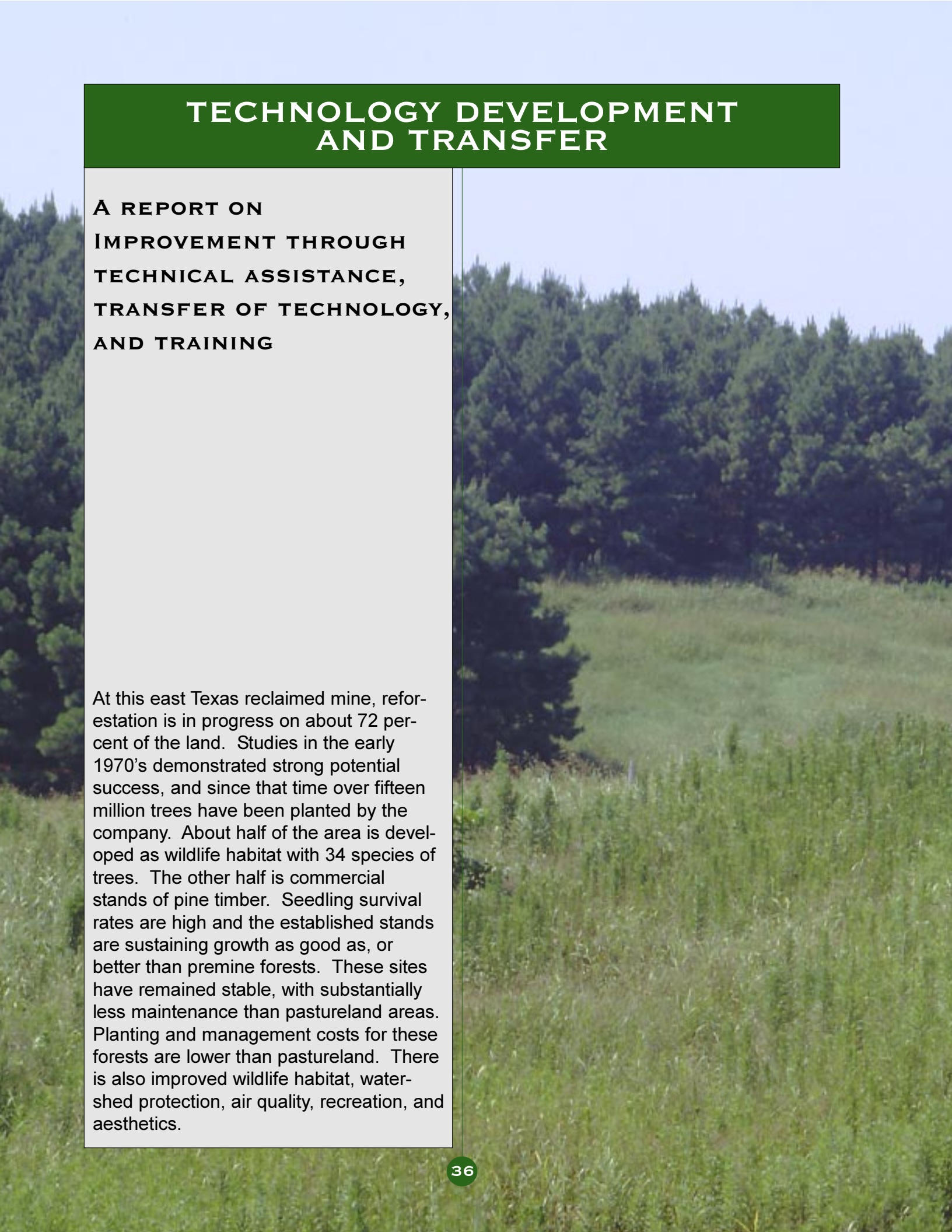
TECHNOLOGY DEVELOPMENT AND TRANSFER

A report on Improvement through technical assistance, transfer of technology, and training



At this east Texas reclaimed mine, reforestation is in progress on about 72 percent of the land. Studies in the early 1970's demonstrated strong potential success, and since that time over fifteen million trees have been planted by the company. About half of the area is developed as wildlife habitat with 34 species of trees. The other half is commercial stands of pine timber. Seedling survival rates are high and the established stands are sustaining growth as good as, or better than premine forests. These sites have remained stable, with substantially less maintenance than pastureland areas. Planting and management costs for these forests are lower than pastureland. There is also improved wildlife habitat, watershed protection, air quality, recreation, and aesthetics.

