

## **A Western Vision of Improving Administration of SMCRA Through Technology and Enhanced Expertise**

The purpose of this paper is to outline a vision and possible next steps for improving administration of SMCRA in the West. The timing of this paper is important given the pending retirements at OSM, the stability of Western state regulatory programs, and the coming demands of processing large-scale bond release applications in the West.

Pending retirements at OSM provide a unique opportunity for the agency to reassess its allocation of resources and to acquire new expertise and apply technologies that better fit the evolving SMCRA administration needs of the West. Western state regulatory programs have been very stable characterized by the absence of intervening crises that introduce uncertainty. With assistance from OSM's existing technology and training programs (OTT/WRTT, TIPS, NTTP), Western state regulatory programs have experienced a steady advance in technical expertise. The major challenge in the West in the near future will be evaluating large-scale bond release applications.

The highest priority for regulatory programs in Western states is to maintain the quality of programs presently in place through adequate funding, including Title V regulatory grants that keep pace with inflation. The next highest priority is improving the efficiency and effectiveness of Western regulatory programs by:

- Applying technology;
- Broadening training opportunities for state program personnel; and
- Tapping technological and scientific expertise.

These priorities should be shared by OSM for their activities in the West. Under the agency's Strategic Plan and Government Performance Results Act, OSM's success in meeting the requirements of SMCRA is ultimately based on the success of state regulatory programs.

This paper is organized into three sections:

- I. An overview of the success of existing OSM training and technology programs for Western primacy states;
- II. A vision of what is possible; and
- III. A rationale for pursuing the vision in the West.

**This paper proposes that OSM and Western states agree on a vision for the region, define in greater detail the elements of that vision, and determine the next steps to realize that vision.**

## **I. Existing OSM Training and Technology Programs for the Western Primacy States**

Western state programs currently utilize various programs available through OSM to enhance and support state regulatory and AML programs. These OSM programs are the Office of Technology Transfer (OTT), National Technical Training Program (NTTP), and Technical Information Processing System (TIPS). Each of these OSM programs provides a distinct and unique set of benefits to the Western state programs. These OSM programs currently provide an outstanding level of support to Western states, and they can provide the structure and basis for additional support to the Western states in the future. In recent years, the states are also receiving positive program support from various OSM personnel associated with the oversight teams. The ongoing state needs for technical and scientific support can be identified and delivered by utilizing these existing programs.

Each of the OSM OTT, NTTP and TIPS programs function by first surveying the needs of each state. Then based on these surveys and available resources, assistance is delivered using a priority assessment. This system of support is highly successful, and should be expanded by OSM without creating competition between the programs.

The concept of oversight teams is also beneficial and has proven successful in the West. Oversight teams serve the necessary oversight function and provide another delivery mechanism by which state support needs are identified and met by OSM. OSM oversight team personnel often provide technical and scientific expertise, in addition to useful regulatory perspective. This nontraditional approach to oversight has proven successful in the West, and can be an essential component of future scientific and technical enhancement of state programs.

Current models of OSM support to the states can be the basis for future enhancements designed to bolster the scientific and technical qualities of Western state programs. Emphasis should be placed first on surveying the individual state needs, and then providing adequate resources to meet those needs. Specific elements such as oversight teams, classroom instruction, scientific personnel pools, software acquisitions, and interactive and benchmarking forums can all be instrumental to this process. All of these functions can be implemented by expanding these beneficial systems already in place within OSM. However, such expansion of these beneficial systems must occur without creating competition between systems and without diminishing state grants. This may be achieved by utilizing savings from future vacancies and by shifting resources away from traditional oversight functions that do not provide benefit or support to state programs.

## **II. Paperless Permitting - A vision of what is possible**

Paperless permitting is the vision for the future. One need only consider the amount of data in paper and electronic form that is accumulated for every coal mine permit. In the West, the total amount of data required (and currently existing) for a single coal mine permit can easily exceed the data required for a small state regulatory coal program. Some western mines are in their fourth decade of operating on a single permit. Once active mining and reclamation are completed bond release liability period begins, lasting at least a ten-years. As the demand for

coal increases in the West, the amount of information acquired by state Regulatory Authorities (RA) also grows. The interconnectivity of natural systems to be reclaimed adds to the volume of data required.

