



TECHNOLOGY DEVELOPMENT AND TRANSFER

A REPORT ON IMPROVEMENT THROUGH TECHNICAL ASSISTANCE, TRANSFER OF TECHNOLOGY, AND TRAINING

The Office of Surface Mining provides states, Indian tribes, federal agencies, and the coal industry with the technical information and tools they need to carry out their responsibilities under the Surface Mining Law. These activities include: a) providing direct technical assistance to address specific mining and reclamation problems, b) maintaining automated systems and databases used by others in making decisions under the Law, and c) transferring technical capability to others through training, consultations, forums, and conferences. The goal is to help them develop the skills needed for solving problems on their own. In recent years, the Office of Surface Mining has been supplementing its traditional oversight presence with an increased emphasis on providing technical assistance and support to states and tribes.

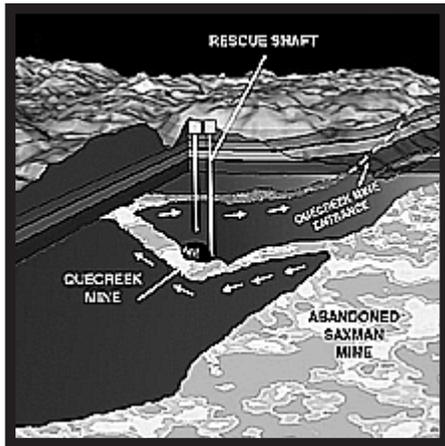
While the focus of the Office of Surface Mining is to help state and tribal partners do their jobs, the ultimate goal is to improve the health, safety, and the environment for our primary customers—the people who live and work in coalfield communities. The Office of Surface Mining provides information to citizens to help them better understand their rights and responsibilities under the Surface Mining Law.

Technical Innovation and Professional Services

The Office of Surface Mining organized the Technical Information Processing System (TIPS) in 1988 to provide state and federal mine regulators with a comprehensive set of analytical tools to aid in technical decision-making related to the Surface Mining Law. In 2002, the name of the function was changed to the Technical Innovation and Professional Services to reflect the primary role that service plays in the everyday function. The services provided are centered on off-the-shelf scientific and engineering computer hardware and software supported by the Office of Surface Mining in partnership with the states and tribes. The service has grown from a few applications available on a single specially designed shared workstation, to a suite of software on each user's desktop computer. Costs are held low through shared licensing of the software via the Internet.

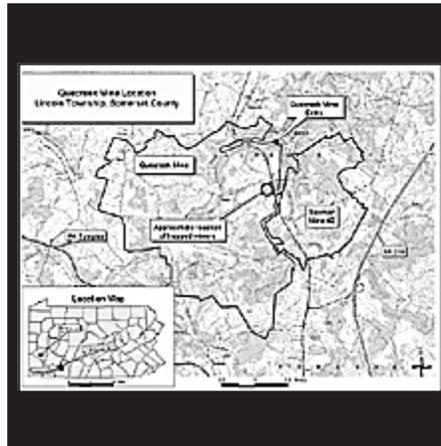
Much of the pre-mining land in the East is forest and it is important to reestablish forests on reclaimed coal mine land. At this reclaimed Western Kentucky mine site (left) the land use is a fish and wildlife habitat and thousands of trees and shrubs were planted. Scattered blocks of oak, pine, tulip poplar, walnut, ash persimmon, hickory, crab apple, chestnut, dogwood, and hawthorn were planted that now create forest land for wildlife.

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The Technical Innovation and Professional Services include: providing a comprehensive training program for core software for users, delivering core software to the users desktop, conducting the necessary research and development to ensure core software is the state-of-the-art, and providing technical assistance. Customers include states, tribes and Office of Surface Mining staff throughout the country. In cooperation with customers, the Technical Innovation and Professional Services Steering Committee was established to help guide the efforts. The Steering Committee is composed of state and Office of Surface Mining staff.

Currently the principal equipment consists of Windows-based computers at state, tribal, and Office of Surface Mining offices with access to the license servers via the Internet and Office of Surface Mining Wide Area Network. The software covers a wide range of subjects and includes 19 commercially available applications covering geospatial, hydrology, engineering, and statistical topics. This software provides products that are used for technical decision-making associated with review 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 lands projects, and providing the scientific basis for environmental evaluations.



During 2002, 700 desktop users at 96 state, tribal, and Office of Surface Mining sites made use of the software. On average, 86 customers use this software each workday.

Software updates were provided to each of the 96 customer sites as part of a semiannual service to keep the tools up to date. Information Technology Administrators at each site then installed the updated software directly on the desktop of each of the 700 customers.

An excellent example of a state regulatory agency using these tools occurred in Pennsylvania when nine miners were trapped 240 feet below the surface in a flooded mine shaft. Pennsylvania Department of Environmental Protection staff in the Bureau of Mining and Reclamation and Bureau of Abandoned Mine Reclamation prepared informational maps for the public, using TIPS software. A Bureau of Mining and Reclamation staff member prepared a 3-D perspective map showing the interaction of surface topography, geology, and coal seams, the locations of the rescue and air shafts, and the cross sections of the abandoned Saxman mine which flooded into the Quecreek mine where the miners were working. The 3-D illustration was provided to the Department of Environmental Protection artists who added graphics showing the water and trapped miners to create a very effective map illustrating the miners' situation (above left).

