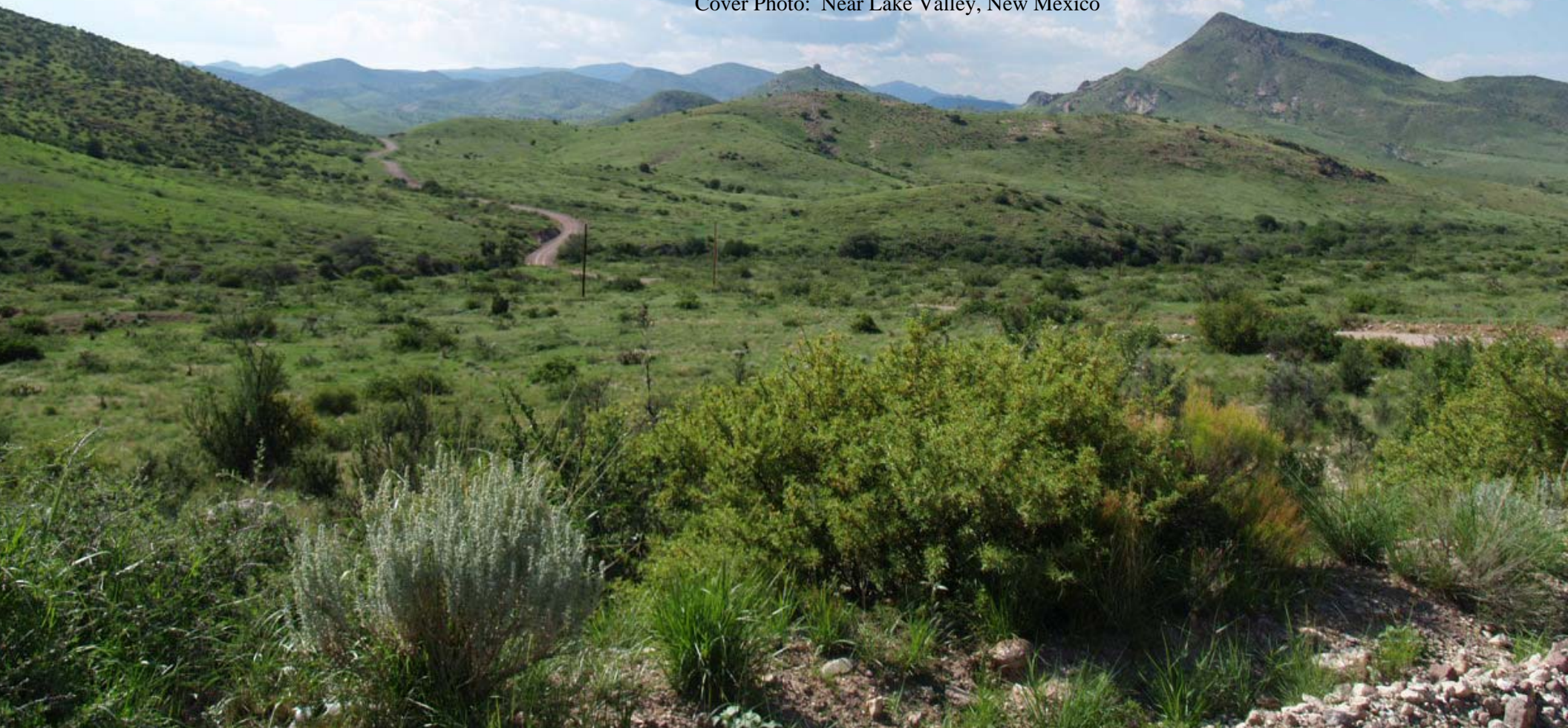


OFFICE OF SURFACE MINING  
Albuquerque Area Office

**Annual Evaluation Report  
for the  
New Mexico Abandoned Mine Land Reclamation Program**

**Evaluation Year 2008**  
(July 1, 2007 through June 30, 2008)

Author: Vernon E. Maldonado  
Cover Photo: Near Lake Valley, New Mexico



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## INTRODUCTION

The Office of Surface Mining Reclamation and Enforcement (OSM) was created by the passage of the Surface Mining Control and Reclamation Act (SMCRA) on May 2, 1977. This law places a fee on active coal mines of 35 cents per ton of surface mined coal and 15 cents per ton of underground mined coal. Monies collected are placed in a fund called the Abandoned Mine Reclamation Fund. This fund is used to reclaim coal mines abandoned prior to the enactment of SMCRA. Under certain conditions, abandoned non-coal mines and some post-SMCRA mines may also be reclaimed.

SMCRA AML fee collections were due to expire on September 30, 2006. However, H.R. 6111 was approved by Congress on December 9, 2006, and thus Congress signed into law P.L. 109-432 effective December 20, 2006. P.L. 109-432 extends AML fee collection at reduced rates through FY-2021 (a 14-year extension of fee collections). In addition, it mandates that OSM begin distribution of the AML fees that have accumulated in the undistributed State or Tribal Share.

For a complete history of the AML fee go to:

<http://cnie.org/NLE/CRSreports/06May/RL32993.pdf>

On behalf of the Secretary of Interior, OSM administers the Abandoned Mine Lands (AML) Reclamation Fund by awarding grants to States and Indian Nations, to cover the costs associated with both Program administration and project construction. The OSM Western Region's (OSM-WR), Albuquerque Area Office (AAO) provides assistance to the New Mexico Abandoned Mine Land Reclamation Program (NMAML) by evaluating compliance with the National Environmental Policy Act (NEPA), and inspecting final reclamation. The twelve month accomplishments of the Program are summarized every year by the OSM-AAO in an annual evaluation report (AER).

This annual evaluation report is produced by the Office of Surface Mining (OSM) in fulfillment of its Statutory responsibility [under Title IV of the Surface Mining Control and Reclamation Act of 1977, (SMCRA)] to annually assess the accomplishments of the New Mexico Mining and Minerals Division, Abandoned Mine Lands Reclamation Program (NMAML).

The primary goal of Abandoned Mine Land Programs approved under SMCRA is to mitigate the effects of past mining by reclaiming abandoned coal and non-coal (mineral) mines. SMCRA specifies that the primary emphasis be placed on correcting the most serious problems endangering public health, safety, general welfare, and property. Although SMCRA provides for the reclamation of both coal and non-coal mines abandoned prior to May 1977, coal mines with physical hazards that pose a danger to the public have funding priority.

This annual evaluation report is for Evaluation Year 2008 (EY-2008), which extends from July 1, 2007 thru June 30, 2008. Through its oversight process, OSM-AAO monitors the progress and accomplishments of the NMAML and produces an annual evaluation report (AER). This annual evaluation report consists of OSM's oversight findings based on field inspections and meetings with the New Mexico AML during the 12-month evaluation period beginning July 1,

2007 and ending June 30, 2008 (EY-2008). It also documents the activities and accomplishments of the NMAML during this period.

In conducting this annual review, OSM-AAO followed OSM Directive AML-22, which contains general procedures for evaluating Abandoned Mined Land Reclamation Programs. OSM and New Mexico AML have agreed to have an ongoing work plan that each annual evaluation will consist of reporting on the Program's reclamation accomplishments under the Abandoned Mine Land Inventory (AMLIS) database. OSM-AAO also routinely reports on reclamation projects, compliance with the NEPA, the status of grants, program administration and staffing.

In past annual evaluation reports, OSM found the NMAML to be an excellent and well managed State Program. As a result of this year's oversight activities OSM did not find any issues or concerns with the NMAML Program and therefore did not see fit to make any recommendations for improvement.

EY-2007 was a difficult time for all AML Programs nationwide in that the AML fee was in jeopardy of expiration and future funding levels were not known. Because most States plan their projects years ahead, the effects of funding level uncertainty in 2007 also affected project planning for EY-2008. However, New Mexico was able to complete the project development work (NEPA Compliance and Engineering Designs) for the Lake Valley Safeguard and Reclamation Project. This is a major project covering a substantial amount of underground workings and associated surface disturbance. The Lake Valley project entered into construction during EY-2008.

This year's oversight activity involved the following State and Federal personnel:

NM-AML

John Kretzmann, Program Mgr./P.E.  
Randall Armijo, Environ. Coordinator  
Lloyd Moiola, Project Manager  
Mike Tompson, Civil Engineer, P.E.  
James Smith, Environmental Engineer  
Ray Rodarte, Reclamation Spec.