For the past eight years, the Western Regional Technical Team (WRTT) has shared their knowledge and computer applications to facilitate everyday permitting operations and bond release decisions. In particular, the WRTT explored and each of the western states implemented various electronic permitting initiatives. As promised and delivered, a paperless permit review environment is now a reality. The Reclamation Division, North Dakota Public Service Commission accepted a challenge from their coal industry, and approved the Nation's first paperless permit. Accepting, reviewing, and approving paperless permit applications is now standard operating procedure in North Dakota.

Electronic permitting yields a better understanding of agencies' workflow and goals. By receiving electronic information and data (not typed on paper, or in map formats), the permit reviewers can immediately process that data through available software, programs, or databases. They can efficiently proceed with their analysis, instead of converting data into a useable format, plotting that data on a map, or validating that data without the benefit of software applications.

Accommodation of spatially distributed data in 3-dimensions is a common need among all approaches to permit review. Such a system would bring the relevant data to the desktops of permit reviewers, decision-makers, and the public room users.

As electronic permitting was implemented, a parallel track emerged with various aerial sensing and measuring techniques being developed and evolving, such as the use of lasers in LIDAR topographic data acquisition, use of hyperspectral imaging to detect chemical bonds on surface, (extrapolating environmental geo-chemistry), detecting vegetation differences, density and cover, observing water quality, and other environmental parameters. Digital photography and storage devices, as well as better network servers and storage, have prompted development of Intranet-distributed softwares and new licensing agreements.

It is the intent of this proposal to capture and apply, over the next five to ten years, the benefits derived from all of the above mentioned developments. The application of these technologies will enhance the implementation of SMCRA. One template does not fit all - western states need the flexibility to implement paperless permitting and apply emerging technologies based on the size and type of their industry's permits.

When planning for enhancing the staff skills and acquiring the appropriate applications and new cutting edge technologies, there are four major areas that should be focused on:

**A. Conversion (bringing the existing records into the 21<sup>st</sup> century)**

Regulatory Authorities (RAs) need to have all the historic mining information available at the permit reviewers' desktop computers for key word searches (currently implemented at Utah DOGM), searches by permit number or permittee (currently available in Colorado, and Utah), and site/area/county searches (currently available for water quality information in Utah DOGM).

This means they have to scan all text documents convert with optical character resolution (OCR) software, scan and vectorize all maps, and place information in relational databases. All known paper mine maps need to be converted into vectorized maps, and possibly 3-D models. Because the infrastructure has to be protected, abandoned and reclaimed mines databases are emerging as a priority for Western RAs and federal agencies. Accurate locations and 3-D representations of all underground mines and workings, as well as locations of previously surface-mined lands, will assist in preventing cave-ins, disruptions to transportation corridors or other infrastructure, and facilitate planning for future development. Such an effort would identify: near surface hazards; opportunities for storage of gas, oil, water or other materials in deeper mine workings; mined out areas for use in calculating the Nation's future fuel supply; and overlying or underlying operations, as well as overlapping operations to facilitate permitting actions. The reclaimed surface mines database would identify areas where additional settlement of the replaced overburden is expected. Appropriate building techniques could then be used to avoid damage to structures, or those areas could avoided altogether.

**B. Relational database architecture design and implementation**

To fully take advantage of electronic data, relational databases need to be developed for each of the western states. Examples are available from states listed below:

Hydrology - Utah, and Wyoming have SQL based hydrology databases

Vegetation - Wyoming has just completed development of Reclamation Management Tool GIS database

Photography - Alaska has implemented a digital photo library on their Intranet

Permit information and tracking systems - currently in use at Utah, Colorado, Alaska

Procedures, documents, tracking data - Utah, Colorado, Montana

(Overburden, bond release tracking, and other databases to be identified.)

**C. GIS design, storage and distribution**

Even though Geographic Information Systems (GIS) were available for a number of years, the age of user-friendly spatial GIS, coupled with relational databases, has just recently arrived for desktop use. The best support tool that RAs can have is a user-friendly GIS with reporting capabilities. When new technologies and web-based interfaces are added, e-Government becomes a reality.

Polygons with mine information, as well as county and state information, are stored in a GIS. Information beyond permit boundaries is also necessary to facilitate CHIA preparation, wildlife and ecological integrity assessment, EA and EIS preparation, and potential off-site impacts identification prior to occurrence. Such information has utility in land use decisions beyond mine permitting.