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.

(Left to right), Office of Surface Mining staff, Rebecca Siegle, Brenda Steele, and Cathy McNish digitizing soils and hydrology data to determine amounts of soil loss that can be expected under different mine plans.

Technical Information Processing System (TIPS)

The Technical Information Processing System (www.tips.osmre.gov) is comprised of off-the-shelf computer hardware and software supported by the Office of Surface Mining in partnership with the states and tribes. The system is maintained by the Office of Surface Mining for use by state and tribal regulators and the Office of Surface Mining staff. The system consists of Windows-based computers at state, tribal, and select federal offices with access to Technical Information Processing System license servers via the Internet and the Office of Surface Mining's Wide Area Network. The Technical Information Processing System suite of scientific, data base, and mapping core software aids the technical decision-making associated with conducting reviews of permits, performing cumulative hydrologic impact 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 assessments and environmental impact statements.

In 2000, the Technical Information Processing System staff took another step in conversion of computer systems provided to state, tribal, and federal sites from UNIX to Windows NT-based systems. The object of this conversion is to accommodate more software types, and to distribute Technical Information Processing System tools to each user's desktop. Conversion to the NT-based system began in 1999 with distribution of new hardware to state, tribal, and federal locations. The process continued in 2000 with procurement and distribution of Geographic Information System and design software to the new systems. The conversion will conclude in early 2001 with completion of procurement and distribution of scientific and engineering software.

During 2000, work continued with state and tribal regulatory authorities in the implementation of the Geographic Information Systems Initiative. In addition, more Geographic Positioning System units have been distributed to field inspectors. More inspectors in states, tribes, and federal offices are

attending Geographic Positioning System training and using the field units to survey mine and reclamation sites. These satellite-surveys and electronic permitting capabilities are streamlining the regulatory process in coal mining. A new initiative to prototype remote-sensing technology has begun with the acquisition of high-resolution satellite imagery. Staff are optimistic that the new technology will bring an improved level of efficiency to coal mine regulation and reclamation.

Training of state, tribal, and Office of Surface Mining personnel in the practical application of the system is done on a continuing basis and is an integral part of the operation. During 2000, training increased to 325 students in 31 classes, compared to 1999 levels of 121 students in 14 classes. Customer satisfaction rate for this training was 89.7 during 2000 (or 1.7 percent higher than 1999 and 4.7 percent higher than 1998). This increase represents a return to more normal levels of training following the Windows-NT platform conversion. Course offerings in 2000 included geographic information system use, global positioning system use, three-dimensional spatial geologic and toxic-material modeling, and automated drafting and site-design. A schedule of these courses is available at www.tips.osmre.gov.training/default.htm.

Acid Drainage Technology Initiative

The Acid Drainage Technology Initiative is a partnership which the Office of Surface Mining has joined with industry, states, academia, other governmental agencies, and groups to identify, evaluate and develop "best science" practices to prevent new acid mine drainage, and eliminating 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, also participate.

The success of topsoil handling is measured by the land's crop production after reclamation. This reclaimed mine site has been returned to productive farmland and is indistinguishable from the surrounding Southern Indiana landscape.

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. Representatives of both the coal and metal mining sectors participated at the Fifth International Conference on Acid Rock Drainage, in Denver in June 2000.

This year, work was completed on a handbook titled, *Review of Mine Drainage Prediction Methods*. This handbook, to be published in early 2001, will cover overburden testing, sampling, and field validation. In addition, work commenced on the second edition of the Remediation Work Group's, *Remediation handbook: a user manual on AMD remediation methods*, which was originally published in 1999. The second edition will contain additional engineering details and performance information on acid mine drainage remediation technologies.

International Activities

In many countries, mining continues in an age-old fashion with little regulation or noticeable care for the environment. The successful implementation of the Surface Mining Law in the United States is a model for nations challenged with protecting the environment while maintaining the often significant

economic and employment benefits of mining. In 2000, the Office of Surface Mining and state government staff made presentations, participated in mine tours, and assisted mining professionals from several countries including China, Russia, and France. Most visiting delegations expressed particular interest in the state/federal partnership we use to implement the Surface Mining Law's regulatory program.

