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CONFERENCE ON THE
ENVIRONMENT AND SAFETY

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ABSTRACT BOOK

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PRESENTATIONS

TITLE: CHEMICAL AND PHYSICAL CHARACTERIZATION OF METAL-RICH SEDIMENTS, KESWICK RESERVOIR, CALIFORNIA

AUTHORS: **ALPERS, C.N., USGS** and T. Bruns

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ABSTRACT:

Since the early 1950's, Keswick Reservoir has received metal-laden acid drainage from inactive Cu-Zn-Au-S mines and associated mine wastes on Iron Mountain, a Superfund site. Fine-grained, metal-rich sediment has precipitated where the metal-rich mine drainage mixes with dilute, neutral waters. During 1993 and 1994, the U.S. Geological Survey (USGS) conducted geophysical and geochemical studies of the fine-grained sediments in Keswick Reservoir to assist other agencies in evaluation of sediment toxicity and development of remediation strategy. Cooperating agencies include: the Bureau of Reclamation, U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, and California Dept. of Fish and Game. Geophysical surveys by USGS indicate a total volume of about 220,000 cubic meters of fine-grained sediment, about half which is located in shallow water. Geochemical analyses of sediment samples and extracted pore waters reveal elevated concentrations of metals that are toxic to aquatic life. Zinc in pore waters appears to be a toxic agent that could be released during sediment resuspension, a result that directly affects remediation strategy.

TITLE: MINE WASTE REMEDIATION RESEARCH

AUTHOR: **AUFMUTH, R.E., USBM**

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ABSTRACT:

The U.S. Bureau of Mines has a long and distinguished history of sound economic research activities in response to and in support of environmental problems associated with mine waste and remediation technologies. The mine waste research program at the USBM covers waste materials derived from all phases of the mining cycle, from mining operations to processing of all mineral commodities. In the past several years, the USBM has expanded its mine waste research program into the environmentally safe disposal of coal combustion residues (CCR). This presentation will address the current and proposed USBM mine waste research program in light of the pending restructuring of the agency. It will also explore partnerships that exist within this program.

TITLE: DOI AS NATURAL RESOURCE TRUSTEE AND PRP AT SUPERFUND SITES

AUTHOR: BARASH, M.D., SOL

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ABSTRACT:

Under the Comprehensive Environmental Response, Liability and Compensation Act (CERCLA) of 1980, as amended, the Department of the Interior can be both a responsible party, and a trustee for natural resources at a single Superfund site. The law and policies directing the Department in this area can give rise to differing, and often inconsistent obligations. This inevitably complicates Departmental involvement in the Superfund process. Specific areas of actual or potential conflict include Departmental guidance, the role of the Department of Justice, and the role of the Solicitor's Office. There are, however, ways in which Bureau and Departmental officials can incorporate these apparently conflicting responsibilities into a unified Departmental strategy.

TITLE: CHARACTERIZING AND UNDERSTANDING BIODEGRADATION OF CONTAMINANTS IN GROUNDWATER USING NUMERICAL MODELS

AUTHORS: BEKINS, B.A., USGS, H.I. Essaid and E.M. Godsy

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ABSTRACT:

Results from numerical simulation of biodegradation occurring at two sites studied under the U.S. Geological Survey Toxic Substances Hydrology Program will be presented. At a former wood treatment plant in Pensacola, Florida, the ground water is contaminated with creosote compounds. Modeling indicates that the field biodegradation rates agree with rates measured in batch microcosm studies. Also, the results suggest that the microbial population is exhibiting no net growth due to the presence of inhibitory compounds. The second site, contaminated by a crude-oil spill, near Bemidji, Minnesota, was analyzed with a two-dimensional transport model that accounts for (1)uptake of dissolved organic carbon (DOC), dissolved oxygen, and cell nutrient nitrogen; (2) production of dissolved manganese, dissolved iron, and methane; and (3) growth and degradation activity of aerobic, Mn/Fe reducing, and methanogenic microbes. The simulation predicted that 45% of the total influx of DOC into the aquifer from the oil was degraded: 48% of this aerobically and 52% anaerobically.

TITLE: **DEVELOPMENT OF STATE/FEDERAL NATURAL RESOURCE DAMAGE ASSESSMENT CONTINGENCY PLAN FOR ALASKA**

AUTHOR(S): **BERGMANN, P.A., OEPC**

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ABSTRACT:

In May 1994, the Department of the Interior, Alaska Office of Environmental Policy and Compliance invited other Federal and State trustees in Alaska to form a working group to develop a Natural Resource Damage Assessment (NRDA) contingency plan. Issues involved in forming the working group included Native trustee and responsible party representation, involvement of legal representatives, and applicability of the Federal Advisory Committee Act. To date, the working group is making progress in developing interim NRDA procedures which will address: notification procedures; trustee emergency contacts; procedures for initiating an NRDA request and responding to an invitation to participate; identification of preassessment sampling teams; guidelines for when to initiate field sampling; protocols and methods for sampling; protocols for analysis of samples; and procedures for coordination with On-Scene Coordinators, Native trustees, non-trustee land owners, and responsible parties.

TITLE: **ENSURING HEALTH, SAFETY, AND ENVIRONMENTAL REGULATORY COMPLIANCE ON HAZARDOUS WASTE-RELATED CONTRACTS**

AUTHOR: **BRIGHTMAN, H., NPS**

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ABSTRACT:

One of the most important functions of the DOI is to protect our nation's natural resources, for ourselves and future generations. Of the many dangers to our resources, the illicit disposal of hazardous wastes on interior lands poses serious risks to the environment, employees, and the visiting public. When hazardous substances are encountered on public lands, DOI frequently hires contractors to remediate these sites. However, a significant number of environmental contracts are prematurely terminated, or services are not fully rendered due to improper specifications, or fraudulent or deceptive means on the part of the contractor. Many of these violations involve health and safety issues, or failure to comply with environmental regulations. This course provides participants with a fundamental understanding of how to prepare accurate health, safety, and environmental specifications for hazardous waste-related projects, and techniques for determining contractor reliability and also highlights on-site contractor monitoring and fraud detection. Participants will receive a comprehensive manual that includes sample scopes-of-work, procedures for determining contractor qualifications, and a proactive approach to on-site health, safety, and environmental regulatory contractor monitoring.

TITLE: **CHARACTERIZATION OF HYDROLOGIC AND CHEMICAL PROCESSES IN STREAMS RECEIVING ACID MINE DRAINAGE**

AUTHORS: **BROSHEARS, R.E., USGS,** B.A. Kimball and R.L. Runkel

CONTACT: Broshears, Bob (303) 236-4882 ext. 299

ABSTRACT:

The Toxic Substances Hydrology Program of the USGS has developed methods to characterize acid mine drainage streams by using tracer-dilution experiments, field sampling, and reactive solute transport modeling. Tracer-dilution experiments incorporate the principle of the conservation of mass to establish values of hydrologic parameters. Temporal patterns of concentration at stream-reach boundaries provide reach-scale values of discharge, time of travel, channel cross-section, and properties of transient storage. Spatially intense sampling of lateral inflows and instream waters provides information on mass loading and instream solute behavior. Interpretation of spatial profiles is enhanced by comparing observed profiles with those generated by a reactive solute transport model. This model couples a transport module that accounts for advection, dispersion, lateral inflow, and transient storage with a geochemical speciation module. The geochemical module accounts for formation of aqueous complexes, precipitation-dissolution, and sorption-desorption under both equilibrium-controlled and kinetically-limited conditions. At St. Kevin Gulch, a stream receiving acid mine drainage near Leadville, Colorado, the methods identified areas of subsurface acid loading and distinguished between decreases in metal concentration due to dilution and decreases attributable to chemical reactions.

TITLE: **EFFECTIVE UNDERSTANDING AND MANAGEMENT OF RADIOLOGICAL HAZARDS AT ABANDONED URANIUM MINE SITES**

AUTHOR: **BURGHARDT, J.E., NPS**

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ABSTRACT:

During the compilation of the NPS inventory of abandoned mineral lands (AML), the national parks of the Colorado Plateau region raised the issue of radiation at abandoned uranium mines. The Colorado Plateau was heavily mined for uranium from the 1940s through the 1950s, and uranium mining has continued on a smaller scale through the present. There are currently no active uranium mines on NPS lands, but the NPS inventory shows 44 abandoned sites in or immediately adjacent to NPS units. Other federal land managers, particularly the BLM and USFS, have many more uranium AML sites than the NPS. These sites are potentially hazardous from elevated levels of radioactivity. Currently there are no federal regulations that address the management of AML sites for radioactive emissions. To manage these sites effectively and safely, human health and reclamation specialists must be versed in the fundamental concepts of radioactivity, environmental characterization methods, possible pathways of exposure, and data interpretation. Management and cleanup of radiologically elevated sites depends upon their planned use, the level of radioactivity present, and the typical duration of public exposure anticipated. This session provides the land manager with a basic understanding of the concepts and management issues involved with these sites.

TITLE: **THE USE OF ALTERNATIVE DISPUTE RESOLUTION IN THE NATURAL RESOURCE DAMAGE ASSESSMENT AND FEDERAL FACILITY CONTEXT**

AUTHORS: **BYRNES, J.L., IBLA,** S. Inderbitzen, B. Johnson and N. Targ

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ABSTRACT:

Both Federal and private sector experience with Alternative Dispute Resolution (ADR) show that assisted negotiations can result in faster, more efficient resolution of hazardous waste disputes. When Congress passed the Administrative Dispute Resolution Act of 1990, it mandated that agencies incorporate ADR into their dispute resolution process. DOI has issued an interim plan which requires its constituent Bureaus to create and implement ADR Plans in their resolution of disputes. ADR techniques can be useful tools in resolving both Natural Resource Damage Assessment (NRDA) and Federal facility disputes.

Federal agencies have used ADR processes to resolve HAZMAT and NRDA disputes under the Resource Conservation and Recovery Act, Comprehensive Environmental Recovery Compensation Liability Act, Clean Water Act, and Oil Pollution Act. As part of its mandate to incorporate ADR into its decision making processes, DOI is developing a plan to use ADR techniques to resolve NRDA and Federal facility disputes.

TITLE: **APPLICATION OF COST ENGINEERING TO THE STUDY OF WASTE REMEDIATION OF MINE TAILINGS**

AUTHORS: **CAMM, T.W., USBM,** M.L. Smith, K.A. Prisbrey, and N. Wetzel

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ABSTRACT:

The U.S. Bureau of Mines has developed a system for methodically estimating mining and processing costs as a function of process feed rate. The objective of the subject study was to apply this system to abandoned mine tailings and to evaluate the benefits, if any, of metal recovery. Cost analysis was applied to the mine wastes of Smelterville Flats: an extensive area of mine tailings in the Bunker Hill Superfund Site with high concentrations of lead, zinc, and other sulfide minerals. Results from previous site characterization and metallurgical processing studies were used as the input for the cost analysis. This analysis indicated that processing this site at an optimum production rate of 3,500 short tons per day (st/d) could generate a positive cash flow.

TITLE: **AIRBORNE GEOPHYSICAL MONITORING OF EVERGLADES RESTORATION EFFORT**

AUTHORS: **CAMPBELL, D.L., USGS**, D.V. Fitterman and V.F. Labson

CONTACT: Fitterman, David (303) 236-1382

ABSTRACT:

A helicopter electromagnetic (HEM) surveying technique has been used to map the freshwater/saltwater interface (FWSWI) in the Everglades National Park (ENP). HEM maps resistivity variations in the subsurface such as those associated with changes in water salinity. This technique, which was first developed for mineral exploration and is now being applied to environmental problems, will be used to map the FWSWI, to site observation wells, and to monitor changes in water quality resulting from modifications in water management practices in the ENP and surroundings areas. An initial survey was flown in April 1994 covering a 140-sq.-mi. (362-km^2) area of the ENP. The survey was reflown in mid-December to determine if there are resistivity variations associated with seasonal changes in water levels. In addition, the second survey, which encompasses over 400 sq. mi. (1036 km^2), extends coverage farther to the west into areas that are not easily accessible on the ground. Airborne resistivity mapping provides a rapid and economical means of synoptically determining water quality. Through repeat surveys, variations in resistivity associated with seasonal changes in water flow and the effects of environmental restoration efforts to provide increased supplies of freshwater to the Everglades can be monitored.

TITLE: **APPLICATION OF GEOPHYSICAL METHODS TO HYDROGEOLOGIC AND ENVIRONMENTAL INVESTIGATIONS AT MILITARY INSTALLATIONS IN NC**

AUTHORS: **CARDINELL, A.P., USGS**, C.C. Daniel, III, and B.M. Wrege

CONTACT: Cardinell, Alex (919) 571-4021

ABSTRACT:

Hydrogeologic data for ongoing environmental studies at military installations in the Coastal Plain Province of North Carolina were obtained by using a combination of surface and borehole geophysical methods. The hydrogeologic framework at Camp Lejeune was mapped by using 100 miles of continuous, single-channel, marine seismic-profiling data that were correlated with land-based borehole geophysical and lithologic data from 180 water-supply, monitoring, and stratigraphic test wells. The geometry of areas of missing confining units at the southern end of Cherry Point was mapped by using land seismic-reflection shear and pressure waves, ground-penetrating radar, marine seismic profiling, vertical seismic profiling, and borehole geophysical and lithologic data from more than 100 water-supply and monitoring wells. These data are being used by both Marine Corps Bases to manage drinking-water supplies and to plan investigations of hazardous-waste sites. A methods development study is being conducted at Ft. Bragg to evaluate the ability of ground-penetrating radar, other electromagnetic techniques, seismic-reflection techniques, and electrical methods to delineate the near-surface hydrogeology at and around hazardous-waste sites.

TITLE: MANAGING OWCP COSTS: DESIGNING AND IMPLEMENTING A STRUCTURED RETURN-TO-WORK/CASE MANAGEMENT PROGRAM

AUTHORS: **CHANDLER, D.L., CHANDLER CONSULTING INCORPORATED**, R.E. Belden and D.J. Lyman

CONTACT: Chandler, Dennis (503) 683-4176

ABSTRACT:

This session is designed to assist the Agency in implementing a worksite-based program to manage OWCP costs. Participants will be presented a case study to overview the entire process of program planning, implementation and maintenance activities. The key components include:

- Getting upper management support
- Implementing a structured return-to-work program
- Obtaining physician and medical provider support
- Team program management, safety and personnel roles
- Strategies to resolve existing claims
- Case tracking, reporting and data analysis

TITLE: PREVENTION OF ACID MINE DRAINAGE BY ESTABLISHMENT OF SULFATE-REDUCING BACTERIA IN GOB PILES

AUTHORS: **CHANDLER, M., USBM**, J. Kilbane II, S. Kim, K. Kayser and F. Pisani

CONTACT: Chandler, Mark (612) 725-4737

ABSTRACT:

An innovative alternative to Acid Mine Drainage (AMD) control is the establishment of active Sulfate-Reducing Bacteria (SRB) communities within the pyritic material. This approach treats the AMD problem at its source converting sulfate/oxidized pyrite back into pyrite/metal sulfide precipitates within the mine waste material, thereby preventing AMD. Laboratory and field experiments conducted by the Institute of Gas Technology, the U.S. Bureau of Mines, and the Illinois Abandoned Mined Lands Reclamation Council are described that illustrate the essential features necessary for the establishment of SRB within pyritic mine waste, and practical concerns regarding the implementation of this AMD prevention approach are discussed.

