lesser long-nosed bats are in the area. If lesser long-nosed bats are observed using the adits, the Fish and Wildlife Service will be consulted immediately.

Alternative A: No Action

Mine adits and surrounding areas would maintain current management status and remain in their present condition. "Danger – Keep Out" signs would continue to hang on T-posts at all four mines warning visitors not to enter. Access to each mine would still be possible.

Alternative B (Preferred Alternative): Install Bat-Accessible Gates and Fill Section of Adit #22 With Rocks

The memorial proposes to install gates constructed of 4-inch angle iron bars placed 5 ¾-inches apart in adit portals on mines #21, #23 and #24. The gate proposed for adit #24 would be set back slightly farther in the portal than the other two mines to allow wildlife to drink from semi-annual water pools that extend toward the mouth of the adit. This setback would be close enough to the portal entrance to nullify a potential human hideout. The gates would be designed to keep people out of the adit while minimizing airflow restriction and allowing bats uninhibited access (see adit photos and bat gate diagrams in appendices). These gates conform to the American Cave Conservation Association (ACCA) standard design, as endorsed by Bat Conservation International, and are used effectively throughout the United States by a variety of bat species. The gates cause little direct impact and can be removed if management directions change.

Adit #21 is approximately 6-feet wide, 6-feet tall and 53-feet deep. Viewed from the Crest Trail, the mine is almost completely obscured by vegetation. According to the NPS Mined Lands Field Inventory Data Sheet completed in February 1993, the adit included evidence of a packrat nest and mouse habitat. Installation of the gate would proceed as follows: Rock debris would be cleared and a 14-inch wide and 9-inch deep trench would be dug across the width of the adit portal. A sill box would be constructed of 4-inch x 4 inch x ⅜-inch angle iron, 6 inch and 2 inch-wide x ⅜-inch-thick steel bar and #6 rebar. The trench and sill box would be filled with concrete. The 2-inch x ¼-inch steel tubing cross members would be spaced 4 inches apart for the bottom 3 feet to conform to Uniform Building Code for railings (to prevent children from crawling through) and 5 ¾ inches apart for the middle and top portion of the gate. They would be welded to 6-inch x ⅜-inch steel bar wall plates. The wall plates would be anchored to the walls using a 1-inch cold rolled steel rod, which would be driven into 1-inch holes drilled into the adit walls. There would be one removable cross member (locked using a McGard bolt fastener to provide

administrative access to the interior of the mine. The NPS will evaluate the most efficient and economical method of installation for the gates when the project begins.

Adit #22 is more of an irregular shaped prospect than a true adit. It measures approximately 20 feet wide with an 8-foot deep side cut. Its floor is undermined by approximately 5 feet and about 15 feet separate the mined-out floor from the roof. The 1993 NPS Mined Lands Field Inventory Data Sheet identified rodent droppings within the adit. The park proposes to fill the 8-foot side cut and 5-foot entrance depression with rocks from around the area (approximately 1.5 tons of fill). The remainder of the adit would remain open and possibly signed with a "Danger – Keep Out" message, although signage may not be necessary.

Adit #23 is approximately 4-feet wide, 5-feet tall and 120-feet deep. The mine is located just above the Crest Trail and only its tailings are visible from the trail. Installation of the gate would be similar to adit #21.

Adit #24 is 5-feet wide, 5-feet tall and 220-feet deep. The mine is located in clear view along the Crest Trail and is the uppermost mine slated for bat gate installation. Sloughed sediments encourage standing water to pool at the adit's portal. Due in large part to the semi-annual water supply, bats, cave crickets, mountain lions, coyotes, javalina and rodents have been recorded at the site. The memorial proposes to install a bat gate similar to those at adits #21 and #23, with the exception that the gate for adit #24 would be set inside the portal far enough to allow animals to drink from the water supply.

Mitigation
Memorial staff would monitor all construction activities to minimize potential impacts. Care would be taken to minimize trampling of vegetation and erosion at mine sites and along trail.

Gate construction would take place between September and January to avoid disrupting the Mexican Spotted Owl (*Strix occidentalis lucida*) breeding season. The federal government currently lists the owl as a threatened species. The memorial established a 600-acre Protected Activity Center (PAC) for the owls after a nest was discovered in the northwest sector of the memorial in 2001. Although the subject mines are located near, but not officially within the PAC boundaries, the memorial recognizes the sensitivity of the area and would plan construction activities accordingly. Proposed helicopter transport of gate materials would have low potential adverse effects, as helicopters flying over the PAC would drop materials in one day. Similarly, should lesser long-nosed bats or Mexican long-tongued bats be present within the memorial during their active season from mid-July until mid-October, the memorial anticipates minimal effects for these sensitive species as installation would take place at off-peak dates.

To minimize impacts on wildlife, work would be done during daylight hours only. There would likely be fewer than 10 people on site at any time and the project would be completed over a span of five days. Part of the crew would likely stage at the Montezuma Pass parking area and hike up and down the Crest Trail on consecutive days, while a law enforcement officer would camp near the mine sites to secure gate materials and equipment, which could be stored in the first gated mine.

Four potential helicopter load drop zones, which are summarized below, have been identified near the Crest Trail mines. The military's Joint Task Force 6 (JTF6), U.S. Customs or the U.S. Border Patrol would provide helicopter flights. As of the distribution of this EA, the memorial has not formally scheduled drop flights with the JTF6 unit or the Border Patrol, so the specific type of helicopter that will be used has not been identified. However, according to NPS geologist and bat gate consultant John Burghardt, who supplied the initial bat gate specifications, the memorial would likely utilize a 206-L111 helicopter with 1,000-pound load capacity or an Astar 350B-2 with a 1,200-pound capacity. Small loads would likely be dropped first, which would burn fuel and allow extra weight capacity for the heavier loads. Several helicopter drops may be required, however, all drops would be completed in one day. If selected for this project, the in-house gate consultant would likely use three welders (approx. 300-400 pounds each) and six to eight tool chests, which weigh about 200 pounds each. Demobilization would also require a helicopter on the last day of the project to collect welders and miscellaneous tools.

