

**BUSINESS LINE: TECHNOLOGY DEVELOPMENT AND TRANSFER**

		FY 2002 Enacted	Uncontrollable Costs	Program Change	FY 2003 Request	Difference from FY 02
Regulation & Technology	\$\$\$	12,151	442	0	12,593	442
	FTE	117	0	0	117	0
Abandoned Mine Land	\$\$\$	4,136	28	0	4,164	28
	FTE	16	0	0	16	0
TOTAL	\$\$\$	16,287	470	0	16,757	470
	FTE	133	0	0	133	0

*These amounts do not reflect the Administration's proposal to include the cost of CSRS/FEHB in this Budget. For FY 2003, the estimated amount for this business line is \$874.*

**Operational Process (Program Activities):** The Technical Development and Transfer program activities enhance the technical skills that States and Tribes need to operate their regulatory and reclamation programs in order to more effectively implement SMCRA. These program activities are an integral part of accomplishing Environmental Restoration and Environmental Protection to achieve OSM's goals and outcomes.

***TECHNOLOGY DEVELOPMENT & TRANSFER  
ENCOMPASSES***

<i>Technology Development</i>
<i>Technology Transfer</i>
<i>Technology Training</i>
<i>Electronic Permitting (EP)</i>
<i>Technical Information Processing System (TIPS)</i>
<i>Applicant Violator System (AVS)</i>
<i>Small Operator Assistance Program Grants</i>

OSM provides technical training to OSM staff, and States and Tribes on a variety of topics. New technologies, changes in regulations, and staff turnover necessitate the need for continued technical training. To solve problems related to the environmental effects of coal mining, OSM provides multi-disciplinary technical assistance and works with industry, States, Tribes and the public on technical issues arising from new regulations. Other technical assistance efforts include the Technical Information Processing System (TIPS), the Applicant Violator System (AVS), Electronic Permitting (EP), and the Small Operator Assistance Program (SOAP). Technology transfer is a major part of OSM's cooperative effort with States and Tribes.

OSM’s technology transfer program will continue its support for electronic permitting efforts, sponsoring interactive technical forums and workshops, providing a regional technical services library, and more efficient access to COALEX (a computer-assisted library search service).

**Strategic Outcome:** Knowledgeable Federal, State, and Tribal regulatory and reclamation staff to effectively implement SMCRA, supported by the technical training and assistance provided by OSM specialists.

**Indicator Measures:** Performance will be measured through the number of staff technically trained (including knowledge and skills taught and applied), the utilization of automated technologies (such as TIPS), and the quality and timelines of technical assistance provided by OSM, determined via evaluations and customer service surveys.

<b>Table 13: Strategic Measures and FY 2003 Measures</b>	2001 Actual	2002 Enacted	2003 Estimate
<i>By 2005, OSM will attain a 90% customer satisfaction (or service) rate (quality, timeliness, and quantity) for efforts within this business goal.</i>			
In FY 2003, OSM will:			
• Attain a 90% customer satisfaction rate in the quality of our technical training.	94.6%	90%	90%
• Attain a 92% customer service rate in the quality of our technical assistance activities.	99.6%	92%	92%
• Attain a 90% customer satisfaction rate for technical training in the use of Technical Information Processing System (TIPS).	88%	90%	90%
• Train 900 students.	908	900	900
• Attain a 90% customer satisfaction rate in the quality and timeline of Applicant Violator System (AVS) provided services.	97%	90%	90%

*Note: FY 2002 and FY 2003 goals are lower than FY 2001 actual performance. FY 2001 data collection was a one-year snapshot. Therefore percentages have been adjusted to better reflect data that are representative of long-term actual customer service. We plan to maintain or improve on FY 2001 performance, but will wait to update performance goals until we have at least three years of customer service data.*

**Data Verification and Validation for Measures:** Technical training measures are based on customer surveys already in place and readily available course attendance records. Measures of

general technical assistance, technology transfer, and AVS success will be based on customer surveys approved by OMB.

The measures of this business line are varied, based on the diversity of activities involved in achieving this goal. The satisfaction of those customers with the quality and relevance of the technical assistance provided will be indicated by customer surveys and questionnaires. Other measures will include the number of times TIPS is used.

**Actions Required to Achieve Annual Goals:** In FY 2002, OSM plans to continue its efforts in this business line. For example, as responses are received from the customer surveys, the activities within the business lines will be evaluated to identify any needed improvements or changes. Also, TIPS, the Mine Map Repository, and AVS will increase access to users by continuing to provide material on the Internet.

**Resources, Skills, and Technology Needed:** A goal for FY 2003 is to continue ensuring that States, Tribes, and OSM have the best available technical data and information needed to make good science-based decisions regarding mining plans, reclamation project design, permit reviews, and acid mine drainage remediation and prevention. To successfully implement the surface mining regulatory and reclamation programs, OSM, as well as the States and Tribes, must maintain multi-disciplinary staffs that are fully competent in addressing a wide variety of technical issues that impact these programs.

The FY 2003 President's Budget requests \$16.7 million for Technical Assistance (including the Applicant Violator System), of which \$1.5 million for the Small Operators Assistance Program; \$2.2 million for Technical Training; and \$3.2 million for Technology Transfer efforts to meet the annual goals set forth above.

Included in the FY 2003 President's budget request for Technical Transfer is \$200,000 for the Acid Drainage Technology Initiative (ADTI), an ongoing effort of OSM, State and other Federal agencies, academic, and industry as part of the Clean Streams Program. The objectives of the ADTI are to compile, assess, and documents the "best-science" technology solutions to acid mine drainage (AMD) reclamation problems as well as to refine the most effective methods for accurate AMD prediction.

The following section details, by program activity, the funding and FTE resources required to meet the annual performance measures. It also includes examples of the types of technical training, assistance efforts, and transfer provided by this business line.

**Table 14 – Justification of Program and Performance  
Technology Development and Transfer**  
Summary Increases/Decreases for FY 2003  
(Dollars in Thousands)

Program Activity		Regulation & Technology		Abandoned Mine Lands		Total		Inc/Dec
		2002	2003	2002	2003	2002	2003	
Technical Assistance	\$\$\$	8,611	8,983	2,345	2,352	10,956	11,335	379
	FTE	80		4	4	4	4	0
Training	\$\$\$	1,951	1,985	234	241	2,185	2,226	41
	FTE	18		4	4	4	4	0
Technology Transfer	\$\$\$	1,589	1,625	1,557	1,571	3,146	3,196	50
	FTE	19		8	8	8	8	0
TOTAL	\$\$\$	12,151	12,593	4,136	4,164	16,287	16,757	470
	FTE	117	117	16	16	133	133	0

## **ONGOING PROGRAM**

The following program activities support OSM's goal to strengthen the capabilities of the States, Tribes, and OSM staff to implement SMCRA effectively through quality technical and scientific information, expertise, and training.