TITLE: **DELINEATING THE EFFECTS OF MINERAL-RESOURCE ACTIVITIES ON THE ENVIRONMENT**

AUTHORS: **CHURCH, S.E., USGS**

CONTACT: Church, Stan (303) 236-1900

ABSTRACT:

Geochemical and isotopic tracer methods developed for mineral-resource assessment can be used to delineate metal contamination from mineral extraction and processing. Application of these techniques in the western U.S. has resulted in delineation of discrete areas where mining has affected both aquatic and riparian habitats. Pyrite, which is ubiquitous in many mineral deposits, weathers rapidly in tailings forming iron-oxides that trap many toxic metals. Applying partial digestion methods to stream sediments, we can separate the metal load resulting from the weathering of mineral deposits from the natural geochemical background. These effects can be depicted in a format readily understood by the layman by contrasting stream-sediment data from affected sections of the stream with geochemical background on regional maps. Because lead is usually greatly enriched in mineral deposits and because its isotopic composition varies with time, mineral deposits usually have a discrete lead-isotopic signature that can often be used to "fingerprint" a district. Lead-isotopes can be used to trace the dispersion trail in the stream sediments to identify the source and allow calculation of metal loads contributed by each mining district. These methods are directly applicable to NRDA studies by trust-resource agencies in DOI. ^{210}Pb geochronology can also be used to date the onset of some mining activities.

TITLE: **SITE CHARACTERIZATION OF SURFICIAL MATERIALS: IDENTIFICATION AND MAPPING WITH IMAGING SPECTROSCOPY**

AUTHORS: **CLARK, R.N., USGS,** G.A. Swayze, and T.V.V. King

CONTACT: Clark, Roger (303) 236-1332

ABSTRACT:

Imaging spectroscopy is a new tool that measures a continuous spectrum from an aircraft or satellite at multiple spatial positions to form an image of the Earth's surface. Imaging spectroscopy represents a major advance in remote-sensing technology because for the first time specific materials can be identified and mapped. Spectroscopy can be used for material identification, and in some cases, the determination of specific chemistry when absorption features shift due to substitutions of elements within a molecular structure. Imaging spectroscopy can be used to map hundreds of materials, including minerals, amorphous materials, liquids, gases, vegetation (including species, and plant stress indicators), man-made materials, and ice and snow. To date, many tens of materials have been successfully mapped. Imaging spectroscopy can be applied to many problems, ranging from minerals exploration, environmental site characterization, hazardous materials mapping, ecosystems mapping (including vegetation species, cryptobiotics, health, etc.) and more. Hundreds of square kilometers can be rapidly mapped for numerous materials, a process that would be cost prohibitive by any other means. Many examples using imaging spectroscopy results will be shown.

TITLE: VEGETATION SPECIES, SENESCENCE/STRESS INDICATOR AND CRYPTOBIOTIC SOILS MAPPING USING IMAGING SPECTROSCOPY

AUTHORS: CLARK, R.N., USGS, T.V.V. King, R. Kokaly, G.A. Swayze and C. Ager

CONTACT: Clark, Roger (303) 236-1332

ABSTRACT:

New methods of imaging spectroscopy analysis allow vegetation species/communities, senescence/stress, and green vegetation leaf-water content to be mapped on large scales. Imaging spectrometer data can be used to discriminate between subtle spectral differences and thus be used to identify and map vegetation species. In agricultural areas such as the San Luis Valley, Colorado, we have mapped alfalfa, barley, oat hay, canola, and open fields containing chico, and other unidentified weeds. Evaluation of the results showed the crop species identification to be 96% accurate. Data analyzed over Colorado forests is showing amazing detail and diversity. Analysis of the position of the chlorophyll-adsorption (red) edge can indicate natural senescence, water deprivation, or toxic materials. New methods of imaging spectroscopy analysis have shown that subtle changes in the red-edge position can be detected at very low levels, and can indicate potential sources of stress and focus field studies. In another example, vegetation cover has been mapped in the arid region of Arches National Park, along with soil and rock mineralogy and cryptobiotic soils. Previous estimates of green vegetation cover, using the popular NDVI ration, have significant errors over the arid lands typical of the western United States.

TITLE: ACCESSING THE OIL SPILL LIABILITY TRUST FUND FOR INITIATION OF NRDA

AUTHOR(S): CRAMPTON, C. A., USCG

CONTACT: Crampton, Carl (703) 235-4765

ABSTRACT:

An outline designed to provide necessary information for use of the Oil Spill Liability Trust Fund (OSLTF) for the initiation of natural resource damage assessments (NRDA). These procedures cover: 1) Establishing inter-agency agreements to make OSLTF monies available for direct obligation by the Federal Lead Administrative Trustee (FLAT); 2) Documenting the activities conducted and resources used for initiation activities by the Natural Resource Trustees; and, 3) A system of accounting to support proper payment and recovery of costs incurred in initiation activities.

TITLE: ENSURING A HEALTHY ENVIRONMENT FOR WORKERS

AUTHOR: DANIEL, J. H., USBM

CONTACT: Daniel, J. Harrison (202) 501-9309

ABSTRACT:

Lung disease caused by dusts and particulates is the major workplace hazard of all industrial workers, ranking ahead of musculoskeletal injury and heart disease. The particulates causing lung disease, which cannot be seen by the human eye, have just recently become the subject of environmental regulation. Air quality health research of the Bureau of Mines focuses on the monitoring and control of these small particulates, which include coal and rock dusts, diesel soot, and radiation. Research strives to control the particulates at their source of generation; hence, it is a true worker health and environmental program. This research is becoming more important since current and proposed Federal regulations controlling airborne contaminants are ahead of the technology to sample, measure, and control many of the substances.

Due to the confined, dusty, humid, and often hot mine environment, the technology developed by the Bureau has application to the most difficult industrial and environmental air quality problems. The presentation will describe the Bureau's air quality research and how it helps ensure the technical and economic feasibility of the growing list of rulemaking legislation involving air quality.

TITLE: IAML INVENTORY & HAZARD EVALUATION AND COST ESTIMATION

AUTHOR: DAVIS, J.D., BOM

CONTACT: Davis, John (202) 501-9749

ABSTRACT:

Because of recently enacted environmental regulations, many groups, including land managing agencies, are increasingly concerned about the environmental and physical hazards and legal liabilities of inactive and abandoned mines. Accordingly, in order to gain an understanding of the scope and magnitude of problems, a number of previous studies were evaluated in comparison with the Bureau of Mines data bases, in an attempt to identify the number of sites, determine the number of features per site, identify the frequency of environmental and physical hazards, determine the average cost per hazard and thus the average cost per feature and finally, estimate the cost per site.

The number of total sites on federal lands is estimated to be between 114,000 and 136,000. These sites contain an estimated 158,000 to 1,289,000 physical hazard features, that will require between $2.5 bullion and $21 billion to remediate. The number of sites requiring environmental remediation is estimated at 1750 to 5000. This will require an additional $3.8 billion to $13.7 billion to cleanup. The total cost of cleaning up the federal lands is estimated to be $6.3 billion to $34.5 billion.

TITLE: **LESSONS LEARNED IN SPILL RESPONSE AND DAMAGE ASSESSMENT - TAMPA BARGE COLLISION AND M.J. BERMAN SPILLS**

AUTHOR: **DAWSON, R.H., FWS**

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ABSTRACT:

The Tampa Barge Collision Spill, August 10, 1993, in Tampa, FL, and the M.J. BERMAN Spill, January 7, 1994, in San Juan, PR, were two of the largest spills under OPA. They were the first spills in the southeastern United States in which the U.S. Coast Guard and the other natural resource trustees expected active participation by the USFWS in spill response. Many environmentally sensitive areas were affected by these spills making damage assessment activities coincident with response actions. The negotiation and settlement strategies used by the trustees offer unique insights into quantification of injuries to natural resources, compensation for lost use, and restoration of injured resources. The lessons learned by the USFWS, in both spill response and damage assessment, highlight issues and problems in meeting the expectations of the Coast Guard and other State and Federal agencies.

TITLE: **STRATEGY AND PRINCIPLES FOR ALL-HAZARDS COORDINATION IN THE DEPARTMENT OF THE INTERIOR**

AUTHOR(S): **DOUGLAS, J., OS** and R. Gale

CONTACT: Douglas, Jim (202) 208-7702

ABSTRACT:

The recently approved Strategic Framework for All-Hazards Coordination in the Department of the Interior lays out a systematic, interagency approach to natural, technological, and other hazards. Interior's interests include (1) its own facilities, employees, and resources, (2) providing information, research, and technical assistance, and (3) meeting responsibilities and commitments to other federal agencies and units of government. The scope of the effort covers mitigation, preparedness, response, and recovery. Among the key principles of the Framework are the sharing of resources and information, minimizing total costs, and relying on existing organizations and staffing to greatest extent possible. The Incident Command System provides the best organizational approach for on-site incident management and should be adopted throughout the Department wherever appropriate. The Department's All-Hazard Program is coordinated through a recently established All-Hazards Coordinating Group, which will have a number of ad hoc and standing working teams to address specific issues and problems, focusing on information, resource sharing, business practices, and ongoing program coordination. Responsibility for specific planning, response, and other actions lies with operating bureaus at the lowest appropriate organizational level.

TITLE: **ENVIRONMENTAL PROTECTION DURING MINE DEVELOPMENT IN AREAS OF CONTINUOUS PERMAFROST OF ALASKA**

AUTHOR(S): **ELLENBERGER, J.E., USBM**

CONTACT: Ellenberger, John (612) 725-4667

ABSTRACT:

In 1994, the U.S. Bureau of Mines entered into a cooperative agreement with Arctic Slope Regional Corporation to develop environmentally-sound technology for mining coal and reclaiming lands disturbed by mining in the Arctic. The technology employed will comply with state and Federal regulations for mine development, active operation, and closure. The Kuchiak Research Mine, about 300 kilometers southwest of Barrow, Alaska, is being developed as a research facility to evaluate techniques and problems associated with coal mining in a region of continuous permafrost. The objective is to prove technologies that provide a post-mined environment that is both aesthetically pleasing and acceptable for secondary use. Mine development operations at the site are limited to winter/spring months when the tundra is frozen and snow covered. Reclamation studies on hydrologic, soil, and revegetation concerns (revegetation, runoff, and reclamation studies) are limited to mid-July to mid-August period when sufficient snow melt has occurred to allow safe access, but before freeze-up. The fragile environment, combined with the challenges of modifying systems to work in continuous permafrost, extreme weather conditions, and isolation must be addressed in order to develop mines in areas of continuous permafrost.

TITLE: **DEVELOPMENT OF HAZARDOUS WASTE SITE HEALTH AND SAFETY PLANS**

AUTHOR: **ENGLEMAN, S.D., BOR**

CONTACT: Engleman, Steve (303) 236-8649

ABSTRACT:

The concurrent development of comprehensive site workplans and a site specific health and safety plan which address the provisions of the OSHA regulations for hazardous waste operations is critical to the successful completion of any hazardous waste project. This presentation will identify the fundamental elements of a health and safety plan and some of the technical developmental considerations of each element. Administrative program support, project scheduling and coordination activities, and other issues which effect a comprehensive hazardous waste program will also be discussed.

TITLE: **FISH AND WILDLIFE SERVICE EXPERIENCE WITH NATURAL RESOURCE DAMAGE ASSESSMENT**

AUTHOR: **ESCHERICH, P.C., FWS**

CONTACT: Escherich, Peter (703) 358-2148

ABSTRACT:

Fish and Wildlife Service (FWS) manages wide ranging trust natural resources: migratory birds, anadromous fishes, endangered species, certain marine mammals, and over 500 National Wildlife Refuges. These have involved FWS in natural resource damages at hazardous waste sites and oil spills not on DOI lands. Our Environmental Contaminants program (over 135 biologists in 65 field offices) also deals with agricultural drainwater, pesticides, refuge contaminant problems, sediments, water quality, and other fish and wildlife contaminant issues. Superfund work often starts as technical assistance to EPA, with recommendations or studies on ecological effects. Oil spill work starts with response assistance to Coast Guard on spill effects on birds and mammals. Data from both, though not damage assessment, can aid early settlements. For large cases, major studies can be required, especially if responsible parties are reluctant to negotiate. Most settlements are cooperative, subject to MOU's among Federal, State, and Tribal trustees. FWS has been in over 100 negotiated settlements, many with multiple sites. Excluding Exxon Valdez, over $18 million has been collected for the Departmental Fund, most for restorations. FWS is also party to multi-trustee settlements with over $150-200 million deposited or due in joint trustee court or other accounts, mostly for restoration.

TITLE: **OVERVIEW OF AQUATIC ASSESSMENTS AT MINING WASTE SITES: CLARK FORK RIVER, MONTANA AND COEUR d'ALENE RIVER, IDAHO**

AUTHOR(S): **FARAG, A.M., NBS**, D. Woodward, and J. Goldstein

CONTACT: Woodward, D. (307) 733-2314

ABSTRACT:

The river basins of these two drainages have received waste products from hard rock-mining activities since the late 1800s. Trace metals are elevated in water and sediments and our assessments of the aquatic environment have focused on pathways by which metals concentrate and move through aquatic biological systems. Other studies evaluated toxicity of metals contaminated water, sediment and food-chain. Indigenous fish populations were evaluated for their health and biochemical status and their avoidance of metals contaminated habitats. Our findings indicate metals are concentrated in tolerant organisms of the aquatic community and prey species may have impaired growth and health when foraging on organisms with elevated body burdens. Aqueous metal concentrations may not result in direct mortality or reduced growth under normal conditions, but fish can detect differences in metals concentrations and will prefer habitats with lower metals concentration.

TITLE: **OFFICE ERGONOMICS**

AUTHOR(S): **FEUERSTEIN, V.L., BOR**

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ABSTRACT:

This short course covers the interphase between the computer user and the computer work station. The intent of the course is to provide the computer user with the ability to identify and correct ergonomic problems. Special emphasis is placed upon what constitutes well designed furniture, taking advantage of strengths and weaknesses to arrange the work station, and what are good work habits. Carpal Tunnel Syndrome & Thoracic Outlet Syndrome are discussed. Written materials providing practical step by step guidelines for setting up your work station, and self evaluation checklists are included. There is a section on visual fitness. Exercises for the upper body and eyes are provided and demonstrated.

TITLE: **CASE STUDY: POL BLADDER TEST SPILL SITE YUMA PROVING GROUND**

AUTHORS: **FISK, S., BOR** and C. Botdorf

CONTACT: Fisk, Sylvia (602) 870-2247

ABSTRACT:

The ongoing investigation is a BOR/US Army joint venture based upon an interagency partnership to combine resources. The project is funded through DOD Defense Environmental Restoration Program which is the military equivalent of CERCLA.

Close regulatory coordination with the State of Arizona was practiced to ensure compliance with Applicable or Relevant and Appropriate Requirements (ARARs). This relationship has been able to anticipate new regulations in evolutionary stages. The project also included development of a computer data base for Quality Assurance Management to accommodate the large number of samples generated.

The contamination found was concentrated in the clay soils, the sands directly above the clay, perched water and groundwater. From the investigations it became apparent that the leaded gasoline was not detectable in the sandy desert surface soils beneath the spills and that only soil gas remained at shallow depths. A process of natural remediation may have occurred.

TITLE: **SITE CHARACTERIZATION WITH X-RAY FLUORESCENCE SPECTROMETRY CASE STUDIES: GRANT KOHRS RANCH AND CLARK FORK RIVER, MONTANA**

AUTHOR: **FORD, K.L., BLM,** P. Meyer, P. Bierbach, M. Brown, B. Bump, T. Ulrich and C. Clemmensen.

CONTACT: Ford, Karl (303) 236-6622

ABSTRACT:

A field portable x-ray fluorescence spectrometer (XRF) was used at these sites to characterize the nature and extent of metals contamination associated with the Anaconda Smelter, Silver Bow Creek, and Warm Springs Ponds NPL sites located upstream on the Clark Fork River. The Grant-Kohrs National Historic Site (NPS) and 12 individual BLM tracts located on the Clark Fork River were evaluated using site-specific empirical calibration for copper, arsenic, lead, and zinc concentrations in soils and floodplain sediments. High concentrations similar to those found at the Silver Bow Creek NPL site were detected, particularly at Grant-Kohrs Ranch. Confirmation samples are planned to further assess data quality. At Grant-Kohrs, over 800 samples were collected from a uniform grid covering 1500 acres and contaminant distributions were displayed using contour maps. The XRF can deliver EPA Level III quantitative data with a rigorous quality assurance program.