Helicopter Load—Drop Zones

Adit # 21	Adit # 22	Adit # 23	Adit #24
10' x 25' zone along Crest Trail	8' x 20' zone on tailings pile along Crest Trail	12' x 35' on mine's tailings pile	20' x 40' zone on tailings pile along Crest Trail

A conservation crew, volunteer labor force, or military assistance would be required to haul rocks and fill for adit #22. Bureau of Land Management (BLM) border funds could possibly be used to finance crew time for the project. In order to avoid disturbing potential cultural resources, crew would select rocks and fill outside of the immediate project area. However, a formal archaeological survey would need to be completed to determine if the adits and associated tailings have archeological significance before crews could move any rock near the mine sites. Approximately one to two tons of rock would be required to adequately fill the lower pockets of the adit. The infill project should occur just after bat gates are installed at adits #21, #23 and #24.

Adoption of this alternative would stipulate that the Western Archeological and Conservation Center (WACC) archeologists complete a formal archaeological survey before any construction would take place. Regional cultural resources specialists would prepare and/or review an Assessment of Actions Having An Effect on Cultural Resources form (AEF) for this project.

Alternative C: Install Bat-Accessible Gates and Construct Steel Grate on Adit #22 (this alt is just a minor modification to Alt B.)

Bat-accessible gates would be installed on adits #21, #23 and #24 as described in Alternative B, however a steel grate would be constructed for adit #22. Because the adits, associated tailings and general project site areas have not undergone an archeological survey, filling in a section of adit #22 with rocks may be considered an adverse effect, which would require additional interagency mitigation processes.

To avoid this potential adverse effect and maximize security, the memorial proposes to construct a steel grate over the two broad, shallow side prospects at adit #22. The left-most prospect measures 6.5-feet wide and 7-feet tall and the right-most prospect measures 5.5-feet wide and 7-

feet tall. A single steel grate with three vertical and two horizontal steel support beams would span the adit opening and cover both prospects. The grate would measure 8-feet wide and 11-feet tall and would be anchored into bedrock using steel pins. The support beams would be covered by steel mesh and bolted into bedrock around the adit's edges (see example in appendices).

Because the adit provides no suitable habitat for bats and because openings next to the pits are less than 12-feet deep, constructing a bat-accessible grate would not be necessary. Because of tight spacing in the grate's mesh, entry would be limited to very small animals. Restricted access is not expected to significantly impact animals, however, due to the adit's scant existing habitat and the availability of more suitable habitat at nearby adits.

The memorial will add specifications for a removable grate hatchway to allow NPS staff access to the adit. The hatchway design has not been specified and therefore is not included in the preliminary cost estimate.

Mitigation
The grate materials would be transported by helicopter with the bat gate materials for the other mines. The grate's size and bulk may necessitate additional helicopter trips, but the park proposes to drop all supplies in one day to minimize environmental impacts. A technician, project manager and laborer would provide grate installation. The same mitigation measures addressed in Alternative B would apply to Alternative C. Demobilization of equipment would be concurrent with demobilization of equipment for the bat gates.

Alternative D: Install Bat-Accessible Fences and Fill Section of Adit #22 With Rocks or Construct Steel Grate

The Crest Trail mines have not historically served as roosts for lesser long-nosed bat populations. However, a slim possibility that acceptable habitat exists within the adits for this species must be acknowledged. Therefore, the memorial would consider installing bat fences, which allow easier bat access than angle-iron gates.

How well bats accept steel gates at roost sites seems to vary by species, and bats may accept certain gate designs and materials better than others. According to bat gate research completed at the memorial's State of Texas Mine from 1999 to 2002, lesser long-nosed bats least preferred horizontal gate bars constructed of 4-inch angle iron structures – which is typically used for bat gates – and most preferred horizontal gate bars constructed of round tubing of 1.5 to 2 inches in diameter (Bucci et. al, 2002).

This bat gate report influenced wildlife managers at Cabeza Prieta National Wildlife Refuge (NWR) to install a bat fence around an abandoned mine, which serves as a lesser long-nosed bat maternity roost (see photo, appendix II). That roost had been disturbed repeatedly by UDIs, which severely hampered the lesser long-nosed bat roost cycles and threatened to drive out the population altogether, according to Assistant Refuge Manager, Curtis McCasland, who was quoted in a September 2006 *Washington Times* article concerning UDI presence at the refuge. A typical bat fence design, like the fence at CPNWR, would be constructed of 8 to 10-foot tall, 1-inch steel pipes, welded to cross pipes at 5-inch intervals. The tops of the vertical pipes would be cut at an angle to produce a sharp point and the top 12 inches of pipe would be bent outward

to make climbing the fence extremely difficult.

Unlike Cabeza Prieta NWR's abandoned mine site, the memorial's Crest Trail adits are located on the side of a steep hill, which would limit the ability to construct a solid, secure fence. The Cabeza Prieta NWR fence, for example, creates a wide perimeter around the mine's entrance, but along the Crest Trail on the memorial, there are few places to properly anchor fences without causing major ground disturbance, due to the steep, eroding hillside. Fences would intrude on the trail and force trail users onto unstable mine tailings. Additionally, fences may be too visible from the trail and attract unnecessary attention toward the mine sites.