Mining Policy Reform in Indonesia

Responding to recent political changes and new legislative directions, Indonesia's Ministry of Energy and Mineral Resources is engaged in dramatically restructuring its approach to regulating mining. The Ministry is rewriting its 1967 Mining Law to delegate authority to local and regional governments who will become responsible for regulating mining operations. Ministry officials recognized that the state/federal partnership approach outlined in the U.S. Surface Mining Law could serve as a model for their new decentralized regulatory program. The Ministry requested the Office of Surface Mining to provide technical advice and assistance so it could develop a completely new way of doing business. The United States Agency for International Development provided the Office of Surface Mining with 100 percent funding to support the Ministry's request.

To demonstrate the value and effectiveness of the state/federal partnership developed over the past 23 years, the Office of Surface Mining has included State Regulatory Authority experts on Office of Surface Mining teams to provide advice and assistance on approaches Indonesia might use during decentralization and to develop a Central/Regional Government cooperative program. Ministry of Energy and Mineral Resources staff have visited the United States to see firsthand how the state/federal partnership works and examples of the results that can be achieved. The Office of Surface Mining and State Regulatory Authority teams have visited Indonesia to assist the Ministry Team rewriting the Indonesian Mining Law.

This latest cooperation between the Office of Surface Mining and Indonesia follows two highly successful technical assistance agreements. The first was a 3-year project from 1995 to 1998, in which the Office of Surface Mining provided technical assistance to improve Indonesia's capacity 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. Under the second project, during 1998 and 1999, the Office of Surface Mining provided training in fighting forest fires sparked by dozens of burning outcrops of exposed coal and peat that dot the mountainous regions of Indonesia. The coal fire-suppression project was entirely funded by the State Department's Southeast Asia Environmental Initiative.

Technical Training Program

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 2000, the program offered 45 sessions of 29 different courses. In addition to regularly scheduled courses, in response to requests, a special session of the Abandoned Mine Land Reclamation Projects course was held for Pennsylvania, and development of a new course on subsidence commenced. A new workshop on Permit Findings was developed and piloted to enhance the skills of state and federal permitting staff. This class will

Carefully positioned and properly sized riprap is one of the most effective techniques for preventing channel erosion. Here, the drainage from a large area of reclaimed land flows over a riprapped channel into a permanent pond.

contribute to the timely and efficient processing of coal mining permits. To facilitate implementation of the Government Performance Results Act, a session of the "SMCRA in the 21st Century" course was held for Eastern and Midwestern states. The course is designed to meet the needs of program managers and staff in developing and evaluating meaningful on-the-ground performance measures and results. This course also seeks to enhance outreach skills, and increase the effectiveness of regulatory and reclamation programs through sharing of information about emerging technologies.

Preventing off-site environmental damage is an important element of the Surface Mining Law. Here at this Kentucky mine site, a small berm is left at the base of a contour mining operation to prevent water from carrying sediment down the hillside and off the mine site. When mining is completed, the berm will be included in the reclamation and graded into the finished contour of the land.

All aspects of the training program, from identification of needs through course development and presentation, are cooperative efforts of state, tribal, and Office of Surface Mining offices. In 2000, there were 194 instructors, -- 50 percent from the Office of Surface Mining, 5 percent from the Interior Department's Solicitor's Office, 44 percent from the states, and the remaining one percent from other sources. The 45 sessions, which reached 902 students, were presented in 22 locations in 11 states. State and tribal students accounted for 79 percent of students, Office of Surface Mining students for 20 percent, and one percent for non-government participants. The attendance goal of 900 students was met and the customer satisfaction rating of 94% exceeded the goal of 89% by 5%. Training courses offered in 2000 included:

Course Name	Sessions	Students
Acid-forming Materials: Fundamentals	1	22
Acid-forming Materials: Planning & Prevention	2	48
Acid-forming Materials for Program Staff	1	20
Administration of Reclamation Projects	2	52
Aml Design Workshop: Dangerous Highwalls	1	11
Aml Design Workshop: Fires	1	10
Aml Design Workshop: Landslides	1	9
Aml Design Workshop: Subsidence	1	10
Applied Engineering	2	33
Basic Inspection Workbook		1
Blasting and Inspection	4	70
Effective Writing	2	34
Enforcement Procedures	1	17
Enforcement Tools and Applications	2	32
Erosion and Sediment Control	3	55
Evidence Preparation and Testimony	1	17
Expert Witness	1	12
Historic and Archeological Resources	3	77
Instructor Training	0	0
NEPA Procedures	1	27
Permit Findings Workshop	2	33
Permitting Hydrology	1	28
Principles of Inspection	1	16
SMCRA in the 21ST Century	1	76
Soils and Revegetation	2	44
Spoil Handling and Disposal	1	16
Surface and Groundwater Hydrology	2	39
Underground Mining Technology	1	15
Wetlands Awareness	4	78
TOTALS	**45**	**902**

Applicant/Violator System (AVS)

One of the underlying principles in the Surface Mining Law is that those who benefit from 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 unabated or uncorrected violations. Determining whether an applicant owns or controls operations with violations is often difficult, largely due to the complexities of corporate relationships and inconsistencies in interpreting the applicable regulations.