Meanwhile, at the Bureau of Abandoned Mine Reclamation offices, staff digitized the Quecreek and abandoned Saxman mine boundaries from available mine maps, creating a map showing where the miners were trapped in combination with the mine boundaries, roads and towns, superimposed on a U.S. Geological Survey basemap (left).

Both of these graphics were widely distributed on the Internet, to the media, and rescue officials.

Training

Training of state, tribal, and Office of Surface Mining staff in the practical application of the software is done on a continuing basis and is an integral part of the operation. Instructor-led software training courses incorporate the reclamation experience of its instructors to provide a unique training experience. Training during 2002 increased to 500 students in 59 classes, compared to 2001 levels of 370 students in 42 classes. This training included ten instructor-led courses. The training program employed 45 different instructors in 2002; 21 of these were state program experts. The composite Government Performance and Results Act rating for Technical Information Processing System training satisfaction for 2002 was 91.5 percent. The four categories making up this score breakdown as follows: class satisfaction 89 percent, facility 90 percent, lead instructor 95 percent, and co-instructor 92 percent.

E-training courses were offered for the first time in 2002. Eight on-line Geographic Information System courses were offered in multiple sessions through a contract with the Environmental Systems Research Institute Virtual Campus. During the year 114 students participated in the classes. By the end of 2002, 58 students had completed their courses, a completion rate of over 50 percent, well above industry e-learning training completion averages.

New courses offered in 2002 included advanced global positioning system

hardware and software use, water quality analysis, and groundwater modeling.

Services Provided

Following are examples of Technical Innovation and Professional Services assistance that occurred in 2002.

■ In the fall of 2001, staff provided Global Positioning System (GPS) project support/training to the Utah Division of Oil, Gas, and Minerals Abandoned Mine Lands program. Nearly 350 tree seedlings planted on hard rock mine tailings near Alta, Utah were GPS-mapped as tree-vigor evaluations were field-recorded. The fieldwork was accomplished in less than six hours, and revealed a distinct zone of seedling mortality that will be studied further. Under the composite

Government Performance and Results Act this assistance obtained a 100% satisfaction rating.

■ Assistance was provided to Indiana program staff and Patoka South Fork Watershed Steering Committee that included map preparation on the Augusta Lake project. The Steering Committee is now using the software products and methods introduced in the project to coordinate, plan, and design future watershed projects.

■ Assistance was provided to the Mississippi Department of Environmental Quality that examined soil, soil-substitution, and geochemistry data on a new permit application. Scientific modeling and mapping tools were used to georeference old aerial photographs for

making determinations on historically used prime farmland and cropland.

■ Using two different engineering design programs, staff assisted the Missouri Abandoned Mine Lands program with designs for several dangerous mine shaft closures.

The Office of Surface Mining solicits customer satisfaction ratings in compliance with the composite Government Performance and Results Act. During 2002, these assistance efforts obtained a 98 percent satisfaction rating.

Geographic Information System Databases

Development of geographic information system databases continues to be a priority in the Western Region and Tennessee. Staff at these locations are converting map and tabular data from mining operations into geographic information system databases. This enables reviewers to bring up permit application data on the computer screen for quick reference and analysis. For example, soil-type data can be combined with vegetation data to explore the success of revegetation growing in different soils.

At the Mid Continent region staff created a geographic information system for abandoned mines in St. Louis, Missouri. The project used four separate software products to scan and digitize mine maps, merge these with other maps, convert all maps to a common coordinate system, merge attribute data, and integrate all information into an easy to use product. Following a presentation to the Missouri Land Reclamation Program, state staff immediately began using the system for Abandoned Mine Land Emergency Program investigations.

Remote Sensing Technology

The remote sensing program was initiated in 2001 and made significant progress in 2002. In the Western region, aerial and satellite imagery are an integral part of the regional geographic information system

This reclaimed mine site contains 110 acres of open water, islands, wetlands, uplands, and forest habitats. Wetland islands were constructed in the shallow areas to maximize transition zones for wildlife. The islands were heavily vegetated and quickly became a connection to the surrounding habitat for birds and mammals. This reclaimed mine is now a regional wetland attraction.



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with quarterly updates acquired, processed, and delivered to permitting and inspection staff. The inspectors routinely use this imagery to assist in planning areas to visit in the field, during consultations with mine operators, and when preparing maps to include in inspection reports. Aerial imagery was acquired during 2002 for four large western mines and is being distributed to the Bureau of Land Management, Bureau of Indian Affairs, and state and tribal governments representing a new era in cooperation with our regulatory partners.

Five pilot projects were initiated in the Appalachian region with regulatory staff in Kentucky, Pennsylvania, Tennessee, Virginia, and West Virginia. Over 500 km² of 1-meter resolution satellite imagery was procured and processed with an accuracy of less than 1 meter using a methodology developed by Technical Innovation and Professional Services staff. A combination of inspection and permitting applications are in development that will allow inspectors to better monitor mines, allow permitting staff to make decisions faster, and allow managers to certify bond release requests in a more timely manner.

