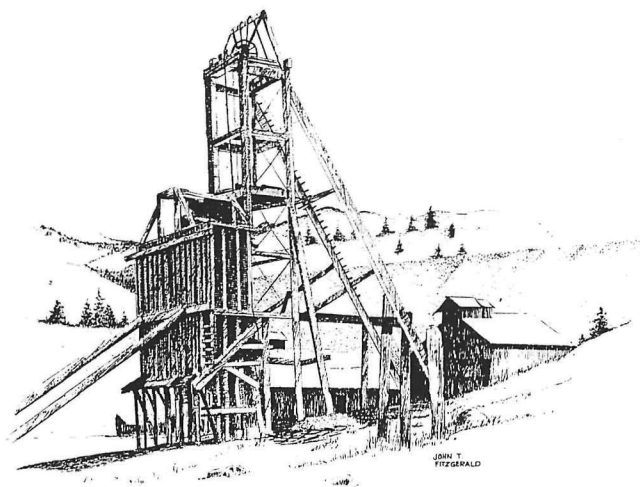


# ABANDONED MINERAL LANDS

IN THE  
NATIONAL PARK SYSTEM

A PICTORIAL SUMMARY



PREPARED BY:  
MINING AND MINERALS BRANCH  
LAND RESOURCES DIVISION  
MARCH 1990

## INTRODUCTION

This paper presents a pictorial summary of the abandoned mineral land (AML) issue in the National Park System. Photographs are used to explain the extent of AML, show the safety hazards and resource damage common to many sites, illustrate historical significance and interpretive possibilities, and present innovative methods of preserving the habitat of wildlife which live in abandoned sites. Several types of closure methods are shown along with some closures which have been defeated. Required elements for a Servicewide program and required funding levels to adequately deal with the problem are also presented.

## SCOPE AND MAGNITUDE OF THE AML PROBLEM

Current data shows 120 parks contain approximately 2,000 abandoned mines with nearly 10,000 associated hazards, approximately 700 abandoned oil and gas wells, and one abandoned geothermal well. The statistics are shown below:

| <u>Region</u>        | <u>NPS Units<br/>Affected</u> | <u>Sites</u> | <u>Abandoned Mine<br/>Hazards/Openings</u> | <u>Abandoned<br/>Wells</u> |
|----------------------|-------------------------------|--------------|--|----------------------------|
| 1. Alaska            | 11                            | 345          | 345  | 1                          |
| 2. Mid-Atlantic      | 12                            | 197          | 1,123                                      | 5                          |
| 3. Midwest           | 14                            | 86           | 161  | 62                         |
| 4. National Capitol  | 3                             | 8            | 39   |                            |
| 5. North Atlantic    | 3                             | 15           | 15   |                            |
| 6. Pacific Northwest | 7                             | 39           | 68   | 1                          |
| 7. Rocky Mountain    | 20                            | 106          | 212  | 44                         |
| 8. Southeast         | 13                            | 164          | 178  | 209                        |
| 9. Southwest         | 14                            | 53           | 122  | 305                        |
| 10. Western          | <u>23</u>                     | <u>923</u>   | <u>7,671</u>                               | <u>45</u>                  |
| TOTAL                | 120                           | 1,936        | 9,934                                      | 672                        |

## THE NPS AML PROGRAM

A comprehensive NPS program should have four main objectives:

- 1) Eliminate safety and health hazards,
- 2) Eliminate or mitigate resource impacts,
- 3) Preserve historically and culturally significant sites, and
- 4) Manage sites for special wildlife habitat.

Achieving these objectives requires the following eight basic components, implemented at the park, region, and Washington office levels:

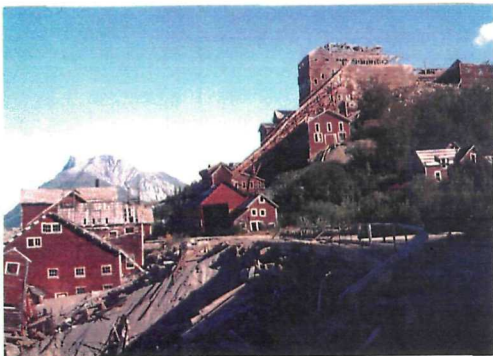
- 1) Inventory AML sites,
- 2) Use inventory data to rank sites,
- 3) Determine costs for site mitigation,
- 4) Comply with appropriate laws,
- 5) Decide on a course of action,
- 6) Obtain funding,
- 7) Implement the site mitigation, and
- 8) Monitor AML sites.