OSM's stakeholders (States, Tribes, and industry) continue to express support for Technology Development and Transfer (TDT) efforts and encourage OSM to provide the types of technical support needed to effectively and efficiently meet SMCRA, the National Environmental Policy Act, and other environmental and safety laws. Cost-effective compliance will help industry remain competitive with other energy sources. Helping industry achieve up-front compliance will reduce the need for additional regulatory resources. The TDT program area described in the following pages represents those activities where OSM staff provides direct technical support and ongoing efforts in other business lines.

### **1. Technical Assistance**

This program activity provides assistance to State regulatory and reclamation staff, and to the OSM staff that review and monitor State programs, develop rules or policy, litigate SMCRA challenges or enforcement actions, or maintain other technical support infrastructure like TIPS, AVS, and technical training programs. Technical activities such as permit review, citizen complaint evaluation, and cumulative hydrologic impact assessment take place where OSM is the regulatory authority.

Technical assistance also is provided for AML project design and monitoring where OSM is responsible for AML emergency and priority projects. However, these types of endeavors are integral parts of the Environmental Protection and Restoration business lines. They are not included in the TDT program activity.

OSM intends to attain a 92 percent customer service rate for its technical assistance efforts in FY 2003. Customer surveys are used to document the responsiveness of OSM's technical assistance to its customers in a timely and professional manner. By meeting the technical assistance needs, OSM can help effectively achieve OSM's Environmental Restoration and Environmental Protection mission goals.

#### *a. Technical Policy Assistance*

OSM specialists provide technical assistance to State and OSM regulatory and reclamation policy staff. The areas of assistance include rulemaking; citizen complaint investigations regarding the mining-relatedness of offsite impacts; guideline development; State program amendments; State mining permit evaluation; AML problem evaluation; blasting policy; prime farmland reclamation standards; coal combustion by-product disposal; reclamation bonding; threatened and endangered species; land unsuitability determinations; participation as technical experts on interagency committees; acid mine drainage (AMD) prevention and remediation; bond release and sufficiency; mountaintop mining and valley fills; permit findings; re-mining;

subsidence caused by underground mining; and assistance in fostering tribal primacy by helping tribes develop technical capabilities.

Projected activities for FY 2003 include:

- Mountaintop mining and valley fills: In steep-slope areas of Appalachia, surface coal mining operations often remove the upper portion of a mountain and deposit large volumes of overburden in engineered fills in adjacent valleys. The conditions favoring these type of operations are most common in central Appalachia, especially southern West Virginia and eastern Kentucky. In recent years, concerns have been raised regarding the impacts of these fills, especially those that cover significant segments of intermittent or perennial streams.

Under a settlement agreement arising from litigation concerning mountaintop mining and valley fills in West Virginia, OSM and other Federal and State agencies are planning to: (1) release a draft Environment Impact Statement (EIS) in FY 2002 with special emphasis on impacts on streams and fish and wildlife; and (2) establish a coordinated process for obtaining authorization for surface coal mining operations in wetlands under section 404 of the Clean Water Act. OSM also plans to assist West Virginia in reviewing permit applications.

OSM has committed over 40 man years to these two efforts, including technical studies assessing future mining potential; evaluating the impact of mining restrictions on coal recoverability, economics, and environmental impacts; analyzing offsite impacts of mine dust and blasting fumes; valley fill hydrology; and documenting stream conditions downstream from mountaintop mining.

- Impoundment Leaks into Underground Mine Workings: During the coal preparation process waste rock is separated from the coal. The larger, coarse fragments of coal waste (typically shale) are used to construct an embankment or dam, which impounds the fine coal waste fraction in a slurry (i.e., mixed with water). In heavily mined areas, many of these impoundments must be constructed over active or abandoned underground coal mine workings.

Since 1994, there have been six reported unplanned discharges into underground mine workings from overlying impoundments. Four of these breakthroughs had discharges to the surface. The latest breakthrough occurred in early FY 2001 (October 2000), in Martin County, Kentucky when more than 250 million gallons of coal waste slurry and black water entered underground mines through subsidence cracks, exiting two mine portals in two different watersheds. The slurry moved downstream until the tributaries joined, entering the Tug Fork River, and continued flowing through the Big Sandy River until assimilated by the Ohio River. Water users all along the path of the slurry were forced into alternative sources. A monumental environmental cleanup effort was required.

During FY 2002, OSM, Appalachian States, and MSHA completed their investigation of the impoundment leak into the underground mine. The National Academy of Sciences (NAS) also completed its study addressing technical issues related to impoundments above underground mines. In addition, OSM, in coordination with Appalachian States initiated evaluation of other high-risk mining-related impoundments over underground mines to ensure against future incidences. OSM also evaluated and began implementation of appropriate recommendations from the study conducted by NAS.

In FY 2003, OSM, in coordination with the States and MSHA, will determine whether revision to the existing regulations and engineering practices are necessary as a result of investigations and NAS study concluded in FY 2002.

- Blasting: The use of explosives is an integral part of most surface coal mining. Overburden must be broken, often through the use of explosives, before it can be removed to expose the coal for mining. Citizens living near a mine sometimes-express concern about the vibrations, noise, and flyrock resulting from blasting. SMCRA and OSM's regulations contain requirements limiting the energy of blasts to protect the public and property from damage caused by blasting.

Many States, including Pennsylvania, Ohio, Alabama, Missouri, Oklahoma, and Kentucky frequently ask for OSM help in evaluating damage complaints, reviewing blasting plans, or setting vibration limits to ensure the prevention of damage to property. OSM helps the States measure damage potential through field's studies and set protective limits on unique structures such as historic buildings, mobile homes, hospitals, water towers, and log homes.

During FY 2002 and FY 2003, OSM will continue to evaluate data specific to unique structures (e.g. Navajo hogans) to determine amplification factors and damage potential from ground vibration and air blast. This information also will generate data that will be used to evaluate the effect of ground vibrations from large cast blasting operations on water wells less than 100 feet deep.

- Designating Areas Unsuitable for Surface Coal Mining: Section 522 of SMCRA (Designating Areas Unsuitable for Surface Coal Mining) establishes a process by which the public may petition the regulatory authority to limit or prohibit all or certain types of surface coal mining operations on non-Federal lands to protect certain features or environmental values. OSM receives and processes these petitions for all lands for which it is the regulatory authority. The decision-making process includes preparation of an environmental impact statement and a takings implication assessment.

OSM also is responsible for making valid existing rights determinations under section 522 (e) for all Federal lands and all lands for which OSM is the regulatory authority. Section 522 (e) prohibits or limits surface coal mining operating within certain areas, subject to valid existing rights.