OSM-AFO

Robert Postle, Albq. Area Office Mgr.  
Vernon Maldonado, AML Pgm. Spec.  
Dan Martinez, Grants Specialist

## **PART I. GENERAL INFORMATION**

The State of New Mexico contains a diversity of ecosystems ranging from high, steeply sloping mountainous areas to semiarid plains and arid desert. Vegetative communities and wildlife are equally diverse across the state. Average rainfall ranges from a high of approximately 20 inches per year to a low of about six inches depending on elevation. New Mexico's coal resource underlies approximately one-fifth of the state's surface (over 15 million acres) and totals over 40.6 billion short tons of coal. A significant amount of pre-law mining has occurred within the State, leaving numerous high priority hazards within the New Mexico abandoned mine inventory.

Land ownership in New Mexico is approximately 34.1% Federal (BLM, USFS, NPS) and 11.6% State Trust Land for a total of 45.7% public lands (55,566 sq. mi.). The highest concentration of AML hazards occurs on much of this public land. Public land is increasingly being developed for open space public recreation such as camping, biking, hiking, campgrounds, etc. Population demographics and increased access to mining areas within the State are continually changing and this change is causing the State to readjust its priority / urgency for addressing several mining areas and associated mine hazards.

The state of New Mexico has a long and interesting mining history. One of the oldest existing mines in the United States, is just south of Santa Fe, New Mexico. It dates back to 1200 A.D. Some pre-historic mining occurred as early as 600 A.D. Indians mined turquoise, lead and copper for years prior to the arrival of Europeans. Spanish explorers mined for silver and gold in the 1800's. The Cerrillos area, just south of Santa Fe, was an important mining district in New Mexico. Abandoned gold and silver mines also exist in the southern part of the State near Orogrande and Deming. Whether from mineral mining or coal mining, numerous physical hazards in the form of mine equipment and structures, portals, and vertical shafts exist throughout the State.

#### **New Mexico AML Program History:**

New Mexico received primacy under SMCRA on December 31, 1980. New Mexico's AML Program was subsequently approved by the Secretary of Interior on June 17, 1981. Since then the NMAML has been working to reclaim both its high priority coal and non-coal inventory. Although the State has not yet certified completion of its high priority coal reclamation, the bulk of the high priority coal reclamation has been completed. Life threatening hazards from abandoned non-coal mines have occasionally superseded the urgency posed by coal mines.

The State's inventory of un-reclaimed mines is substantial and total estimated reclamation cost of reclaiming all known mine related hazards exceeds the amount of AML funds currently available and projected to be available to New Mexico. Therefore, New Mexico continually struggles to prioritize its most important safety and environmental hazards.

New Mexico estimates that there are over 15,000 abandoned coal and non-coal mine features within the State that are in need of being addressed. In EY-2007, New Mexico AML updated its cost estimates for completing just the Priority-1, Priority-2 and Priority-3 "coal" hazards in their AMLIS inventory. No new sites were added to the inventory. By updating the estimated costs of reclaiming the abandoned coal mines in the AMLIS inventory to reflect 2007 construction prices, the costs estimate grew to approximately three times that of the original 1981 cost estimate (The NMAML Program was approved by OSM in 1981). Priority-1 & -2 estimated coal costs grew from \$5.2M to \$13.8M and for Priority-3 coal the costs grew from \$3.2M to \$12.1M. Collectively the total cost estimated to address all three priorities has grown from \$8.4M in 1981 dollars to \$25.9M in 2007 dollars.

#### **Program Staffing:**

The NMAML is under the New Mexico Mining and Minerals Division, of the New Mexico Energy, Minerals and Natural Resources Department. The NMAML is under the direction of Mr. John Kretzmann, Program Manager / P.E. All of the AML staff work out of the New

Mexico AML Office, Mining and Minerals Division, Energy and Minerals Department located at 1220 South Saint Frances Drive, Santa Fe, New Mexico, 87505, telephone (505) 476-3400.

The AML Program consists of eight (8) full time employees plus the equivalent of one additional support staff employee within the Mining and Minerals Division. The NMAML Program staffing level was nine (9) FTE's during the past 25 years. Three (3) of these positions are partially funded (cost share) by other programs within the Division. Staffing levels did not change during EY-2008. Although the funding levels have substantially increased since passage of the 2006 SMCRA Amendment, NMAML does not project any significant increase in staffing in the near future. NMAML plans to hire at least one FTE during EY-2009.

**Funding Under the 2006 SMCRA Amendment:**

SMCRA AML fee collections were due to expire on September 30, 2006. However, H.R. 6111 was approved by Congress on December 9, 2006, and thus Congress signed into law P.L. 109-432 effective December 20, 2006. P.L. 109-432 extends AML fee collection at reduced rates through FY-2021. In addition, it mandates that OSM begin full distribution of AML fees that have accumulated in each State or Tribal Share's undistributed balance. It is a rather complicated amendment to the Surface Mining Control and Reclamation Act that is difficult to interpret and understand.

To implement the amendment, OSM published a Propose Rule in the Federal Register on June 20<sup>th</sup> 2008 that solicits public comments by August 19, 2008. A final rule should be published in the Federal Register after all public comments are considered. These final rules will ultimately amend relevant part of 30 CFR Parts 700 through end.

Under the 2006 SMCRA Amendment, there are now six (6) possible OSM sources of State / Tribal AML Program funding. The availability of these funding sources varies depending upon whether or not an individual AML Program has "certified" that it's high priority coal hazards in its Abandoned Mined Land Inventory System (AMLIS) have been addressed. NMAML, is not a certified AML Program. Funding for the NMAML Program under each of the six (6) possible OSM funding sources, is explained below:

- |   |
|---|
| <p>1) <b><u>Prior Un-appropriated State / Tribal Share Balance</u></b> – As of 10/01/07, this funding source contained \$1.2 Billion nationwide. Approximately half of this money (\$600M) stemmed from the un-appropriated 50% State Share collections of currently un-certified Programs and the other half (\$600M) stemmed from the un-appropriated 50% State Share collections of currently certified Programs. As a result of the 2006 SMCRA Amendment, all of the money in this fund was reallocated to the Historic Coal Share and is to be distributed solely to uncertified Programs beginning in 2023. <i>[Because NMAML is a not a certified Program, it is eligible to receive its share of funds from this funding source via the Historic Coal Share discussed below.]</i></p> |
| <p>2) <b><u>Prior Balance Replacement</u></b> – As stated above, as of 10/01/07 approximately \$1.2 Billion existed in the Prior Un-appropriated State / Tribal Share Balance. The 2006 SMCRA Amendment matched this \$1.2 Billion with an additional \$1.2 Billion of US Treasury money. Each AML Program is entitled to exactly the same amount of money out of this fund that they were previously entitled to out</p>   |

of their Prior Un-appropriated State / Tribal Share Balance before it was reallocated to the Historic Coal Fund in October 2007. The money in this fund will be fully awarded to both certified and uncertified Programs in seven (7) equal payments over the 7-year period beginning in 2008 and extending through 2014. However, this payment is subject to a \$490M total annual cap for all approved AML Programs in the nation. Should the nationwide distribution calculations be larger than this amount, the funding will be decreased on a proportionate basis so that the total annual distribution does not exceed the \$490M cap. Certified Programs are not restricted in how this money is used, however, **uncertified Programs like New Mexico AML can only use these funds for high priority coal reclamation or to maintain an AML inventory. Thus, NMAML will receive its share of this Fund (\$21,927,511.) over a seven year period beginning in 2008 and can use these funds for any eligible project it chooses. Each year NMAML will receive approximately \$3,009,502 out of this Fund.**

3) **Annual State / Tribal Share** – This funding source consists of 50% of current AML fee collections from active coal production. Money from this Fund are distributed in the year following the year it was collected. In FY-2007 and FY-2008 NMAML received 50% of its annual fee collections from active coal mine production during each previous year. Under the 2006 SMCRA Amendment, as of 2009 only uncertified AML Programs are entitled to receive these funds. ***NMAML will continue to receive its 50% State Share Collection funds until it certifies completion of its high priority coal inventory. Under the 2006 SMCRA amendment, these funds may be used for both coal and non-coal reclamation.***