Fences vary in cost and may require the purchase and transport of greater material volume compared to bat gates, due to the wide proposed perimeter of each mine site. Thus, bat fence construction is likely a cost-prohibitive alternative.

Rock infill or steel grate construction on adit #22 (Alternatives B and C) would remain the preferred options for this alternative. The memorial would not propose to construct a bat fence for adit #22.

Mitigation
Like alternatives B and C, memorial staff would monitor all construction activities to minimize potential impacts. Compared to the gate installation alternative, the larger perimeter area needed for fence installation would involve trampling a greater amount of vegetation near the mine sites. However, care would be taken to minimize trampling vegetation and causing erosion at mine sites as much as possible. Installation may take up to three days and possibly longer depending on hillside conditions.

Installation and construction procedures would likely follow the routine described in Alternative B, although the project may necessitate more helicopter drops than described in the gate alternative. Helicopter use would likely be completed in one day, but some demobilization of equipment might be necessary, which would slightly alter this estimate.

Alternative E: Install Steel-Cable Netting on All Adits

Steel cable netting installed on the portals of the Crest Trail mines would allow some bat access via the standard 6-inch by 6-inch grid pattern, which is also conducive to the flow of sunlight, air and small animals (Kretzmann). The ¼-inch to 5/16-inch thick galvanized aircraft cable is often the most economical means to safeguard large openings with a minimum amount of materials (see example in appendices). Additionally, nets can accommodate irregular-shaped openings like adit #22 more easily than other structural solutions.

Potential for vandalism and corrosion as well as an expected lifespan of only 20 to 30 years are downsides of cable net installation. Bolt cutters, hacksaws, and cutting torches can easily breach ¼-inch thick cable, and in recent years, vandals have sawed through the cable netting at one of the mines on the memorial.

The increase in cost and weight of a 5/16-inch thick cable increases costs by approximately 50 percent and overall weight by 30 percent (Kretzmann). Specially coated galvanized wires, which

are more resistant to corrosion, significantly increase cable costs as well. However, cable wires tend to unravel over time and projecting wires can harm bats. For example, in 2005, a lesser long-nosed bat at a State of Texas mine died after it impaled a wing on a loose wire of a cable net and was unable to free itself.

Alternatives Considered, but Rejected

◆ *Install gates made of other materials:* Installation of a bat-accessible gate constructed from 1-inch diameter manganal steel was considered. The steel alloy, which is comprised of 12 to 14 percent manganese and iron mix has proven resistance to vandals' various tools, including hacksaws, chisels, come-a-longs and jacks (Amodt, L and Mesch, M). Manganal gates, although easily adaptable, were dropped from consideration because they are almost double the cost of conventional gates.

◆ *Blast and permanently close mines:* Obliterating habitat and historic resources does not conform to the NPS or memorial missions. Although human safety is the principle goal of this project, the aforementioned alternatives can provide for both visitor and law enforcement safety while preserving habitat and historic resources in the process.

◆ *Blast and backfill mines; re-contour slopes; restore sites with natural vegetation:* Full natural recovery of the mine sites was considered, although restoration would erase the site's historical mining character and destroy potential habitat for threatened and endangered species. Furthermore, recovery projects are very expensive and completing full restoration of the Crest Trail mines would not be cost-effective at this point.

Comparative Summary of Alternatives

Alternative A	Alternative B	Alternative C	Alternative D	Alterative E
No Action	**Install Bat-Accessible Gates / Fill Section of Adit #22**	**Install Bat-Accessible Gates / Install Grate on Adit #22**	**Install Bat-Accessible Fences / Grate or Infill on Adit #22**	**Install Steel-Cable Netting on All Adits**
Mine adits and surrounding areas would maintain current management status and remain in their present condition. "Danger – Keep Out" signs would continue to hang on T-posts at mines #22 and #24 warning visitors not to enter the mines. Access to all four mines would still be possible.	Gates constructed of 4-inch angle-iron would be installed inside portals on adits #21, #23 and #24. The gates would be designed to keep people out of the adit while allowing bats and small animals uninhibited access. A section of adit #22 would be filled with rocks.	Gates constructed of 4-inch angle-iron would be installed inside portals on adits #21, #23 and #24, as mentioned in Alternative B. An 8-foot wide and 11-foot tall steel grate would be installed on adit #22.	Fences would be constructed of 8 to 10-foot tall, 1-inch steel pipes, welded to cross pipes at 5-inch intervals, around adits #21, #23 and #24. A grate would be installed on adit #22 or a portion of the adit would be filled with rocks.	Steel cable netting would be installed on all adits. The netting would be 1/4-inch thick and aligned in 6-inch by 6-inch square panels.

Environmentally Preferred Alternative

The environmentally preferred alternative is the alternative that would promote the national environmental policy as expressed in the National Environmental Policy Act's (NEPA) Section 101. Generally, this is the alternative that causes the least damage to the biological and physical environment. It is also the alternative that best protects, preserves and enhances historic, cultural and natural resources.

Installing bat-accessible gates is more beneficial than the other alternatives for the biological and physical environment because gates effectively keep humans out and are not easily breached. Human use of the mines represents the greatest environmental impact and future threat to the sites. Thus, Alternative B, the preferred alternative, is also the environmentally preferred alternative. Bat gates will protect habitat better than bat fences and steel cable netting because of its more robust materials and longer lifespan. Filling in sections of adit #22 with rocks would also complement the gates as the preferred environmental alternative because it would only fill in sections of the adit where humans could potentially hide, but leave the majority of the prospect open.