TITLE: **COEUR d'ALENE BASIN MINING WASTE STUDIES USING FIELD X-RAY FLUORESCENCE UNIT**

AUTHORS: **FORTIER, D., BLM,** J. Lindsay and K. Ford

CONTACT: Fortier, David (208) 769-5022

ABSTRACT:

The Coeur d'Alene Basin in Northern Idaho has extensive environmental impacts from heavy metal mining wastes and smelting activities. A portable field X-Ray Fluorescence Spectroscopy (XRF) instrument was used during the 1994 field season to examine the primary mining waste contaminate levels in soils and tailings in a wide range of situations.

X-Ray fluorescence is a nondestructive analytical technique which performs qualitative and quantitative analysis of elements in samples. This technique allowed us to investigate river bank cross sections, soil corings and surface transects to determine contaminated areas and levels of contamination. We have been able to quickly determine if the samples are needed and if further samples or more analyses are needed. At our offices we further analyzed field samples and dried them to examine variations among the samples and the XRF calibrations. The instrument has enabled the evaluation of very complex sites in a very cost effective and timely way. The lessons learned include quality control needs, sampling design effects, sample variations and some factors that influence the instruments results.

TITLE: **USING SPATIAL DATA ANALYSIS FOR FLOODPLAIN MANAGEMENT**

AUTHORS: **FRAZIER, A.G., USGS** and J.A. Kelmelis

CONTACT: Frazier, Ann (703) 648-4644

ABSTRACT:

In response to the major flooding in the Upper Mississippi River Basin in 1993, the U.S. Government established an interdisciplinary team of senior scientists from Federal agencies to build a scientific data base which would help managers and decision makers with flood recovery and future floodplain and river basin management. The team, named the Scientific Assessment and Strategy Team (SAST), evaluated existing data, identified new data needs, conducted a preliminary analysis, built a data base, initiated a data and information clearinghouse, and made recommendations on scientific issues regarding river basin management to the Federal Government. The 240 gigabyte data base contains a variety of data, including satellite imagery, physical data such as meteorologic, hydrologic, topographic, and geologic; biological data such as species, habitat, and land cover; and social data such as economic, demographic, critical infrastructure, and hazardous and toxic sites. Several aspects of river basin and floodplain management benefit from this scientific approach to data acquisition, analysis, and distribution. For example, SAST data have already been used to analyze flood effects, define high risk floodplain zones, examine the impacts of flood insurance policies, delineate potential areas for wetland or habitat restoration, and find suitable sites for relocating a town.

TITLE: **GWINN CAVE - THE MONEY PIT**

AUTHOR: **FULLER, T., BLM**

CONTACT: Fuller, Tim (208) 886-7273

ABSTRACT:

Gwinn Cave is a lava tube 10 miles north of Shoshone, Idaho where arsenic containing soils have been found and are believed to be derived from both natural processes and illegally disposed of arsenic-containing materials. Several small drums were discovered in the cave containing about 22% (217,000 ppm total) arsenic. Samples collected subsequent to removal of the containers disclosed that elevated levels of arsenic still remained. Three more removal operations were conducted, followed by additional sampling which revealed the presence of additional arsenic contamination. During the last removal, layers of whitish soil appeared which contained nearly 62,000 ppm of arsenic. Contamination was extensive and created a number of concerns, including public safety and potential liability. Remediation costs and techniques are complicated by OSHA Confined Space regulations, land disposal restrictions for arsenic, and the physical difficulties of removal. The Idaho Division of Environmental Quality has assisted in developing a plan to determine whether the clays in the soil are attenuating the arsenic and preventing it from being transported chemically in the subsurface and/or groundwater. The plan includes differentiating between the naturally occurring arsenic and the contaminant species. If arsenic materials are not being chemically mobilized, possible ways to stabilize the contaminants in place will be identified.

TITLE: **CONTAMINANTS PROBLEM IDENTIFICATION PROCESS - A SYSTEMATIC INVENTORY AND ASSESSMENT PROCESS**

AUTHORS: **GAMBLE, L.R., NBS** and W. Crayton

CONTACT: Gamble, Larry (303) 236-4625

ABSTRACT:

Despite numerous federal and state laws and regulations to protect the environment from hazardous waste, and pollutants in general, natural resources on Department of Interior (Interior) lands continue to be exposed to various contaminants. In an effort to avert such situations, the Biomonitoring of Environmental Status and Trends (BEST) program has developed the Contaminants Problem Identification Process. Although originally intended to assist the U.S. Fish and Wildlife Service in assessing potential contaminant problems on National Wildlife Refuges, the process can be used on all Interior land units. The standardized process, which is detailed in a guidance manual (Contaminants Problem Identification Manual), takes the user through a series of steps which inventory or identify natural resources; all pertinent reports, studies, and data relating to contaminants; potential contaminant pathways (surface water, ground water, air, and biotic) on or within, the land unit; contaminant sources on the pathways; and specific contaminants that may be released from the sources. If it is determined that contaminants may reach and potentially affect natural resources on the land unit, then the manual assists the user in designing a sampling plan to confirm or deny whether these contaminants pose a threat. The process will provide land managers sound information to assist in decisions.

TITLE: **HAZARDOUS SUBSTANCE DETERMINATIONS ON LANDS PROPOSED FOR ACQUISITION BY THE DEPARTMENT FOR THE UNITED STATES**

AUTHOR: **GARD, G.L., BLM**

CONTACT: Gard, Glen (503) 683-6434

ABSTRACT:

Departmental Manual, Part 602 DM 2, Subject: LAND ACQUISITION - Hazardous Substance Determinations requires that a hazardous substance determination be made prior to the acquisition of any land by the Department for the United States. DOI Memorandum dated August 23, 1989, provides Interim Guidance on Land Acquisition.

This presentation will describe an acquisition where known or suspected contaminants were present on the property. The landowner and the BLM reached agreement whereby the landowner agreed to perform a Phase I Environmental Site Assessment. The agreement further provided that the landowner would complete all further investigations and cleanup/remediation required at the site prior to acquisition by the BLM for the United States.

TITLE: IMPROVED REMEDIATION OF HAZMAT SITES USING VALUE ANALYSIS

AUTHOR: GERNERD, K., PCM

CONTACT: Gernerd, Kurt (202) 208-5399

ABSTRACT:

Remediation design teams must balance alternative remediation technologies and special site characteristics/limitations with considerations of levels of cleanup, cost, regulatory compliance, and environmental risk management. This presentation informs the remediation community about how the technologies of remediation and Value Engineering have been successfully combined.

Value Engineering methodology was used to help the remediation design team identify and evaluate remediation alternatives to develop a site cleanup strategy that maximizes site remediation for the lowest cost. A value engineering study was conducted during the Final Remedial Response Plan for the cleanup of a site on the Parker River Wildlife Refuge, Massachusetts. The environmental investigation conducted at the site indicated a presence of heavy metals, PCB's, and polynuclear aromatic hydrocarbons at elevated concentrations that must be remediated. The Value Engineering study identified cost saving opportunities through 13 recommendations and 3 design suggestions in areas of cleanup levels, treatment processes, sampling, and earthwork for improved remediation design and project savings of over $1.1 million.

TITLE: TRUSTEE COORDINATION: CREATING A FORMAL RELATIONSHIP

AUTHOR(S): GLAZER, R.K., SOL

CONTACT: Glazer, Robin Kohn (415) 744-3980

ABSTRACT:

This presentation will focus on the creation of a formal relationship among co-trustees in a natural resource damage case. Discussion will include: elements of an effective Memorandum of Understanding; selection of lead trustee(s) for damage assessment and restoration; duties, responsibilities and decision making under the MOU; the need to provide a coordinated approach that focuses on the ecosystem as a whole rather than individual trustees' resources; and how to preserve confidentiality for litigation purposes without sacrificing the open damage assessment process or violating other federal laws.

TITLE: **IDENTIFYING POTENTIALLY HIGHER RISK ABANDONED AND INACTIVE MINE SITES ON PUBLIC LANDS**

AUTHORS: **GOKLANY, I.M., PPA,** L. Coppa, M. Kaas and D. Ferderer

CONTACT: Goklany, Indur (202) 208-4951

ABSTRACT:

In an effort to deal with the potential environmental (including public health) risks associated with inactive and abandoned mine sites on federal lands and the associated financial liability, the DOI has initiated activities which will help address this issue cost-effectively. The USBM, in conjunction with DOI's Office of Policy Analysis, is developing methodologies which identify, on a national scale, the location of past mining activities which have a potential to create environmental risks. They are also developing a Geographic Information System which will identify areas where the probabilities for such risks are greatest to help land management agencies cost-effectively focus their efforts on detailed field investigation, site characterization and, ultimately, site remediation. Utilizing the Minerals Availability System/Minerals Industry Location System in conjunction with other national information systems, this paper estimates that about 15,000 sites on DOI lands have the potential for environmental hazards. A case study in the Coronado National Forest indicates that less than 2% of those may require investigations at the level required by the Environmental Protection Agency's Preliminary Assessments and Site Investigations protocols.

TITLE: **ALTERNATIVES FOR PROTECTING RESOURCES DURING THIRD-PARTY CLEANUPS**

AUTHORS: **GOODYEAR, B., SOL,** N. Horner and D. Jarrat

CONTACT: Goodyear, Barbara (415) 744-4095

Abstract:

Contamination on DOI lands is often caused by the activities of concessioners or permittees. Nevertheless, CERCLA and analogous state laws render DOI, as landowner, liable to the same extent as the polluter. This often forces DOI into a defensive posture, where limiting financial liability takes precedence over resource protection mandates.

One of the most visited areas of the Golden Gate National Recreation Area is the Golden Gate Bridge, operated by the Golden Gate Bridge District, an NPS permittee. Maintenance activities conducted by the District have caused the release of hazardous substances onto park lands. The state has determined that the site must be remediated and that the District and the NPS are RPs. NPS has intervened in the cleanup negotiations but has taken a unique stance. NPS has asserted that it is not responsible for the cleanup, and that its resource protection mandates permit NPS to require that the cleanup goals and methods be protective of park resources. The resources of concern include: endangered species, native plants, cultural resources, and scenic and recreational values. This presentation will describe procedural and substantive issues associated with NPS's position, and will provide an overview of associated legal issues.

TITLE: HEAT STRESS ASSOCIATED WITH ENCAPSULATING PROTECTIVE EQUIPMENT: EFFECTIVE MEANS TO REDUCE THE HEAT STRESS

AUTHOR: GRIFFITH, D.A., USBM

CONTACT: Griffith, Debra (612) 725-4549

ABSTRACT:

This paper discusses the nature of heat stress and the heat balance equation, the physical and mental effects of heat stress, and types of encapsulating protective equipment, then reviews the physical methods that have been employed to reduce the heat stress associated with the use of encapsulating protective equipment. These methods include forced-air cooling, ice vests, circulating water systems, and fluid replacement. None of the four systems discussed is perfect for all situations. Engineers and management, in conjunction with labor representatives, need to look at the type of work done using an encapsulating suit and make appropriate recommendations based on the task variables. Work rules, in combination with these systems, may be the most efficient way of dealing with the heat stress. Employees of an asbestos removal company are restricted to four hours per day in the containment suit; the workers alternate one hour in and one hour out of the suit. In this sort of situation, an ice vest in combination with fluid replacement may be an adequate solution. In situations where the work done is light intensity or of short duration, such as monitoring or inspecting some process, an ice vest may be adequate. In tasks that require very little whole-body movement, a forced-air system may be used.

TITLE: COST SAVINGS IN ENVIRONMENTAL REMEDIATION USING MINERAL-PROCESSING PRETREATMENT METHODS

AUTHORS: GRITTON, K.S. and J.P. Allen

CONTACT: Gritton, Ken (801) 584-4170

ABSTRACT:

Environmental-remediation strategies that utilize mineral-processing methods for pretreating or concentrating contaminated phases can significantly reduce overall restoration costs in selected remediation scenarios. Mineral-processing techniques are employed in the mining industry to recover or concentrate valuable constituents from low-grade sources, and methods such as gravity separation, flotation, and particle-size separation can effectively segregate organic-and metal-laden phases from bulk soils or sediments. Thus, the bulk material is left with much lower concentrations of contamination and should require no further treatment, and the contaminants are concentrated in a phase comprising only a fraction of the original material. This smaller, yet more contaminated, phase requires disposal or final treatment to stabilize or destroy the objectionable components. Savings result from application of the more-costly treatment methods to a smaller amount of material. Savings attainable using pretreatment are shown to be proportional to the ratio of the cost of pretreatment to the cost of final treatment or disposal. Because of the low cost of mineral-processing methods, and the comparatively high cost of disposal or destructive treatments, even modestly effective mineral-processing pretreatments can result in significant reductions in the cost of remediating a contaminated site.

TITLE: SOFT BODY ARMOR REVISITED

AUTHOR(S): GROSS, R.A., NPS

CONTACT: Gross, Roger (202) 619-7019

ABSTRACT:

The U.S. Park Police issues its officers all necessary uniforms and equipment, including firearms, handcuffs, badge, uniforms, shoes, and soft body armor.

In the summer of 1994, Force officers who belong to the Police Association of the District of Columbia advised the Chief of Police that they had concerns pertaining to the quality of the Force issued soft body armor. At issue was the fact that the manufacturer's warranty stated that the soft body armor was warranted for only 5 years. The manufacturer had mailed all Force officers a letter advising them that their soft body armor needed to be replaced.

The U.S. Park Police Planning and Development Unit was tasked to investigate the issues pertaining to the quality of the soft body armor, as well as concerns as of sanitation and wearability. As chairman of the ad hoc committee, I researched the issues and concerns of the Police Association and looked into the cost factors of replacement. The research began with a review of the facts, as well as a review of the equipment. The Acting Director of the National Institute for Standards and Technology was also interviewed. The efforts necessary to achieve the positive results are discussed in the paper and in the policy statement issued by the Chief of Police.

TITLE: LESSONS LEARNED FROM THE LACROSSE ENVIRONMENTAL AUDIT

AUTHOR: GUTHRIE, D.L., FWS

CONTACT: Guthrie, David (703) 358-1719

ABSTRACT:

An environmental multi-media assessment of the National Biological Service's LaCrosse National Fisheries Research Center, Wisconsin, was conducted during the period July 18-21, 1994, by the Fish and Wildlife Service (FWS) Pollution Control Office. The purpose of the assessment was to determine compliance levels in ten major environmental categories by identifying specific areas of noncompliance. The assessment incorporated Federal regulations and good management practices. The FWS Environmental Compliance Assessment and Management Program (ECAMP) manual was used to conduct the assessment. A thorough inspection of all environmental aspects of the laboratory and interviews with personnel were conducted. This presentation discusses the lessons learned from the assessment for application of the ECAMP process to environmental audits at other Department of the Interior facilities.

TITLE: **ECOLOGICAL RISK ASSESSMENT AT DEPARTMENT OF DEFENSE FACILITIES**

AUTHOR: **HAAS, J.E., FWS**

CONTACT: Haas, James (916) 979-2110

ABSTRACT:

The Department of Defense (DOD) controls a vast amount of real estate throughout the country and significant natural resources that also fall under Department of the Interior (DOI) trusteeship. Under the provisions of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), DOD is a co-trustee for the natural resources occurring on their lands, and the protection of those resources from further injury and their restoration to pre-release conditions should be key objectives of the Installation Restoration Programs (IRPs) in place at most DOD facilities. However, the impacts of contaminants on natural resources are frequently not addressed. The IRPs are conducted following the guidance of CERCLA: Records of Decision for contaminant remediation are arrived at following an extensive Remedial Investigation/Feasibility Study (RI/FS), with a requirement that the final remedy be protective of human health and the environment. Ecological risk assessments should be conducted as part of the RI/FS process. However, risk assessment guidance is currently vague and inconsistent. DOD program managers are required under CERCLA to notify natural resource trustees of potential injuries to trust resources, but IRPs will continue without further DOI input if allowed to do so. Aggressive action by DOI personnel in working through the IRP process is essential if trust resources are to be protected and enhanced.