4) **State / Tribal Share Replacement** – Under the 2006 SMCRA Amendment, beginning in 2009, the portion of the State / Tribal Share fund mentioned above, that was collected from certified States or Tribes, will be matched annually with an equivalent amount of US Treasury Funds. These matching Treasury funds constitute the State / Tribal Share Replacement Fund, which is intended to replace the money, collected from active mining production in States or Tribes that have certified AML Programs, which was reallocated to Historic Coal. ***Uncertified programs like NMAML do not receive replacement funds.***

5) **Historical Coal Share Funds** –Historical Coal Share funding is reserved for uncertified Programs that still have remaining un-reclaimed high priority coal hazards. The money in this fund stem from two different sources. One is the backlog of unpaid (Unallocated State / Tribal Share Balance) 50% State / Tribal Share collections that was reallocated to the Historic Coal Share Fund in 2007. The second is the current annual collections from the 50% State / Tribal Share of both certified and uncertified Programs, that is reallocated annually to the Historical Coal Share Fund. Both of these reallocations are prescribed by the 2006 SMCRA Amendment in order to increase the amount of funding available to uncertified AML Programs to address high priority coal reclamation hazards in their AMLIS inventory. However, money in this fund may be used to address both high priority coal and non-coal hazards. ***NMAML has not certified, so it is eligible to receive Historical Coal Share funding. Under the 2006 SMCRA amendment, these funds may be used for either coal or non-coal purposes.***

**6) Minimum Program Makeup Funding** – Minimum Program funding has always been reserved exclusively for uncertified Programs. Prior to the 2006 SMCRA Amendment, SMCRA set the minimum level of funding for uncertified Programs at \$2.0M. For various reasons, Congressional appropriations only allowed OSM to bring the minimum level of funding for uncertified Programs up to \$1.5M. The 2006 SMCRA amendment specifically raised the minimum program funding level to a mandatory \$3.0M per year, but made it subject to a four year phase-in period (2008 to 2011). Under the new Law, these funds will come from the Secretary’s 50% Federal Share of annual fee collections. These funds are no longer subject to Congressional appropriation, therefore, neither the Congressional budget nor OSM can limit or decrease the minimum program funding level from the mandatory \$3M level set by the new Law. *Because NMAML has not certified, it is eligible to receive Minimum Program Makeup funding in the amount necessary to bring its annual funding level up to \$3M. [See 402(g)(8)(A)]. From 2008 through 2014, annual NMAML funding from the six possible OSM funding sources is projected to exceed \$3M, pre-empting its eligibility for receiving Minimum Program Makeup funding. However, from 2015 through 2022, NMAML funding from these sources is projected to be approximately \$2M, thus NMAML will then qualify for approximately \$1M annually of Minimum Program Makeup funding, provided that it has not already certified. It is unlikely that NMAML will not have certified by 2015 or shortly thereafter. Thus, it is unlikely that NMAML will receive much if any Minimum Program Makeup funding.*

OSM has prepared preliminary funding estimates for existing AML programs. The table below shows the most recent funding projection for New Mexico over the next fifteen years from all funding sources.

Projected Funding Levels for NMAML by Year\* (in millions)

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
\$4.0	\$4.3	\$5.0	\$4.7	\$5.2	\$5.2	\$5.0	\$1.9	\$1.9	\$1.9	\$2.2	\$2.2	\$1.9	\$1.9	\$1.9	\$49.2

\* These figures do not include deobligated funds from previous grants that may be applied for.

**Status of Fee Collections and Fund Distributions Relative to the AMLIS Inventory:**

Cumulative State-share distributions as of September 30, 2007 to New Mexico, via construction and administration grants, totals \$37,224,658. In EY-2008, NMAML also requested deobligated funds from previous grants. Therefore, 2008 funding exceeded the amount shown in the table above. With the de-obligated funds, total funding for EY-2008 was \$5.2 million, bringing the total cumulative distribution to NMAML since the Program began to \$42,424,658. With its cumulative funding to date, the Energy, Minerals and Natural Resources Department has overseen the closure of over 4,000 mine openings and the remediation of hundreds of acres of mine waste (see the New Mexico EMNRD web site at [www.emnrd.state.nm.us](http://www.emnrd.state.nm.us) for further information). New Mexico estimates that about 15,000 (coal and non-coal) mine related hazards still exist on the State’s 800 abandoned mine sites that have yet to be reclaimed.

Based on the cost estimates reflected in OSM’s AMLIS database as of August 2007, New Mexico has completed \$12.5 million in high priority-1 and -2 coal problems. New Mexico AML has also completed \$3.5 million worth of priority-3 coal & non-coal problems in its inventory.



Altogether, the State’s AML Program has claim to **\$19,310,907** worth of completed mine reclamation work since the Program began in 1981 (See Table-2, page 22). This figure represents actual on the ground construction costs and does not include the cost of project development, so actual costs are somewhat higher.

In EY-2007, New Mexico updated its cost estimates for existing unreclaimed hazards in its AMLIS inventory of Priority-1, -2, and -3 coal hazards. The updated cost estimate reveals that New Mexico has \$12 million worth of unreclaimed priority-3 coal hazards remaining and \$14 million worth of unreclaimed high priority (priority-1 and -2) coal hazards remaining. The 15-year funding table above shows that projected funding levels for NMAML over the next six years (2009 thru 2014), will be substantially higher than that of subsequent years (2015 thru 2022). In fact, NMAML will receive \$29.4M in funding over the next six years.

In the past, NMAML budgeted 75% of its total annual funding for construction and 25% to program administration and project development. NMAML also uses equal amounts of its construction budget for coal and non-coal projects.

If over the next six years NMAML continues to devote 75% of its annual funding to construction costs, with half of that amount going to high priority coal reclamation, NMAML will spend approximately \$11M on coal related projects. Because there is \$14M worth of high priority coal hazards exist in the State, OSM estimates that NMAML will likely certify completion of its high priority coal around 2015 or shortly thereafter. Of course, this is just an estimate of how things will occur, actual certification may occur earlier or later than projected. Should NMAML not be certified by 2015, it will be eligible to receive Minimum Program Makeup funds.

**Grants and Financial Information:**

The following AML grants were active during the evaluation period:

<b>Grant Number</b>	<b>Grant Period*</b>	<b>Amount</b>
<b>GR507350</b>	07/01/05 to 06/30/08	\$1,637,421.
<b>S06AP12062</b>	07/01/06 to 06/30/09	\$2,998,187.
<b>S07AP12403</b>	07/01/07 to 06/30/10	\$1,500,000.

\* Construction grants are awarded for a three-year period.

**PART II. PROGRAM ACCOMPLISHMENTS**

**Protection of Bats / Habitat:**

The NMAML continues to make a dedicated effort to identify and protect bat populations that use abandoned mines for habitat. New Mexico AML installs bat gates and bat cupolas as necessary to provide for bat access while restricting public access (see photos in the Appendix to this report). Designs have included access panels for follow-up studies on the effectiveness of the bat-compatible closures and access by owls and small mammals has been incorporated into recent designs. In addition, the Program has contracted out Bat studies to the University of New Mexico. This year NMAML installed several bat compatible closures at the Lake Valley Phase

II reclamation safeguard project, including bat cupolas and high strength steel mesh closures. The underground mine workings at the Lake Valley phase II project contain significant bat populations and the mine workings provide excellent bat habitat. The engineering designs for the Lake Valley Phase II project took great pains to preserve the bat population(s) and protect their habitat.

#### **Technical Information Processing & Technology Transfer Activities:**

OSM Western Region's Technical Innovation and Professional Services (TIPS) supported the State of New Mexico during EY-2008 by providing software upgrades, and submitting requests for hardware and equipment.

NMAML continues to be on the western forefront in GIS. The State borrowed the TIPS Western Region RTK unit, GPS-enabled camera, and the thermal imaging camera for use in both SMCRA Title-V permitting and Title-IV AML work. The State also attended vendor training for using the RTK unit.

Two members of the NMAML staff attended the OSM-Western Region's annual Technical Transfer meeting in 2008 and continue to provide insight to the OSM's Technical Transfer efforts.