**D. Mass storage for data intensive applications**

Huge volumes of data-intensive files accumulate during the ten-year bond liability period. Tracking successful reclamation efforts for large western operations requires files that contain aerial over-flight data (with spectral or hyperspectral information), LIDAR topographic data (used for computing volumetrics) as it relates to pre-mining topography AOC, verification of production data, and collection of AML fees.

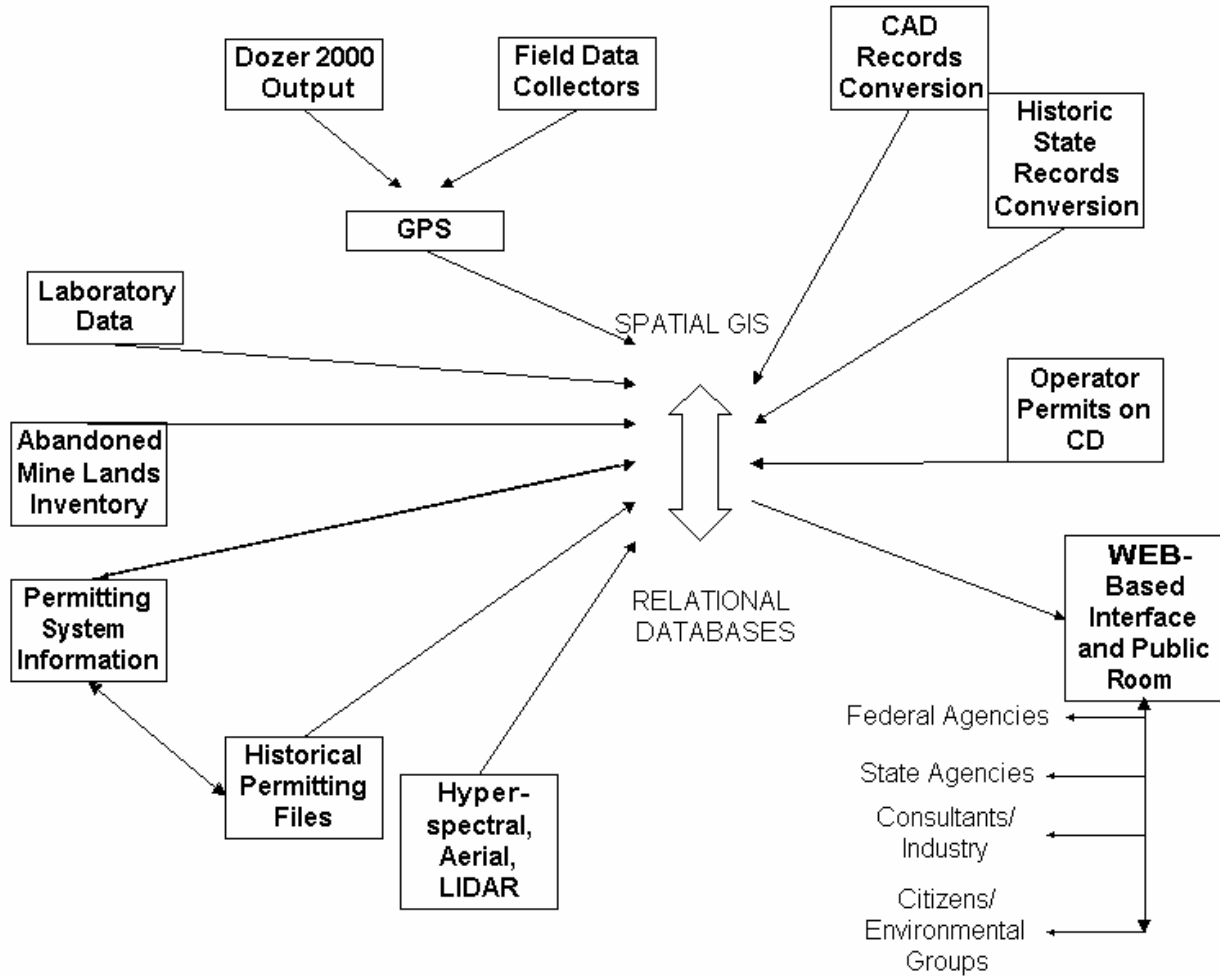
Huge digital photography databases are being established by each of the western states. In addition to documenting required inspections/site visits, inspection report photographs documenting the progress of reclamation efforts, and building a case that SMCRA works. The digital records also capture the variety of Western landscapes which should be returned to their pre-mining conditions, capturing the range of existing aesthetics of pre-mining landscape such as bluff-extensions, buttes, special features, etc. All of these digital photographs would have the GPS (xyz coordinate) data and be available relationally in the GIS.