TITLE: **NATURAL RESOURCE DAMAGE ASSESSMENT AND RESTORATION SUCCESSES IN THE FISH AND WILDLIFE WESTERN REGION**

AUTHORS: **HELM, R.C., FWS** and D.W. Steffeck

CONTACT: Helm, Roger (503) 231-6223

ABSTRACT:

Region 1 of the Fish and Wildlife Service has been working in close cooperation with the National Oceanic and Atmospheric Administration and the States of California, Oregon, and Washington to obtain natural resource damage (NRD) settlements from companies responsible for hazardous material or oil spill releases. Our efforts have been very successful, as in the last 4 years we have reached settlements in 14 cases for a total of over $170,000,000. Beginning in 1995, we are starting "on-the-ground" restoration actions that we believe will return some of the natural resources injured from these spills to their baseline conditions. In addition, our aggressive pursuit of NRD claims has prompted many companies to invest more upfront money in preventative measures. Our presentation will discuss the reasons why Region 1 has been so successful in settling NRD claims and it will address some of the difficulties we have encountered.

TITLE: **MANAGEMENT OF FORMERLY USED DEFENSE SITES BY THE DEPARTMENT OF THE INTERIOR**

AUTHOR: **HEMPEL, D.J., BLM**

CONTACT: Hempel, Dwight (202) 452-7778

ABSTRACT:

Department of the Interior (DOI) agencies manage hundreds of formerly used Defense sites (FUDS) covering millions of acres. A report to Congress concerning lands potentially contaminated with military ordnance and explosive waste listed 169 sites affecting 7-million acres that are managed by the DOI. There are additional FUDS with buried tanks, solid waste disposal sites, and other potentially contaminated lands. The Department of Defense (DOD) retains liability for FUDS. The DOD has delegated the responsibility for remediation of FUDS to the U.S. Army Corps of Engineers (COE). The DOI agencies and the COE jointly have responsibility for managing the risk posed by FUDS until the sites are completely remediated by the COE.

A partnership is required between the DOI agencies and the COE to ensure all FUDS are known to COE and DOI land managers. The DOI managers should assist the COE with its process of listing sites, determining site eligibility for remediation, archival research, assigning priority for remediation action, and developing the remediation plan for the site. The DOI manager's participation is required to ensure appropriate interim management of any risk at sites and that COE actions are compatible with the management plans for the affected lands.

TITLE: **ABANDONED MINERAL LANDS - AN ASSESSMENT OF FOUR YEARS OF CHANGE FROM THE 1991 DOI CONFERENCE ON SAFETY TO THE PRESENT**

AUTHOR: **HIGGINS, R.D., NPS**

CONTACT: Higgins, Robert (303) 969-2092

ABSTRACT:

At the 1991 Department of Interior (DOI) Safety Conference in San Diego, the Mining and Minerals Branch of the National Park Service (NPS) gave a presentation on Abandoned Mineral Land Safety. Substantial progress has been made in the NPS program since that time in completing field inventories of AML sites, creating and installing warning signs at AML sites, and raising public, NPS, and departmental awareness and understanding of the AML safety issue through briefings, memoranda, issue papers, and production and broad distribution of an AML brochure. Many NPS units and regional offices have developed, or are developing, AML management plans which assess the magnitude of the problem, set priorities, and estimate remediation costs. All DOI safety offices should be involved in their agencies' AML programs. Suggested actions include:

- promoting completion of their agency's AML inventory
- requesting a safety budget and other funds that provide for AML mitigation
- promoting and sponsoring AML mitigation projects every year
- developing AML management plans insisting that AML warning signs be posted at all AML sites
- insuring that all their management units have AML rescue contingency plans

TITLE: **USBM CONDUCTS AML INVENTORY FOR BLM IN COLORADO'S ANIMAS RIVER WATERSHED**

AUTHOR: **HITE, B.J., USBM**

CONTACT: Hite, Barbara (303) 236-0428 ext. 261

ABSTRACT:

The U.S. Bureau of Mines in cooperation with the BLM Colorado State Office has completed an AML inventory of BLM managed land in the Upper Animas River Watershed, Colorado. This watershed has experienced significant heavy metals loading from historic mining activities and from natural mineralization.

During the summer of 1994, field examinations of 304 abandoned mine sites were conducted by interagency teams. On-site investigations entailed recordation of major features, determination of precise geographic locations using Geographic Positioning System (GPS) units, and water quality measurements (pH and conductivity). A total of 89 water samples were collected and later analyzed.

The resultant report, titled "Abandoned Mine Land Inventory of BLM Administered Land in Upper Animas River Watershed, Colorado" by Barbara J. Hite was delivered to the BLM Colorado State Office in February 1995. The report contains an evaluation of physical hazards at the sites, analytical results of water testing, and a prioritization of the most problematic sites.

TITLE: **CHARACTERIZATION OF GROUND WATER CONTAMINATED BY ACID MINE DRAINAGE AT THE PENN MINE, CALIFORNIA**

AUTHORS: **HUNERLACH, M.P., USGS,** C.N. Alpers and S.N. Hamlin

CONTACT: Alpers, Charlie (916) 979-2615 ext. 356

ABSTRACT:

Oxidation of sulfide minerals in waste rock, tailings, and unmined mineralized rock has caused metal (copper, zinc, cadmium) contamination in surface and ground waters at the Penn Mine, Calaveras County, California. Ongoing hydrogeologic and geochemical studies by the U.S. Geological Survey (USGS) have identified and characterized a plume of contaminated ground water in fractured metavolcanic rock between an unlined waste-water impoundment and a freshwater reservoir. Downhole logging methods, including gamma, caliper, acoustic televiewer, and heat-pulse flowmeter, were used to identify hydraulically active fracture zones, which were later separated by inflatable packers for monitoring of water quality and hydraulic head. Naturally occurring isotopic and geochemical tracers were used to "fingerprint" acidic drainage from two sources: (1) underground mine workings, and (2) surface piles of waste rock and tailings. This distinction is important because eventual removal of the waste piles will not prevent the seepage of zinc-cadmium-rich waters from the underground workings during relatively wet years. These results provide a basic knowledge of the hydrogeologic system that is essential for selection of an effective remediation strategy.

TITLE: **POLLUTION PREVENTION IN THE NATIONAL PARK SERVICE**

AUTHOR: **HUNT, S.N., NPS**

CONTACT: Hunt, Steven (970) 225-3513

ABSTRACT:

The national park system consists of 367 park units covering more than 80 million acres across the United States and its possessions. The NPS is responsible for resource preservation, facility operations, and management of park visitation, and must administer the national park system according to a standard that will keep the parks unimpaired for future generations. In addition, pollution prevention and right-to-know laws are now by executive order applicable to the federal government. An effective pollution prevention program can lead to improved environmental management, reduced use of toxic chemicals, and decreased generation of hazardous waste.

TITLE: **TREATMENT OF MINING AND MINERAL PROCESSING WATERS USING A SYSTEMS APPROACH**

AUTHORS: **JEFFERS, T.H., USBM** and A.E. Isaacson

CONTACT: Jeffers, Tom (801) 584-4135

ABSTRACT:

In response to a critical need to remove toxic metals from our Nation's streams and waterways the U.S. Bureau of Mines (USBM) is combining innovative USBM-developed water treatment techniques with existing technologies to create more effective systems for complex water. A systems approach is used to ensure that the best combination of unit operations can be tailored for a particular site. The USBM technologies include primary treatments to recover salable metals and minimize solid waste generation and secondary treatments to produce effluents meeting strict water quality criteria. Examples of primary treatments include biogenic sulfide generation, passive biological treatment liquid emulsion membranes and processes that improve alkaline neutralization. Secondary treatments include polymeric beads containing immobilized extractants biological adsorbents zeolites and ion elutriation. These technologies are currently in various stages of development and three have achieved commercial application. This strategy is applicable to contaminated waters emanating from abandoned adits and pits waste rock dumps and active workings. A significant current focus of USBM activities is application of the systems approach to remediation of waters on Federal lands administered by the Bureau of Indian Affairs the U.S. Forest Service and the National Park Service.

TITLE: **EVALUATION OF GEOPHYSICAL METHODS FOR LOCATING SUBSURFACE HAZARDS IN THE SHAWNEE NATIONAL FOREST**

AUTHOR: **JESSOP, J.A., USBM,** K.L. Hauser and D.D. Gese

CONTACT: Jessop, James (612) 725-4586

ABSTRACT:

The Bureau of Mines initiated a subsidence study in the Shawnee National Forest in Southern Illinois with the U.S. Forest Service. Two sites were chosen from a Bureau study which identified 200 inactive tripoli mine sites and subsidence holes. Reconnaissance geophysical investigations were carried out to determine specific methods for detection of subsurface openings. Magnetic gradient, ground penetrating radar (GPR) and high resolution seismic survey were conducted at chosen sites. Preliminary results identified a subsurface opening based on disturbed wave patterns observed in the GPR and seismic records. The magnetic gradient profiles show variations of 5 to 10 gamma per meter changes over undermined areas. The ground penetrating radar signal shows a single frequency, high amplitude "ringing" effect when data are recorded over know underground workings. GPR data recorded over unmined areas typically show higher frequency signals due to reflections from structural and lithologic features. This pronounced effect is observed in the GPR profiles. The seismic data were collected in a common mid-point (CMP) method from which common offset profiles were generated. These profiles show disturbances in the first breaks over undermined areas. Comparison of the geophysical records provides the best method for proper interpretation of the data.

TITLE: **THREE PHASES TO DEVELOP SPECIFICATIONS FOR HAZARDOUS MATERIALS REMEDIATION**

AUTHOR: **JONES, G.L., BOR**

CONTACT: Jones, Greg (602) 870-2504

ABSTRACT:

In the past 10 plus years, hazardous material remediation/disposal projects have become standard practice in the construction industry. The method of developing a remediation project to final specifications for these projects can basically be broken into three phases. These phases to be discussed in detail will allow for each project to be individually analyzed and the best method of remediation/remove in regard to cost, practicability, and only perform the required work.

TITLE: **BENTHIC MACROINVERTEBRATE AND FISH BIOMONITORING OF ABANDONED MINES SITES NEAR KELLOGG, IDAHO**

AUTHOR: **JOSEPH, S.J., USBM**

CONTACT: Joseph, Seva (509) 353-2700

ABSTRACT:

Benthic macroinvertebrate and fish communities were surveyed in Pine Creek and its tributaries to detect impacts of historic mining activity on aquatic life and to assess the location and degree of impact. Benthic samples were collected and the organisms identified and enumerated. These numbers were used to calculate a number of metrics which were compared to the metrics from an undisturbed reference site. The benthic survey indicated that the stream and tributaries were moderately impacted below most of the mine sites. The impacts seemed to be fairly localized as the benthic community showed some recovery at a relatively short distance below mines. The overall bioassessment rating was significantly correlated with habitat conditions but not with metal concentrations. This lack of correlation is probably due to 1) strong influence of habitat conditions, 2) variability in the chemical and physical processes which influence the bioavailability of metals, and 3) the presence of only moderate metal contamination. The fish survey also showed regions of impact and recovery which corresponded to location of mining activity. However, the degree of impact appeared higher, particularly where metal concentrations were elevated. These result indicate that biomonitoring is a useful tool in assessing the impact of mining on aquatic ecosystems.

TITLE: **PERSPECTIVES ON INDOOR AIR QUALITY**

AUTHOR(S): **KAISER, E.A., FWS**

CONTACT: Kaiser, Edward (413) 253-8311

ABSTRACT:

With the advent of energy efficient "sealed" buildings, indoor air pollution has become a major concern for both building tenants as well as property managers. Hazardous air quality can result from such innocuous items as new carpeting, wall board, or paint, as well as from everyday use of office supplies, or photocopying equipment. These items frequently emit chemicals which include benzene, formaldehyde, and other air contaminants and toxins into the common air. More obvious areas of concern are faulty heating, ventilation and air-conditioning (HVAC) systems and environmental cigarette smoke which have proven to cause negative health effects.

This lecture will present an Industrial Hygiene approach to conducting an Indoor Air Quality Investigation. This presentation will identify some of the most frequently encountered causes of poor indoor air quality isolated in typical office settings, as well as industrial work environments and it will provide some recommendations which may be employed to improve environmental indoor air quality.

TITLE: **DIGITAL TERRAIN MODELING FOR ANALYSIS OF PREDICTED SUBSIDENCE AND ITS SURFACE HYDROLOGIC EFFECTS**

AUTHORS: **KILLEN, S.M., USBM** and T.L. Triplett

CONTACT: Killen, Sean (612) 725-4740

ABSTRACT:

This paper presents research, conducted by the Bureau of Mines on procedural techniques for computer assisted 3-D analysis of subsidence and its potential effects on surface hydrology. The prediction of coal mine subsidence through the use of a "Type A" computer model developed by Bureau researchers has enabled production of elevation data which can be incorporated into digital terrain models (DTM'S) and animated with CAD and 3-D modeling software. Bureau researchers served as unbiased authorities in negotiations between coal companies and landowners and used these tools to encourage multiple land use. Three case studies were done to enhance the ASPP subsidence prediction model's functionality and a fourth was done to verify the accuracy of the ASPP model for the Rend Lake area of southern Illinois. These case studies involved DTM creation over about 40 proposed longwall panels for a preliminary assessment of surface hydrologic impact. Our results were considered in the permitting process for each mine.

TITLE: **ENVIRONMENTAL RADON MONITOR**

AUTHORS: **KILLORAN, L.K., USBM**, R.F. Holub and R.F. Droullard

CONTACT: Killoran, Linda (303) 236-0777

ABSTRACT:

In order to measure outdoor ambient radon, the U.S. Bureau of Mines Denver Research Center designed and developed a continuous Environmental Radon Monitor (ERM) that is about 50 times more sensitive than most commercially available instruments. The ERM is based on the classic two filter method of measuring radon with the addition of aerosols to attach to the radon progeny to reduce plateout and thereby increasing sensitivity. The two filter method of measuring radon uses a chamber through which air is drawn. The air passes through the first filter at the inlet to remove any progeny and then through the second filter, as it leaves the chamber, to catch progeny generated in the chamber. An alpha or beta counter is positioned over the exit filter to measure the collected radon progeny activity and, thus, the amount of radon in the chamber. The ERM performed satisfactorily over a period of more than two years at Operable Units IV/V of the Denver Radium Superfund Site and is suitable for measuring low levels of radon around uranium and other mines, as well as in any environment where radon levels are of concern.

TITLE: **MAPPING MINERALS AT THE SUMMITVILLE MINE AND THE ADJACENT SAN JUAN MOUNTAINS USING AVIRIS DATA**

AUTHORS: **KING, T.V.V., USGS,** R.N. Clark, G.A. Swayze, N. Gorelick, and C. Ager

CONTACT: King, Trude (303) 236-1373

ABSTRACT:

The Summitville open-pit mine is located in the San Juan Mountains of southwestern Colorado. From 1985 to 1992, the Summitville mine produced gold from low-grade ore using heap-leach techniques. In 1992, the operator of the mine ceased mining activity and had begun environmental remediation when the company declared bankruptcy (December, 1992) and abandoned the mine site. Subsequent to the abandonment, the U.S. Geological Survey was asked to provide hydrologic and geologic information to describe and evaluate the environmental condition and downstream effects of the mine site. To address these problems we analyzed imaging-spectroscopy data for the Summitville mine and adjacent areas in the San Luis Valley. We mapped minerals based on the presence of absorption features in the ~0.45-2.4 *um* wavelength region of the electromagnetic spectrum. Hydroxyl-bearing minerals were observed at both the mine site and within the Iron, Alum, and Bitter Creek basins. These areas were also sources of iron-bearing sediments to the Alamosa River. The iron-bearing sediments make the stream banks reddish-brown (a characteristic typically associated with acid drainage) and are potential carriers of heavy metals to locations downstream.