#### **Project Approvals:**

The OSM-AAO reviewed grant applications, grant close out reports and project packages submitted for funding. OSM issued Findings of No Significant Impact (FONSI) and Authorizations to Proceed (ATP) for all projects submitted by NMAML during the evaluation period. During EY-2008, New Mexico submitted NEPA packages and OSM issued Findings of No Significant Impact (FONSI) and Authorizations to Proceed (ATP) for the Jones Mine and the Bradley Group Reclamation Projects. NEPA documents prepared and submitted by the NMAML for OSM review and approval during EY-2008 were of excellent quality. Both submissions were found to be complete and adequately addressed all NEPA requirements.

#### **Overall Program Accomplishments to Date:**

In 2004 OSM revised its 12 month oversight evaluation period to begin on July 1<sup>st</sup> of every year rather than on October 1<sup>st</sup>. The new 12 month evaluation period splits the summer construction period in half. This makes reporting of annual accomplishments difficult and makes it almost impossible to have AMLIS data for the current year available by the end of the evaluation period. For example, any projects completed after July 1<sup>st</sup> would not be reported until the following evaluation period.

NMAML did not report any fatalities to OSM during EY-2008. However, New Mexico has experienced eight (8) abandoned mine related fatalities in the last 40 years and numerous AML related injuries (many of which likely go unreported). Past fatalities have placed a lot of public attention and political emphasis on the NMAML Program which forced the NMAML Program to focus attention on several non-coal sites. This caused NMAML to readjust the priority level of several sites that it previously considered to be remotely located from public access. Increased off-road recreational vehicle use has caused the SMCRA priority to be revisited for several sites in the NMAML inventory.

Following is a summary of the reclamation projects performed by NMAML since 2004:

**2004-2005:** The 2004-2005 construction season added Abbe Springs (copper), Sugarite Phase IV (coal), Cerrillos South (coal), Bogg Canyon (noncoal) and Spar Group (noncoal). In addition, some small maintenance projects were completed at Fluorite Ridge and Lordsburg.

**2005-2006:** The 2005-2006 construction season added Lake Valley Phase I (noncoal), Lumberton (coal), Sugarite-Phase V (coal), Yankee Vukonich (coal), Gold Hill (noncoal), La Madera (noncoal) and Manhattan Mine Maintenance Project (noncoal).

**2006-2007:** The 2006-2007 construction season added Lake Valley Phase-II (noncoal), Bayard-Niblett Mine Safeguard Project (non-coal), Granite Gap Mine Safeguard Project (non-coal), Madrid North Mine Safeguard Project, Clum Mine Maintenance Project (non-coal), and the Lordsburg Mine Maintenance Project (non-coal project that did not start construction during EY-2007)

**2007-2008:** The 2007-2008 construction season continued construction on the Lake Valley Phase-II (non-coal) project.

The NMAML Program was approved in June, 1981. As of June 2008, NMAML has been in operation for 27 years. In that time it has completed over 168 AML reclamation projects and has closed or safeguarded over than 3,190 hazardous mine features. Among these were some of the most hazardous features in the State. Although many serious hazards still exist, certainly lives have been saved and injuries prevented because of this work.

Substantial environmental degradation is typically associated with abandoned mines. The more than 168 reclamation projects completed as of July 2008 have certainly had a positive environmental effect on the State. These positive environmental effects can be measured in terms of protection of cultural and historic property, wildlife enhancement and protection of habitat, revegetation and associated decreases in erosion, improvements in water quality, improvements in air quality and overall a discernable improvement in the quality of life for the citizens of New Mexico.

A lot of work remains to be done, with regard to abandoned coal and non-coal mines. NMAML is caught in a dilemma in which the SMCRA places its main emphasis on the reclamation of high priority coal hazards, whereas most of the worst abandoned mine hazards in the State exist on abandoned non-coal mines. SMCRA funding under the 2006 SMCRA Amendment further restricts NMAML's ability to concentrate on non-coal hazards until all high priority coal hazards are eliminated. Both OSM and NMAML must deal with this reality. SMCRA is a national law and as such it is not always well suited to address the specific circumstances of individual States. Such is the case with New Mexico. Although NMAML can fund some non-coal AML projects, it must focus much of its funding on addressing coal related AML projects.

#### **Summary of EY-2008 Projects:**

The following tables list projects that were either completed or in some phase of project development during EY-2008. Project development means site characterization, obtaining

biological, archaeological or cultural / historic clearances for National Environmental Policy Act (NEPA) compliance and project design engineering & contract designs / specifications.

**AML Projects in Project Development during EY-2008:**

1	Orogrande Ph. II Mine Safeguard (non-coal)	Under Construction
2	Lake Valley Ph. III Mine Safeguard (non-coal)	Under Construction
3	Sugarite Ph. VI Gob Reclamation (maintenance) (coal)	Under Construction
4	Zuni 21 Mine Safeguard (non-coal)	Construction completed Fall of 2007, AML-USFS partnering project, 21 mine features were safeguarded.
5	Boston Hill Phase II (non-coal)	Preliminary reconnaissance
6	Bradley Mine Safeguard (non-coal)	Engineering design underway
7	Burro Peak Mine Safeguard (non-coal)	Resolving ROE issues, Preliminary NEPA
8	Caballo Mountains Mine Safeguard (non-coal)	Preliminary reconnaissance
9	Carbonate Hill Mine Safeguard (non-coal)	Engineering design complete, planning to bid Fall 2008 or Spring of 2009
10	Carrizalillo Hills Mine Safeguard (non-coal)	Preliminary reconnaissance, partnering with BLM
11	Carthage Gob Reseeding (coal)	Design completed.
12	Cerrillos Central Mt. Mine Safeguard Project (non-coal)	Archaeological report in progress
13	Cooke's Peak Mine Safeguard (non-coal)	Preliminary reconnaissance, partnering with BLM
14	Fluorite Ridge Maintenance (non-coal)	Complete Design
15	Gallup area projects (coal)	Preliminary reconnaissance and mapping
16	Gila USFS Mine Safeguard (non-coal)	NEPA underway, AML-USFS partnering project
17	Harding Pegmatite Mine Safeguard (non-coal)	Preliminary reconnaissance
18	Hatch Mine Safeguard (non-coal)	Preliminary reconnaissance
19	Hatchita Mine Safeguard (non-coal)	Preliminary reconnaissance, partnering with BLM
20	Jones Coal Mine (coal)	NEPA complete, Engineering design underway
21	Kingston Mine Safeguard (non-coal)	Preliminary reconnaissance
22	Kingston Mine USFS Safeguard (non-coal)	NEPA underway, AML-USFS partnering project
23	Lake Valley Ph.-IV Mine Safeguard (non-coal)	Preliminary engineering design complete; planning to bid out project in EY-2009
24	La Ventana Maintenance (coal)	Construction contract awaiting approval
25	Madrid Planning Coal (coal)	Beginning community planning efforts to address coal related problems
26	Organ Maintenance (non-coal)	Engineering design underway
27	Oscura Maintenance (coal)	Reconnaissance
28	Petaca USFS Mine Safeguard (non-coal)	NEPA, AML-USFS partnering project
29	Poison Canyon Uranium Project (non-coal)	Preliminary reconnaissance and mapping
30	Real de Cerrillos Maintenance (non-coal)	Preliminary design phase
31	Rogersville Coal Reclamation (coal)	Archaeological clearance received; NEPA underway
32	Socorro West Maintenance	Engineering design underway
33	Sugarite Phase VII Gob Reclamation Maintenance (coal)	Engineering design underway
34	Vermejo Park Reclamation Projects (coal), Multiple phases	Archaeological report in progress. Engineering design contract in progress
35	Water Canyon Maintenance (non-coal)	Engineering design underway
36	Waterflow-II Gob Reclamation (coal)	Dropped due to right-of-entry issues
37	Yankee-Vukonich Maintenance (coal)	Entering into design/construction contract

### **PART III. RESULTS OF ENHANCEMENT AND PERFORMANCE REVIEWS**

OSM-AAO and NMAML have agreed that the oversight work plan by default will annually evaluate the following two topics or principles for annual review unless a special program area is identified by OSM for nationwide evaluation:

**Principle 1:** On-the-ground reclamation is achieved in a timely, cost-effective manner.

**Principle 2:** Progress in completing AMLIS Accomplishments

The goal of these two principles is to document on-the-ground reclamation work accomplishments in terms of quality and quantity relative to its inventory of mine hazards.