A remote sensing workshop was held for 14 attendees from seven regulatory programs. This core group of users will help disseminate remote sensing knowledge, assist as future class instructors, and assist in the preparation of a report on eastern remote sensing applications. Under the composite Government Performance and Results Act this workshop obtained a 100 percent satisfaction rating.

A noteworthy accomplishment in this area during 2002, was receipt of the 2nd place prize in the annual *GeoSpatial Solutions* magazine contest for geotechnology, out-placing over 70 other entries from around the world.



What does coal mining and reclamation look like? Most people have never seen an active coal mine or had a chance to see its similarity to modern highway construction or other major earth-moving operations. These three photos show a sequence of steps that are found at most coal mines. The photos are all taken from the same viewing point and show a rural Ohio mining operation over a three year period. During the initial stages of mining (left) the land is cleared of trees and shrubs, topsoil removed and stored for use during reclamation. Six months later (center) the area has been mined and rock and overburden is piled where the coal was extracted. Two years later (right) the regrading is complete, the top soil replaced, and vegetation is growing on the site. The following year agricultural crop production resumed.

Mobile Computing

During 2002, field-oriented software running on mobile computing devices was successfully tested. Inspectors from Colorado, New Mexico, and Office of Surface Mining field offices navigated to permit features and field-verified jurisdictional boundaries at Western mines. These features were established on permit maps with existing high-precision geographic positioning system units employing satellite real-time correction.

Acid Drainage Technology Initiative

The Acid Drainage Technology Initiative is a partnership which the Office of Surface Mining has joined with industry, states, academic, other governmental agencies, and groups to identify, evaluate and develop “best science” practices to prevent new acid mine drainage and eliminate existing sources.

The National Mine Land Reclamation Center at the West Virginia University serves as the central location for the initiative. The Eastern Mine Drainage Federal Consortium, a group of federal agencies working in the Appalachian region, helps coordinate federal participation. The Interstate Mining Compact Commission, representing

eastern coal producing states, and the National Mining Association, representing the U.S. coal industry, are participants. While the focus was initially on the coalfields of Appalachia, the initiative’s scope was expanded when the Metal Mining Sector Work Group was formed in 1999.

The Office of Surface Mining has been funding this initiative at approximately \$200,000 per year. In 2002, the Office of Surface Mining funding was used for field verification of acid mine drainage prediction, the printing of additional *Review of Mine Drainage Prediction Methods* handbooks, and initial work on standard Acid Drainage Technology Initiative kinetic testing protocols used in evaluating acid mine drainage potential, monitoring the performance of in-situ drainage treatment systems, evaluating methods of identifying selenium in geologic and overburden materials, and evaluating methods to remove selenium from drainage water.

International Activities

During 2002, the Office of Surface Mining continued to provide guidance to the Government of Indonesia in the national reform of mining policy. Three years ago, the Ministry of Energy and



Mineral Resources sought the Office of Surface Mining's assistance in restructuring and decentralizing the regulation of mining and reclamation in Indonesia. The Ministry delegated considerable authority to local and regional governments and made them responsible for regulating most aspects of mining operations. In drafting statutory changes to Indonesia's mining law, Ministry officials looked to the state/federal partnership under the U.S. Surface Mining Law as a model for decentralizing government authority over mining. The United States Agency for International Development provided the Office of Surface Mining with 100 percent funding to support the Ministry's request.

In addition to relying on the expertise of numerous Office of Surface Mining technical professionals, as well as staff from other federal offices, the Ministry tapped into the vast regulatory and technical experience of personnel in state governments. The highly visible role of the State Regulatory Authorities in the project has been important in demonstrating to Ministry officials how national and regional government personnel can work together to produce positive results. Indeed, almost all of the project training, technical assistance and consultations have been carried out jointly by federal and state experts. In addition to retaining a full-time Project Director on duty in Jakarta, the Office of Surface Mining coordinated the work of several

state/federal teams on temporary assignments at various locations within Indonesia. Likewise, Ministry officials visited the United States to see firsthand how the state/federal partnership works and to view examples of the reclamation results that have been achieved through the partnership.

During 2002, project activities designed to improve Indonesia's national, regional and local capability for mine inspection and enforcement included training in the development of more effective permitting processes, the management of an environmental assessment process, and the effective conduct of mineral production and royalty audits. In addition to presenting seminars on Advanced Mine Inspection techniques and Water Quality

Standards for mining operations, federal and state staffs presented the Office of Surface Mining's highly regarded Instructor Training Course to help Indonesian officials develop the capability to provide on-going training. Specialized technical training and consultations focused on topics of special interest to Indonesian officials, including advanced coal fire suppression techniques, fine coal recovery at coal processing operations, gold and mercury mining technologies, and the translation of training materials into Bahasa Indonesia.

During stays in the United States, Indonesian officials attended a seminar on coal fines processing, observed fine coal recovery circuits in Western Maryland and visited the Interior Department's Bureau

Signs and markers provide important identification for citizens and mine inspectors. Perimeter signs, such as the one shown at this Texas mine, are particularly valuable in preventing equipment operators from inadvertently entering areas not authorized for disturbance and helping to eliminate disagreements over the location of the permitted mine site.