TITLE: **THE CONCEPT OF ECONOMIC VALUATION IN NATURAL RESOURCE DAMAGE ASSESSMENT**

AUTHOR: **KING, W.E., MMS**

CONTACT: King, William (703) 787-1527

ABSTRACT:

The essential goal of natural resource damage assessment is to make society "whole" after an insult to its environmental assets. Compensation for the "whole" damage requires consideration of the asset nature of natural resources, the time value of consumption and money, and choice as the basis of value. Full accounting for damages encompasses permanent lost use values, restoration costs, interim lost use values, and transaction costs. Monetization entails consideration of cost, profit, price, and what economists refer to as "consumer surplus." Finally, the damage equation must include the entire panoply of environmental goods and services: market, non-market, consumptive, non-consumptive, and passive enjoyment values. Thus, the analysts assigned to estimate damages must juggle consideration of all of these elements of monetization as well as expertly applying tools (to be reviewed in the following papers) for estimating these elements.

TITLE: **CULTURAL RESOURCES ARE PART OF THE PUBLIC TRUST**

AUTHORS: **KNUDSON, R., NPS** and D.M. Hamson

CONTACT: Knudson, Ruthann (202) 343-4119

ABSTRACT:

The public trust doctrine holds that some things are so valuable to the human community that they should be held and managed by the state in trust for the benefit of all people. The village green, water, and air are clearly part of the public trust. So are cultural resources, the record and remnants of the human past–prehistoric and historic, terrestrial and submerged, archeological, architectural, and engineered sites and landscapes and their associated collections and records, and archival materials and traditional lifeways. These materials clearly do not come under the rubric of "natural resources" as the term is used in CERCLA, CWA, or OPA, or their accompanying regulations. Cultural resources are part of the environment as defined under the National Environmental Policy Act. CWA evaluations of the economic and social costs necessary to achieve water quality should include the cost of the conservation, mitigation, or compensation for loss of cultural resources. The OPA provides guidance for compensation for "resources of special significance," which may include cultural resources. The Archaeological Resources Protection Act authorizes compensation for damages to archeological resources based on either archeological or commercial value and the cost of restoration and repair. Cultural resources are part of the compensable public trust.

TITLE: **PRP FUNDING AND PARTICIPATION: AT WHAT COST?**

AUTHORS: **KRAUSMANN, J.D., FWS** and K. Benkert

CONTACT: Krausmann, Jeff (360) 753-9440

ABSTRACT:

Federal, State and Tribal governments (Trustees) have initiated a Natural Resource Damage Assessment (NRDA) and restoration planning process in Commencement Bay, Tacoma, Washington. A subgroup of the businesses and local governments identified as potentially responsible parties (PRPs) for natural resource damages, participated with the Trustees in conducting the first phase of damage assessment and restoration planning studies. These PRPs entered into funding and participation agreements, also known as "pay to play" agreements, with the Trustees. The agreements allow the PRPs to participate on a joint trustee-PRP coordinating committee and to follow and comment on case development. The benefits and disadvantages of this approach to conducting a damage assessment are discussed.

TITLE: USE OF A POSTURE CODING SYSTEM TO ANALYZE POSTURES AND DETERMINE BACK INJURY RISK

AUTHOR: KUENZI, J.K., USBM

CONTACT: Kuenzi, Joan (612) 725-4590

ABSTRACT:

This paper will discuss the background for the Ovako Working posture Analysis System, how it is used, and how the results are analyzed and used. People often need to assume awkward postures in order to do their jobs. Whether the work involves computers, assembly lines or large equipment, there may be a risk for back injury depending on the postures your job puts you in. The Ovako Working posture Analysis System (OWAS) is a method that does not require a great deal of background and is easy to use. In OWAS, a worker is observed doing his/her normal tasks. The worker's posture is coded at given intervals using a number which correspond to the position of one of the body and the amount of load handled. The worker's tasks are also recorded. The posture codes are then assigned to one of four categories based on degree of injury risk. Tasks that include postures falling into the high risk categories are given highest priority in job redesign efforts.

TITLE: CLOSED-CIRCUIT BREATHING APPARATUS TESTING LABORATORY

AUTHOR: KYRIAZI, N., USBM

CONTACT: Kyriazi, Nicholas (412) 892-6478

ABSTRACT:

The Life Support group at the Pittsburgh Research Center has developed a testing laboratory for closed-circuit breathing apparatus used for both escape from and entry into areas with irrespirable atmospheres. These apparatus are used after a mine fire or explosion. Outside of mining, they are used for shipboard and land-based firefighting, and hazardous materials clean-up. The apparatus are tested either on a treadmill using human subjects or on a breathing and metabolic simulator. Apparatus tested are compared with each other and evaluated with respect to human compatibility. We have tested apparatus for the Navy, Air Force, National Fire Protection Association, and apparatus manufacturers. A performance comparison of entry apparatus used in mine rescue, fire service, and hazmat will be presented including information on carbon dioxide levels, breathing resistance and temperature.

TITLE: **MERLIN LANDFILL: PAST, PRESENT, AND FUTURE ACTIONS**

AUTHOR: **LABER, R.K., BLM**

CONTACT: Laber, Ronald (503) 770-2205

ABSTRACT:

The Merlin Landfill has operated under a Recreation and Public Purpose lease since 1967. In 1988, the lessee contracted a site inspection which indicated the presence of groundwater contamination. As lessee, the City of Grants Pass contracted a phased investigation, with Phase I the equivalent of a Preliminary Assessment, and Phases II and III the equivalent of a Remedial Investigation.

In May 1992, the lessee signed a substitute lease which requires certain tasks be accomplished within definite time frames. The Oregon Department of Environmental Quality is playing a major role in developing strategies for the lessee to pursue remediation measures and ultimately close the landfill and perform subsequent monitoring.

The presentation will explore, through slides and narrative, the BLM Medford District Hazardous Material Coordinator's role in the past, present, and future interactions between the lessee, legal and environmental consultants, the operator, and the DEQ.

TITLE: **NATURAL RESOURCE DAMAGE ASSESSMENT METHODS: OVERVIEW AND SELECTION CRITERIA**

AUTHOR: **MEADE, N.F., NOAA**

CONTACT: Meade, Norman (301) 713-3038 ext. 201

ABSTRACT:

Natural resources held in trust by government agencies (and Native Americans) are public assets which provide services to society. Their value is determined by the public's willingness to pay for the benefits they receive from these services. Most natural resources lack organized markets and explicit prices. Economists have developed a number of valuation techniques which are applicable to natural resource damage assessment. Selection and application of methods to estimate damages is an important strategic decision that entails careful consideration of complex technical and legal issues on the part of trustees.

TITLE: BLM AND INDUSTRY--IMPLEMENTING EMERGING TECHNOLOGY TO PREVENT POLLUTION WHILE REMAINING COMPETITIVE IN THE MINERAL INDUSTRY

AUTHOR: MC CRACKEN, M.J., BLM

CONTACT: McCracken, Mike (307) 261-7682

ABSTRACT:

Mineral production lessees in the Bureau of Land Management have long been faced with a dilemma: how to legitimately and cost effectively recycle used motor oils from machinery and waste crude oil from production pits? In December, 1993, the Casper District learned about a local company that had obtained a patent to re-refine used motor oils and waste crude oil sludges such that wastes are fully converted to clean oil and residuals for manufacturing asphalt. This presentation addresses why and how the BLM teamed up with industry to implement good technology for better management of the public lands.

TITLE: UTILIZATION OF CARTOGRAPHIC TECHNOLOGIES FOR DAMAGE ASSESSMENT

AUTHOR: MC DONALD, M.A., BOR

CONTACT: McDonald, Michael (602) 870-2527

ABSTRACT:

As the Bureau of Reclamation (Reclamation) transitions from a civil works construction agency to a resource management agency, there is a need to explore new methods and technologies to meet the needs for our new mission. This change has been in response to a number of factors including legislation, changing public needs and values, economic considerations, and environmental concerns. Water quality and hazardous waste are but two of Reclamation's concerns. Future hazard waste activities will be the handling, storing, and disposing of hazardous materials generated primarily during the operation at Reclamation-owned facilities. There also needs to be a natural resource damage assessment of all Reclamation property as part of Reclamation's plan to divest itself of excess real estate. As Reclamation downsizes, new technologies have been explored to accomplish this natural resource damage assessment and to assist hazardous waste disposal activities. Base data is always needed for these programs. Cartographic and spatial data, as presented, plays a key role for Reclamation. The following are some of the cartographic technologies and methods being utilized by the Phoenix Area Office: Metric Aerial Photography, Conventional Mapping Services Close Range/Terrestrial Photogrammetry, Surveying (traditional and GPS), Geographic Information Systems (GIS), Airborne Scanning Laser/Radar Capture, and various remote sensing reduction techniques.

TITLE: CYANIDE IN PRECIOUS METALS HEAPS

AUTHORS: **MC GILL, S.L, USBM,** P.G. Comba and R.B. Dix

CONTACT: McGill, Sandra (702) 334-6600

ABSTRACT:

Decommissioning of spent precious metals heaps generally involves rinsing the leached ore to remove residual cyanide and mobile metal species. To prevent degradation of water resources, many gold producing states have enacted regulations that govern closure of heap leach operations. These regulations stipulate the criteria for pH, cyanide, and metals content that must be attained before the facility can be permanently closed. The U.S. Bureau of Mines is currently investigating effective and environmentally sound means to identify and remove cyanide and mobile metal species from spent precious metal ores. Results from the laboratory and field rinsing studies and the associated cyanide neutralization chemistry are presented and discussed in this paper.

TITLE: SOURCE CONTROL OF ACID MINE DRAINAGE

AUTHORS: **MC GILL, S.L, USBM,** R.M. Balderrana and K.J. Maggs

CONTACT: McGill, Sandra (702) 334-6600

ABSTRACT:

A significant environmental issue, and one of increasingly widespread interest over the past decade, is that of acid rock drainage (ARD) from mineral processing tailings deposits and mine waste piles. Acid rock drainage is caused by the oxidation of sulfide-bearing minerals followed by leaching and mobilization of toxic elements. This paper describes research by the Bureau of Mines demonstrating the feasibility of reprocessing the tailings and removing the sulfidic material, which is the ARD source, using conventional mineral processing methods.

TITLE: **UTAH BUREAU OF LAND MANAGEMENT ABANDONED MINE LAND INVENTORY PILOT PROJECT**

AUTHORS: **MC PARLAND, T., BLM**, J. Romney and W. Atwood

CONTACT: McParland, Terry (801) 539-4026

ABSTRACT:

In 1993 and 1994, the BLM Utah State Office conducted an Abandoned Mine Land (AML) inventory pilot project to investigate means to identify abandoned mine sites on public lands. Remote sensing techniques identified 230 potential sites; ground verification identified 61 as mine sites. Airborne videography is not cost effective due to the intense post-processing involved. The use of aerial photography was effective in mine site identification; however, additional criteria must be developed to make mine site identification more accurate.

Collection of site coordinates and attributes with Global Positioning System technology was an effective inventory tool. The BLM AML inventory checklist was programmed in a Corvallis Microtechnologies MC-V datalogger for attribute collection. The raw digital files contained site coordinates and attributes were differentially corrected for positional accuracy in Trimble Pathfinder with local base station data. Corrected data was exported from Trimble PATHFINER to the AutoCAD/ArcCAD environment. The AutoCAD/ArcCAD combination facilitates the generation of a spatial database of site coordinates for GIS spatial analysis functions and map production. This spatial database will ultimately be maintained in ARC/INFO eliminating the need for AutoCAD/ArcCAD.

TITLE: **RECOVERY OF INFLATABLE FORMS AFTER PLACING CELLULAR CONCRETE IN STEEPLY DIPPING MINE OPENINGS**

AUTHOR(S): **MILLER, R.E., USBM**, W.E. Wright

CONTACT: Miller, Rusty (303) 236-0777 ext. 778

ABSTRACT:

The U.S. Bureau of Mines is developing technology to reduce the hazards and costs associated with sealing abandoned mine shafts. Shafts utilizing concrete fill for a competent plug often require forms that are dangerous and expensive to install. Construction of forms within a shaft exposes workers to several dangers, including collapse of unstable ground, falls within the shaft, and possible explosive or toxic gases. Initial economic analyses revealed that the cost benefits associated with reusable inflatable forms are significantly higher than those for conventional forms. This research focuses on tasks that include: (1) placement of an inflatable form within a shaft; (2) inflation of the form; (3) the use of lightweight cellular concrete; and (4) retrieval of the inflatable for use in sealing additional mine shafts. In fiscal year 1994, half-scale laboratory testing using 1.3-m diameter inflatable forms was completed. The inflatables, acting as forms for the cellular concrete, were recovered intact through a 0.3-m diameter retrieval tube in the center of the seal. A 3.3-m diameter by 4.8-m long inflatable has been fabricated for a full scale seal planned for the Spring of 1995. The location selected for demonstrating this technology is an abandoned coal mine shaft near Seattle, WA.

TITLE: **ENVIRONMENTAL AND SAFETY AUDIT - A TOOL TO IMPROVE FACILITY MANAGEMENT**

AUTHOR: **MORIN, K.D., BLM**

CONTACT: Morin, Ken (303) 236-6418

ABSTRACT:

BLM facilities, like most DOI facilities, due to their relatively small size are exempt from significant portions of EPA's hazardous material/waste regulations. However, OSHA and DOT regulations do not provide exemptions for small facilities. Their regulations pertaining to the management of hazardous materials essentially address the same issues which our facilities are technically exempt from under the EPA's regulations. The combining of hazardous material safety and environmental issues into a single audit provides the BLM with an efficient means to assist facilities attain and sustain environmental and hazardous material safety compliance. During each assessment, facility personnel receive training on how environmental and hazardous material safety regulations affect their specific facilities and operations. This job specific training is a key component of every audit. It promotes the incorporation of environmental and safety issues into the daily operational and business practices of the facility.

TITLE: **CHARACTERIZATION OF ABANDONED & INACTIVE MINE SITES: KATHERINE MINE, ARIZONA - A CASE HISTORY**

AUTHORS: **MOYLE, P.R., USBM,** S.R. Iverson, S.W. McNary and J.M. Fay

CONTACT: Iverson, Steve (509) 353-2700

ABSTRACT:

Thousands of potentially hazardous abandoned and inactive mine sites are present on public lands in the United States. The U.S. Bureau of Mines has developed procedures for characterization of those mineral-related sites prioritized as having high potential for environmental or physical hazards. The purpose of characterization is to identify the nature and extent of hazards and to determine appropriate remediation measures, if necessary. Site characterization involves careful integration of multi-disciplinary investigations, a "holistic" approach, in order to fully understand and evaluate the complex environmental relationships and problems unique to each site. The Katherine Mine, Mill, and tailings site in Mojave County, Arizona provides a good example of successful application of the characterization process. Integration of engineering, geotechnical, geochemical, hydrological, geophysical, statistical, and related disciplines with a Geographic Information System platform succeeded in identifying hazards and providing the National Park Service with sound recommendations for mitigation measures. The procedures described have wide-spread applications to mineral-related sites on lands managed by Interior Department agencies.

TITLE: THE NPS CERCLA ENFORCEMENT PROGRAM: SHIFTING THE FINANCIAL BURDEN OF CERCLA RESPONSES TO RESPONSIBLE PRIVATE PARTIES

AUTHOR: MULLIGAN, S.P., NPS

CONTACT: Mulligan, Shawn (303) 969-2080

ABSTRACT:

The NPS maintains approximately 1,300 hazardous sites that are subject to the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Historically, the NPS has responded to those sites through cleanup efforts designed to protect human health and the environment, as mandated by both CERCLA and the NPS Organic Act. In its response activities, the NPS frequently assumed the financial burden of cleanup, a strategy that has proven extremely unrewarding. To minimize prospective NPS CERCLA liability and expenditures, the NPS is implementing a CERCLA enforcement program through which the NPS can ensure that the responsible parties either, when presented with a release of hazardous substances, clean up the site themselves or reimburse the NPS for any costs the NPS may have incurred. The NPS CERCLA enforcement program, featuring cost avoidance and cost recovery components, will be discussed in the presentation, with particular attention focusing on the Krejci Landfill located in Ohio. Krejci represents the first instance of a referral by the Department of the Interior to the Department of Justice for pursuing a cost recovery case under CERCLA. The case is accordingly precedential and is providing valuable lessons to the NPS, as well as the other DOI bureaus, in handling cost recovery matters.