In evaluating Principle 1, NMAML and OSM-AAO inspected reclamation sites, grants files, NEPA Documents, and contract specification documents. This year the AAO conducted site inspections of the Lake Valley (noncoal) and the Sugarite Phase VI coal gob stabilization project. NMAML also completed a small coal reclamation project near Cuba, New Mexico this year which OSM did not inspect.

Representatives from the NMAML Program sponsored and led AAO on the site inspection tours. No problems were identified as result of the EY-2008 oversight inspections.

The NMAML staff and management maintained ongoing communication with OSM as needed throughout the evaluation period and partnered effectively with other members of the Southwest AML Partnership. Their partnership has been leading an effort to address mining related concerns in Navajo communities that lie within the State's jurisdictional area.

There are no performance standards for AML reclamation set forth in SMCRA. OSM inspects field reclamation and may occasionally offer suggestions or recommendations. The NMAML Program design engineer / Program Manager prepared detailed designs & contract specifications for all projects. No outside design consultants were hired or contracted. The internal design engineering together with New Mexico's contract bidding procedures, ensure that high quality and cost effective reclamation is routinely achieved.

#### **Principle No. 1 - On-the-ground reclamation –quality, accomplishments and cost-effectiveness.**

Inspections of Lake Valley Phase II (non-coal) and Sugarite Phase VI (coal) projects, determined that reclamation work accomplished by the NMAML, provides effective safeguards to the public from mine related hazards. All reclamation sites inspected by OSM demonstrated that physical mine hazards posing a danger to people and wildlife were effectively eliminated.

Revegetation efforts were in place to not only control erosion but also seed mixes were designed to enhance and protect threatened or endangered wildlife as well as non-threatened species. The reclamation completed in the southern part of the State were in very dry desert conditions so

limited revegetation efforts were performed there including surface roughening and pitting of surface areas followed by application of fertilizer and native seed.

This finding is consistent with past oversight evaluations that concluded that reclamation work accomplished by NMAML is of excellent quality and environmentally sound. All NEPA documents reviewed were well written, concise, and appropriately addressed all environmental concerns to the satisfaction of OSM-AAO. FONSI's and ATPs were issued without delay for all project packages submitted to OSM-AAO for approval and funding.

**La Ventana Phase II Reclamation & Safeguard Project:**

During EY-2008 NMAML completed this small project. With this project NMAML safeguarded seven (7) coal mine subsidence features located near La Ventana, south of Cuba, in Valencia County, New Mexico. The project involved removing approximately 2,000 cubic yards of waste material and using it to backfill seven subsidence holes. These holes have nearly vertical sides and constitute a public hazard. (See photos in the appendix to this report.) During reclamation, the site was properly graded, followed by extreme roughening to accommodate seeding and to facilitate germination by holding small quantities of water. This practice has proven useful in the desert southwest. The project area encompasses approximately 3.5 acres of private land. The project was completed by December 2007 for a cost of \$6,620.

**Lake Valley Mine Safeguard Project (near completion):**

This is the main project completed by NMAML during EY-2008. It is a huge project and was undertaken in phases. This year's construction work is referred to as Phase II. It consists of 50 vertical openings, sixteen (16) portals, one (1) hazardous equipment removal, and two (2) dangerous highwalls. All of these mine features are littered over about 20 acres of land. Most of these features constitute hazardous mine openings. The cost of the project was \$671,322.

The underground workings were investigated under contract to Dr. Scott Altenbach with University of New Mexico to do the underground mine mapping and the reconnaissance / inventory of the bat populations within the workings. The mine workings are home to a variety of bat species and they have proper airflow conditions to serve as a maternity habitat. Also superimposed upon this project site are several cultural & historic and biological avoidance areas. Some of the avoidance areas are protected mining equipment and buildings that are being preserved as part of the areas generous mining history.

This project site was inspected by OSM in July 2008, following the end of the evaluation period. The project was nearing completion at the time of inspection. A representative from NMAML lead the inspection tour of the site and provided essential information regarding the project and the scope of work. The contractor was on site during the inspection. Some drainage upgrades, final roughening and seeding were taking place at the time of the inspection.

Safeguarding of all of the mine shafts and adits had been finished by either of the following methods: 1) backfilling, installation of high strength steel mesh that served to preserve the air movement characteristics of the underground mine shafts essential to the un-natural (man made) bat habitat; 2) installation of bat compatible closures consisting of either bat cupolas or bat gates that provide for ingress and egress by bats as well as small mammals.

An unusual engineering feature that predominates over the on site reclamation work are numerous steel culverts that are inserted deep into several of the mine features and which open to the surface. These culverts serve several purposes. They preserve the integrity of the adits or shafts while at the same time serve to provide a fixed safeguard that can withstand both natural assaults from wind and weather as well as human intervention. They sufficiently stabilize the entry points to various mine features, some of them are designed to allow authorized personnel to enter if necessary and/or access by small mammals. All of the culvert closures are designed to preserve air flow within the underground workings and access to the underground workings by bats.

The engineering designs required for the numerous and various features within this project were substantial. Almost every feature required specialized or unique designs due to size, stability and grade. Clearly, this project was taxing to everyone involved from the design phase through contract execution and monitoring. Special attention was given to ensure that the closures and cupolas would blend into the surrounding landscape with regard to placement and color. Finally, the project took special pains to ensure that bat populations, species and habit were clearly studied to decipher between those aspects of the underground workings that were essential to the bat populations and habitat versus those that could be permanently sealed off. OSM appreciates the expense and effort that the State went through to design and construct this mine safeguard project in a manner that preserves bat populations that reside within these underground workings. NMAML could have easily just backfilled the entire area for much less expense and effort with a devastating impact upon these substantive bat colonies. See photographs of the Lake Valley Project in the Appendix to this report.

### **Sugarite Gob Stabilization and Yankee-Vukonich Coal Reclamation Projects:**

NMAML sponsored a Southwest AML Partnership meeting in July 2007. In conjunction with a field tour for the Partnership, OSM was able to visit two coal reclamation sites in the Raton, New Mexico Area. These are the Sugarite Project and the Yankee-Vukonich Projects as discussed below.

#### **1. Sugarite Gob Stabilization / Reclamation Project (Phases IV and V):**

The multi-phase Sugarite AML Project is located just east of Raton, New Mexico within the Sugarite State Park. Huge volumes of coal gob (piles) exist at this site. Much of this material has been eroding into Chicorica Creek since the mine site was abandoned. The creek is situated right at the toe or base of the gob piles. Because the gob contains materials that are toxic to plants, little vegetation was previously growing on the gob piles and rainfall runoff resulted in huge gullies throughout the face of the gob piles. The volume of the gob piles is so large that hauling of gob to relocate the pile is not an option for reclamation. Also, the State Historic Preservation Division will not allow removal of the gob waste.

The AML Program has been working to stabilize the gob piles in place. Another goal of the project is to improve the safety of the visitors to the park. There are several gob piles on both sides of the steeply sloping canyon. The project has been ongoing since 1998 and is being done in phases. Each phase addresses stages of reclamation work and



different gob piles located in the canyon. The AML Program recently received the OSM Western Regional AML Reclamation award and the Peoples Choice Award in 2002, for this project.

Phases IV and V of the project are on the west side of the canyon with east facing slopes. These are the phases of the project that we saw during the Southwest Partnership tour.

Following the tour, OSM accompanied the Program Manager / Engineer on a hike over the east side of the canyon to look at the site of the earliest reclamation work done in Sugarite as Phases I and II. NMAML had evaluated this site for maintenance, using the experience gained at later phases of work, most particularly on the development of effective techniques to re-vegetate very steep slopes between 1.5:1 and 0.75:1. Also the need to incorporate amendments into the flatter slopes in order for seeding to be effective had become clear to NMAML in subsequent work. This maintenance will require an additional phase of the project (currently under construction as Phase VI of the work).