Both unsuitability determinations and valid existing rights determinations require substantial technical and programmatic resources. They also involve litigation support if a takings claim is subsequently filed against the Federal Government.

- EPA Rulemaking on Coal Combustion By-Products (CCBs): OSM continues to work with EPA on reviewing and analyzing information related to EPA's intended drafting of a proposed rule in FY 2003 concerning the placement of CCBs at mine sites. During FY 2001, EPA and OSM visited sites in Pennsylvania, West Virginia, Indiana, Illinois, and New Mexico. EPA will continue to visit several more states in FY 2002, with OSM continuing to assist EPA in its data collection, review, and analysis through its participation in meetings, monitoring implementation of EPA's risk analysis model, participation in site visits, and review of future proposed rules.
- Subsidence: Portions of the 1995 subsidence rules were suspended by OSM in 1999 subsequent to a Court decision. OSM continues to work with state regulatory authorities to ensure enforcement of subsidence regulations still in effect. OSM anticipates these activities will continue in FY 2002 and FY 2003. Additionally, OSM expects to initiate rulemaking in response to the 1999 Court decision in FY 2002, and that these rulemaking activities will continue in FY 2003.
- Acid Mine Drainage (AMD): Surface and underground coal mining activities expose iron sulfide minerals in rock to weathering. The interaction of these rocks/minerals with air and water can result in acid mine drainage, which is the number one water quality problem in Appalachia and to a lesser, but still serious, extent in other coal and hard rock mining regions. OSM technical staff resources are focused on advancing and applying the best science to remediate AMD from abandoned pre-SMCRA mines and to prevent active mines from contributing additional new sources of AMD.

During FY 2002 and FY 2003, OSM will continue to participate in the Acid Drainage Technology Initiative (ADTI). ADTI is a collaborative effort among federal agencies, industry, the states, academia, and the National Mine Land Reclamation Center (NMLRC) to promote communication and technology enhancement in the field of acid mine drainage. The main goals of ADTI are to identify, evaluate and develop "best science" practices to prevent acid mine drainage and to describe, for existing sources of acid mine drainage, the best technology for avoidance/remediation practices.

OSM staff contributed significantly to an ADTI publication addressing avoidance/remediation of existing sources of acid mine drainage for Eastern coal mining and a comprehensive manual on acid mine drainage prediction focusing on Eastern coal mining. Both volumes were very positively received by the mining community. Ongoing projects that OSM will continue into FY 2003 include:

- Field verification of the widely-used Acid Base Accounting method for predicting acid mine drainage production by comparing the quality of water at mines terminated from SMCRA jurisdiction;

- Initiation of development of two standardized kinetic test procedures for evaluating coal-mine related acid mine drainage potential by more realistically simulating the chemical conditions under which acid mine drainage forms; and
- Development of a second edition of the avoidance/remediation document.

During FY 2002, OSM will participate with ADTI in its plans to develop a five-year roadmap for future activities, with actions to implement and refine these activities ongoing during FY 2003.

- Invasive Species: Executive Order 13112 of February 3, 1999, Invasive Species, directs Federal agencies whose actions may affect the status of invasive species to identify those actions and to the extent practicable and permitted by law, take actions to address the problem (consistent with their authorities and budgetary resources); and not authorize, fund or carry out actions that the agency believes are likely to cause or promote the introduction or spread of invasive species.

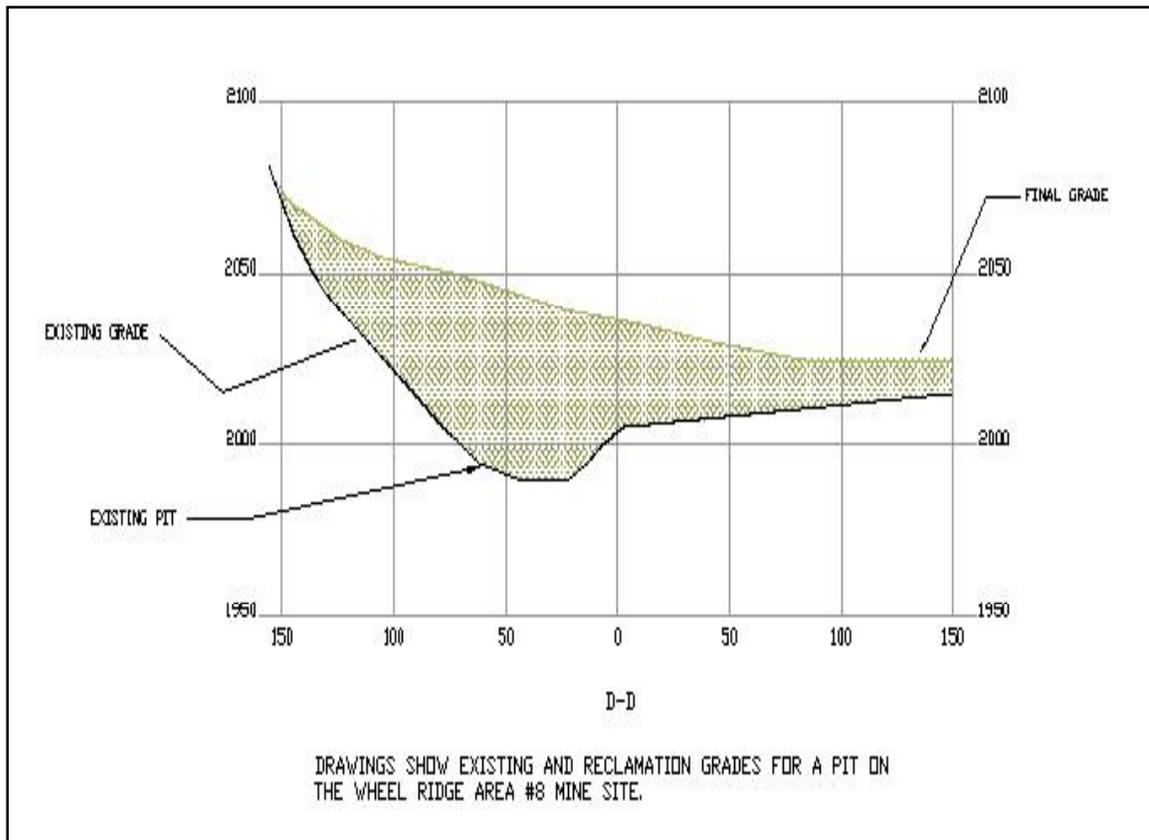
Educational materials are being developed for placement on OSM's home page and information on invasive species issues is being developed for inclusion in the course, Soils and Revegetation, which is taught as part of OSM's Technical Training Program. States were surveyed to determine their efforts to address the threats from noxious weeds and invasive species, and programs were found to vary widely. OSM will assess the need for Federal guidance in this area during FY 2002 and as necessary, develop any guidance during FY 2003.