The primary purpose of the Applicant/Violator System is to provide state regulatory authorities with a centrally-maintained database of application, permit,

ownership and control, and violation information. State officials review 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 2000, the Office of Surface Mining responded to 3,732 requests for Applicant/Violator System data evaluations from state and federal regulatory authorities, state abandoned mine land program officials, and others who use the system to check violations. The Office of Surface Mining collected and/or settled payments of civil penalties and reclamation fees in the amount of $1,064,549 partially due to violation information in the system.

On December 21, 1998, the Office of Surface Mining published a proposal to redesign its ownership and control, permit information, and related regulations. A final rule was published December 19, 2000.

Access to the Applicant/Violator System is available to the public, coalfield citizens, coal companies, and

This permanent impoundment on the reclaimed mine site provides a valuable source of water for the agricultural postmining land use. At this Ohio site the water provides an outstanding wildlife habitat for geese, ducks, herons, and a host of fish, while ensuring a dependable source of water for grazing livestock.

This mine inspector is checking soil acidity on a reclamation site. While measuring the acidity he is also recording the location with a global positioning system receiver.

industry representatives through public domain software, the Internet, or by direct dial-in. As needed or requested, the Office of Surface Mining provides training to system users on how to access and interpret information as well as system demonstrations. Instruction is tailored to meet the needs of the target audience. For example, inspectors, auditors, investigators, coal industry representatives, and citizens are provided training to meet their specific needs. New initiatives completed this year include obtaining feedback from the customers who use the system. Customer surveys showed that the Applicant/Violator System Office averaged an approval rating of 97 percent during 2000 (up from 96.1 percent in 1999). General information about the system, including access information, instructions for downloading access software, and how to obtain customer assistance can be found on the web page www.avs.osmre.gov.

Prime Farmland

Successful reclamation of prime farmland has been a major concern to coal mine operators and citizens in the Midwest since before passage of the Surface Mining Law.

Successful reclamation, to prime farmland standards, is now standard operating procedure where mining disturbs prime farmland. The Office of Surface Mining is in the process of updating its prime farmland regulations to incorporate the latest versions of the U.S. Department of Agriculture *Handbook 436: Soil Taxonomy* (U.S. Department of Agriculture, 1999) and *Handbook 18: Soil Survey Manual* (U.S. Department of Agriculture, 1993) which are used to determine the status of prime farmland before mining.

Interactive Forum

An Interactive Forum, Approaching Bond Release: Cumulative Hydrologic Impact Assessment and Hydrology Topics for the Arid and Semi-Arid West was held in Billings, MT, August 27 through September 1, 2000 (the fourth in a series of six planned annual forums on bond release topics in the arid and semi-arid west). Hydrology topics included: required pre-mine data, reclamation planning, design, and modeling, databases, and postmining hydrologic assessments. The forum provided an opportunity for industry and the regulators to openly discuss hydrology issues by sharing information and interacting with all the interested parties in the coal mining community. The four day forum was supplemented by two field trips and three workshops: Spatial Data for Hydrology Modeling, Surface and Sub-surface Modeling with Geographic Information Systems, and Coalbed Methane. The 118 forum participants were from 15 States and two Indian tribes. Two additional Interactive Forums on Bond Release are planned for years 2001 and 2002.

Revised Universal Soil Loss Equation

Guidelines for the Use of the Revised Universal Soil Loss Equation (RUSLE) on Mined Lands, Construction Sites, and Reclaimed Lands, along with the public domain software (RUSLE Version 1.06) were distributed on a CD-ROM. 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 conditions. The new guidelines are providing information for maximizing the accuracy of soil-loss prediction estimates, recommending procedures ensuring soil-loss estimates calculations that are generally reproducible, and identifying critical areas for future research. During 2000, the Office of Surface Mining sponsored two RUSLE presentations and supported a workshop.