Damage to the surrounding environment from bat gate construction and rock in-fill would be minor and short-term and would be completed in an area previously disturbed from decades of mining and most recently from the use of UDIs and memorial visitors. Therefore, the alternative to install bat gates and fill a section of adit #22 with rocks is the environmentally preferred alternative.

III. AFFECTED ENVIRONMENT

Coronado National Memorial encompasses 4,750 acres adjacent to the United States – Mexico border in southeastern Arizona. The memorial is located approximately 18 miles south of Sierra Vista in Cochise County at the southern end of the Huachuca Mountains. The proposed project would involve four mine sites located along the Crest Trail in the northwestern section of the memorial. The mine adits, which are single-entrance shafts dug horizontally into the hillside, are within an approximately quarter-mile radius of each other, about 1.5 miles northwest of the Montezuma Pass Trailhead. The mine area has been repeatedly disturbed over the past century due to mining activities.

The Crest Trail passes near two other mine sites that are worth mentioning in this EA. Mine #48, which is located along a steep drainage south of adit #24, consists of a large tailings pile with no associated shaft or adit. A well-defined adit located just north of the NPS / Coronado National Forest boundary, west of the Crest Trail, has also been documented. Based on a December 2006 visit, neither of these sites showed any signs of recent human use or activity. The memorial should remain aware of smuggling potential in the National Forest (upper) adit, however, as closure of adits #21-24 may cause UDIs to look for additional hiding spots in the Crest Trail vicinity. Because this mine is located on National Forest property, the memorial should consider periodically monitoring the site with Coronado National Forest personnel.

The Crest Trail adits are located on a rocky slope, with a grade of approximately 25 to 30 percent, however, portions of the work site near adit portals are relatively flat. Soils would only

be impacted within the adit portal where a trench would be dug. There are no anticipated impacts to water quality, drainage or flows.

Vegetation at the site is predominately Oak and Pinyon-Juniper Woodland. There are no sensitive plant species in the area. Impacts to vegetation and air quality during construction would be confined to the immediate vicinity of the work site and would be of short duration.

Wildlife would not be impacted by this project. The mine sites would continue to be accessible to bats, rodents and other small animals. Larger animals such as bear, javalina and mountain lion would be excluded from the adits, but they would maintain drinking access to semi-annual water pools at adit #24.

Sensitive Species

Abandoned mines often provide critical roosting habitat for bats. Many bat species roost on the memorial including the endangered lesser long-nosed bat (mentioned in introduction), which is present in some mines on the memorial from July through October. Although the Crest Trail mines could serve as bat roosts, only a few bats have been detected in the mines and none of these were lesser long-nosed bats.

Mexican spotted owls (*Strix occidentalis lucida*) have nested on the memorial in the past. Consequently, a Protected Activity Center (PAC) has been designated for the owls and is surveyed regularly by memorial staff. The Fish and Wildlife Service list the entire memorial as critical spotted owl habitat. The project would have minimal effect on Mexican spotted owls because they do not roost in abandoned mines and all installation activities would take place outside of the owls' breeding season. Although the mine sites are located near the owls' PAC, which helicopters must fly over to deliver supplies, the drops will be limited to one day and are not expected to significantly disturb the owls. In the spring before the project, memorial biologists will survey for Mexican Spotted Owl as part of its ongoing monitoring program.

Although barking frogs (*Hylactophryne augusti*) – considered a state wildlife species of concern – are found in the memorial, three of the Crest Trail adits remain dry throughout the year and do not provide good habitat for them. No barking frogs have been detected in adit #24, which contains water.

The memorial may preserve habitat for other species, including jaguar, jaguarundi, Mexican gray wolf and ocelot, although recent mammal surveys found no evidence of them in the memorial. Because the project would impact such a small area and the disturbance (noise and human presence) would last only a few days, there would be minimal effect on any of these species.

Sensitive Species Status

Species	Status
Lesser Long-Nosed Bat	Federally endangered
Mexican Spotted Owl	Federally threatened
Ocelot	Federally endangered
Jaguar	Federally endangered
Mexican Gray Wolf	Federally endangered; proposed for de-listing

Cultural / Historic Resources

Little is known about the specific history of the Crest Trail adits. There is evidence that the early Spanish and Mexican settlers prospected in the southern Huachuca Mountains prior to the 1850s (Van Cleve, 1997) and the Crest Trail adits were likely excavated before the turn of the century. It is highly unlikely that these mines are Spanish in origin, however.

Very few historic features remain, although pieces of wood with intact nails were noted near adit #48 (located east of the Crest Trail in a drainage, below adit #24) in December 2006. NPS personnel surveyed the mines for closure recommendations in February 1993. The mines were determined ineligible for inclusion on the List of Classified Structures in 1994 due to lack of integrity and significance.

Evaluating the effects of the project on archeological resources is pending an archeological survey. The compliance under Section 106 of the National Historic Preservation Act for this project – the Assessment of Actions having an Effect on Cultural Resources form (AEF) – will be forwarded to the Arizona State Historic Preservation Office (SHPO).

There are no known ethnographic resources in the project area. In the unlikely event that human remains, funerary objects, sacred objects or other objects of cultural significance are discovered during installation, provisions outlined in the Native American Graves Protection and Repatriation Act of 1990 would be followed. The project area has not been formally evaluated as a cultural landscape. Installation of bat gates, grates, or cable netting would not significantly detract from the historic character of the area. Fence construction is more likely to draw attention to the area, however, and could affect the site's mining character more significantly than the other alternatives.

Visitor Use

The Crest Trail mines are located along the Crest Trail, which is a section of the Arizona Trail. The route has become increasingly popular for UDIs and associated smuggling activities, although it is also a premier hiking route for ascents of 9,466-foot Miller Peak in the neighboring Coronado National Forest. The area is rich in mining history, yet people often make the mistake of equating an abandoned mine to a natural cave. Abandoned mines present serious hazards to memorial visitors, however. They are inherently dangerous sites due to their unstable nature.