TITLE: LIABILITY OF FEDERAL EMPLOYEES FOR ENVIRONMENTAL CRIMES

AUTHORS: NAGLE, E.W., SOL and D.A. Watts

CONTACT: Nagle, Eric (202) 273-3448

ABSTRACT:

Federal facilities are required to comply with all environmental laws. Just as in private industry, those who manage federal facilities can be criminally prosecuted when they knowingly violate environmental laws, or when they allow those they supervise to violate the law. A federal employee is never authorized to violate environmental laws; "performance of official duties," or "lack of funds" are not valid defenses. Federal employees have been convicted of various environmental crimes, including illegal disposal of hazardous waste, spilling fuel into streams, and submitting false monitoring reports. You can take a few common-sense precautions to avoid getting into trouble: (1) know the environmental rules that apply to your situation; (2) use whatever authority you have to ensure compliance; if someone else has the necessary authority, ask them to use it; (3) keep superiors and regulators informed of any compliance problems.

TITLE: **REMEDIATION OF ACTIVE AND ABANDONED MINERAL MINE TAILING MATERIALS USING ORGANIC RESIDUES**

AUTHOR: **NORLAND, M.R., USBM**

CONTACT: Norland, Michael (612) 725-4573

ABSTRACT:

The surface waste materials or tailing discarded from mineral processing activities results in a unique environment which, potentially, can severely inhibit surface and subsurface stabilization. Mineral tailing materials contain residues from metal ore processing operations and are often excessive and/or deficient in chemical, physical, and biological properties necessary for stabilization through revegetation. As a result, there is a need for the development of treatment technologies to remediate active and abandoned mineral waste materials. To investigate the potential of organic residues as a physical agent to ameliorate the chemical, physical, and biological limitations of tailing materials for vegetative stabilization, the USBM has implemented a series of experiments at active and abandoned mineral mine tailing sites in northeastern Minnesota and southeastern Kansas. In each climatic zone, vegetative cover has improved depending on the type of organic residue used and rate of application. Total cover has progressively increased over 5 years at all experimental sites and has not reached steady state conditions. A potential new strategy for reclaiming difficult sites through the use of organic residues is proposed.

TITLE: **ENVIRONMENTAL INFRASTRUCTURE, AND MINING APPLICATIONS OF TIME DOMAIN REFLECTOMETRY**

AUTHORS: **O'CONNOR, K.M., USBM,** W.N. Herkelrath and M.R. Norland

CONTACT: O'Connor, Kevin (612) 725-4731

ABSTRACT:

This presentation summarizes the Symposium and Workshop on Time Domain Reflectometry (TDR) in Environmental, Infrastructure, and Mining Applications, held at Northwestern University in Evanston, Illinois on September 8-9, 1994, was sponsored by the U.S. Bureau of Mines, Infrastructure Technology Institute at Northwestern University, and Los Alamos National Laboratory. The session on Instrumentation and Basic Physics focused on basic hardware and mechanics of both electrical and optical TDR. Soil Moisture-General concentrated on the application of TDR to measure volumetric water content in porous materials, especially soils. Soil Moisture and Contaminant Transport described the evolving application of TDR to measurement of solutes within pore fluids. Ground Water gathered applications of TDR to measurement of changes in fluid levels and pressures. Soil Moisture and Infrastructure describes applications of TDR to monitor changes in unfrozen and frozen subgrade moisture conditions. Finally, Rock and Soil Deformation presented applications of TDR to monitor displacements induced by mining and construction. Case history summaries of studies conducted by the USBM and U.S. Geological Survey will also be summarized.

TITLE: **POTENTIAL APPLICATION OF REACTIVE WALL GROUNDWATER TREATMENT TECHNOLOGY TO THE LEE ACRES LANDFILL SITE IN FARMINGTON, NM**

AUTHOR: **ODELL, S., BLM**

CONTACT: Odell, Stephanie (505) 599-6314

ABSTRACT:

In August of 1993, the Bureau of Land Management Farmington District began investigating the feasibility of treating the groundwater plume associated with the Lee Acres Landfill using a reactive wall which utilized an iron catalyst for contaminate removal. A bench scale study was performed by Environmental Technologies and the University of Waterloo in Guelph, Ontario through a subcontract with Roy F. Weston. Preliminary studies of this technology have been aimed at VOC and other organic contaminants. At the request of BLM, a bench scale study was performed by the subcontractor to determine removal rates for manganese (the risk driving contaminant at Lee Acres), as well as for the low level VOC's which are found at the site.

TITLE: **PROJECT MANAGEMENT OF A MEGA-NRDA SITE: THE COEUR d'ALENE BASIN NRDA**

AUTHOR: **PEDERSEN, D., FWS**

CONTACT: Pedersen, Dick (503) 231-6223

ABSTRACT:

Environmental impacts to natural resources in the Coeur d'Alene (CDA) River Basin as a result of 100 years of heavy metal mining and smelting activity have occurred and continue to occur. Under federal law, trustees for natural resources in the Basin are the Secretary of the Interior, Secretary of Agriculture, and the CDA Tribal Chairman. The Trustees are completing an NRDA under the DOI's Type B regulations. The ultimate purpose of the NRDA is to restore injured resources and the services they provide.

The CDA Basin NRDA is a high priority for the DOI. The Regional Director of the FWS Region I has been delegated trust authority for DOI. As lead, the FWS is responsible for ensuring the NRDA is coordinated and conducted in an efficient manner. The DOI's FWS, BLM, BIA, USGS, and NBS, along with the CDA Indian Tribe and the USFS are brought together in a unique way to effectively complete a complex, multi-year process. Project Managers have established teams to work on various components of the assessment. The technical, economics, and restoration teams are directed by project managers with support from the legal team to ensure the NRDA is completed on time, is fully integrated and supports the NRDA claim for damages.

TITLE: STRATEGIES FOR ENCOURAGING SELF-PROTECTIVE EMPLOYEE BEHAVIOR

AUTHOR(S): PETERS, R.H., USBM

CONTACT: Peters, Robert (412) 892-6895

ABSTRACT:

This presentation was prepared by the U.S. Bureau of Mines to provide safety professionals with some direction concerning the choice of strategies for encouraging employees to adopt self-protective behaviors and avoid unsafe acts. Four strategies are considered: (1) incentives, (2) employee surveys, (3) fear communications, and (4) disciplinary actions. Each strategy is described, and the research findings concerning its effectiveness and limitations are briefly summarized.

TITLE: MINE CLOSURE CONCEPTS

AUTHORS: PETERSON, E.K., USBM and M.J. Gobla

CONTACT: Peterson, Eileen (303) 236-0428 ext. 242

ABSTRACT:

Historic mining operations have left a legacy of dangerous mine openings such as open shafts and adits across our public lands. With the recent increases in recreational activities on the public domain the frequency of public visitation to inactive and abandoned mine sites has heightened the need to properly secure dangerous mine excavations.

Closing a mine opening is complicated by numerous factors such as presence of endangered species, future mineral potential, need to protect the public, presence of mine gases, and misuse of mine sites as illegal dumping grounds. The presentation reviews the factors that should be evaluated when selecting a closure method, application of closure methods currently in use, and new innovative techniques that have been developed to handle difficult sites.

TITLE: **EMERGING TECHNOLOGIES FOR IN-SITU REMEDIATION OF METAL CONTAMINANTS IN GROUND WATER**

AUTHORS: **PETRIE, L.M., USBM**, S.E. Paulson and P.M. Jones

CONTACT: Petrie, Lloyd (612) 725-4662

ABSTRACT:

Many inactive/abandoned mines and other industrial sites on DOI lands have metal-contaminated waters; but size, hydrogeologic complexity, and remoteness often render conventional water pump-and-treat or source material excavation and treatment unfeasible. In-place or "in-situ" treatment is attractive because it minimizes materials handling, uses lower-cost "passive" technologies, protects workers, and can be used for remote contamination. However, success requires a thorough understanding of site specific geochemical and hydrologic processes affecting metal contaminants solubility and transport. The USBM "applied scientific research" approach to in-situ remediation technology development will be described. This approach includes: 1) detailed characterization of site hydrogeology and geochemistry; 2), characterization of contaminant phases and host mineralogy, 3) laboratory evaluation of fluid-rock reactivity, 4) hydrologic and geochemical modeling of site conditions, 5) engineering design, and 6) field demonstration of the technology. Current research on emerging in-situ treatment technologies will then be reviewed, with particular emphasis on metal contamination. For example, both DOE and EPA have active research and field demonstrations using in-situ remediation. These technologies and those under development may be applicable to DOI sites.

TITLE: **RESPIRATORY PROTECTION PROGRAM REQUIREMENTS**

AUTHOR: **PHILLIPS, B.G., CES**

CONTACT: Knapp, David (703) 876-6800

ABSTRACT:

Respiratory protection programs are vital safety program components used to ensure a safe breathing environment for workers when engineering controls are not available or practical. When respiratory protection is required, OSHA dictates employer establishment and maintenance of a respiratory protective program. OSHA also requires the selection and use of NIOSH approved respirators. Consensus standards organizations such as ANSI and NFPA provide additional support to respirator program parameters, equipment certification and user performance. Respirator use requirements and environmental conditions must be understood, along with the physical qualifications of the worker, to enable proper respirator selection in accordance with a respiratory protection program. Types of respiratory protection equipment, their capabilities and limitations, must be understood and evaluated, along with worker tasks and work environment, to support respiratory selection. Selected respirators must be individually fit tested, and supported with the appropriate maintenance and training programs to fulfill respiratory protection program requirements. Respiratory protection programs are comprehensive programs intended to ensure the proper selection, use, maintenance and training of respiratory protection in the workplace. They enable the respiratory protection equipment utilized to provide the worker the respiratory protection for which it was designed.

TITLE: QUALITY ASSURANCE OF ENVIRONMENTAL AND HAZARDOUS MATERIALS MONITORING ACTIVITIES

AUTHOR(S): RAE, K.L., BOR

CONTACT: Rae, Kerry (916) 979-2427

ABSTRACT:

Department of Interior agencies who manage Federal lands and waters must comply with a variety of environmental and hazardous materials monitoring requirements mandated by Federal and State regulations. The complexity surrounding environmental compliance issues and the growing need for accurate and legally defensible chemical data underscores the importance of effective quality assurance (QA) programs that guide project planning, quality control of laboratory analyses, and effective data validation and assessment. Good QA practices are sometimes overlooked when conducting site characterizations, health risk assessments, ecological assessments, and other monitoring programs due to inexperienced project management, weak planning, time and budgetary constraints, and the high costs of technical or contractual services. When QA planning is omitted because of inexperience of perceived added costs, significant hidden or unexpected costs may result: increased time required to validate poor results; resampling and reanalysis costs; increased litigation costs; failure of poor data to meet program objectives; potential for prolonging employee and public health risks; and the potential for agency loss of public trust. This presentation will describe the essential elements of an effective QA program.

TITLE: UTILIZATION OF PARTNERSHIPS WITH INDUSTRY FOR ENHANCING THE EFFECTIVENESS OF DOI-DEVELOPED TECHNOLOGIES

AUTHOR(S): RALSTON, D.E., USBM and T. Inderbitzen

CONTACT: Ralston, Don (202) 501-9323

ABSTRACT:

This presentation addresses the subject of enhanced R&D results and technology transfer through the involvement of industry partners. Primary emphasis is placed on the philosophy, utilization, and implementation mechanics associated with incorporating and involving industry partners in Department research programs and planning. The primary focus is the use of Cooperative Research and Development Agreements (CRADA's). Department-wide, R&D partnerships and agreements are under-utilized for a variety of reasons including, little exposure, knowledge, and understanding of partnership mechanisms; low appreciation for why its becoming essential for industry and customer participation; thoughts that partnering is impossibly bureaucratic; and the "Why should I do this?" syndrome on the part of some of our researchers and research managers. This presentation addresses the above issues in the context of examples of successfully negotiated CRADA's from four Department of the Interior agencies with the aim of opening a horizon for expanded thinking about partnerships and technology transfer. Enabling legislation is addressed (the Technology Transfer Act) and how this Law, and several others, have opened up avenues for effecting partnerships.

TITLE: LIABILITY CONCERNS FOR MANAGERS OF PUBLIC LANDS

AUTHOR: RANKIN, J.S., PROFESSOR, WIDENER UNIVERSITY SCHOOL OF LAW

CONTACT: Rankin, Janna (610) 255-5140

ABSTRACT:

This session will identify important legislation and judicially imposed legal considerations which may impact upon liability of managers and public agencies for accidents on public lands. We will review the basic defenses available to the government, and will discuss the application of these defenses and principles to make on-the-ground determinations regarding warning signs, construction projects (railings, boardwalks, fences) and other safety-related concerns. The overall goals are to "de-mystify" the legal system and to develop a risk management attitude which will carry over into program and procedure formulation when the participant returns to his or her regular assignment.

TITLE: HOW TO DEVELOP A CONTAMINATED PROPERTY NEXT DOOR TO A CERCLA SITE, AND KEEP MULTIPLE AGENCIES ON-BOARD

AUTHOR: REBER, J.H., NPS

CONTACT: Reber, John (303) 969-2418

ABSTRACT:

The National Park Service (NPS) and the City of Charleston (City), South Carolina, have faced a difficult decision process attempting to develop a NPS-owned site that is an area of concern of a larger CERCLA site. Hazardous substances derived primarily from a manufactured gas plant on adjoining property have spread throughout the site's groundwater, surface and subsurface soils, and tidally influenced sediments in the Cooper River, leading the NPS and City to try to resolve liability issues, provide resource protection, and remain within NEPA and CERCLA requirements. The overall surrounding area is currently undergoing CERCLA investigations using the EPA's SACM model, proceeding to an RI/FS plan due in April 1995. The NPS worked closely with the City, EPA, F&WS, and numerous other state and federal agencies and consultants to meet complex needs and requirements for this project. An Environmental Assessment was performed by the NPS to meet NEPA requirements, and at the same time preserve the continuing CERCLA process for the overall area site. The NPS proposes to lease the site to the City to build an Aquarium with numerous lease provisions, including a Demonstration Plan, extensive monitoring, and interagency communication.

TITLE: **RECLAIMING ABANDONED URANIUM MINES IN ARIZONA**

AUTHOR: **SANDOVAL, J.P., BOR**

CONTACT: Sandoval, John (602) 870-2218

ABSTRACT:

The Bureau of Reclamation conducted site investigations at three abandoned uranium mines near Cameron, Arizona to remediate and return ownership of withdrawn land to the Bureau of Land Management. The remediation program is based on similar design and construction practices used by the Navajo Nation. Radiological monitoring was completed by taking two sets of readings on 50 ft centers producing a horizontal and vertical grid. The readings were collected in counts per second and converted into Equivalent Ra-226 Concentrations for environmental ground reading in picocuries per gram (pCi e Ra-226/g) and into True Exposures for the 1 meter reading in microrems per hour (R/hr) by correlation equations. The pits and waste piles were categorized into three classes based on radiological emissions. The bulk of the material at the site was categorized as at or near natural background levels with isolated areas of low level radioactive material. Currently, the material is not subject federal standards because the site is abandoned and has not been milled. Therefore, no approved standards exist in Arizona regulating radioactive substances or emissions from abandoned mine sites. However, this does not negate the concern for radiological hazards at abandoned mine sites nor the need to document the degree of danger and take appropriate remedial actions on withdrawn land.

TITLE: **HAZARDOUS WASTE SITE REMEDIATION WITH BOREHOLE MINING TECHNOLOGY**

AUTHOR: **SAVANICK, G.A. USBM** and A. L. Miller

CONTACT: Savanick, George (612) 725-4543

ABSTRACT:

The Bureau of Mines has developed borehole mining equipment. This equipmcnt has potential applications in environmental remediation and is especially suited for removing hazardous waste buried in situations where conventional excavation ls not possible such as ln urban areas. The method is selective and can extract deposits that are small or erratically distributed. This selectivity allows the volume of interest to be extracted without disturbing the surrounding rock or the overburden. Borehole mining has been proposed as a method for removing dense, nonaqueous phase liquids (DNAPLS) which have leaked into soils. DNAPLS cannot be removed by pumping of the groundwater and must be physically removed in order to remediate the groundwater.