Coal Combustion By-Products

Office of Surface Mining staff serve on the newly formed National Steering Committee for the Emission Control By-Products Consortium that is attempting to develop technologies for use by the coal utilities and their suppliers that will be useful in solving problems related to the handling of by-products from their clean coal processes. The main strategy of the consortium is to: (1) characterize product streams from flue gas desulfurization materials and low nitrous oxide burners; (2) develop a list of potential market opportunities and disposal options; and (3) develop and implement research and demonstration programs around identified priority topics. During 2000, the steering committee selected and recommended $1.29 million be awarded by the Department of Energy to 17 research projects including several with direct application to coal mining.

Technical Interactive Forum

A technical interactive forum on "The Use and Disposal of Coal Combustion By-Products at Coal Mines was held in Morgantown, West Virginia on April 10-13, 2000 (the second national forum conducted by the Office of Surface Mining on this topic). Twenty-four summary talks were presented in four sessions on the basics of coal combustion by-products, regulatory perspectives, beneficial uses at the mine site, and hydrologic long term monitoring. The purpose of this forum was to provide: (1) an organized format for discussion of issues concerning the use and disposal of coal combustion by-products at coal mines; (2) an easily understood, state of the art summary talk by knowledgeable speakers; (3) a published proceedings that summarizes the presentations and participant discussions; (4) access to the discussions for all interested participants at the forum; (5) opportunity for poster presentations on projects and research; (6) opportunity for exhibits of coal combustion by-product use, technology, services, and equipment; and (7) permitting workshops and field trips. The 140 participants were from 20 states and one Indian tribe. An additional forum is being planned for 2002.

Proceedings are currently being prepared for publication in 2001. In addition to the papers presented at the forum, the publication will include a subject guide to the edited discussion, recommendations by the participants and the steering committee, and an evaluation of the forum and speakers by the participants.

For additional coal combustion by-product information see www.mcrcc.osmre.gov/ccb.

This bat gate, used to close a Colorado underground mine portal, has openings at the top to let bats fly in and out. The metal grate allows ventilation; but, keeps people safely out.

The Bat Conservation and Mining Technical Interactive Forum

One bat weighs approximately one ounce and will consume one-half its body weight in insects each night. The mathematical result is that one colony of bats can consume many tons of insects each night. In addition to their role as primary predators of a wide variety of insects that cost farmers and foresters billions of dollars, these flying mammals are also instrumental in the pollination and seed dispersal of numerous plant species.

Contrary to their much-maligned image, bats are ecologically and economically critical to the well being of the nation. And yet, over half of the 43 species living in the U.S. are endangered or on the candidate list for endangered species. As their traditional habitats such as caves and tree hollows are being disturbed by human intrusion, bats are becoming more and more dependent on abandoned mine sites

for suitable habitat. Many of the 43 species, including endangered species, have been observed using abandoned mines either as permanent roosts or temporary stops during migration. Abandoned mines provide microclimates similar to caves, suitable for rearing young, hibernation, and rest stops during migration in the spring and fall. Closure of mine openings without a biological survey can trap and destroy an entire colony of bats.

The Office of Surface Mining and the states, through their Abandoned Mine Land programs, are committed to the protection and preservation of bats, their habitat, and their ecosystems. Although procedures may differ from program to program, a biological survey normally is conducted in coordination with wildlife departments to check for bat habitation prior to closure of a mine opening. If bat activity is confirmed, the typical response is to construct a bat gate. Bat gates may be different sizes, shapes, or designs but usually involve a steel grid with openings large enough to allow passage for the bats, yet small enough to prevent human entry. Gates often are installed on mine openings with no visible signs of bat habitation in order to maintain ventilation patterns which may be essential to adjacent or connecting areas which do contain bats.

A technical inactive forum on "Bat Conservation and Mining" was held in St. Louis, Missouri on November 14-16, 2000. Forty-seven summary talks were presented in six sessions on why we need to protect bats, interest group perspectives, bat protection at underground mines, bat protection at surface mines, program development, and interest group recommendations. Proceedings are currently being prepared for publication in 2001.

A description of the importance abandoned mines have in the survival of bats and other related information can be found at www.osmre.gov/bats.htm.

Grazing is one of the most important land uses in the West, and at this reclaimed Montana mine site the land has been returned to its pre-mining grazing land use. Native plants were used to reestablish this vegetation, and monitoring shows the levels of cover and production to be equal to or better than native vegetation adjacent to the reclaimed site.