## WHAT IS AML?

ABANDONED MINERAL LANDS (AML) INCLUDE ALL ABANDONED MINERAL EXTRACTION SITES INCLUDING HARDROCK, COAL, AND SAND AND GRAVEL MINES, OIL AND GAS AND GEOTHERMAL WELLS, ACCESS ROADS, AND PROCESSING FACILITIES ASSOCIATED WITH THE OPERATIONS.



TALC MINE IN DEATH VALLEY NM



KENNICOTT MILL FACILITIES IN WRANGELL-ST. ELIAS NP&P



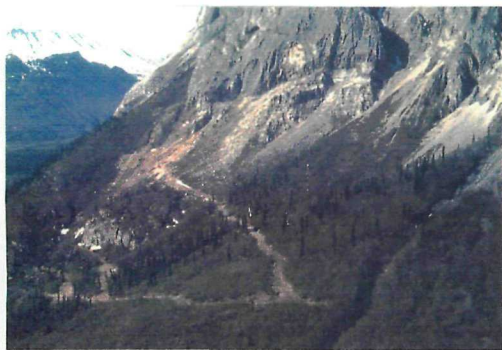
OIL AND GAS WELL AT CUYAHOGA VALLEY NRA



CINDER PIT IN LAVA BEDS NM



GEOTHERMAL WELL IN LASSEN VOLCANIC NP



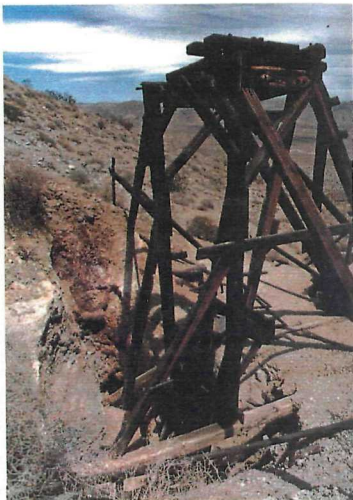
MINE ACCESS ROAD IN WRANGELL-ST. ELIAS  
NP&P



## SAFETY HAZARDS

THERE ARE MANY SAFETY HAZARDS ASSOCIATED WITH ABANDONED SITES. MINE OPENINGS ARE EXTREMELY HAZARDOUS AND CAN CONTAIN VERTICAL DROP-OFFS, BAD AIR, WATER, ROTTEN TIMBERS, LOOSE ROCK, UNDETONATED EXPLOSIVES, AND HIGH LEVELS OF RADIOACTIVITY. RESCUES AT THOSE SITES CAN PUT PARK PERSONNEL INTO DANGEROUS SITUATIONS. DECAYING STRUCTURES, ATTRACTIVE TO CLIMB ON, ARE OFTEN UNSTABLE. ABANDONED OIL AND GAS WELLS CAN LEAK METHANE AND OTHER POISONOUS GASSES.

DANGEROUS HEADFRAME AT THE GOLDEN BEE MINE IN JOSHUA TREE NM



SKIDOO MINE IN DEATH VALLEY NM



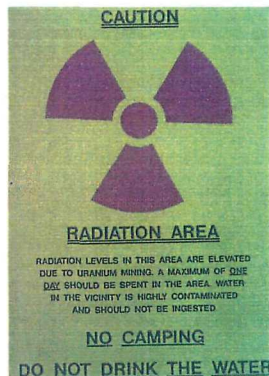
ADIT IN WRANGELL-ST. ELIAS NP&P



METHANE LEAKING FROM A WELL IN BIG SOUTH FORK NR&RA



WARNING SIGN IN CANYONLANDS NP



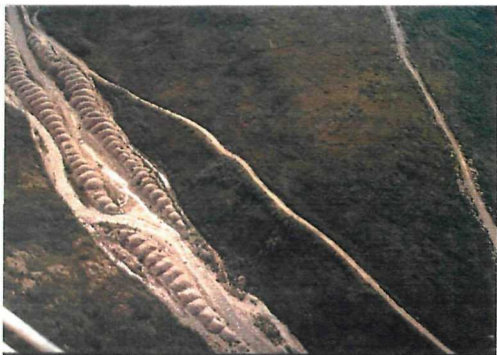
## IMPACTS TO RESOURCES

RESOURCE IMPACTS FROM ABANDONED SITES VARY DEPENDING ON THE TYPE AND SIZE OF OPERATION AND THE LOCAL ENVIRONMENT. THE GREATEST IMPACTS ARE TO THE WATER, SOIL, VEGETATION, AND AQUATIC LIFE. IN MANY CASES, THE ECOSYSTEMS HAVE BEEN RADICALLY ALTERED OR DESTROYED. ACID MINE DRAINAGE HAS AFFECTED WATER QUALITY, PLACER MINES HAVE DESTROYED RIPARIAN HABITAT, AND VEHICLES CROSSING THE TUNDRA IN ALASKA HAVE RESULTED IN PROBLEMS WITH THE PERMAFROST. CHEMICAL SUBSTANCES USED AT MINES AND EXTRACTED FROM WELLS HAVE SOAKED INTO THE SOILS, RUINING THEIR PRODUCTIVITY AND CREATING KILL ZONES.