*b. Site-Specific Technical Assistance*

OSM specialists assist in the technical aspects of compliance monitoring (including inspection and enforcement assistance), experimental practice reviews, reclamation cost estimate calculation, bond release application reviews, bond approval reviews, bond forfeiture reclamation designs, land unsuitability determinations, surveying, revegetation, geologic sampling, AML designs, subsidence and AMD abatement, and any technical assistance on citizen complaints and ten-day notices. Below are examples of the types of assistance provided to States and tribes.

- Utah Reforestation: OSM, through the Technical Information Processing System (TIPS) provided Global Positioning System (GPS) project support and training to the Utah Division of Oil, Gas, and Minerals, AML program in FY 2001. Nearly 350 tree seedlings planted on hard rock mine tailings were GPS-mapped, while vigor evaluations were field-recorded in the GPS units. The work was accomplished in less than six hours, and revealed a distinct zone of seedling mortality that will be studied further. Similar tree seedling mapping and vigor determinations will be carried out by the Utah AML program at the Sunnyside Mine near Price.

- Tennessee Bond Forfeiture: The Knoxville Field Office (KFO) used AutoCAD/SurvCADD design software to generate site reclamation plans for the bond forfeiture mine sites at Wheel Ridge Coal Company. Survey data were used to create contour maps that represent the existing site conditions and the final reclamation construction maps. Subsurface cross-section drawings and a three-dimensional model of the site were also created from the data. These were used to calculate earthwork volumes for the site. Electronic design tools allowed for efficient exchange of site design information with the reclamation contractor resulting in faster and more accurate job completion.



- The Trail of Tears: The Tennessee State Historic Preservation Office (SHPO) requested OSM assistance in digitizing a portion of The Trail of Tears in three specific counties in Tennessee. Paper maps of the trail were received from the SHPO and used by OSM to create digital coverage using AutoCAD Map 2000. This is the first effort to capture The Trail of Tears in electronic format.
- Aerial Photography: OSM's TIPS staff provided detailed topographic contours of the Peanut Mine to the State of Colorado to assist in the reclamation of this AML site in a heavily used recreational area. The two-foot contours, high-resolution aerial photography, and GPS mapping support were provided to the state at a significant savings over using contracted services because OSM staff performed much of the work

in-house using specialized software OSM owns. Two additional AML sites in Oklahoma were mapped using the same technology, and three additional sites will be mapped in FY 2002. By encouraging the use of complete digital mapping, design and stakeout procedure, OSM anticipates significant time and cost savings on future AML projects.

- Hydrologic Balance Issues from Underground Mining: Over a century of extensive underground coal mining in Pennsylvania and West Virginia have left miles of interconnected, flooded working called mine pools. The water level in these mine pools may rise and overflow into streams or could potentially create a mine “blowout,” which may result in rapid and sometimes catastrophic discharges of large amounts of stored mine water, often acidic in nature.

For instance, the Fairmont Mine Pool covers more than 27,000 acres comprised of several pre-and post- SMCRA mines. These mines, which have filled with acidic water, threaten to discharge into the Monongahela River. EPA Region III, OSM, and West Virginia are cooperating on a study to delineate the extent of these pools, identify discharge points, and, ultimately develop strategies to prevent degradation of streams from potential discharges. During FY 1998, OSM installed a monitoring network of boreholes to assess the fluctuating pool levels and allow modeling of the hydrology of the pool. In FY 2002, OSM plans to extend the monitoring network to other mined-out areas. This study will assist Pennsylvania, West Virginia, other States, OSM, and EPA to evaluate possible solutions to protect the hydrologic balance from future “Fairmont Pools.”

- Bond Approval and Administration: To ensure that bonds for permits on lands for which OSM has and shares regulatory authority responsibilities are sufficient to reclaim forfeited sites, OSM calculates bond amounts using engineering and science-based, reclamation cost estimates. OSM also evaluates bond mechanisms posted with OSM to ensure legal, financial, and regulatory requirements are met. OSM provides technical assistance and training on bonding activities, and a technical review of any issues identified in a State program’s bonding activities.

During FY 2001, OSM received 93 requests for technical assistance on reclamation bonding from States, tribes, other Federal agencies, and the coal mining industry. Approximately 100 requests are expected in FY 2002, and again in FY 2003. Also in FY 2001, OSM completed special on-site bonding training for Alaska on reclamation bonding. OSM anticipates receiving several requests for specific on-site bonding technical assistance and training in FY 2002, and the same for FY 2003.

*c. Mine Map Repository*

OSM maintains a mine map repository authorized under the former Bureau of Mines and subsequently transferred to OSM. This repository, located in OSM’s Appalachian Regional Coordinating Center in Pittsburgh, Pennsylvania, maintains the only national inventory of maps of abandoned coal and non-coal mines throughout the United States. Mapping information is used to fulfill customer requests for unique information that can range from rare maps for small

uncommon projects to a national collection for assisting in large interstate projects. OSM customers include State regulatory and reclamation staff, local government agencies, developers, engineering and mining companies, architects, universities, law firms, environmental consultants, pollution control boards, realtors, law-enforcement agencies, historical societies, and homeowners. Some of the costs for this program are paid out of offsetting receipts from the sale of maps.

The OSM is automating the repository operational process. The new technology will enable OSM customers to retrieve mine maps and related information more efficiently via the Internet. Future enhancements are planned through partnering with the United States Geologic Survey (USGS). Operating revenues will increase due to a new and revised fee schedule for business clients.

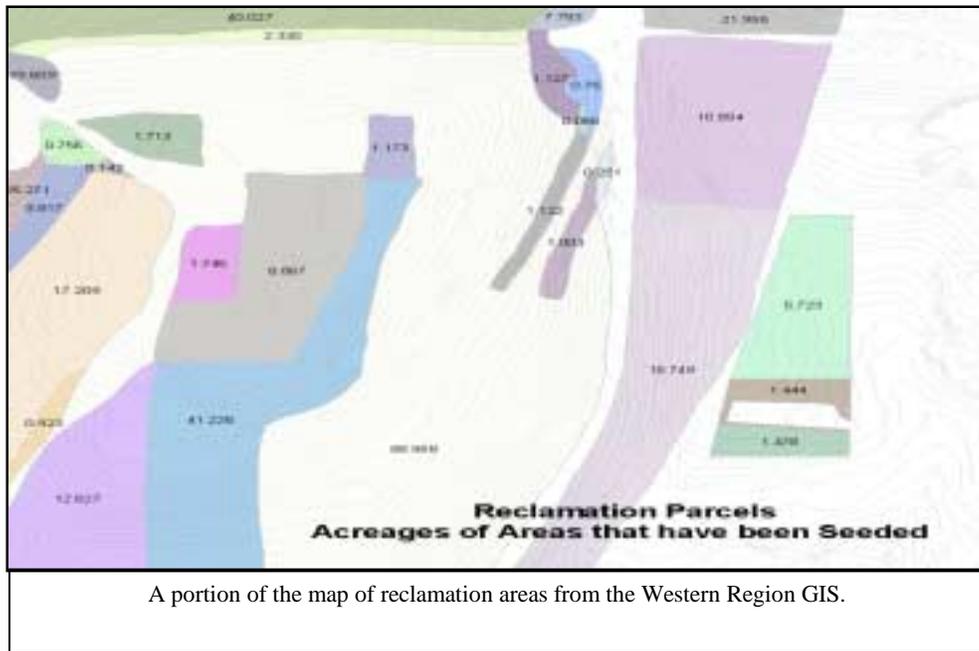
*d. Small Operator Assistance Program (SOAP)*