One interesting facet of the reclamation approach used at all Sugarite work sites is that it incorporates erosion as part of the stabilization process – eroded material is being trapped by branch packing in the deep gullies on the gob sites to keep the gob material on site, to partially fill the gullies and to provide soil that hopefully over time will become vegetated on its own to stabilize the gullies. Overall, the reclamation technology being applied at the Sugarite sites is proving to be effective. Branch-packing and sediment logs in the erosion channels, straw bale and coir roll terraces on the slopes, and the overall revegetation of the site is proving to be even more effective than when the site was last visited. Looking across the canyon from the east side to the west, the reclaimed (stabilized) slopes were thick with vegetative cover (grasses, shrubs and trees) and it will only be a few more seasons before it will be difficult to differentiate the reclaimed areas from the natural mountain side.

## 2. Yankee-Vukonich Coal Reclamation Project:

This coal reclamation project is in a canyon approximately three miles northeast of the Sugarite Project in northern New Mexico (approximately 8 miles east of Raton). Six coal piles (2.9 acres) were stabilized and two small mine openings (adits) were closed by the project in 2004. The survival rate for the seedlings was estimated to be at about 77% survival rate after six months. Overall, 5.6 acres were reclaimed by the project in two phases, the second phase involved the relocation of the road and stream channel reconstruction of a segment of an unnamed tributary to Yankee Creek (which feeds into Chicorica Creek and ultimately into the Canadian River).

The abandoned mine site was originally littered with mining debris. The debris was also cleaned up as part of the reclamation work. Approximately ¼-mile of arroyo that contained coal mine waste material was reclaimed and a roadway was relocated in certain locations next to the channel. The existing drainage pattern was damaged by past mining so New Mexico AML restored the natural sinuosity of the channel. In addition, steep slopes surrounding the channel were stabilized and revegetated. Construction on the stream channel and access road started in May 2005 and was completed in August 2005.

The reclaimed stream channel incorporated geomorphic channel design methods. Vegetation is coming in quite well due to lots of rainfall and use of specialized planting techniques. The side slopes of the stream channel were covered with grass over one foot tall. Very little erosion of the stream channel was visible. The geomorphic stream channel reclamation was quite successful overall. The landowner was present on site and he was very happy with the final product.

The project involved reshaping of waste piles, construction of straw bale terraces, coir roll terraces, and coir roll terraces with live brush layers; installation of straw wattles, shade and stabilization fabric fences, branch packing in gullies, and a rock rundown channel; restoration of 1200 feet of an ephemeral stream, relocation of a road, incorporation of soil amendments, planting of native seedlings and hydro-seeding with native species. The entire project was inundated with protected historical resources and associated avoidance areas, which together with protection of the stream from pollutants during construction, made the reclamation work difficult to access with heavy equipment.

This NMAML project was selected by OSM-HQ in EY-2008 to receive a national award for its innovative design, stream channel reconstruction and inherently difficult reclamation conditions.

## **Principle No. 2 – Accomplishments under the AMLIS inventory.**

AMLIS accomplishments during EY-2008 are reflected below in Tables-1 and Table-2 of Part IV of this report. Accomplishments specifically for EY-2008 are in bold blue print. The main items addressed from a hazard standpoint include 71 vertical openings, 16 portals, 5 dangerous piles, 2 dangerous highwalls, 1 hazardous equipment removal and 7 subsidence holes. Also, there were two (2) other dangerous piles at the Sugarite Project that OSM erroneously did not include in Table-1 and Table-2 of last years annual evaluation report, that are now included in this report. Although the two dangerous piles were not counted in the tally for last year's report, they were substantial in that the total cost of addressing them was over half a million dollars (\$538,897).

The Sugarite AML Reclamation project is an in-place coal gob stabilization project. It has had several phases of construction and most of the work was done by hand rather than with heavy equipment. This has been an expensive project but much less expensive than it would be to try to transport such huge volumes of gob material. Over \$2.75M has been spent in total at the Sugarite site. Also, there is no good disposal area for such material nor would the State Park allow it. There are no good categories or key words in AMLIS to capture this workload or expense which consists of "in-place" stabilization of coal gob piles and establishment of drainage on the piles.

New Mexico has completed over \$19.3 M (see table) worth of AMLIS related construction work. This amount does not include the project development work done by NMAML in-house, which substantially increases the overall cost. NMAML pays for its project development costs out of its program administration budget not its construction budget. One of the things that NMAML does to be cost effective is that its project development costs are not tracked on a project by project basis and almost everything except for bat studies are done in-house.

Without a doubt, NMAML has continued to make significant strides with regard to its AMLIS coal inventory. Some years the Program dedicates more time or project funds to coal than other years, however the Program is always able to keep projects in the pipeline and make significant accomplishments. The costs associated with coal and non-coal construction have been about evenly divided in the past. The Program's staffing is small relative to the amount of work completed annually. NMAML is given a high score for its AMLIS accomplishments during EY-2008.

## **PART IV. AML INVENTORY STATUS & NEW MEXICO'S NEW IN-HOUSE DATABASE**

Because very little surface coal mining occurred in the State prior to SMCRA, most reclamation work involves the reclamation of underground mine hazards. Although the acreage associated with underground mining is small relative to surface mining, the numbers of hazards encountered are high and the danger associated with these hazards is extreme.

The AMLIS database contains an inventory of priority-1, -2, and -3 hazards associated with

abandoned coal mines and a list of non-coal abandoned mines that have been funded (or completed). The table for 2008 also includes two dangerous piles that were reclaimed in EY-2007 but were omitted by OSM in the EY-2007 annual evaluation report, this correction brings the table fully up to date. The following tables show AMLIS accomplishments for EY-2008 and cumulative accomplishments to date as of the end of EY-2008.

**Table 1**  
**New Mexico AML Reclamation Program**  
**EY-2008 Accomplishments**

<b>Problem Type and Description</b>	<b>Completed EY-2008</b>	<b>Costs</b>
Benchs	0.0 acres	\$0.
Clogged Stream Lands	0.0 miles	<b>\$0.</b>
Dangerous Highwalls	<b>2 (count)</b>	<b>\$12,680.</b>
Dangerous Impoundments	0 (count)	\$0.
Dangerous Piles & Embankments	<b>7 (count)</b>	<b>\$1,150,820</b>
Dangerous Slides	0 acres	\$0.
EF-Equipment/Facilities	0 (count)	\$0.
Gasses: Hazardous / Explosive	0 (count)	\$0.
Gob (coal piles)	<b>1.0 acres</b>	<b>\$122,385.</b>
Highwalls	0 feet	\$0.
Hazardous Equipment & Facilities	<b>1 (count)</b>	<b>\$4,570.</b>
Haul Roads	<b>1.0 acres</b>	<b>\$122,385.</b>
Industrial/Residential Waste	0 acres	\$0.
Mine Openings	0 (count)	\$0.
Other	0 (count)	\$0.
Portals	<b>16 (count)</b>	<b>\$204,281.</b>
Pits	0.0 acres	\$0.
Polluted Water: Agric. & Indust.	0 (count)	\$0.
Subsidence	<b>0.25 acres</b>	<b>\$7,141.</b>
Spoil Areas	0 acres	\$0.
Surface Burning	0.0 acres	\$0.
Slurry	0.0 acres	\$0.
Underground Mine Fires	0.0 acres	\$0.
Vertical Openings	<b>71 (count)</b>	<b>\$493,135.</b>
Water Problems	0 (count)	\$0.
<b>NEW MEXICO TOTAL COSTS</b>		<b>\$2,117,397.00</b>

**Note:** This table is based on a Problem Type Unit and Cost Detail Report from the Abandoned Mine Land Inventory System. Neither AMLIS nor this table contains an inventory of un-reclaimed non-coal hazards.