The borehole miner can also be used to backfill the mined out caverns to minimize subsidenee or to emplace materials for controlling the flow of groundwater or modifying its chemistry.

TITLE: THE CONFINED SPACE ENTRY STANDARD OSHA TO ENGLISH

AUTHOR: SEELY, M., NPS

CONTACT: Seely, Mark (206) 220-4247

ABSTRACT:

A confined space entry program written in plain English that covers permit-required and certificate-required procedures and policies will be presented. Emergency and rescue requirements and guidance for sewer system entry and atmosphere testing will also be discussed.

TITLE: CASE STUDY OF SITE CHARACTERIZATION EFFORTS AT AN ABANDONED HARD ROCK MINE AND MILL SITE IN CENTRAL COLORADO

AUTHORS: SHEA-ALBIN, V., USBM, N. Miller and E. Williams

CONTACT: Shea-Albin, Valois (303) 236-0777 ext. 775

ABSTRACT:

The U.S. Bureau of Mines (USBM) performed geophysical surveys and hydrologic tracers tests to identify and map sources and pathways of subsurface, metal-bearing water plumes at the abandoned Mary Murphy Mine and Mill site located along Chalk Creek near St. Elmo, Colorado. The site is the target of a cooperative effort by the Colorado Division of Minerals and Geology (CDMG), EPA Region VIII, US Forest Service, and USBM to characterize and remediate a NonPoint Source pollution site. The Mary Murphy site is the source for increased metals loadings during spring runoff periods responsible for fingerling trout kills at a State rearing unit using Chalk Creek for source water. The Bureau has performed dye tracer tests in attempt to verify the existence of a mine pool and its connection with the subsurface contaminant plume at the mill site, conductive tracer tests to map pathways of contaminant flow through a bedrock fracture system at the mill site, and geophysical surveys under high-flow and low-flow conditions to map the extent of the contaminant flow through and adjacent to the tailings pile at the mill site. Results of this research will be presented as a case study.

TITLE: **CASE STUDY OF SINKHOLES OVER A NEBRASKA LIMESTONE MINE**

AUTHORS: **SIEKMEIER, J.A., USBM,** T.L. Triplett, L.R. Powell

CONTACT: Siekmeier, John (612) 725-4591

ABSTRACT:

The USBM responded to a citizen's request for assistance when five sinkholes, each 20 m to 25 m in diameter, developed within a 90 m by 105 m area on agricultural land overlying an abandoned section of an underground limestone mine. It was determined that the subsiding area could enlarge due to three mechanisms: (1) caving and sliding of soil into the existing sinkholes, (2) new roof falls in the mine adjacent to the existing sinkholes, or (3) new pillar failures in the mine adjacent to the existing sinkholes. The safety of agricultural workers was the main consideration at the site and so it was recommended that a buffer zone be created around the subsiding area based on the mechanism that could cause the greatest sudden increase in the subsiding area. Drilling logs were used to create a geologic model from which a simplified computer simulation of the stress distribution in the rock mass was developed. It was determined that the vertical stress had increased in the pillars near the existing sinkholes during sinkhole formation and that this may have weakened the nearby pillars. These pillars are currently stable, but may eventually deform or fail due to this weakening. Subsequent roof failure would then result in enlargement of the existing sinkholes. Therefore a buffer zone extending 43 m from the edge of the existing sinkholes was recommended.

TITLE: **ABANDONED MINE LAND INVENTORIES AND PRIORITIZATION: EFFICIENT METHODOLOGIES AND COSTS**

AUTHORS: **SMITH, R.C., USBM,** and G.C. Knutsen

CONTACT: Smith, R. Craig (303) 236-0428 ext. 283

ABSTRACT:

The USBM has conducted numerous AML inventories for other Federal agencies. As such, the USBM has developed and evaluated several methodologies for conducting inventories. Prioritization and ranking of mine sites for physical and environmental hazards are performed after field assessments and analytical sample data are evaluated. Based on results from eleven different AML inventories, the USBM has developed predictive methodologies for preliminary assessments of the extent of AML problems for a given area, the relative amount of hazardous sites by ranking criteria, and empirical formulas for predicting costs and time for AML inventory plans.

Lessons learned from these efforts have also allowed the USBM to identify fundamental elements and issues which should be considered before inventory efforts are conducted. Elements and issues such as driving forces, what is inventoried, inventory forms, sampling protocols, data bases, jurisdictional administration, coordination and partnerships, prioritization and ranking standards, cost-benefit considerations, and risk assessments should be included in the process.

TITLE: EMPHASIZING RESTORATION, THE "BOTTOM LINE" IN THE NATURAL RESOURCE DAMAGE ASSESSMENT AND RESTORATION (NRDAR) PROCESS

AUTHOR: SPENCER, S.R., OEPC

CONTACT: Spencer, Stephen (505) 766-3565

ABSTRACT:

The goal of restoration projects must be to assure that no net loss of natural resources or their services occurs. Prior to the consideration of restoration alternatives, trustees should strive to: 1) control releases that would impede natural recovery or limit the effectiveness of restoration activities; 2) restore chemical and physical quality of the environment to baseline or no effects levels, 3) accelerate the rate of return of injured habitats or ecosystems to baseline levels of services; and 4) restore key species to baseline levels and replace lost services as directly and quickly as possible. A hierarchy of preferred restoration options will be discussed. DOI may have over 500,000 contaminated sites on lands it controls. While other Federal trustee agencies cannot sue DOI for failure to take appropriate NRDAR actions at these sites, states or Tribal governments can (CERCLA 120). It would be advisable (the draft Departmental Manual Part on NRDAR requires it when possible) for DOI land managers to incorporate the restoration of affected natural resources into remedial actions after consultation with other Trustees.

TITLE: BASIC ELEMENTS OF DAMAGE ASSESSMENTS

AUTHOR(S): STEIN, B., SOL

CONTACT: Stein, Barry (503) 231-2173

ABSTRACT:

This presentation will review the fundamental elements of a damage assessment case pursuant to CERCLA, OPA and the CWA. The four areas covered will include 1) Release of hazardous substance or oil; 2) Injury to natural resources; 3) Casual link between the release and injury; and 4) Damages resulting from the established injury. Legal issues will be synthesized with the technical aspects of damage assessment to present a broad overview of the entire NRDA process. The presentation will explain the legal framework for damage assessments which has been established under the applicable statues.

TITLE: **RADIATION MONITORING AT THE MIDNITE MINE**

AUTHORS: **STROUD, W.P., USBM** and L.E. Snyder

CONTACT: Stroud, William (303) 236-0777 ext. 787

ABSTRACT:

The Midnite Mine is an inactive uranium mine located on the Spokane Indian Reservation near Wellpinit, Washington. In 1993, the Congress directed the U.S. Bureau of Mines (USBM) to investigate remediation alternatives at the mine site. As part of this initiative, the USBM Denver Research Center has been collecting baseline radiation data. Radiation monitoring being conducted by the Bureau is essentially that described in NRC Regulatory Guide 4.14. Radon and radon decay products are continuously monitored by instrumentation developed at the Denver Research Center. Wind speed and direction, ambient temperature, relative humidity, barometric pressure and solar radiation are also measured. All data are dumped to a central computer and are periodically transmitted to the Denver Research Center via a cellular phone link. In addition to the central monitoring site, three other locations have been established for ambient air sampling. Airborne particulates collected at these stations are analyzed for Ra-226, The 230, Pb-210, and total uranium. Use of the continuous monitors provides a unique means of detecting extremely low levels of radon and radon decay products. The cellular phone link makes real time data acquisition feasible, and is well suited to use in remote areas.

TITLE: **FACILITY INSPECTIONS**

AUTHOR: **SULLIVAN, J.D., NPS**

CONTACT: Sullivan, Daniel (215) 597-5368

ABSTRACT:

This session will explore the reasons for conducting a facility inspection and review the types which can and should be conducted. Pre-inspection preparation, in-briefing, walk through, out-briefing and the importance of issuing an accurate report will be discussed.

TITLE: **DEMONSTRATION OF A SUBSIDENCE PREDICTION TECHNIQUE FOR THE ILLINOIS COAL BASIN**

AUTHORS: **TRIPLETT, T.L., USBM** and D.W. Yurchak

CONTACT: Triplett, Ted (612) 725-4743

ABSTRACT:

This paper presents Bureau of Mines research on modifying the influence function method to predict subsidence, as well as techniques to predict the resultant damages. According to theory, the influence function technique must incorporate an intensity function to represent the relative significance of the causes of subsidence. This paper shows that the inclusion of a reasonable intensity function increases the accuracy of the technique, then presents the required functions for case studies of longwall coal mining subsidence in Illinois, and subsidence produced by ground water withdrawal in California. Then the paper discusses a method to predict the resultant strain from a simply measured site constant and calculated ground curvatures. Finally, the paper presents a technique to predict the damages caused by subsidence, particularly structural damage to residential foundations. This technique relates the values of bending and twist in the footing to the formation of cracks. The use of a Mohr's circle of curvature to predict damage then is introduced. Finally, the use of the influence function subsidence prediction technique to calculate the curvature values for the Mohr's circle is demonstrated, and hazard maps above typical longwall panels are created.

TITLE: **THE FISH AND WILDLIFE SERVICE'S SPILL RESPONSE CONTINGENCY PLAN - A COMPREHENSIVE APPROACH**

AUTHOR: **UNDERWOOD, J., FWS**

CONTACT: Underwood, Jeffrey (703) 358-2148

ABSTRACT:

It is the responsibility of the Fish and Wildlife Service (Service) to conserve, protect, and restore fish and wildlife and their habitats. The Oil Pollution Act of 1990 (OPA) calls for the protection, rescue, restoration, and rehabilitation of fish and wildlife threatened or impacted by a discharge of oil. The Service's broad and diverse range of responsibilities for protecting the natural resources of U.S. extends from nearshore marine and estuarine communities, to inland terrestrial and freshwater environments. In order to meet the mandates outlined in the OPA and enhance its capabilities in responding to discharges, the Service has developed a Spill Response Contingency Plan (SRCP). The SRCP is comprehensive, offering an A to Z compendium of guidance for responsibilities and procedures for spill events. These responsibilities include a wide variety of duties, from the Service's National Spill Coordinator to refuge and hatchery staff. Procedures include the implementation of the Incident Command System (ICS) a new "3 tiered" guidance for fish and wildlife protection during a discharge. The tiers represent specific goals in the protection of fish and wildlife, offering progressively more aggressive intervention in order to obtain the necessary levels of protection.

TITLE: **SCREENING PROCEDURE FOR INACTIVE AND ABANDONED MINE SITES**

AUTHOR: **ZILKA, N.T., USBM**

CONTACT: Zilka, Nick (509) 353-2700

ABSTRACT:

Inactive and abandoned hardrock mine (AML) sites pose a largely unknown threat to human health and the environment. Due to the provisions of the 1872 mining law, most of the sites are in the western U.S. and most are on or within federal lands. In order to cope with the large number of sites, estimated at over 500,000, in a timely and orderly fashion, federal agencies need an efficient and effective means to prioritize which sites to address first.

To that end, the Bureau conducted research to develop a screening procedure for AML sites. This research, which was one of four pilot studies evaluated by the BLM in designing its national AML strategy, used the BLM Winnemucca District, Nevada (1295 sites) as a test area. The procedure relies on data readily available in the literature and in state and federal agency files. Application of the procedure results in numeric ratings for mineral-commodity-related human health and environmental hazards for each site in a study area.

POSTERS

TITLE: **REACH-SCALE CHARACTERIZATION OF IRON REMOVAL IN ACID MINE DRAINAGE STREAMS**

AUTHORS: **BENCALA, K.E., USGS,** D.M. McKnight, R.E. Broshears and B.A. Kimball

CONTACT: Bencala, Ken (415) 354-3326

ABSTRACT:

Transport simulations can be used to link experimental results obtained at different scales and increase the opportunity for inter-site comparisons and the extrapolation of results between laboratory, flume, and whole-stream studies. We have recently completed steady-state simulation (at the reach length scale of 10 to 100 meters) of iron removal in the acid mine drainage stream, St. Kevin Gulch (Leadville, Colorado). This characterization was specifically designed to account for coupling of transport and removal processes. We used two quantitative characterizations at the stream reach-scale; first, a first-order rate constant for iron removal, and second, a dimensionless ratio of convective residence time to removal time. In the stream reaches of active iron removal, the rate constant was of order of magnitude, 0.001 per second, and the dimensionless ratio (the Damkohler number) was of order of magnitude 1. We suggest that the removal rate-constant and the Damkohler number are useful for quantitative characterizations of mine drainage streams of concern to the U.S. Department of the Interior. These characterizations would be useful in (1) identifying those streams in which iron is actively being removed and (2) extending the information value of studies from one stream to another.

TITLE: **USGS GEOPHYSICAL SITE CHARACTERIZATION TECHNIQUES**

AUTHORS: **CAMPBELL, D.L., USGS,** D.V. Fitterman, W.P. Hasbrouck, R.J. Horton, V.F. Labson, L.D. Pellerin, J.D. Phillips and M.H. Powers

CONTACT: Campbell, Dave (303) 236-1380

ABSTRACT:

This poster shows examples of environmental site characterization using electromagnetic surveying (EM), ground penetrating radar (GPR), magnetic surveying, and geotechnical seismic work. EM work can be done from ground or air. An airborne example is a helicopter EM survey of Everglades National Park showing areas of salt water incursion. A ground example used a commonly available commercial ground EM unit to survey a landfill at U.S. Air Force Academy. Combinations of different measurement modes showed up particular aspects of the landfill's makeup. At a DOD test site near Yuma, AZ, GPR detected unexploded ordinance with both metallic and nonmetallic casings. At the Oak Ridge National Laboratory vertical-magnetic-gradient airborne data are being used to map buried hazardous waste containing ferrous metal. A seismic study for OSMRE outlined a likely subsidence area at a reclaimed coal mine near Steubenville OH.

TITLE: **HYDROGEOLOGY, SIMULATED GROUND-WATER FLOW, AND GROUND-WATER QUALITY, WRIGHT-PATTERSON AIR FORCE BASE, OHIO**

AUTHORS: **DUMOUCHELLE, D.H., USGS,** C.W. Schalk, G.L. Rowe and J.T. deRoche

CONTACT: Dumouchelle, Denise (614) 469-5553

ABSTRACT:

More than 60 hazardous-waste sites have been identified on the Wright-Patterson Air Force Base (WPAFB). This study and the resulting ground-water model have improved an understanding of the regional ground-water-flow system. Ground water is the primary source of water in the WPAFB area in southwestern Ohio. WPAFB overlies a buried-valley aquifer system, which consists of glacial sands and gravels. The buried-valleys incise interbedded, poorly permeable shales. A steady-state, three-dimensional ground-water-flow model was developed to simulate ground-water flow in the region. The analysis indicates that the contribution of water to the buried-valley aquifer from the bedrock that forms the valley walls is about 2 to 4 percent of total ground-water flow in the study area. Ground waters in the vicinity of WPAFB can be classified into two groups on the basis of their chemical composition: calcium magnesium bicarbonate-type and sodium chloride-type waters. Calcium magnesium bicarbonate-type waters are found in the glacial deposits whereas the sodium chloride waters are exclusively found in the shales.

TITLE: **CASE STUDY: POL BLADDER TEST SPILL SITE YUMA PROVING GROUND**

AUTHORS: **FISK, S., BOR** and C. Botdorf

CONTACT: Fisk, Sylvia (602) 870-2247

ABSTRACT:

The ongoing investigation is a BOR/US Army joint venture based upon an interagency partnership to combine resources. The project is funded through DOD Defense Environmental Restoration Program which is the military equivalent of CERCLA. Close regulatory coordination with the State of Arizona was practiced to ensure compliance with Applicable or Relevant and Appropriate Requirements (ARARs). This relationship has been able to anticipate new regulations in evolutionary stages. The project also included development of a computer data base for Quality Assurance Management to accommodate the large number of samples generated.