Section 507 (c) of SMCRA provides that up to \$10 million may be appropriated each year from AML fee to assist eligible small operators by paying certain costs associated with obtaining hydrologic, geologic, and other environmental information needed to prepare coal mining permit applications. Public and private laboratories under contract to regulatory authorities collect the data and provide the environmental analyses. Mine operators with annual coal production of less than 300,000 tons per year are eligible for assistance under SOAP.

States with approved regulatory programs are responsible for administering SOAP. They receive grants from OSM to pay qualified laboratories to provide the technical services authorized under the program. OSM is responsible for SOAP programs in non-primacy States, such as Georgia, Tennessee, and Washington. In FY 2001, six State SOAP programs (Alabama, Kentucky, Maryland, Ohio, Pennsylvania and West Virginia) assisted 121 operators. In Pennsylvania, each dollar spent on SOAP assistance in the year ending June 30, 2000, generated \$5.85 in AML-related benefits: \$2.33 in AML fees paid, and \$3.52 in reclamation completed at no cost to AML.

*e. Permitting*

Western Region Coal Mine GIS: An Internet Map Server system has been implemented for five western mines that allows OSM Western Region users to access high resolution satellite imagery of the mine permit. As additional image acquisitions are made, users will be able to compare changes over time. OSM intends to pursue a licensing agreement with the image data providers so that we can allow authorized States, tribes, mine operators and other federal agencies to access the system in FY 2003.



Tennessee GIS: OSM's Field Office uses Geographic Information System (GIS) technology for every day scientific analyses, permitting review, field inspections of mine sites, and analytical capability to determine the environmental impacts of surface coal mining operations within the State of Tennessee. Using review techniques that include the best scientific software available for modeling and visualizing coal mining impacts, converting public domain environmental data from paper to digital format for use in these software applications, and disseminating this digital data in spatial and tabular format to the public will result in greater objectivity and better understanding of the complex relationships involving environmental and natural resource issues. This methodology also allows both State and OSM offices to produce better quality scientific engineering decisions much faster.

*f. Technical Information Processing System (TIPS)*

The goal of TIPS is to provide State and OSM personnel with a comprehensive set of analytical tools to aid in technical decision-making processes related to the SMCRA. Services include: providing a comprehensive training program in core software for users; providing core software at the users desktop; conducting the necessary research and development that ensures that core software is the state-of-the-art; and providing technical assistance in software and hardware use. Customers include states, tribes and OSM offices across the country.

The system is comprised of off-the-shelf computer hardware and software supported by OSM in partnership with the States and Tribes. TIPS consists of Windows-based computers at State, Tribal, and OSM offices with access to system license servers via the Internet and OSM's Wide Area Network. The software that the system provides covers a wide range of subjects necessary to assist technical staff in carrying out their duties in both the environmental protection and restoration programs under SMCRA. There are 18 commercially available software applications covering geospatial, hydrology, engineering, and statistical topics. These applications assist in the technical decision-making associated with conducting reviews of permits, performing

hydrologic assessments, quantifying potential effects of coal mining, preventing acid mine drainage, quantifying subsidence impacts, measuring revegetation success, assisting in the design of abandoned mine land reclamation projects, and providing the scientific basis for environmental evaluations.

Examples of OSM TIPS related projects include:

Remote Sensing: A new effort was begun in FY 2001 to answer the needs of OSM customers in the area of remote sensing and image processing and analysis. Remote sensing tools allow SMCRA authorities to evaluate the effects of mining and reclamation with airborne and satellite images. Such information triggers a timely application of remedial measures resulting in faster and more effective reclamation.

In FY 2001, OSM successfully utilized imagery from the IKONOS 2 satellite for inspection and enforcement tasks, AOC verification, and monitoring mining progress. OSM intends to publish a white paper on the potential applications during FY 2003 to serve as reference guide for others to use the technology.

The Space Policy Institute and the National Remote Sensing and Space Law Center singled out OSM because of the exemplary work it is doing in this cutting edge field. OSM has been one of the first non-military customers to use all of the benefits of this powerful new data source, including stereoscopic measurements and 3-D fly through animations.

AML Emergency: OSM uses TIPS software in the field to investigate AML emergency problems and prepare quick-response design solutions on site. For instance, an AML response/design team met on an AML emergency site at 8:00 a.m. to determine the source of a flooding problem. GPS was used to provide exact location of the project site, with the total station used to shoot about 15 points on the project site, and a small diversion resulting from previous AML work was identified as the problem. By using the system, a grading plan was developed and presented to the landowner at noon the same day.

Wetland Rehabilitation: During FY 2000 and 2001 OSM staff used TIPS drafting, GIS, and watershed modeling software to develop a detailed project design for a passive treatment system to rehabilitate a failed man-made aerobic wetland in Macon County, Missouri. AutoCAD and SurvCADD were used to develop detailed design layout and SedCAD was used to model water transport within the watershed area and to size the drainage structures. ArcView was used in generating maps for presentation purposes, for incorporating water data and scanned paper maps into the presentation and to perform 3-D modeling. These projects proved essential in presenting the design options to state personnel and in providing post construction views of the treatment system.

TIPS Website: The TIPS website ([www.tips.osmre.gov](http://www.tips.osmre.gov)) provides information about TIPS, including current TIPS training classes, descriptions of TIPS software, access to digital data files for public domain TIPS software, lists of TIPS specialists, standardized AML emergency design drawings, and digital topographic maps for coal-producing areas within the United States.