**Table 2**  
**New Mexico Abandoned Mine Reclamation Program**  
**“Cumulative” AML Reclamation Accomplishments as of June 30, 2008**

<b>Problem Type and Description</b>	<b>Completed to Date</b>	<b>Costs</b>
Benches	3.0 acres	\$7,301.
Clogged Stream Lands	2.0 miles	\$532,364.
Dangerous Highwalls	2 (count)	\$47,780.
Dangerous Impoundments	0 (count)	\$0.
Dangerous Piles & Embankments	15.5 acres	\$1,519,720.
Dangerous Slides	0 acres	\$0.
EF-Equipment/Facilities	12 (count)	\$31,635.
Gasses: Hazardous / Explosive	0 (count)	\$56,563.
Gobs	125.0 acres	\$3,545,750.
Highwalls	0 feet	\$0.
Hazardous Equipment & Facilities	18 (count)	\$124,037.
Haul Roads	8.0 acres	\$188,684.
Hazardous Water Bodies	0.0 acres	\$0.
Industrial/Residential Waste	0 acres	\$0.
Mine Openings	4 (count)	\$122,140.
Other	0 (count)	\$163,052.
Portals	519 (count)	\$2,379,549.
Pits	2.0 acres	\$3,890.
Polluted Water: Agric. & Industrial	4 (count)	\$13,400.
Polluted Water: Human Consumption	1 (count)	\$34,710.
Subsidence	36.85 acres	\$4,624,785.
Spoil Areas	260.0 acres	\$134,910.
Surface Burning	35.0 acres	\$760,406.
Slurry	2.0 acres	\$421,782.
Underground Mine Fires	168.0 acres	\$234,983.
Vertical Openings	878 (count)	\$4,363,466.
Water Problems	0 (gal./min.)	\$0.
<b>NEW MEXICO TOTAL COSTS</b>		<b>\$19,310,907.00</b>

**Note:** This table is based on a Problem Type Unit and Cost Detail Report from the Abandoned Mine Land Inventory System. Neither AMLIS nor this table contains an inventory of un-reclaimed non-coal hazards. Non-coal hazards in New Mexico are not all inventoried in AMLIS. New Mexico AML estimates that an additional 2,000 un-reclaimed portals and 14,000 vertical openings exist in New Mexico that still require safeguarding (hazard abatement / reclamation).

## **PART V. Summary and Recommendations:**

OSM-AAO views the NMAML as a State partner in meeting mutual environmental goals and challenges. The Program has always been willing to provide assistance to other State and Tribal Programs and has established a cooperative, productive relationship with OSM. The NMAML is an active member of the Southwest AML Partnership which functions to assist, educate and share resources in an effort to accomplish more with their limited AML funds.

The 2006 SMCRA amendment substantially increased the annual funding that the Program will receive during the next six years, after that funding will be near past funding levels. The increased level of funding will place larger demands upon the Program to plan, develop and construct projects, however, the six year time frame which the increased funding level will last is not sufficient to justify significant increases in staffing. OSM is confident that NMAML can make good use of the improved funding levels and that it can handle the increased workload associated with this level of funding. OSM also believes that this increase in funding will shorten the time it takes the Program to achieve certification.

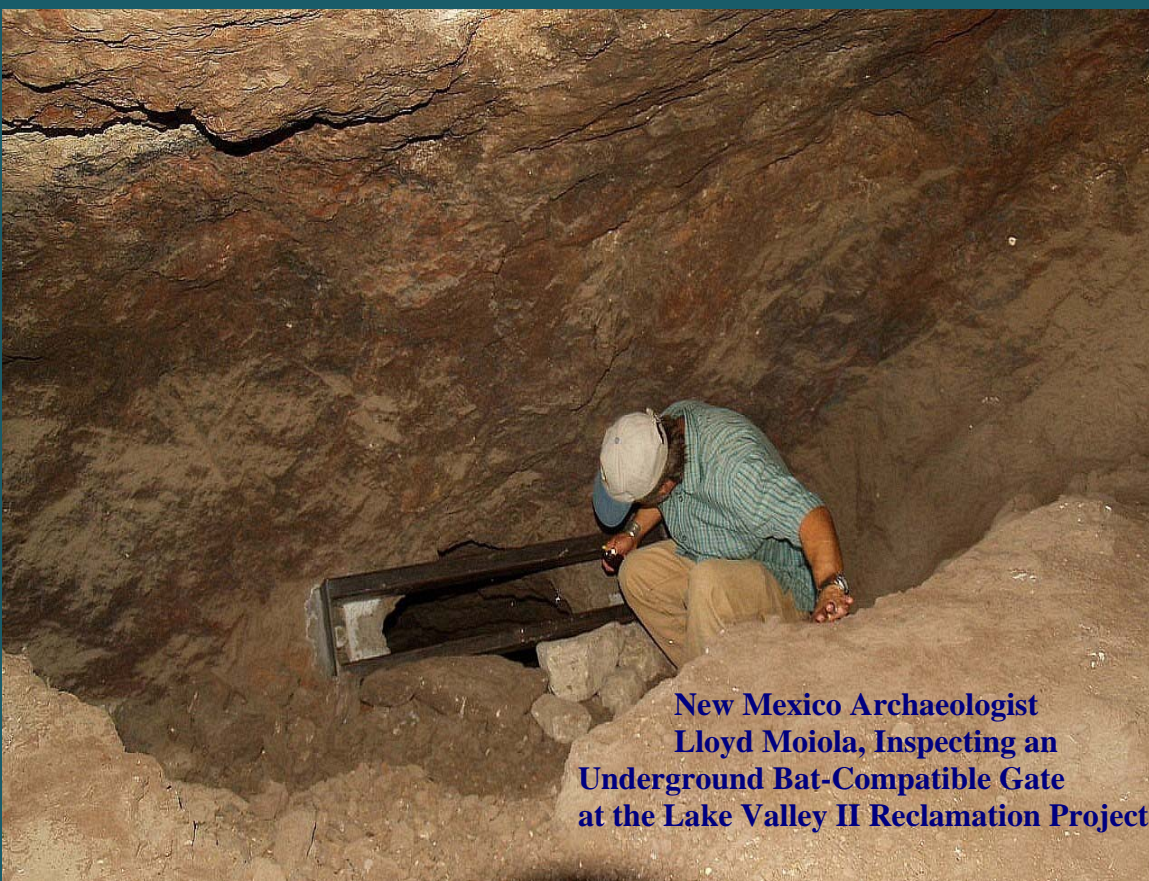
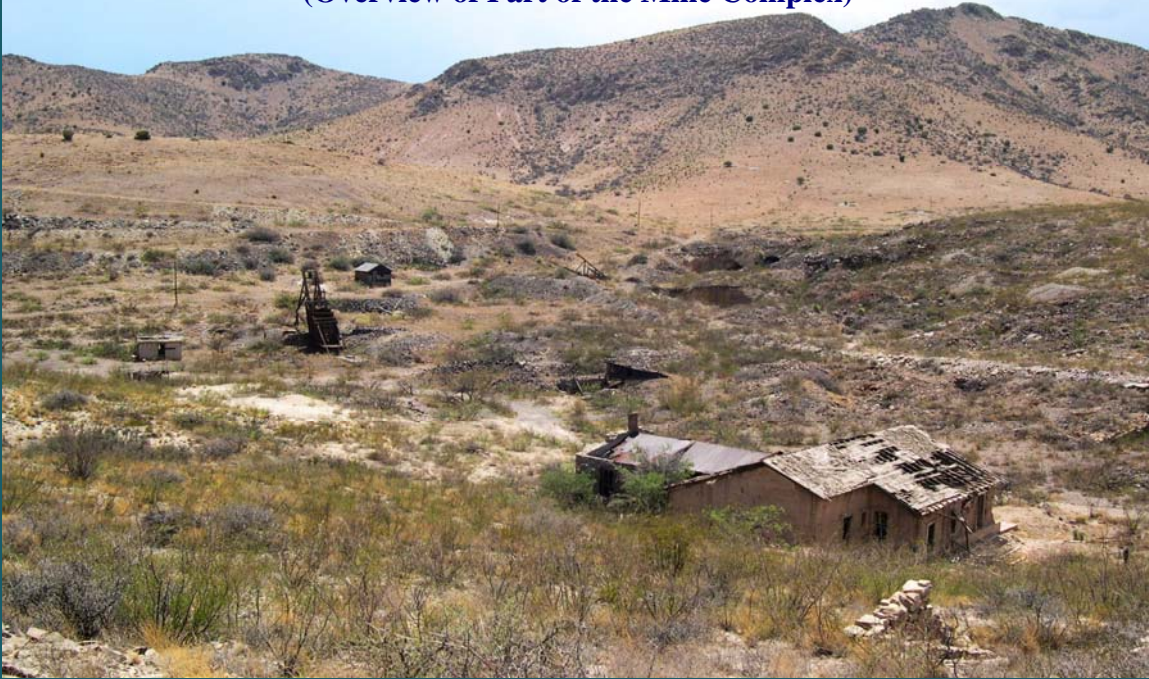
OSM considers the NMAML to be an exemplary Program. OSM's review determined that the NMAML is doing excellent reclamation and safeguarding work. In fact, NMAML received another national OSM award during this evaluation period for the innovative reclamation work done at the Yankee Vukonich project located in the mountains just east of Raton, New Mexico. The NMAML consistently makes cost-effective use of its AML funds while achieving quality reclamation. Attention is paid to details, contractors are required to fulfill all contract specifications in the field, and NEPA compliance is fully satisfied both prior to construction and avoidances areas are routinely observed.