ACID MINE DRAINAGE IN BIG SOUTH  
FORK NR&RA

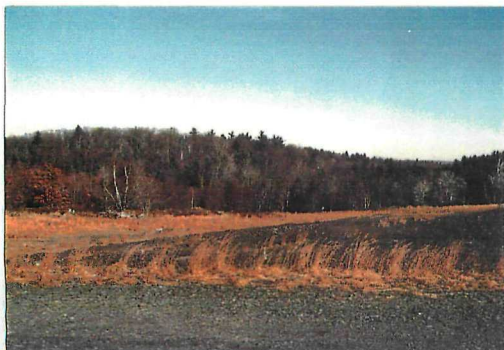


PLACER MINE IN DENALI NP&P



KILL ZONE CAUSED BY ACID MINE  
DRAINAGE IN BIG SOUTH FORK NR&RA

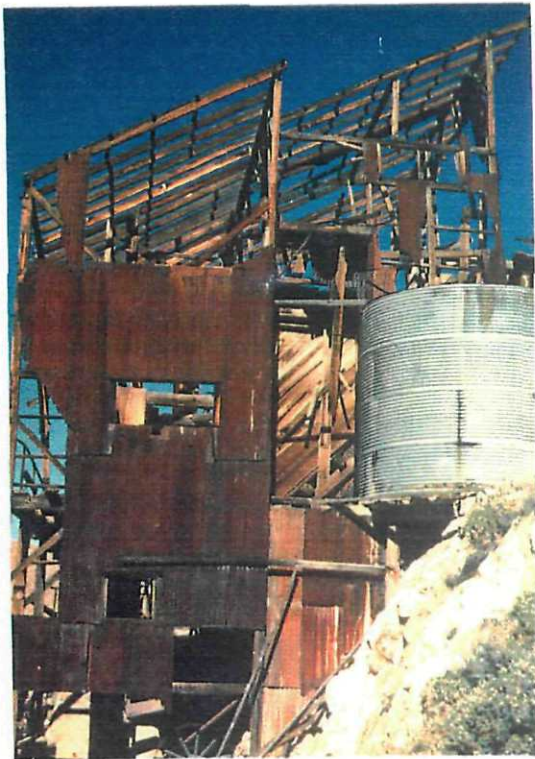
TOPSOIL REMOVAL SITE IN DELAWARE  
WATER GAP NRA





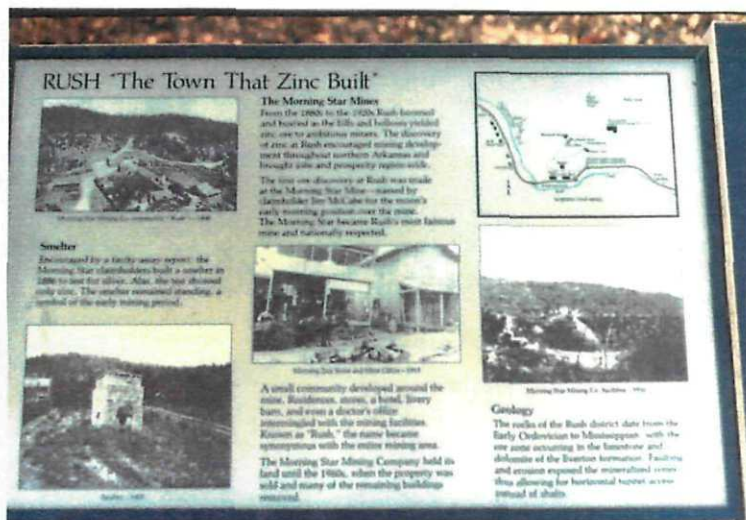
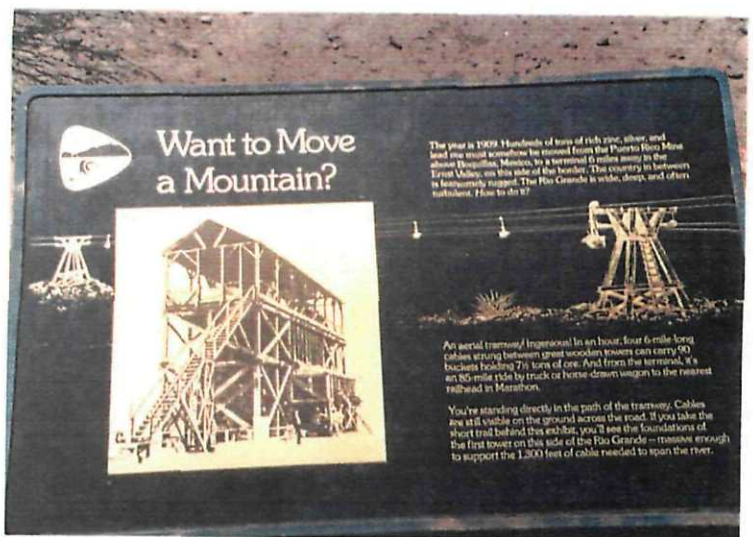
## HISTORICALLY SIGNIFICANT AML SITES