*g. Reclamation Support Activities*

Future Mountaintop Mining Sites: During FY 2000, OSM obtained geologic information on coal seams from the West Virginia Geologic and Economic Survey, Kentucky Geologic Survey, and Virginia Polytechnic Institute and State University. In FY 2001, OSM began developing GIS mapping of feasible surface mining areas in southwest Virginia, central and southern West Virginia, and eastern Kentucky. The GIS tools allow removal of past mining areas from the geologic extent of coal beds. Then, applying three-dimensional analysis, staff calculated and compared coal and overburden volumes. Economic extraction is determined based on standard mining engineering-derived stripping ratios. This GIS method of determining economic coal reserves and methods will continue in FY 2003.

Enhanced Contemporaneous Evaluation of Reclamation: As part of an effort to more effectively evaluate reclamation as it occurs at each mine, inspectors from OSM with assistance from technical specialists are using GPS units to locate the boundaries and input data for the areas as they are reclaimed. The field data (slopes, topsoil depths, etc) are subsequently downloaded into a GIS under development for each mine. This process will enable the OSM, States and industry professional and technical staff to keep track of the status of reclamation on each acre of mined land as it occurs. The initial success of this method means that OSM plans to expand its use through FY 2003.

Pittsburgh Coal Seam Model: In FY 2001, OSM completed modeling the Pittsburgh coal seam for the northern two-thirds of the Appalachian bituminous coal basin. Using TIPS software and workstations, OSM staff included mine mapping and prediction of acid-drainage problems. The data also will be used in predicting mine pool discharges and three-dimensional hydrologic modeling of pool elevations as part of the Monongahela River Mine Pool Project through FY 2003.

*h. Applicant/Violator System (AVS)*

The primary purpose of the Applicant Violator System (AVS) is to provide State and Federal regulatory authorities with a centrally maintained national database containing information related to ownership and control of surface coal mining operations. As part of the permit review process, State and Federal regulatory authorities use the information to evaluate an applicant's mining and violation history in order to determine the applicant's eligibility to engage in surface coal mining operations. OSM responds to approximately 4,000 requests per year for these evaluation reports. The AVS is also used to determine the eligibility of potential recipients of AML reclamation contracts and grants under the Small Operator Assistance Program.

Information is entered into the AVS by both State and Federal personnel. To ensure the accuracy and completeness of the automated information, OSM performs continuous reviews of the data maintained in the AVS as well as the operating system itself. During FY 2003, OSM will continue to evaluate the possibility of upgrading the AVS operating platform to incorporate improved user-friendly technologies and redesign certain regulation-based aspects that were not available when the system was last updated in FY 1994.

OSM responds to approximately 700 requests each year for a variety of customer assistance services including distribution of AVS software, ad hoc reports, referrals to resolve violations and debt, and enforcement and litigation support. OSM also conducts or assists State regulatory authorities and other Federal and State agencies in conducting ownership and control investigations; negotiating and tracking agreements to settle debts and or perform reclamation; investigating and responding to coal operators' challenges of agency decisions on ownership and control of surface coal mining operations; and, resolving conflicts concerning information in the AVS. These and other activities, such as providing users with basic or advanced training, will be continued throughout FY 2003. Additional system information may be found at the AVS website ([www.avs.osmre.gov](http://www.avs.osmre.gov)).

## **2. Technical Training**

### *a. National Technical Training Program*

OSM established the National Technical Training Program in 1985, recognizing the need for an ongoing educational program to increase the technical competence and professionalism of Federal, State, and Tribal personnel. The program delivers training related to permit approval, bond release, reclamation, and enforcement. The training received serves to update technical expertise and fosters consistent application of standards. Training is provided in each of the disciplines involved in implementation of SMCRA, which include engineering, hydrology, blasting, agronomy, and botany. The program also ensures training is available to enable SMCRA staff to maintain the ability to gather and present information as an expert with the most recent data available. In addition, periodic training is needed to disseminate the latest technological and the other changes in regulatory and associated reclamation activities. All aspects of the training program, from the needs identification through course development and presentation, are a cooperative effort of State, Tribal, and OSM offices.

In FY 2001, the Technical Training Program provided 45 sessions of 31 courses to a total of 908 participants at 24 locations in 14 different States. Forty seven percent of the instructors were from 17 OSM offices, 44 percent from 17 States, five percent from Solicitor's offices, and four percent from other sources. The program met its goal of training 900 students, and had a 95 percent customer satisfaction rating, exceeding its target of 90 percent by 5 percent.

In FY 2001, a new course on subsidence was piloted to enhance scientific knowledge and technical skills in predicting subsidence and identifying methods to protect and/or minimize damages caused by subsidence impacts of longwall and room and pillar mining. This course will assist inspectors and technical staff in implementing requirements of the Energy Policy Act requirements. In FY 2001, in addition to regularly scheduled courses, several sessions were held to meet special requests, including sessions of the Blasting and Inspection course for Kentucky, and of Evidence Preparations to meet an urgent need of MSHA inspectors.

Also in FY 2001, in support of the government initiative component of the Administration Management Plan, the training program made its annual customer Needs Survey available through the Internet. In FY 2002, the program also will make GPRA follow-up evaluations and

other administrative processes available through the Internet. In FY 2002 and 2003, OSM intends to continue to meet its 90 percent customer satisfaction rate for its national training efforts and provide training to approximately 900 students.

Future plans for the training program for FY 2002 and FY 2003 include a benchmarking initiative with the States, development of new offerings including an Employee Orientation Program for OSM employees, a workshop on Acid-Forming Materials for AML staff, an Advanced Blasting course, and a course that will be developed in conjunction with the Fish and Wildlife Service on endangered species. The training program recently began working with the States on a coordinated effort to identify and document outstanding examples of State systems and processes. This benchmarking information will be shared through a series of presentations and seminars with State, Tribal and OSM staff for the purpose of improving service to regulatory and reclamation program customers. The program also will complete development of an Orientation program for new OSM staff. States have requested that pertinent parts of this course also be made available to their staff.

A new workshop will be developed for AML staff to address the long-term problems of acid-forming materials on abandoned mine lands that affect revegetation success, landform stability and water quality. This workshop will provide a forum that promotes information exchange between AML professionals and their agencies to improve AML reclamation success. Emphasis will be on field applications and reclamation techniques. Development of a new course, Advanced Blasting: Investigation and Analysis of Blasting Effects, will be completed. This course will enhance student skills in gathering and analyzing blast-related information. This will assist in resolving citizen complaints from ground vibrations, air blasts, fumes, and flyrock. And, as a part of the National Energy Policy initiative to streamline the permitting process OSM, in conjunction with the U.S. Fish and Wildlife Service, will develop a new course to further the Biological Opinion that is a model for streamlining the ESA process.

*b. TIPS Software Application Training*

TIPS Established a software application training program specific of the use of the software in Title IV and V applications, including permitting analysis, AML reclamation design, construction and monitoring. TIPS software training is a cooperative State-Federal effort: 18 of the 51 current TIPS instructors are from State programs.