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At this large North Dakota mine the reclaimed land has returned to an agricultural use -- wheat production and livestock grazing. Tree and shrub seedlings (top) have been machine planted to established shrub patches and shelter belts. More than 150,000 trees and shrubs have been planted to establish windbreaks (above) and wildlife plantings. These plantings provide shelter for livestock and protection against wind and water erosion.

of Land Management's Phoenix Training Center. Other project activities in 2002 included training in the preparation of Environmental Impact Statements through the University of Southern Maine and the development of a preparer's certification course.

This latest cooperation between the Office of Surface Mining and Indonesia follows two highly successful technical assistance agreements. The first, a three-year project from 1995 to 1998 in which the Office of Surface Mining provided technical assistance to improve Indonesia's capacity

Figure 5

Course Name	Sessions	Students
Acid-forming Materials: Fundamentals	1	23
Acid-forming Materials: Planning and Prevention	1	20
Acid-forming Materials for Program Staff	1	17
Acid-Forming Materials Abandoned Mine Land Workshop	1	14
Administration of Reclamation Projects	1	15
Advanced Blasting	1	22
Abandoned Mine Land Design Workshop: Dangerous Openings	1	12
Abandoned Mine Land Design Workshop: Dangerous Highwalls	1	9
Abandoned Mine Land Design Workshop: Landslides	1	15
Applied Engineering	1	23
Basic Inspection Workbook	0	(61) ¹
Blasting and Inspection	2	44
Blasting and Inspection (Module 3)	1	34
Bonding Workshop: Cost-Estimation	1	28
Bonding Workshop: Legal and Administrative Aspects	3	48
Effective Writing	3	67
Enforcement Procedures	1	21
Enforcement Tools and Applications	1	17
Erosion and Sediment Control	3	60
Evidence Preparation and Testimony	1	15
Expert Witness	1	10
Historic and Archeological Resources	2	45
Historic and Archeological Refresher	1	22
Instructor Training	1	22
NEPA Procedures	2	43
Office of Surface Mining Orientation	1	16
Permit Findings Workshop	1	15
Permitting Hydrology	1	16
Principles of Inspection	1	13
Soils and Revegetation	1	23
SMCRA and the ESA	2	30
Spoil Handling and Disposal	1	24
Subsidence	1	22
Surface and Groundwater Hydrology	2	46
Underground Mining Technology	2	32
Wetlands Awareness	3	49
Total	49	932

¹ 61 books distributed

to regulate the surface coal mining industry and reclaim mined lands in an economical and environmentally sound manner. The World Bank funded the project and fully reimbursed the Office of Surface Mining for all costs. In the second project, the Office of Surface Mining provided training to Indonesian officials in suppressing fires at outcrops of exposed coal and peat to prevent the occurrence of much larger forest fires in the mountainous regions of Indonesia. The coal fire-suppression project was entirely funded by the State Department's Southeast Asia Environmental Initiative.

Technical Training

The Office of Surface Mining continued its emphasis on providing technical assistance to the states and tribes by enhancing the technical skills of regulatory and reclamation staff through the National Technical Training Program. In 2002, the program offered 49 sessions of 36 different courses (see Figure 5). In addition to regularly scheduled courses, in response to specific requests, special sessions of the NEPA Procedures course were held for Navajo students and a special session of the Bonding Workshop: Administrative and Legal Aspects was held for Virginia. A new course, SMCRA and the Endangered Species Act, was piloted

to facilitate implementation of the 1996 Biological Opinion which was issued to the Office of Surface Mining by the U.S. Fish and Wildlife Service. This course, which was developed in conjunction with the Fish and Wildlife Service, provides information on how requirements of the Endangered Species Act are integrated into the Surface Mining Law permitting process. Another new course that piloted in 2002 was Advanced Blasting: Investigation and Analysis of Blasting Effects. This course enhances student skills in gathering and analyzing blast-related information and will assist in resolving citizen complaints from ground vibrations, air blasts, fumes, and flyrock. A new course for Abandoned Mine Land students, Acid-Forming Materials AML Workshop, brought together experts to exchange information on reclaiming problematic areas in the Midwest. This course will be adapted in 2003 for Eastern states. Another new 2002 offering was Office of Surface Mining Orientation for new personnel. This course familiarizes students with the missions of the Department of Interior and the Office of Surface Mining. Students are provided with an overview of all Office of Surface Mining programs and a wide variety of information on personnel issues. At the request of the states, pertinent parts of the course will be offered to state and tribal staff to facilitate an understanding of the roles played by state/tribal and federal agencies in implementing the Surface Mining Law. In 2002, the training program provided technical and logistical support for a highly successful state and tribal benchmarking workshop on the Probable Hydrologic Consequences (PHC)/Cumulative Hydrologic Impact Analysis (CHIA) process as well as a related seminar on performance measurement and strategic planning. The workshop was attended by 83 state, tribal, and Office of Surface Mining representatives. The workshop shared information about model state programs with the goal of adopting or adapting processes to more effectively deliver products and services (e.g., permitting) to customers.