Comparative Summary of Impacts

	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Impact Topic	**No Action**	**Install Bat-Accessible Gates / Fill Section of Adit #22**	**Install Bat-Accessible Gates / Install Grate on Adit #22**	**Install Bat-Accessible Fences / Grate or Infill on Adit #22**	**Install Steel-Cable Netting on All Adits**
Sensitive Species	Sensitive bat species using the adits (potentially) would remain vulnerable to disturbance by visitors	If sensitive bat species use the adits, they will benefit from increased habitat protection afforded by gates. Sensitive species will still have an opportunity to drink from pools at adit #24	Not likely to affect sensitive species	Sensitive bat species and their habitat would be protected	Sensitive bat species and their habitat would be protected
Cultural and Historic Resources	No impacts	Needs evaluation/ survey. Minor visual impact	Needs evaluation/ survey. Minor visual impact	Needs evaluation/ survey. Significant visual impact	Needs evaluation/ survey. Minor visual impact
Visitor Use	Visitors would be able to enter mines risking injury. Use by UDIs would continue as another threat to visitor safety.	Elevated noise levels and visitor encounters with work crews during installation of the gate would be intermittent and temporary. Visitors would be protected from health and safety hazards of abandoned mines. Some visitors would consider restriction of access to the mine openings a loss of a recreational experience. UDI safety problem would be eliminated.	Elevated noise levels and visitor encounters with work crews during installation of the gate would be intermittent and temporary. Visitors would be protected from health and safety hazards of abandoned mines. Some visitors would consider restriction of access to the mine openings a loss of a recreational experience. UDI safety problem would be eliminated.	Elevated noise levels and visitor encounters with work crews during installation of the gate would be intermittent and temporary. Visitors would be protected from health and safety hazards of abandoned mines. Some visitors would consider restriction of access to the mine openings a loss of a recreational experience. Fences could encroach on trail as well, which may be considered a loss of the recreational experience. UDI safety problem would be eliminated.	Visitors would be protected from the hazards associated with abandoned mines. Some visitors would consider restriction of access to the mine openings a loss of a recreational or public land-use experience. The cable net would remain vulnerable to vandals, which could result in major, long-term, negative impacts. UDI safety problem would be eliminated.

IV. ENVIRONMENTAL CONSEQUENCES

Methodology for Assessing Impacts

For the purposes of this analysis, intensity and duration of the impact are defined as:

- *Negligible* – the impact is barely perceptible or not measurable, and confined to a small area
- *Minor* – the impact is perceptible or measurable, and it is localized
- *Moderate* – the impact is clearly detectable and could have an appreciable effect
- *Major* – the impact would have a substantial, highly noticeable influence
- *Short-term* – the impact would be less than 5 years in duration
- *Long-term* – the impact would be 5 years or more in duration

Cumulative Impacts were determined by combining the impacts of the alternatives with other past, present, and reasonably foreseeable future actions within the memorial and throughout the region.

The memorial released a final General Management Plan (GMP) in January 2004, which ensures that the memorial has a clearly defined direction for visitor use and resource preservation for the next 10-15 years. Potential actions considered in the GMP for the Crest Trail mines are vague. Mitigation issues like the construction of bat gates to provide visitor safety and habitat protection are operational and outside the scope of the GMP (p. 27). Therefore, the memorial must respond to visitor safety and habitat threats as they arise, and plan accordingly.

Many federal agencies are working to restrict visitor access to abandoned mines throughout the country due to safety hazards. Because mines often provide significant critical wildlife habitat, other agencies are studying the feasibility of installing bat-accessible gates or similar alternatives.

Impairment of NPS Resources or Values

The Organic Act, reaffirmed by the General Authorities Act, and agency policy, mandates the NPS to conserve natural and cultural resources, leaving them unimpaired for the enjoyment of future generations. The impacts discussed for any of the alternatives B-E would not constitute impairment because: (1) none of the impacts would prevent the memorial from fulfilling specific purposes identified in the establishing legislation or proclamation of the memorial; (2) none of the impacts are significant to the integrity of the natural or cultural resources of the memorial; (3) prevent the opportunities for enjoyment of the memorial; and (4) none of the impacts would prevent the attainment of a goal as defined in the memorial's planning documents.

Alternative A – No Action

Sensitive Species – Sensitive bat species using the mine would remain vulnerable to disturbance by visitors entering the adit.

Cultural/Historic Resources – There would be no impacts.

Visitor Use – Visitors would be able to enter the mine risking injury.

Cumulative Impacts: If visitor access is restricted at other mines in the region, it could lead to increased visitation to mines in the memorial. Although few toxicology studies of human waste impacts in abandoned western U.S. mines exist, visitors undoubtedly introduce foreign matter and microorganisms, as well as nutrients in the form of hair, tiny flakes of skin, droplets of sweat, and crumbs of food (US News and World Report, 1993). They may deposit trash, which consists mainly of cans, bottles and clothing (UDIs). Fecal contamination is also a concern (likely UDIs). The environmental effects of these actions are largely unknown, although the memorial must consider cumulative effects of trash buildup in mines that would increase by selecting this alternative.

Unrestricted access to the adits would continue to provide UDIs and visitors with the opportunity for exploration at their own risk. With increasing visitation to the adits, potential bat species and other small animals may abandon the sites or not use them at all. However, animals can use other abandoned mines and caves in the memorial and surrounding lands as alternative habitat.