In FY 2001, 370 technical professionals from the States, Tribes, OSM, and industry were trained in 42 classes under the TIPS computer applications training program. Twenty-eight of these classes were held at OSM's regional computer training facilities. Fourteen of these classes were conducted at customer sites. The table below shows the various courses conducted at customer sites. These classes are specially designed to address mining specific applications, as requested by TIPS users and the TIPS steering committee, and therefore are uniquely different from courses available from the vendors.

TIPS Customer Courses Conducted in FY 2001

COURSES
Global Positioning Systems (GPS)
ArcGIS (geographic information system)
ArcView(GIS)
Computer-Aided Design Applications
Statgraphics (Statistics software)
earthVision (dimensional modeling)
Groundwater Vistas
Galena slope stability
SurvCADD (geology model)
AquaChem (water quality)
SDPS (subsidence prediction)
Aqtesolv (ground water model)
SedCAD (surface water sediments)
GIS Online Courses

For FY 2002 and FY 2003, the TIPS training program plans on scheduling 30 classes to be held at regional training centers each year, with at least 12 classes conducted at trainee sites per year.

In FY 2001, the TIPS training program exceeded its target customer satisfaction rate of 88 percent by 1.7 percent, for an average satisfaction score of 89.7 percent. In FY 2002 and FY 2003, OSM intends to meet its 90 percent customer satisfaction rate for each year, and to provide training for approximately 800 students in each year.

*c. Regional/Site Specific Training*

OSM has regional training centers, which offer classes on customer requested topics and provide facilities for the national training program to minimize expenses. In FY 2002 and FY 2003, examples of such training may include:

- Tribal Training: OSM offers training to tribal staff in formal OSM training classes (NTTP and TIPS) as well as through courses offered by State universities and attendance at OSM forums and workshops. This effort is carried out under provisions of the Energy Policy Act of 1992, which includes:
  - (1) Courses relating to SMCRA to assist the Tribes (Navajo, Hopi, Crow and Northern Cheyenne) in their development of regulations and programs for assuming the regulation of surface coal mining and reclamation operations on Indian lands.
  - (2) Courses to enable the Tribes to assist OSM in the inspection and enforcement of surface mining activities on Indian lands, including, but not limited to, permitting, mine plan review, and bond release.

(3) Courses in the use of TIPS provided software and technology.

- Regression Time Series Analysis of Hydrology and Soils Data. The workshop provides advanced statistical analysis to 12 attendees in each class. In FY 2003, statistical expertise will become more important as final bond release applications in the West are considered by OSM and the States. OSM will continue to provide on demand advanced applied statistics workshops dealing with soils, vegetation, and hydrology issues in the arid and semi-arid western States.
- Electronic Permitting Workshop: In FY 2001, OSM conducted an electronic permitting workshop for the Western Regional Technical Team on Digital Photography Systems. In FY 2003, OSM and the Western Regional Technical Team plans to conduct a paperless permitting support interactive forum and exhibition. The forum will feature case studies and examples of electronic permitting. The exhibition will feature innovative technologies relating to electronic permitting, paperless permitting, digital imaging, and e-Government.

### **3. Technology Transfer**

A sound technical development program ensures that the most current and valid scientific information is available to the industry, States, and Tribes. OSM plans to attain a 92 percent service rate in FY 2003.

#### *a. Technology Development*

OSM seeks to meet the needs of State, Tribes, and all OSM staff, as well as the public and the coal industry by solving problems related to reclamation projects, and regulatory implementation through cooperative research efforts with other bureaus. OSM does not fund research of its own. OSM's research needs are coordinated with the regulatory and research programs of USGS and other Federal agencies having responsibility for or supporting environmental protection.

OSM participates on the Department of the Interior's Base Mapping Needs Committee to coordinate OSM's mapping needs with other Interior bureaus. The Base Mapping Needs Committee ranks and funds mapping requests based on multi-party needs; current work includes the 2003 National Map pilot project in Colorado.

OSM works with the academic community and private research organizations to identify potential areas of cooperation. The National Mine Land Reclamation Center (NMLRC), located at West Virginia University, receives funding from several Federal and State agencies including OSM and industry organizations to research solutions to environmental problems associated with coal mining.

An industry/government (State and Federal) academic task force developed joint action plans to define "best science" practices that are expected to solve acid mine drainage problems, and to work toward implementation of those practices through the coalfields. Cooperative efforts

involving many agencies, groups, and individuals are implementing the Acid Mine Drainage Technology Initiative (ADTI). NMLRC acts as the coordinator.

*b. Electronic Permitting*

The goal of Electronic Permitting is to obtain computer-generated permit applications in which all text, baseline data, models, drawings, and maps are in electronic media. As a long-term program that has significant monetary and time savings, electronic permitting provides more complete and up-to-date records for those involved in the permitting process. Currently, OSM is assisting primacy States in development and implementation of electronic permitting.

Electronic permitting provides State, Tribal, and OSM permit reviewers with computer-based tools to access electronic documents, maps and data, and to perform necessary environmental analyses. Electronic data and information can be downloaded directly onto computer systems, where users can access the computer databases and analytical software, such as those provided by TIPS, making data manipulation and analyses more efficient and accurate. Electronic permitting saves staff time by reducing many “clerical” aspects of accessing and transferring hard copy information. Additional benefits include the ability to share computer-based data with managers, field personnel, other agencies, the public and industry.

In FY 2003, OSM plans to continue to (1) coordinate activities with primacy States, tribes and industry; (2) sponsor interactive forums, training and workshops for primacy States, tribes and industry; and (3) expand Federal/Industry electronic data exchange initiatives. OSM will support electronic permitting initiatives of States by concentrating on their needs in the area of data conversion, acquisition and storage, and interpretation of remote sensing data.

Examples of electronic permitting achievements include the following:

- *Alabama* – The Alabama Surface Mining Commission (ASMC) is accepting fully digital permits. Digital quadrangle maps have been acquired for coal mine areas.
- *Illinois* – The State currently has four basic coverages in ARC/INFO: (1) the permit boundary, (2) the annual affected acreage report, (3) the approved post-mining land use, and (4) the bond release status for parcels within the permit. The State has also made good progress in adding approved shadow areas, approved annual underground undermined acreage, groundwater monitoring wells, NPDES discharge points, and mine shaft locations. There are three full time GIS Specialists employed by the Illinois Reclamation Division for this effort.
- *Colorado* – Colorado’s permitting staff have developed an MS-based workflow database that tracks permitting information and generates electronic reports and correspondence automatically. In FY 2002 Colorado began a digital imaging project converting all existing permitting information into electronic format.
- *Kentucky and Virginia* – Permits are now processed electronically routinely. All permit applications are electronically routed and reviewed from submittal to approval. Permit

applications can be delivered electronically or in hard copy, in which case they are scanned into the office network by State personnel.