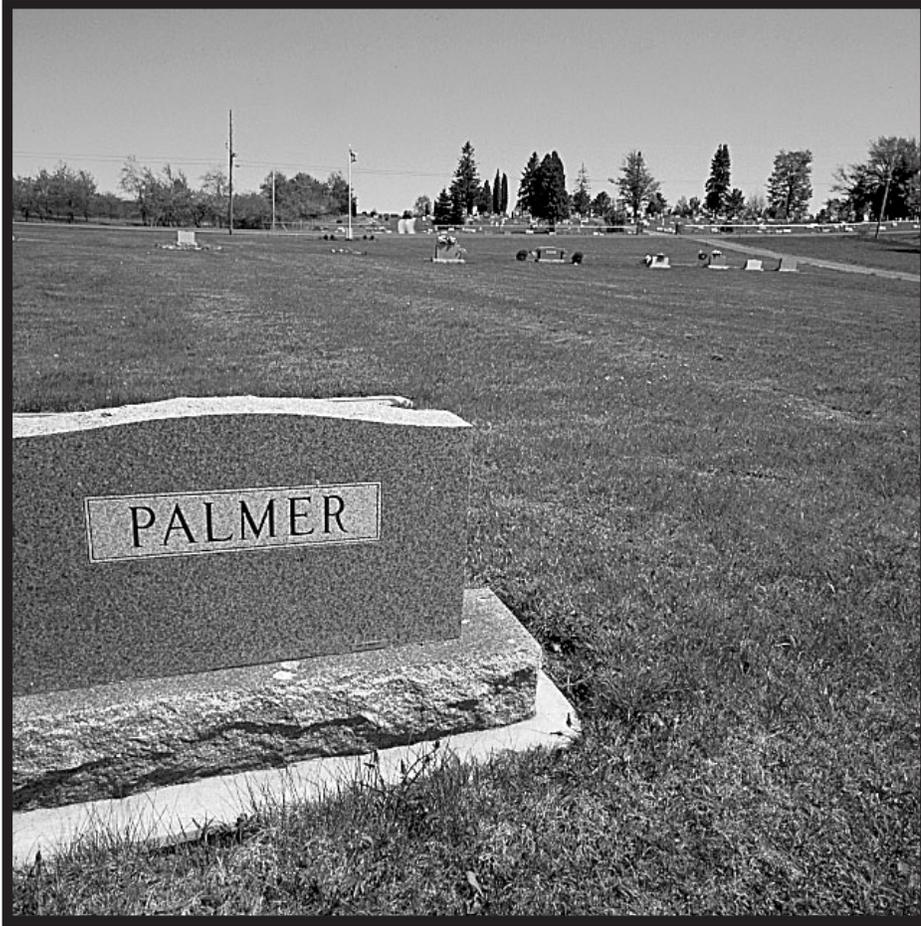


When reclamation is successfully completed, the land closely resembles the landscape before mining. This Oswego, Kansas mining operation disrupted the landowner's agricultural operation for only a short time and today it is back into agricultural production.

In line with the President's e-government initiative and in conjunction with the states, development of a new on-line training course was initiated that will provide students with basic information on acid-forming materials prior to attending advanced acid-materials classes. This should result in better prepared students and more in-class time to address applications and advanced concepts. Some costs savings from reduced travel are anticipated as well. Preliminary work also began on a new course on Passive Treatment Systems for acid-mine drainage. This course will include topics such as wetlands and anoxic limestone drain treatments. The audience for the course is permitting specialists, inspectors, and Abandoned Mine Land specialists.

All aspects of the National Technical Training program from identification of training needs through course development and presentation are cooperative efforts of state, tribal, and Office of Surface Mining offices. This joint effort exemplifies Secretary Norton's 4Cs of cooperating, communicating, consulting with local agencies, and fostering good conservation practices. In 2002, there were 163 instructors, — 52 percent from 16 Office of Surface Mining offices, 39 percent from 16 States, 4 percent from the Interior Department's Solicitor's Office, and 5 percent from other sources. The 49 sessions, which reached 932 students, were presented in 28 locations in 13 states. State and tribal students accounted for 82 percent of students, Office of Surface Mining

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With proper reclamation, mined land can be returned to its premining use or to a valuable new use. A cemetery adjacent to an active coal mining operation in Davis, West Virginia, needed room to expand. Extra blasting in this area reduced the size of the rocks in the backfill so that this reclaimed mine site could become a level, well-drained cemetery.

students for 16 percent, and 2 percent for other participants. The program's Government Performance and Results Act attendance goal of 900 students was exceeded by 32 students and the customer satisfaction rating of 96 percent exceeded the goal of 90 percent by 6 percent.

Applicant/Violator System

One of the underlying principles in the Surface Mining Law is that those who conduct mining are responsible for returning the land and water to productive use. Section 510(c) of the Law prohibits the issuance of new permits to applicants who own or control operations with unabated or uncorrected violations.

The primary purpose of the Applicant/Violator System is to provide state regulatory authorities with a central database of application, permit, ownership and control, and violation information. Federal and state officials review Applicant/Violator System data when evaluating an applicant's eligibility for new permits. The system is also used to determine the eligibility of potential recipients of Abandoned Mine Land reclamation contracts and for inspection and oversight purposes.