In conclusion, all reclamation work is of high quality, timely, and consistent with contract specifications. OSM has no recommendations or criticism to offer the NMAML.

It should be mentioned that OSM appreciates that NMAML continues to work down its inventory of high priority coal hazards within the State and that the Program continually strives for excellence in its reclamation work.

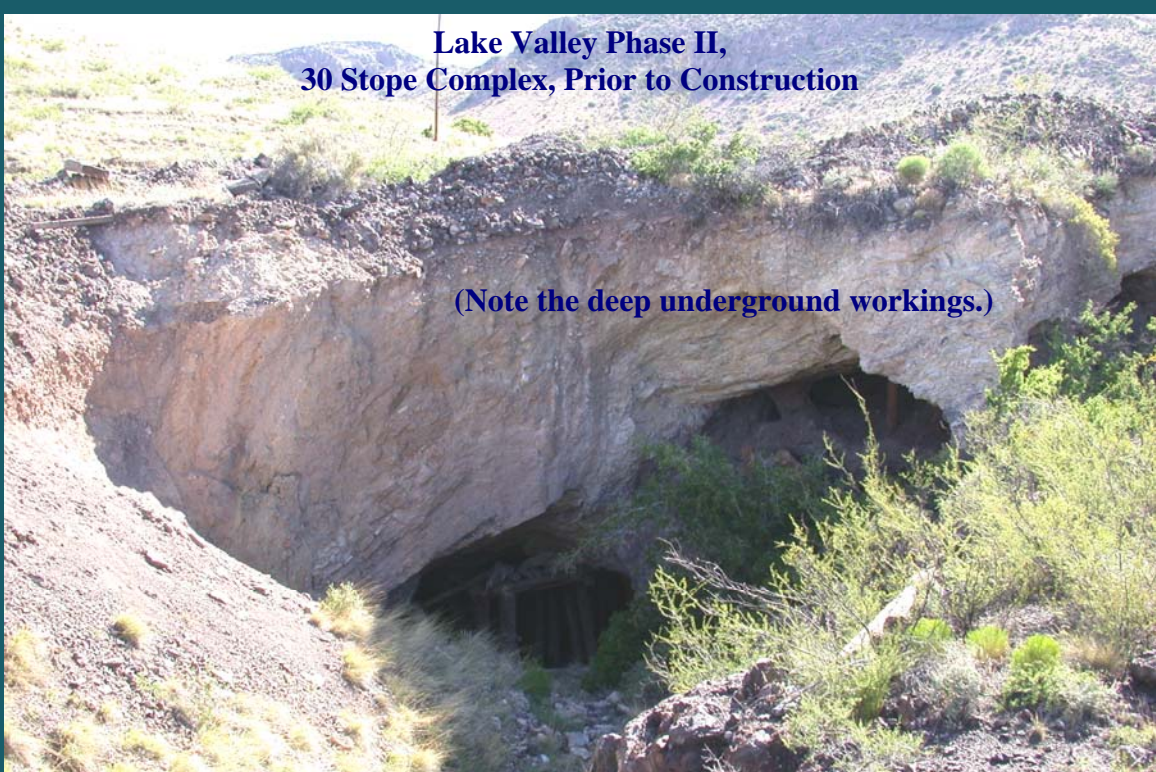
The NMAML is a mature program that continues to do high quality reclamation work. The NMAML Program and staff are respected by many other AML Programs as leaders and innovators in the field of reclamation, especially when it comes to preservation of bat habitat through innovative and state of the art designs. The approach taken to stabilize coal gob piles at Sugarite, have not been applied elsewhere in the United States. The Program has also demonstrated its talent in the design of small geomorphic stream channels, coal gob stabilization, and in working with community groups to merge the public's demand for historic and cultural resource preservation with the Programs objective to safeguard and reclaim abandoned mine hazards within the State.

**Lake Valley Mine Area  
(Overview of Part of the Mine Complex)**



**New Mexico Archaeologist  
Lloyd Moiola, Inspecting an  
Underground Bat-Compatible Gate  
at the Lake Valley II Reclamation Project**





-- Two Photographs of Toroid Tire Plugs...  
Used to Plug Large Stope Complexes at Lake Valley II --





Lloyd Moiola, Inspecting Installation of Corrugated Metal Culvert.  
Culvert Is Placed into Mine Drift to Protect the Integrity of  
Underground Workings and to Accommodate Bat Access and Airflow.



**Lake Valley-II**  
**Bat Gate Capping Off a Vertical Shaft**

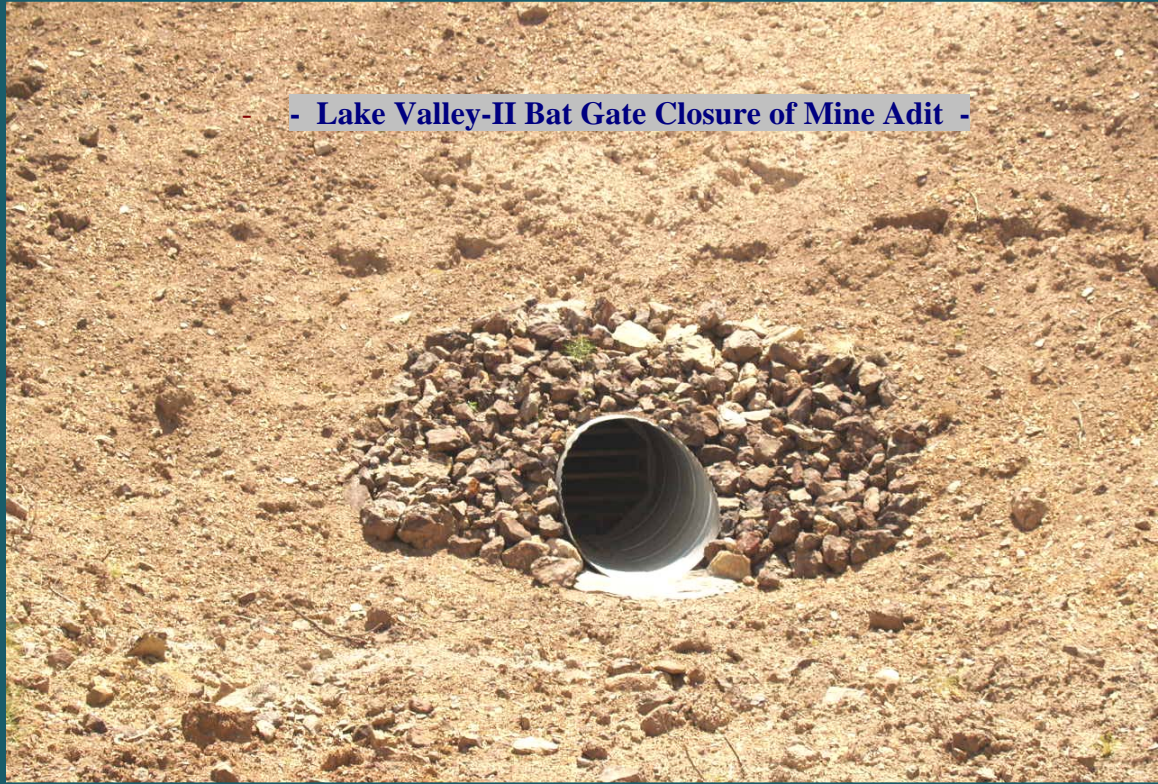
**APPENDIX-A**



**Lloyd Moiola and James Smith  
Demonstrate the High Tensile Strength Steel Mesh Design  
Used by NMAML, to Safeguard Several Vertical Shafts  
at the Lake Valley-II Project**



**- Lake Valley-II Bat Gate Closure of Mine Adit -**



**Bat Cupola with Owl Perch - Placed Over Vertical Shaft at Lake Valley-II  
One of several bat cupola designs by John Kretzmann, NMAML**



**APPENDIX-A**