- *North Dakota* – Following its success in 2001, North Dakota’s partnership with their coal industry and the production of the nation’s first paperless coal mine permit, one mining company is planning to convert a second permit to electronic format, in addition to assisting a sister mine in converting all its documents into electronic format in preparation for a paperless permit application submittal. These fully paperless coal mine permits will also be on a CD-ROM on file at the Public Service Commission, at OSM, and at the County Auditor’s Office (the public access site). Each CD-ROM contains all the information normally contained in numerous three-inch binders and on many CAD maps and drawings.
- *Utah* – Utah currently retrieves water-quality information and reports water-quality data electronically, by means of either the Internet or e-mail. Utah is preparing mine permit information in GIS format, and will make these maps available directly over the Internet.
- *West Virginia* – West Virginia provides operators the electronic permit format via CD. The operator submits the application via CD, floppy disk or e-mail. West Virginia plans on making the electronic permit fully functional on the Internet in FY 2003.

*c. Technology Transfer and Publications*

Technology Transfer is accomplished through a variety of activities. State technical representatives meet frequently with OSM regional staff to share resources whenever practicable to resolve regional technical issues. OSM sponsors or attends interactive technical forums, computer applications workshops, and technical seminars to address mining and reclamation environmental issues. After coordinating the need of States, Tribes, and industry, OSM plans and presents technical topic forums. The following describe the two types of forums.

Mountaintop Mining EIS Workshops: To document the state-of-the-art in reclamation technology and explore impacts of regulatory decisions on mining practices, the Mountaintop Mining EIS Steering Committee sponsored several workshops. The workshops were targeted for specialized audiences based on expertise and experience in various topics and attendance was generally by invitation only. OSM was instrumental in the planning of the workshops, which were organized by West Virginia University and the U.S. Department of Energy through an arrangement with U.S. EPA.

Bond Release: The fifth in a series of five Interactive Bond Release Forums on Arid and Semi-Arid Areas is scheduled for FY 2002. OSM will continue co-sponsoring bond release forums in FY 2003 and subsequent years because of increased permitting activity and increased bond release inspections related to bond release applications. The states are continuing to encounter new issues needing discussion and resolution in all regions and find the interactive technical forums a suitable format.

Coal Combustion By-Products: OSM has successfully pioneered numerous technology transfer events and products on this topic with the focus on the use of these materials in reclamation, and will continue to advance this issue through FY 2003. During FY 2001, OSM published proceedings of a second technical interactive forum, improved its technical information website, participated in interagency negotiations with the U.S. EPA on future rulemaking presented technical papers at coal and CCB symposia and served on related national and international technical steering committees. An additional technical interactive forum is being planned for April 16-18, 2002.

Reforestation Initiative: OSM began an effort to encourage reforestation practices that would increase the amount of mined land reclaimed as forest. This effort has resulted in technical and policy symposia, a website, speaking at professional organizations, a video, and publications that transfer state-of-the-art science and technology. In September of 2000, the Interior and DOE entered into an MOU to promote a market-based approach to reclaiming abandoned mined lands through reforestation. OSM will work with numerous private, tribal, and State interest groups to identify potential reforestation sites and work to facilitate funding partnerships between potential reforestation sites and work to facilitate funding partnerships between potential donors. A technical interactive forum on the "Market-Based Approaches to Mined Land Reclamation and Reforestation" is currently being planned for FY 2002.

Reports, Forum, and Workshop Proceedings: OSM publishes and co-sponsors the publication of numerous forums and workshop proceedings and various tropical reports. These publications are distributed to interested parties at technology transfer events, upon request, and at various websites maintained by OSM. The agency uses the Internet to make available and seek comments to its reports and technology transfer products for as wide a client audience as possible. In FY 2002 and 2003, OSM will continue to develop, distribute, and communicate these products.

OSM Technical Library: OSM maintains a technical library in its Western Regional Coordinating Center located in Denver, Colorado, which provides access to technical, scientific, and legal information for the agency, States, tribes, industry, citizen groups and the public through a variety of services, reference assistance, technical research, document delivery, and the dissemination of critical current awareness information. The library projects that it will receive approximately 350 requests in FY 2002 and again in FY 2003. As well as providing technical information and services to State Regulatory Agencies and other OSM customers on a variety of mining-related topics, the technical library shares its collection through interlibrary loan with libraries around the world. The library catalog was made web-accessible for anyone with internet access during the FY 2001.

*d. Experimental Practices Program*

Section 711 of SMCRA allows variances from Sections 515 and 516 performance standards as alternative or experimental mining and reclamation practices to encourage advances in mining technology or to allow innovative industrial, commercial, residential, or public (including recreational) post-mining land uses. However, the experimental practices must be at least as environmentally protective as the performance standards promulgated under Sections 515 and

516 of SMCRA. The experimental practice also must not reduce the protection afforded public health and safety below that provided by the applicable performance standards. Approval and monitoring of a permit containing an experimental practice requires a close working relationship between the operator, the regulatory authority, and OSM.

Since the inception of the program, 35 experimental practices have been approved. Fourteen were determined to be successful and three unsuccessful; thirteen are currently underway; one was terminated due to regulation change, and four have been completed but final reports not yet received.

OSM received ten new experimental practices from Virginia, Ohio, and Kentucky in FY 2002. An additional 15 applications are anticipated in FY 2002, all from Kentucky and Virginia. It is likely that the interest in experimental practices will continue at the same level in FY 2003.

*e. Educational Outreach*

To make the public and students aware of OSM's responsibilities and of its environmental stewardship mission, OSM staff provides educational outreach to the science teachers associations, science classes, educational fairs, Earth Day events, career days, foreign visitors, grassroots organizations, and professional associations and societies. This outreach includes demonstrating surface mining reclamation using an open-pit mine model with reclamation equipment and activities in place and providing educational posters and materials involved in permitting, monitoring and reclaiming a mine site. Additional outreach is provided through publications and distribution of forum proceedings, such as the Approaching Bond Release: Revegetation, Reclamation Issues, and Surface Mining Applications in the Arid and Semi-Arid West, the Boy Scout Mining Information Handbook, and the integration of the Handbook of Western Reclamation Techniques into university curricula, conversion of important technical documents into electronic format, and compilations of technical information such as OSM's Mid-Continent Regional Coordinating Center's Comprehensive Technology Transfer CD Outreach efforts will continue in FY 2002 and 2003.

**Justification of Program Changes:**

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Technology Development & Transfer	FY 2003 Budget Request	Program Changes (+/-)
\$(000)	16,757	0
FTE	133	0

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