Some cutting edge technology opportunities are “operator dependent”; e.g. use of GPS guidance for earthmoving equipment on North American Coal Company’s mines literally eliminates the in-field approximate original contour (AOC) measurements by field inspectors when the operator collects CAD files of equipment movement and final elevations as constructed. The AOC measurement becomes a comparison of two drawing layers, the proposed post mining topography (PMT) in the permit, and the topography achieved by the equipment.

Cooperative efforts between RAs and industry can provide mutual benefits. For example, Falkirk Mining Company’s submittal (and approval) of a fully paperless permit, and the RA’s ability to compare pre- and post-mining topographic information in electronic format, has prompted the Glenharold Mine, a competitor to Falkirk, to convert its paper permit to fully electronic format, in anticipation of facilitating bond release review. Glenharold Mine has ceased production and is in the 10-year liability period. In another example, scanning equipment available at the RA, but not being used some days, prompted a permittee preparing a paperless permit to request to scan the strip-chart electric core logs, and convert them to electronic format, for inclusion on the permit application CD. Since then, the permittee bought its own scanning equipment, having realized the time savings in electronic document handling and ease of use of electronic files compared to otherwise unwieldy (several feet long) core log strip charts.

Other opportunities may exist. For example, Peabody’s Powder River Coal Company has collected vegetation hyperspectral data on portions of their 35,000 acres permit. Provisions for analysis, sharing, additional data acquisition, ground-truthing of interpreted data could be done in a cooperative effort.

The chart below outlines a possible architecture for the use of applications and technologies by RAs.



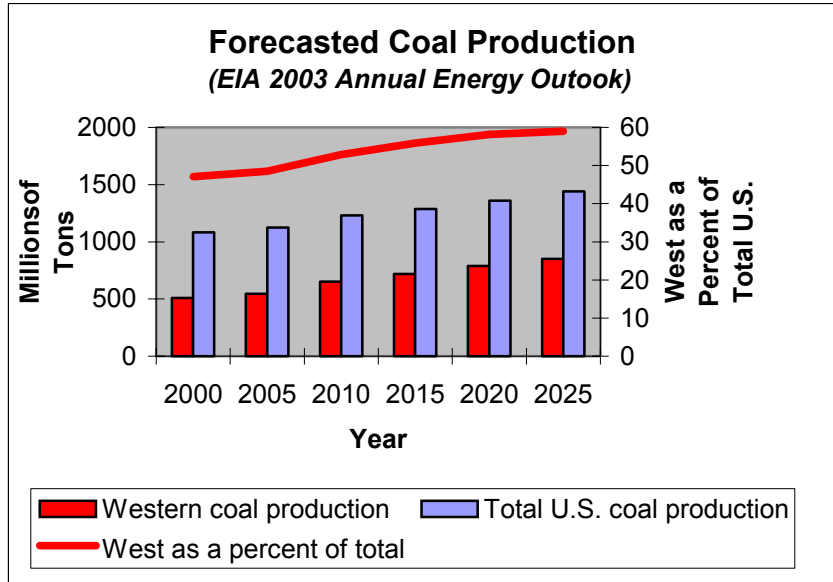
In some states, the SMCRA regulatory program is still largely paper-based. This situation is changing due to the use of GIS technologies, e-document management systems, and pilots projects on electronic and paperless permitting initiatives. If done properly, all of the stakeholders in the SMCRA regulatory system stand to benefit from moving SMCRA to electronic systems. The following table illustrates some of the possibilities.