During 2002, the Office of Surface Mining responded with quality reviews for 3,316 requests for Applicant/Violator System data evaluations from state and federal regulatory authorities and state

abandoned mine land program officials. The Office of Surface Mining collected and/or settled payments of civil penalties and reclamation fees in the amount of \$1,536,479 due, in part, to violation information in the system.

Access to the system is available to the public, coalfield citizens, coal companies, and industry representatives via the Internet. The Applicant/Violator System Office in Lexington, Kentucky, distributes customized communication software, free of charge. Upon request, system training is provided users on how to access and interpret information as well as system demonstrations. Instruction is tailored to meet the specific needs of the target audience.

Outreach efforts by the Applicant/Violator System Office included sponsoring an exhibit at the 24th Annual Conference of the National Association of Abandoned Mine Land Programs. The exhibit explained the process of how abandoned mine land contractors obtain a permit eligibility check from the system prior to being awarded a contract and to promote access to the system.

Regrading the land's surface is a major part of the surface mine reclamation process. Because golf course construction also requires extensive surface grading, they are found on reclaimed mine sites throughout the country. This course near Pittsburgh, Pennsylvania (below) has provided golfers with enjoyment for many years and it is impossible to find any trace of the coal mining that occurred in past years.



During 2002, the Applicant/Violator System Office received customer satisfaction ratings that averaged 97 percent. This is the fourth year of extremely high customer satisfaction ratings.

General information about the system, including access and user information, instructions for obtaining access software, and how to obtain customer assistance, can be found at www.av.sosmre.gov.

Slurry Impoundments

Since 1996, there have been four major breakthroughs from coal preparation plant slurry impoundments into underground mines. The National Research Council of the National Academies of Science conducted a study on preventing coal waste impoundment failures and breakthroughs and released a report on that study in October 2001. The report included several recommendations for joint work by the Office of Surface Mining and the Labor Department's Mine Safety and Health Administration to minimize the potential for future breakthroughs. The Office of Surface Mining and Mine Safety and Health Administration have established a joint technical committee to facilitate ongoing impoundment issues. In addition, the Office of Surface Mining and the Mine Safety and Health Administration developed several ad hoc technical working groups to develop specific responses to the recommendations contained in the National Research Council report. These groups, which also involve representatives from state regulatory authorities, are working to develop proposals for consideration by the Office of Surface Mining and the Mine Safety and Health Administration. As a part of this effort, two separate technical meetings on the use of geophysical methods for identifying underground mine voids were planned. In October, 2002, the Mine Safety and Health Administration hosted a one-day technical meeting on the subject. The Office of

Surface Mining is planning a three-day interactive forum on geophysical methods to be held in Lexington, Kentucky in July, 2003.

Mountaintop Mining

As part of a 1998 settlement agreement in *Bragg v. Robertson, No. 98-0636 (S.D.W.Va.)*, the Office of Surface Mining continued to work with the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the West Virginia Department of Environmental Protection to prepare an environmental impact statement on mountaintop mining and valley fills in the steep slope regions of Appalachia. The agencies plan to publish a draft environmental impact statement in early 2003.

During mining at this Indiana mine site, soil on nearly all of the 520 disturbed acres was removed and replaced on the reclaimed land to prime farmland depths (48 inches), even though nearly 250 acres were non-prime farmland where soil could have been replaced at the 12-inch depth. Today this reclaimed mine site has been returned to productive farmland and is indistinguishable from the surrounding landscape.

As provided in the settlement agreement, the Office of Surface Mining also continued to cooperate with West Virginia in the review of permit applications proposing to construct large fills as part of the mining operation. During 2002, the Office of Surface Mining participated in the review of nine permit applications. These activities are reported monthly to the West Virginia Congressional delegation; the reports are available on-line at www.osmre.gov/mtindex.htm.

However, on May 8, 2002, in *Kentuckians for the Commonwealth, Inc. v. Rivenburgh, No. 01-0770 (S.D.W.Va.)*, Judge Charles H. Haden II enjoined the Huntington District of the U.S. Army Corps of Engineers from issuing any permit under section 404



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At this North Dakota mine site the operator has completed exemplary reclamation that has included the local community in all stages of the work. Using local partnerships and innovative farm planning the company has returned mined lands to full agricultural production in a very short time. Partnerships with farmers in planning and managing the reclaimed lands were the key to success. This close working relationship resulted in improved on-the-ground productivity and more rapid return of agricultural lands to the owners.

of the Clean Water Act for placement of a fill in waters of the United States unless the fill has a primary purpose or use other than the disposal of waste. Because of this decision, permitting activity for mines involving large fills in West Virginia, which is within the jurisdiction of the Huntington District, has slowed significantly. Therefore, the monthly reports have been discontinued until the legal status of fills associated with mining operations is clarified.