PART OF THE NPS MISSION IS THE PRESERVATION OF THE NATION'S HISTORIC AND CULTURALLY SIGNIFICANT SITES. ABOUT 2 PERCENT OF THE ABANDONED SITES IN THE NPS ARE CULTURALLY OR HISTORICALLY SIGNIFICANT. AT SEVERAL PARKS, THE NPS IS INCORPORATING THE THEME OF MINING INTO PARK INTERPRETIVE PROGRAMS. TO ENSURE THAT HISTORIC STRUCTURES ARE NOT LOST FOREVER, THEY MUST BE STABILIZED BEFORE THEY DETERIORATE ENTIRELY.



SKIDOO MILL IN DEATH VALLEY NM

INTERPRETIVE SIGN OF THE BOQUILLAS TRAMWAY THAT ONCE EXISTED IN BIG BEND NP



INTERPRETIVE SIGN AT RUSH VILLAGE IN BUFFALO NR

## WILDLIFE MANAGEMENT

MANY AML SITES PROVIDE HABITAT FOR WILDLIFE. IN SOME INSTANCES, THE WILDLIFE ARE RARE, THREATENED AND ENDANGERED SPECIES. IN CASES WHERE AML SITES ARE PROVIDING HABITAT TO SIGNIFICANT WILDLIFE, INNOVATIVE CLOSURES PRESERVE THE HABITAT AND ALSO ENSURE SAFETY FOR VISITORS.



TOWNSEND'S BIG EARED BATS IN THE LAST  
CHANCE MINE IN GRAND CANYON NP



BAT GATE IN NEW RIVER GORGE NR  
DESIGNED TO ADMIT RARE BATS



## MITIGATION MEASURES

THERE ARE MANY ALTERNATIVES AVAILABLE TO RESOLVE THE PROBLEMS ASSOCIATED WITH ABANDONED MINERAL LANDS. TYPICAL MEASURES USED TO CLOSE UNDERGROUND MINES INCLUDE INSTALLATION OF FLEXIBLE CABLE NETS, GRATES, OR BAT GATES; BACKFILLING WITH WASTE MATERIAL; AND SEALING MINE OPENINGS BY BLASTING OR WITH POLYURETHANE FOAM. MINE ACCESS ROADS, QUARRIES, AND OTHER SURFACE DISTURBANCE CAN BE RECONTOURED AND RECLAIMED, AND ABANDONED WELLS CAN BE PLUGGED. COSTS CAN RUN FROM AS LITTLE AS \$500 TO SEVERAL HUNDRED THOUSAND DOLLARS, DEPENDING UPON THE SITE, THE AMOUNT OF RECLAMATION, AND THE PRESENCE OF HAZARDOUS MATERIALS.

BACKFILLING TWO OPENINGS AT TERRY MINE IN CAPITOL REEF NP COST \$7,000.



MINE OPENINGS CAN BE BLASTED SHUT. COSTS VARY FROM \$500 TO \$2,000 PER OPENING.



BAT GATE AT KAYMORE MINE IN NEW RIVER GORGE NR COST \$5,000.



GRATES INSTALLED BY HELICOPTER AT VICTORIA MINE IN ORGAN PIPE CACTUS NM. GRATES COST FROM \$700 TO \$8,300 DEPENDING ON ACCESS AND SIZE.





INSTALLING A POLYURETHANE FOAM PLUG.  
COSTS VARY FROM \$1,000 TO \$31,000  
DEPENDING ON SIZE, ACCESS AND SITE  
CONDITIONS.