Impact Analysis and Conclusion: There would be moderate, long-term, negative impacts for bats, small animals and visitors. Sensitive bat species would not be protected; their habitat would be degraded as more visitors (and vandals) enter the adits. Over time, unauthorized visitor and UDI access could result in serious injury. This alternative does not meet the project objectives to protect sensitive species and their habitat and to provide for human safety.

Because the actions described in this alternative do not adversely affect a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the memorial; (2) key to the natural or cultural integrity of the memorial or to opportunities for enjoyment of the memorial; or (3) identified as a goal in the memorial's or other relevant NPS planning documents, there would be no impairment of the memorial's resources or values.

Alternative B (Preferred Alternative): Install Bat-Accessible Gates and Fill Section of Adit #22 With Rocks

Sensitive Species – The proposed action would result in less human-bat and less human-small animal encounters, which may be beneficial to all bats and small animals. Larger animals and sensitive species like the jaguar will still have an opportunity to drink at semi-annual water pools at adit #24.

Cultural/Historic Resources –Regional cultural resources specialists will complete and/or review an AEF form after the archeological survey has been completed.

Visitor Use – Visitors would encounter work crews and elevated noise levels from mechanized equipment during the construction and installation of the bat-accessible gates. Rock gathering and infill may create elevated noise levels as well. This would be intermittent and temporary. The noise and use of equipment would result in reduction of some visitors' recreational experience.

Visitors would be protected from the health and safety hazards associated with abandoned mines. However, some visitors would consider restriction of access to the mine openings a loss of a recreational or public land-use experience. Visitor and UDI interactions in the area would cease.

Strategic placement of abandoned mine hazards warning signs on the bat-accessible gates would warn visitors of the potential dangers of abandoned mines. These signs might also be helpful in minimizing vandalism of the gates, and therefore, prevent further deterioration of the sites.

Cumulative Effects – Installation of a gate would provide for visitor and law enforcement safety and habitat protection. UDI encounters with visitors and law enforcement would decline due to lack of hiding places.

Impact Analysis and Conclusion – Negative impacts to vegetation would be short-term and minor. Visitor experience would be compromised during construction, but the installation time-frame would be minor and of short duration, then the visitor experience would improve along this section of the Arizona Trail.

Negative effects on wildlife would be minor. Bats and other small animals that currently use the mines would still be able to use them, and all wildlife would still be able to access the pool of water at adit #24. In addition, the gates would positively affect bats and other small animals by protecting them from human disturbance when they are in the mines.

Some would consider restriction of visitor access to the interior of the adits a negative impact. However, access restriction would be offset by a positive impact on visitor and law enforcement safety. Visitors who wish to explore mines have safer, interesting opportunities nearby in Bisbee where tours of a large underground mine are offered regularly.

This alternative provides for the safety of visitors and law enforcement personnel and protects bats, small animals and their habitat based on the best scientific knowledge currently available. Because the actions described in this alternative do not adversely affect a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the memorial; (2) key to the natural or cultural integrity of the memorial or to opportunities for enjoyment of the memorial; or (3) identified as a goal in the memorial's or other relevant NPS planning documents, there would be no impairment of the memorial's resources or values.

Alternative C: Install Bat-Accessible Gates and Construct Steel Grate on Adit #22 (this alt is just a minor modification to Alt B.)

Sensitive Species – The proposed action would result in less human-bat and less human-small animal encounters, which may be beneficial to all bats and small animals. Because adit #22 provides no suitable habitat for bats and openings next to the pits are less than 12-feet deep, construction of a grate would have no significant effect on sensitive species. Larger animals and sensitive species like the jaguar will still have an opportunity to drink at semi-annual water pools at adit #24.

Cultural/Historic Resources – Besides providing visitor and law enforcement safety, grate installation on adit #22 would mitigate any potential for disturbing potential cultural and historic resources versus what is proposed in Alternative B's rock infill concept. Regional cultural resources specialists will complete and/or review an AEF form after the archeological survey has been completed.

Visitor Use – Visitors would be protected from the health and safety hazards associated with abandoned mines. Visitor and UDI interactions in the area would cease. Some visitors would consider restriction of access to the adit openings a loss of a recreational or public land-use experience.

Cumulative Effects – Installation of gates and the grate on adit #22 would provide for visitor and law enforcement safety. UDI encounters with visitors and law enforcement would decline due to lack of hiding places.

Impact Analysis and Conclusion – Some would consider restriction of visitor access to the interior of these adits a negative cumulative effect, because several federal agencies are working to close abandoned mines throughout the country due to safety hazards. Closing access to adit #22 versus filling in a portion of the adit with rocks as suggested in Alternative B would eliminate a marginal opportunity for visitors to experience the adit's broad opening. However, UDI encounters with visitors and law enforcement would decline due to lack of hiding places. Visitors who wish to explore mines have safer, interesting opportunities nearby in Bisbee where tours of a large underground mine are offered regularly.

Because the actions described in this alternative do not adversely affect a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the memorial; (2) key to the natural or cultural integrity of the memorial or to opportunities for enjoyment of the memorial; or (3) identified as a goal in the memorial's or other relevant NPS planning documents, there would be no impairment of the memorial's resources or values.

Alternative D: Install Bat-Accessible Fences and Fill Section of Adit #22 With Rocks or Construct Steel Grate

Sensitive Species – Fences would provide nearly unobstructed flight paths, which frugivorous bat species appear to prefer (Bucci, 2002), however, the site area's steep topography may nullify a fence's effectiveness. Potential intruders could use the slope to gain leverage on the fence and climb over, especially with ropes or other gear. Fence installation would result in less human-bat encounters, but larger animals like the jaguar would not be able to drink from semi-annual water pools at adit #24 because the fence perimeter would be constructed around the adit, which will block access for larger animals.