Interactive Forum

An Interactive Forum entitled "Approaching Bond Release: Post Mining Land Use in the Arid and Semi-Arid West" was held in Bismarck, North Dakota, on August 25-30, 2002 (this was the last in a series of six forums on bond release in the arid and semiarid west). The post mining land use topics included: achieving goals, verifying success, and releasing bond on post mining reconstructed farmlands, forests, wildlife habitat, grazing lands, reclaimed native grasslands, and industrial sites. In addition, presentations were made on slope and channel reclamation using fluvial geomorphic principles, and oil and gas development on post mining landscape. The forum provided an opportu-

nity for industry and the regulators to openly discuss post mining land use issues by sharing information and interacting with all parties in the coal mining community. The three-day forum was supplemented by two days of workshops on Geographic Information Systems for Mining Applications, and Digital Imaging for Permitting and Regulatory Applications. The forum concluded with a field trip to reclaimed portions of the Dakota-Westmoreland and BNI mines. The one hundred and twenty participants from 15 states, one tribe, and Canada attended the forum, field trip, and two workshops.

Revised Universal Soil Loss Equation

For the third consecutive year *Guidelines for the Use of the Revised Universal Soil Loss Equation (RUSLE) on Mined Lands, Construction Sites, and Reclaimed Lands*, software (RUSLE Version 1.06) was distributed on CD-ROM. In 2002, The Office of Surface Mining upgraded the software, enabling it to run in WINDOWS 2000 and XP environments. With the addition of new weather station data, and extension of existing databases, the software is now a more powerful tool that is being used to estimate soil loss under a wide variety of site-specific conditions. The new guidelines are providing assistance for maximizing the accuracy of soil-loss prediction estimates, recommending procedures that ensure soil-loss calculations are reproducible, and identifying critical areas for future research.

In its outreach, the Office of Surface Mining is sponsoring the conversion of the Guidelines to a WINDOWS environment to complement the Agriculture Department's new RUSLE 2.0 software. In addition, the Agriculture Department's Natural Resources Conservation Service has incorporated the Office of Surface Mining guidelines into their version of RUSLE 2.0 software for agricultural purposes.

Coal Combustion By-Products

The Office of Surface Mining has continued to be involved in several Coal Combustion By-Product related activities, including technology transfer, rulemaking efforts by the Environmental Protection Agency, and research efforts by the Energy Department's National Energy Technology Laboratory.

During 2002, the Office of Surface Mining conducted the third in a series of technical interactive forums that focused on the use and disposal of Coal Combustion By-Products at coal mines in the Western U.S. The proceedings for this forum will be available on the Office of

Surface Mining website by late 2002. The proceedings include 33 presentations on the basics of Coal Combustion By-Products testing and terminology, Western mining case studies, environmental impacts to ground water, and the regulatory direction of by-product placement at mine sites.

The Office of Surface Mining is an active participant on the Technical Steering Committee of the University of Kentucky's International Ash Symposium series that is planning for its upcoming symposium in 2003. In support of Environmental Protection Agency data collection for its rulemaking efforts, the

Office of Surface Mining: (1) continued to participate with the Environmental Protection Agency in field visits to investigate state programs and field conditions of by-product placement at mine sites, and (2) provided extensive technical information and guidance to the Environmental Protection Agency on its Risk Assessment study concerning ground water quality impacted by by-product placement at mine sites. The Office of Surface Mining also provided extensive technical and regulatory guidance on by-product placement at coal mining sites to the Interstate Mining Compact Commission for its State/Federal Initiative that is building a state consensus on Coal Combustion By-Products regulatory guidance. In support of by-product research activities, the Office of Surface Mining actively participates on the Energy Department's Combustion By-Products Recycling Consortium national steering committee that evaluates and makes recommendations for funding of Coal Combustion By-Products research. For additional information on by-product placement at mine sites see www.mcrc.osmre.gov/ccb.

The pond and forested wetland reclamation at this Mt. Pleasant, Texas mine is an aesthetic and recreational setting that will benefit the community for many years. When a final pit was being reclaimed as a pond, engineers designed a 30-acre two-tier flood plain that provides both flood storage and a forested wetland. Machine planting of containerized seedlings resulted in a 77 percent survival rate and a dense stand of trees and shrubs. Today, established wetland oaks, pecan, sweetgum, blackgum, persimmon, and red maple cover the upper tier, and baldcypress, water tupelo, and water hickory cover the depressions and wet areas. In the years to come, the vegetation will continue to grow and enhance this Texas landscape.



Bat Conservation and Mining

The Office of Surface Mining has worked to protect the populations and habitats of bats associated with mining since 1998 when a Memorandum of Understanding was signed with Bat Conservation International. During 2002, the Office of Surface Mining conducted the second in a series of technical interactive forums on all aspects of Bat Gate Design. The forum served as the format to produce a "state of the art" manual on Bat Gate Design for distribution by Bat Conservation International and the U.S. Fish and Wildlife Service. The manual includes 41 presentations on why bats and their habitats need protection, how to plan for a mine or cave closure project, how to design specific bat friendly closures, how to manage the construction of a bat friendly closure, and how to maintain a closure structure and monitor the effects of that closure on bat populations.

TECHNOLOGY DEVELOPMENT AND TRANSFER



The Office of Surface Mining was selected to receive the 2002 Department of the Interior Environmental Achievement Award for achievements of Bat Conservation Steering Committee. For additional information on Bat Conservation and Mining see, www.mcrc.org/osmre.gov/bats.