RECLAIMED TIMBER HAULAGE AND QUARRY  
ACCESS ROAD IN REDWOOD NP. RECLAMA-  
TION OF THIS ROAD COST \$189,000/MI.  
SMALLER ROADS COST AS LITTLE AS  
\$11,000/MI.

RECLAMATION OF JENSIK QUARRY IN CUYAHOGA  
VALLEY NRA COST \$20,000. RECLAMATION OF  
LARGER QUARRIES WILL COST SEVERAL HUNDRED  
THOUSAND DOLLARS EACH.



CABLE NET AT STATE OF TEXAS MINE IN  
CORONADO NM. CONSTRUCTED AND IN-  
STALLED BY DEATH VALLEY NM STAFF.  
COST AVERAGES \$1,250 PER NET.



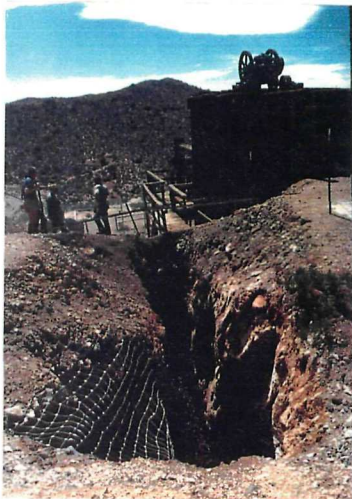
## FIELD INVENTORY AND MONITORING

TRAINED FIELD PERSONNEL ARE CRITICAL TO EFFECTIVELY IMPLEMENT AN AML PROGRAM. PARK STAFF MUST BE TRAINED TO COLLECT SITE DATA. AFTER MITIGATION, SITES NEED TO BE MONITORED TO ENSURE THAT CHANGING CONDITIONS HAVE NOT ALTERED THE CLOSURES.

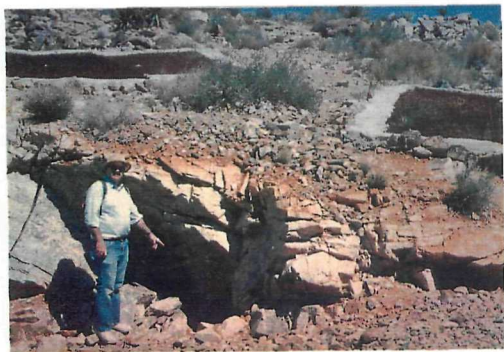
### SITE INVENTORY IN GREAT BASIN NP



EARTHQUAKE-INDUCED CABLE NET FAILURE AT THE LOST HORSE MINE IN JOSHUA TREE NM



CUT FENCE AROUND THE ORPHAN MINE IN GRAND CANYON NP



HOLE DUG TO ACCESS SHAFT COVERED BY A STEEL GRATE AT THE DESERT QUEEN MINE IN JOSHUA TREE NM. OF THE 12 CLOSURES AT THIS MINE, ALL HAVE BEEN DEFEATED.



## NPS AML PROGRAM STATUS

At present, the NPS has a very small AML program. Projects are funded from park and region budgets as money becomes available, but this is insufficient to adequately address the problem. Over the last twenty years only \$2 million has been spent to mitigate AML sites.

Many parks have not been adequately inventoried, and staff trained to perform the inventories is lacking. Because the inventories are not complete, it is difficult to estimate the resources needed to remedy the problem. However, based on the number and types of sites known to exist and costs incurred to date, we estimate that about \$45 million will be required to successfully address the problem from abandoned mines and quarries. Another \$2 million will be required to plug abandoned wells.

At the present time, mine closures are occurring each year on a piecemeal basis, as is plugging of abandoned wells. Most of the efforts have concentrated on closures; little effort has been spent on reclamation of disturbed areas. Temporary closures, such as fences, have been used in an attempt to safe many sites because of their low cost. Those methods have proven to be inadequate because they have been repeatedly defeated. In addition, funding for the Death Valley Mine Maintenance Crew, responsible for making and installing 350 cable nets Servicewide, was terminated in 1989. On a more positive note, as an interim measure the Mining and Minerals Branch is developing warning signs to post at hazardous sites in the field.

The NPS has sought assistance from various state and federal agencies in obtaining funds for AML. The Office of Surface Mining Reclamation and Enforcement has committed to spend \$1 million reclaiming abandoned coal sites on NPS land. However, reclaiming coal sites will cost many times this amount--and coal sites are less than twenty percent of the AML problem. Several states, through their AML programs, have agreed to assist the NPS on specific projects. Servicewide, however, there is a great need for increased funding levels to adequately deal with abandoned mineral lands.