Cultural/Historic Resources – Regional cultural resources specialists will complete and/or review an AEF form after the archeological survey has been completed.

Fence construction represents the most visibly obtrusive alternative because unlike bat gates and cable nets, which can be tucked away on the inside of adit portals, fences will be clearly visible

around the perimeter of the mine sites. The visible obstruction may represent a negative historical effect.

Visitor Use – Visitors would be protected from the health and safety hazards associated with abandoned mines. Visitor and UDI interactions in the area would cease, however, fences will cover a large area and therefore would intrude on the trail. They would be very visible and detract from the aesthetic quality of views along the trail. Some visitors would consider restriction of access to the adit openings a loss of a recreational or public land-use experience.

Cumulative Effects – Installation of fences and grating or infilling adit #22 would provide for visitor and law enforcement safety. UDI encounters with visitors and law enforcement would decline due to lack of hiding places.

Negative effects on wildlife would be minor. Bats and other small animals that currently use the mines would still be able to use them, but large wildlife would not be able to access the pool of water at adit #24. In addition, the fences would positively affect bats and other small animals by protecting them from human disturbance when they are in the mines.

Impact Analysis and Conclusion – Some would consider restriction of visitor access to the interior of these adits a negative cumulative effect, because several federal agencies are working to close abandoned mines throughout the country due to safety hazards. However, access restriction would be offset by a positive impact on visitor and law enforcement safety. Visitors who wish to explore mines have safer, interesting opportunities nearby in Bisbee where tours of a large underground mine are offered regularly.

Because the actions described in this alternative do not adversely affect a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the memorial; (2) key to the natural or cultural integrity of the memorial or to opportunities for enjoyment of the memorial; or (3) identified as a goal in the memorial's or other relevant NPS planning documents, there would be no impairment of the memorial's resources or values.

Alternative E: Install Steel-Cable Netting on All Adits

Sensitive Species – The proposed action would result in less human-bat and less human-small animal encounters, which may be beneficial to all bats and small animals. Memorial staff has noted that bats do fly through the main State of Texas mine portal, but they seem to do so with difficulty. This conclusion is based on observations, not formal experiments. For larger animals and sensitive species like jaguar, steel cable netting would still allow them to drink at semi-annual water pools at adit #24.

Cultural/Historic Resources – Regional cultural resources specialists will complete and/or review an AEF form after the archeological survey has been completed.

Visitor Use – Visitors would be protected from the health and safety hazards associated with abandoned mines. Visitor and UDI interactions in the area would cease. Some visitors would

consider restriction of access to the adit openings a loss of a recreational or public land-use experience.

Cumulative Effects – Installation of steel cable netting would provide for visitor and law enforcement safety, but could be breached by vandals and UDIs. However, UDI encounters with visitors and law enforcement would decline due to lack of hiding places.

Negative effects on wildlife would be minor. Bats and other small animals that currently use the mines would still be able to use them, and all wildlife would still be able to access the pool of water at adit #24. In addition, the cable would positively affect bats and other small animals by protecting them from human disturbance when they are in the mines. However, fewer bats may accept cable nets than bat gates because the nets have restrictive openings that are only six square inches.

Impact Analysis and Conclusion – Some would consider restriction of visitor access to the interior of these adits a negative cumulative effect, because several federal agencies are working to close abandoned mines throughout the country due to safety hazards. However, access restriction would be offset by a positive impact on visitor and law enforcement safety. Visitors who wish to explore mines have safer, interesting opportunities nearby in Bisbee where tours of a large underground mine are offered regularly.

It is likely that the cable nets would be tampered with and possibly breached by vandals. This moderate vandalism potential would require extra management attention. Future vandalism would result in a negative effect on bats, small animals, and their habitats and on visitor and law enforcement safety.

Compared to the more durable gates and grate options, this alternative would provide relatively short-term protection. The cable nets would remain vulnerable to vandals, which could result in major, long-term, negative impacts. Netting would, however, have a positive short-term impact on sensitive species and their habitat as well as visitor and law enforcement safety.

Because the actions described in this alternative do not adversely affect a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the memorial; (2) key to the natural or cultural integrity of the memorial or to opportunities for enjoyment of the memorial; or (3) identified as a goal in the memorial's or other relevant NPS planning documents, there would be no impairment of the memorial's resources or values.

V. CONSULTATION AND COORDINATION

The following agencies, organizations and persons were contacted for information or assisted in identifying important issues, developing alternatives or analyzing impacts.

Barbara Becker – Principal Investigator, Planning Degree Program, University of Arizona
Ron Beckwith – Archeologist, Western Archeological and Conservation Center, NPS
John Burghardt – Geologist, Natural Resource Program Center, NPS

Tony Dominguez – Operations and Environmental, U.S. Border Patrol, Naco, AZ
Laurie Domler – NEPA / 106, Intermountain Support Office, NPS
Bob Frankeberger – Historical Architect, Arizona State Historic Preservation Office
Kym Hall – Superintendent, Coronado National Memorial, NPS
Sherry Mann – Biologist, Coronado National Memorial, NPS
Curt McCasland – Assistant Refuge Manager, Cabeza Prieta National Wildlife Refuge
Larry Norris – Southwest Research Coordinator, Desert Southwest CESU, NPS
Yar Petryszyn – Ecology and Evolutionary Biology Specialist, University of Arizona
Jason Roberts – Law Enforcement Ranger, Coronado National Memorial, NPS
Luke Sabala – Bat Gate Consultant, NPS
Bob Spude – Historian, Cultural Resources Management, NPS
Matt Stoffolano – Acting Chief Law Enforcement Ranger, Coronado National Memorial, NPS
Thane Weigand – Supervisory Law Enforcement Ranger, Coronado National Memorial, NPS
Susan Wells – Archaeologist, Western Archeological and Conservation Center, NPS