Reforestation

The Office of Surface Mining has been extensively involved with efforts to encourage reforestation of coal mined lands since 1998. During 2002, the Office of Surface Mining conducted the second in a series of technical interactive forums on Market-Based Approaches to Reclamation and Reforestation of Mined Land. The proceedings included 17 presentations on market-based approaches to land reclamation, market-based economic and management considerations related to reforestation of mined lands, and reforestation success stories.



The Office of Surface Mining has developed an outreach package that is ready for distribution. This outreach package provides general guidance to land owners and others on how to use existing market-based approaches to finance reforestation efforts on active and abandoned mined lands. For additional information on the Office of Surface Mining's Reforestation Initiatives see www.mcrc.org/osmre.gov/tree. The Market-Based Approaches forum proceedings will be available on this website by the end of 2002.



Wooded draws are a natural feature of the North Dakota landscape that provide critical habitat for wildlife (top). Traditionally coal mining operations mined through these draws and then reclaimed them. Although this has met with success, this mine operator took a new look at working with these unique natural features – they left the wooded draws alone. Instead of mining through them, they mined around them. Today, the reclaimed land around the draws is used for grazing land and the cattle frequent the draws for water and cover (center). Reclaimed grazing land goes right up to the wooded draws and is indistinguishable from the premining conditions (bottom). The extra work needed to accomplish this reclamation has eliminated environmental impacts and provided reclamation that is already part of the natural landscape.

Hydrologic Permit Requirements

Hydrology – ground water flow and quality, surface water flow and quality and the interaction of ground water and surface water as part of the hydrologic balance, constitute a significant part of the Surface Mining Law and its implementing regulations. The Office of Surface Mining completed two major activities related to permitting hydrology requirements during 2002. The first was a technical reference document, the second was a benchmarking workshop on best practices dealing with hydrology.

The technical reference document titled *Permitting Hydrology: A Technical Reference Document for Determination of Probable Hydrologic Consequences (PHC) and Cumulative Hydrologic Impact Assessments (CHIA), Baseline Data* was disturbed via the Internet in May 2002. The “Probable Hydrologic Consequences” is a responsibility of permit applicants to collect baseline ground and surface water data and to make a prediction of the impacts of the mining and reclamation operation on these baseline conditions. The “Cumulative Hydrologic Impact Assessments” are hydrologic analysis done by the regulatory authorities prior to permit approval to ensure that material damage to the hydrologic balance outside the permit area will not occur.

The Office of Surface Mining, in conjunction with the Interstate Mining Compact Commission, sponsored the Workshop on Hydrologic Permitting Requirements. The workshop was held March 12-14 in New Orleans, Louisiana. The purpose of the workshop was for federal, state and tribal regulatory authorities to share with each other which regulatory program experiences have proven to be their best or most innovative methods, processes and practices related to the Probable Hydrologic Consequences and Cumulative Hydrologic Impact Assessments.

Bonding Technical Assistance

Office of Surface Mining's Bonding Specialist provided technical assistance and background data on Frontier Insurance Company with respect to their liquidation process to primacy states, in addition to providing articles about current status of the surety industry. In 2002, the Office of Surface Mining provided on-site administrative bonding technical assistance for newly hired Utah Division of Oil Gas and Mining's staff, and conducted a joint quality-control review of bond instruments as part of the training.

Technical Library Resource Center

During 2002, the Office of Surface Mining Technical Library in Denver, Colorado actively publicized the new web site www.wrcc.osmre.gov/glas/ that provides on-line access to the library catalogue. The library staff respond to more than 325 requests from state regulatory agency staff, other federal agency staff, citizens, coal industry, consultants, and academics, in addition to fulfilling more than 280 Office of Surface Mining requests for information. The technical library plays a large role in technology transfer by assisting with the dissemination of electronic information and publications to Office of Surface Mining constituents.

Evaluation of Technical Assistance Performance

The 2002 performance goal was to attain a 92 percent customer satisfaction rating in technical assistance and technology transfer activities. Preliminary results from a customer survey gave a 100 percent satisfaction rating for technical assistance and 98.7 percent satisfaction rating for technology transfer. This rating compares favorably with 2001, rising from 99.6 percent to 100 percent for technical assistance and 98.7 and 96.8 percent to 98.7 percent for technology transfer. The goal was exceeded based on 41 responses received from 46 surveys sent for technical assistance (89.1 percent response

rate) and on 195 responses received from 242 surveys for technology transfer activities (80.5 percent response rate). For 2003 the goal will be to attain a 94 percent customer satisfaction rating based on the surveys. Different measures of performance will also be employed as a result of the new cost accounting system and new output measures.

For many years the trees used for the National Christmas Pageant of Peace tree-lighting ceremony on The Ellipse in Washington, D.C. were grown on tree farms located on reclaimed mine land. One year they came from this Christmas tree farm in Garrett County, Maryland that was previously a reclaimed coal mine. Following the month-long pageant, the balled-and-burlaped trees were transported to permanent locations at parks throughout the Washington, D.C. area. The scotch pine in the center of this photo was used for the holidays and is now a large tree growing next to the Office of Surface Mining Headquarters in Washington, D.C.