<b>What</b>	<b>Who benefits</b>	<b>Emerging Models</b>
One stop permit filing	Operators	OSM and EPA-HQ Office of Water exploring one stop NPDES permitting process for western alkaline coal mine drainage
E-Permit Filing -- Operators would have the choice of filing permits over the Internet, via email, on disk, or paper. Fees could be sliding scale to discourage paper filings.	Operators and Regulators	Utah, Montana, New Mexico  North Dakota is accepting and encouraging paperless electronic permit applications
Web-based Water Quality Database	Regulators, Operators, Public	Utah-all water quality data are submitted to DOGM via Internet
Web-based training	Regulators, Operators	ITRC, ESRI, EPA
Historic Record Conversion to Electronic Format	Regulators, Public, Operators	Colorado North Dakota
Improved use of GIS in permitting and reclamation tasks	Regulators, Operators, and Public	New Mexico, Montana, Utah
Improved Use of Environmental Software/Hardware	Regulators	TIPS-GPS Courses
Secure Web-based multi-agency permit review and comment	Regulators and Operators	Forest Service – Chugach Forest, AK See <a href="http://www.geographynetwork.com/chugach/">http://www.geographynetwork.com/chugach/</a>
Intranet-based Digital Photographic Record	Regulators	Alaska
Intranet-based Permit Tracking, Information and Compliance Records	Regulators	Utah, Colorado
Satellite imaging and remote sensing for compliance	Regulators, Operators, and Public	Arizona Department of Water Resources has used satellite data and GIS capabilities continuously since 1984. Water rights data are managed using GIS to enforce limits on irrigated acreage expansion  Powder River Coal Company's Hyperspectral vegetation assessment of 35,000 acres

### III. Rationale for Pursuing the Vision in the West

Conditions in the West present a unique opportunity to implement a pilot program to test how the vision outlined above could be implemented at essentially no risk to accomplishing the objectives of SMCRA. Many of the major challenges facing OSM nationwide are not found in the West. Only three of the 596 bond forfeitures in the past six years were in the West. Acid mine drainage is largely non-existent in Western coal mines. Western mining does not involve mountain top removal. The number of enforcement actions in the West tends to be very low (57 of 3,961 Notices of Violation issued by states in 2002).

A pilot program in the West would also enable OSM to meet its statutory mandate of contributing to the nation's energy needs by improving the regulation of mines in the West, where an ever-increasing share of the nation's compliance coal is being produced. DOE's Energy Information Administration forecasts that a majority of the nation's coal will be produced in the West. As more of the nation's coal is produced at large Western mines, there will



be increased scrutiny of the regulation of these mines and the success of achieving pre-mining or better conditions at time of bond release

Most Western coal will be produced by large mines covering thousands of acres. The average inspectable unit in the West in 2002 was more than 11,500 acres, compared to less than 400 acres for mines outside the West. . New technologies will be needed to provide interested parties with information on the regulation of these mines. Quicker and more efficient means of ascertaining the status and success of reclamation activities are needed.

The size of Western mines creates new challenges because of the vast amounts of data generated that requires evaluation. Agencies must rely on more than just on-the-ground inspections to review the progress of reclaiming such vast acreages. New technologies and training in the use of such technologies need to be adopted/implemented by Western RAs. The physical environment also presents different challenges in revegetation and hydrology than found in other regions. Being west of the 100<sup>th</sup> Meridian implies that climate patterns and drought play a greater role in successful reclamation.

The major time-challenge facing Western RAs will be evaluating the status of reclamation and approval of bond release on large acreages. Bond release can be made more efficient by (1) using technologies that allow quicker access to information needed for science-

based decisions resulting in timely and higher quality analysis, and (2) providing scientific support to state regulatory agencies and keeping them informed of technological advances, such as remote sensing and remote data collection.

The success of Western state bond release programs impacts the ability of OSM to meet its goals in other regions. Successful bond release programs in the West will reduce the demand on bonds nationwide and help ease the present bonding crisis.

**The rationale for pursuing the vision in the West is compelling, but, is it feasible?**

At no time in OSM's history has there been a better opportunity to conduct an enhanced test of this vision. OSM is entering a period where there will be a significant increase in retirements. This presents the agency with a unique opportunity to re-allocate resources without disrupting the lives of employees. New hires could have skills that enable the vision to be realized. Resources could be made available for experts in the private sector to assist states and OSM. This would comport with the President's Competitive Sourcing Initiative (OMB Circular A-76, Revised February 24, 2003). Resources could also be redeployed to implement new training and technologies.

**Next steps:** It is proposed that the directors of Western state regulatory programs and OSM management discuss the vision outlined in this paper and make any necessary changes via conference call. Technical staffs from OSM and Western states would be directed to provide further details on the next steps in implementing the agreed-upon vision.