Preparer

This document was prepared by Steve DeGrush, Desert Southwest CESU Investigator, Planning Degree Program, University of Arizona

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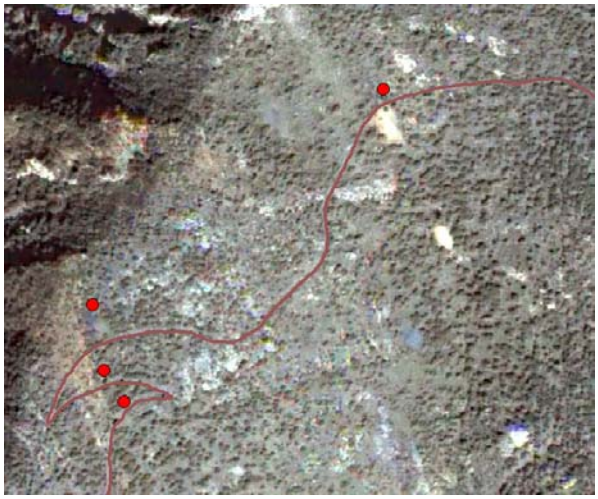
List of Environmental Assessment Recipients

This environmental assessment is available at **http://parkplanning.nps.gov/** and was sent to the following agencies and organizations for review and comment:

Arizona Game and Fish Department
Arizona State Historic Preservation Office
Arizona Trail Association
Arizona Trailblazers Hiking Club
Bat Conservation International
DOD Fort Huachuca – Environmental & Natural Resources Division
NPS – WACC
NPS – Desert Southwest CESU
Southern Arizona Hiking Club
University of Arizona
US Border Patrol
USDI Fish and Wildlife Service
USGS Sonoran Desert Field Station
USGS Biological Resources Division
USDA Forest Service – Sierra Vista Ranger District

VI. SITE MAP



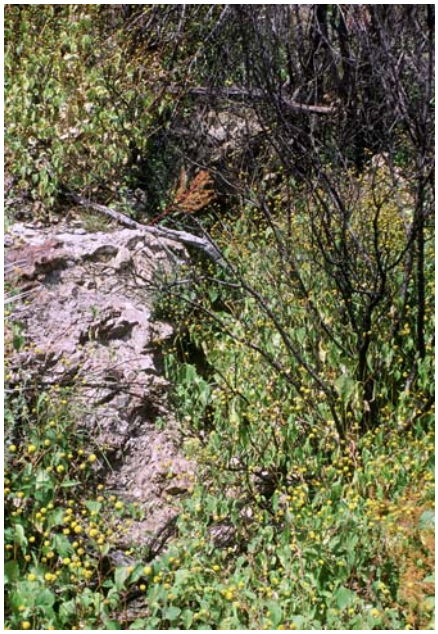
↑ N scale: ---------- ¼-mile

↑ N scale: ---------- ½-mil

Appendices

I. Crest Trail Mines

Crest Trail mines, long view from trail, 10/2/06 Photo: Larry Norris

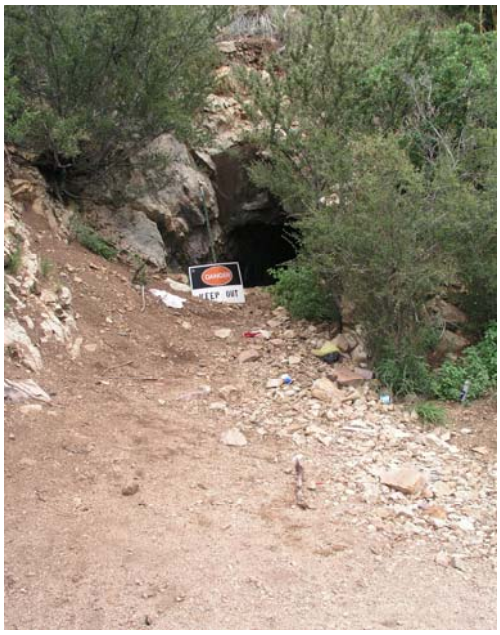


Adit #21 from trail Photo: Larry Norris

Adit #21 close-up Photo: John Burghardt

Coronado LE Ranger Jason Roberts and CESU Investigator Steve DeGrush at Adit #22 Photo: Larry Norris

Adit #23 Photo: Steve DeGrush

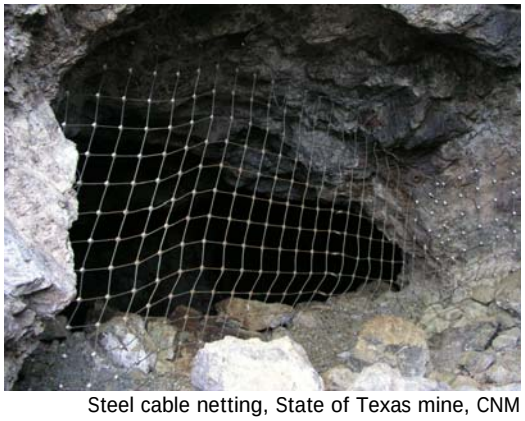


Adit #24, view from trail, Photo: John Burghardt

11. Bat Gate, Bat Fence, Steel Cable and Grate Examples


Bat gate, State of Texas mine, CNM


Bat fence, Blue Bird mine, Cabeza Prieta NWR


Steel cable netting, State of Texas mine, CNM


Grate steel mesh covering, Courtesy: John Burghardt