The contamination found was concentrated in the clay soils, the sands directly above the clay, perched water and groundwater. From the investigations it became apparent that the leaded gasoline was not detectable in the sandy desert surface soils beneath the spills and that only soil gas remained at shallow depths. A process of natural remediation may have occurred.

TITLE: ABANDONED MINE CLOSURE CONCEPTS

AUTHORS: **GOBLA M.J., USBM** and E.K. Peterson

CONTACT: Peterson, Eileen (303) 236-0428 ext. 242

ABSTRACT:

The U.S. Bureau of Mines, with the cooperation of several state and federal agencies, prepared mine closure concepts for adits and shafts at the request of the National Park Service. Eleven "Closure Concepts" have been completed and 10 more are in preparation. The information includes description of the closure methods as well as suggestions for where they can be used and technical illustrations for construction. Multiple closure options, by type of mine opening, were prepared as one-page field guides to assist field personnel in determining the most appropriate closure method for a given field situation. The mine concepts completed include design information provided by the Colorado Mined Land Reclamation Division, Montana Abandoned Mine Reclamation Bureau, National Park Service, and United Kingdom National Coal Board. Concepts available include adit backfill, bat gate, cable net closure, concrete block bulkhead, concrete bridge channels cap, concrete shaft cap, hollow-core shaft closure, native rock bulkhead, PUF shaft closure, riprap bulkhead, and shaft or slope backfill.

TITLE: MIDNIGHT DUMPING OF HAZARDOUS WASTE IN THE CALIFORNIA DESERT

AUTHORS: **GUNN, C.L., BLM,** J.W. Key and W.T. Wiley

CONTACT: Key, John (909) 697-5383

ABSTRACT:

With the dramatic increase of hazardous waste disposal costs (more than 50 million tons annually), many areas are experiencing problems with illegal hazardous waste disposal. This "midnight dumping" is especially a problem in remote areas of public land located in the California Desert. Some southern California industrial facilities have not been able to find, afford or have been trying to avoid paying for proper storage or disposal of hazardous waste that they generate. As a result, waste is stockpiled in their own facilities or disposed of illegally. Wastes have been found in locations such as sand and gravel quarries, mining facilities, sewage lagoons, pits, landfills, along streams and roadways, in dry washes, in large and small abandoned containers. Over time these hazardous materials containers may begin to leak and release their products into the surrounding soil, water, and air. In addition, southern California has a great deal of clandestine drug laboratory manufacturing activity that produces a surprising amounts of toxic/hazardous waste. The costs of properly disposing of these wastes can be very high, but improper disposal can be exceedingly expensive to the affected communities in terms of cleanup, human distress, safety, and health of the public as well as the environment.

TITLE: SAFETY IN THE FIELD

AUTHOR: HEINE, P.R., NBS

CONTACT: Heine, Paul (314) 875-5399

ABSTRACT:

This display will deal with the safety and health precautions that a research field team needs to address before, during and after their time afield. The poster will contain photos and text describing an actual research sampling trip.

TITLE: NATIONAL PARK SERVICE POLLUTION PREVENTION, RIGHT-TO-KNOW, AND WASTE REDUCTION STRATEGIES

AUTHORS: HUNT, S.M., NPS, T.J. Widegren and F. Sturniolo

CONTACT: Hunt, Steve (970) 225-3513

ABSTRACT:

Provisions of the Pollution Prevention Act, the Emergency Planning and Community-Right-to-Know Act, and the Resource Conservation and Recovery Act are now by executive order applicable to the federal government, and must be integrated into federal facility environmental compliance programs. Right-to-know requirements include notification, recordkeeping and reporting on listed substances used at federal facilities. Pollution prevention requirements include use of recovered materials and environmentally preferable products; consideration of virgin material requirements, life-cycle costs, recyclability, and disposal during product acquisition; and the preparation of pollution prevention plans. The intent is to stimulate development of new technologies and develop markets for environmentally preferable products and recovered materials. Compliance will result in decreased use of toxic chemicals, solid waste reductions, and decreased generation of hazardous wastes servicewide. This enhances environmental quality, emergency preparedness, and health and safety for the public and park employees.

TITLE: **KNOWN MINERAL DEPOSIT AREAS AND MINING CLAIMS IN EIGHT WESTERN STATES**

AUTHOR: **HYNDMAN, P.C., USBM**

CONTACT: Hyndman, Paul (509) 353-2700

ABSTRACT:

Past and present mineral-development activity are represented spatially. Past activity is represented by Known Mineral Deposit Areas (KMDAs). KMDAs were developed as part of the Bureau's 10-year "Inventory of Land Use Restraints" project. Present activity is represented by existing mining claims, as recorded in the Bureau of Land Management's Mining Claim Recordation Database. Claim data is attached to the Public Land Survey for each of eight states - California, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming. KMDAs with open claims identify areas being re-explored; open claims outside KMDAs may represent new discoveries. Area with abandoned claims may be candidates for remediation of environmental concerns or areas of past economic interest (i.e., uranium).

TITLE: **REMEDIATION OF SMALL ARMS FIRING RANGE SOIL USING MINERAL PROCESSING TECHNIQUES**

AUTHORS: **JOHNSON, J.L., USBM,** W.R. McDonald, L. Karr, B. Nelson and D. Friess

CONTACT: Johnson, Jerold (801) 584-4157

ABSTRACT:

This is a mobile process to remediate heavy metal-contaminated small arms firing range soil. The soil is treated on-site and produces clean soil and metal byproducts for recycle. Mineral beneficiation apparatuses (mineral jigs, spirals, screens, etc.) are used to remove about 90% to 95% of the metal from the solid as fragments. Impact of high velocity bullets smear lead on the soil grains and fragments into the micron sizes. This lead is removed with a dilute acetic acid solution about half the strength of household vinegar. This technology can be applied to base closures, abandoned sites, and maintenance of active sites.

TITLE: **OIL AND HAZARDOUS SUBSTANCE SPILL RESPONSE CONTINGENCY PLAN PILOT PROJECT**

AUTHORS: **JOHNSON, M., BLM**, R. Britton, D. Mutter, D. Hamson and W. Clark

CONTACT: Johnson, Merrie (907) 271-3545

ABSTRACT:

This pilot project pools DOI expertise to develop a spill response personnel qualifications database for Alaska and to prepare operational information that each bureau can include in spill response contingency plans. The project is using DOI's wildfire qualification system (managed by the National Park Service in Boise) in conjunction with current oil spill contingency planning efforts. One objective is to present pilot project results and recommendations for possible use in a national interagency all-hazards spill personnel qualifications system. Anticipated products generated by the Alaska pilot project are: Employee Spill Response Qualifications Questionnaire (and instructions), Catalog of related training for determining qualifications, Incident Command System (ICS) structure for DOI-managed spills, ICS position task and qualifications descriptions, ICS position physical fitness requirements, Oil Spill Qualification System Guide, Alaska qualifications database on NPS wildfire qualifications system, Pilot project report with recommendations for implementation and expansion, and information for use in preparation of bureau contingency plans.

TITLE: **UNEXPLODED ORDNANCE AND MILITARY MATERIAL LOCATED ON FORMERLY USED DEFENSE SITES ON PUBLIC LAND IN THE CALIFORNIA DESERT**

AUTHORS: **KEY, J.W., BLM**, C.L. Gunn and W.T. Wiley

CONTACT: Key, John (909) 697-5383

ABSTRACT:

More than 60 Formerly Used Defense Sites (FUDS) have been identified on public land in the California Desert. Many of these sites are suspected to contain unexploded ordnance, exploded ordnance residue, underground storage tanks, or other military material resulting from military operations and training exercises from the World War II era until the present. The FUDS Program is a Department of Defense (DOD) program managed by the U.S. Army Corps of Engineers (USACE). It consists of two major components: inventory and remediation. In the inventory phase, projects are investigated and evaluated to determine if a particular site is eligible, i.e., was it formerly controlled by DOD and did DOD cause or potentially cause the contamination problem and what is the risk associated with the site. The remediation phase includes the preliminary assessment/site inspection (PA/SI), remedial investigation/feasibility study (RI/FS), record of decision (ROD), and remedial design/remedial action (RD/RA).

TITLE: **EVOLUTION OF RESTORATION PLANNING WITH NRDA CASE PROCESS**

AUTHORS: **KRAUSMANN, J.D., FWS**, J. Lantor, K. Benkert, and P. Cagney

CONTACT: Lantor, Judy (360) 753-9440

ABSTRACT:

Commencement Bay is an estuarine bay in the southern part of Puget Sound, Washington. Downtown City of Tacoma occupies the southern shore of the bay and the Port of Tacoma and its associated industrial area occupies the Puyallup River delta. A portion of Commencement Bay was designated as a Superfund site in 1981. In 1991 federal, state and tribal trustees formally initiated a natural resource damage assessment (NRDA) and restoration planning process. In typical NRDA cases, the damage assessment is finalized prior to restoration planning and implementation. This linear methodology has been criticized due to the potential for long delays and the continuing loss of services for injured natural resources which can occur between the conclusion of the damage assessment and implementation of restoration. The Commencement Bay NRDA is atypical in that damage assessment and restoration planning are being conducted concurrently. The Trustee's philosophy has been that restoration planning must take precedence so that remaining opportunities are not lost in the interim. GIS mapping techniques were utilized to document cumulative impacts and to inventory and assess potential restoration sites. A Programmatic Environmental Impact Statement is currently being developed for the Commencement Bay Restoration Plan.

TITLE: **A GUIDE TO HAZARDOUS WASTE GENERATORS ON THE ELEMENTS OF A WASTE MINIMIZATION PROGRAM**

AUTHOR: **LOPEZ, R., USGS**

CONTACT: Lopez, Ricardo (703) 648-7345

ABSTRACT:

The purpose of this poster is to inform all Department of the Interior (DOI) hazardous waste generators of the requirement as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA), established by Congress declaring that the reduction or elimination of hazardous waste generation at the source should take priority over the disposal of generated wastes.

This poster describes in detail the 6 elements of a waste minimization program, the 6 benefits of a waste minimization policy, and two "success stories" where technology transfer methods were implemented and achieved by the DOI; at the U.S. Geological (USGS), Eastern National Mapping Division (NMD) located at the National Center, Reston, Virginia; and the Earth Resources Observation System (EROS) Data Center, Sioux Falls, South Dakota.

TITLE: **BLM AND INDUSTRY--IMPLEMENTING EMERGING TECHNOLOGY TO PREVENT POLLUTION WHILE REMAINING COMPETITIVE IN THE MINERAL INDUSTRY**

AUTHOR: **MC CRACKEN, M.J., BLM**

CONTACT: McCracken, Mike (307) 261-7682

ABSTRACT:

Mineral production lessees in the Bureau of Land Management have long been faced with a dilemma: how to legitimately and cost effectively recycle used motor oils from machinery and waste crude oil from production pits? In December, 1993, the Casper District learned about a local company that had obtained a patent to re-refine used motor oils and waste crude oil sludges such that wastes are fully converted to clean oil and residuals for manufacturing asphalt.

This presentation addresses why and how the BLM teamed up with industry to implement good technology for better management of the public lands.

TITLE: **INVESTIGATIONS OF CONCENTRATIONS OF POTENTIALLY TOXIC SUBSTANCES BY THE U.S. GEOLOGICAL SURVEY**

AUTHORS: **MEREWETHER, E.A., USGS,** R.C. Severson, B.D. Smith and J.K. Otton

CONTACT: Merewether, Al (303) 236-5778

ABSTRACT:

Natural and anthropogenic contributions of potentially toxic substances to sediments, soils, waters, vegetation, and air in many regions of the U.S. have been identified and investigated by the USGS using chemical, petrographic, and radiometric surveys, geophysical mapping of the surface and subsurfacet and remote sensing of surface features. These studies commonly involve the baseline composition of the surficial components; biogeochemical cycles of potentially hazardous materials near the surface; and lateral changes in the chemistry of surface-waters and groundwaters contaminated by effluent from mines, mill sites, oil fields, agriculture, and natural processes. Examples of the subjects of ongoing USGS environmental studies include: 1. Biogeochemical baselines for national parks; 2. Sources of environmental contamination by elements; 3. Acid mine drainage; 4. Brine- contaminated aquifers near oil-fields; 5. Uranium and radon in natural and man-made environments.

TITLE: COMPARISON OF MINED LAND REMEDIATION EFFORTS BETWEEN ABANDONED AND ACTIVE MINING CLAIMS ON BLM MANAGED LANDS

AUTHOR: MOORE, T., BLM

CONTACT: Moore, Tim (408) 637-8183

ABSTRACT:

The BLM administers the majority of mining activity done on Federal Land. Since 1980, the BLM has developed specific guidance and procedures for reclamation and restoration of lands disturbed by ongoing mining activities. Current mining activities must meet all environmental statues for BLM to authorize and approve mining operations. However, abandoned and unreclaimed mine sites can release toxic pollutants and be placed on the EPA's Superfund list for remediation. This paper will compare two asbestos mines; one abandoned and currently undergoing Superfund remediation (Atlas Mine), and the other one (KCAC mine) is still productive and performing concurrent reclamation. A brief review of the similarities in both sites, focussing on the type of technology used, economic considerations and environmental impacts will be presented.

TITLE: COEUR d'ALENE BASIN NATURAL RESOURCE DAMAGE ASSESSMENT

AUTHORS: PEDERSEN, R., FWS, W. Putnam and P. Cernera

CONTACT: Fortier, David (208) 769-5022

ABSTRACT:

The Coeur d'Alene Basin has extensive environmental impacts, including the Bunker Hill Superfund Site, as a result of one hundred years of heavy metal mining and smelting activities. The Basin's Natural Resource Damage Assessment is a major effort to document the natural resource damages, develop a claim for trustee values, and a restoration plan for the public values. The assessment is a cooperative effort of federal trustees including the Forest Service; the Coeur d'Alene Indian Tribe; and the Fish and Wildlife Service, Bureau of Land Management, Bureau of Indian Affairs, U.S. Geological Survey, National Biological Service and Bureau of Mines. The assessment efforts involve collecting and compiling extensive amounts of natural resource and economic data. This poster presentation displays examples of information which is being collected, how it is being collected, and how it can be presented. A Geographic Information Systems are being utilized to assemble the project maps and related data. Examples of the resource data collection and data management illustrate some of the efforts in this assessment.

TITLE: **BIOTECHNOLOGY FOR TRANSFORMATION AND REMOVAL OF INORGANIC CONTAMINANTS**

AUTHORS: **PETERSON, J.H., USBM**, D.J. Adams and R.A. Davidson

CONTACT: Adams, D.J. (801) 584-4148

ABSTRACT:

Contamination of surface and ground waters, as a result of mining and mineral processing, represents some of the most complex and wide-spread environmental problems facing the nation today. The U.S. Bureau of Mines Biotechnology Program is developing and demonstrating bioprocesses to control inorganic pollution and restore environments damaged by past mining activities.

One of the many current research projects involves investigations of natural remediation mechanisms occurring at Chalk Creak, CO. This includes cooperative research with Atlanta University and coordination with the Denver Research Center, Environmental Protection Agency, Colorado State Division of Minerals and Geology, and U.S. Forest Service to characterize the mine, tunnel drainage, and wetlands at the site. The Biotechnology Program will investigate the natural remediation of mines waters containing high zinc manganese concentrations. Site bacteria, water, and solid samples have been collected to characterize remediation mechanisms occurring within the tunnel. The project goals are to determine the naturally-occurring remediation mechanism(s), maintain and enhance the mechanisms to prevent further site pollution, and apply the remediation mechanisms to other similar areas.

TITLE: **GEOCHEMICAL OPTIMIZATION OF IN-SITU CHROMATE REMEDIATION**

AUTHORS: **PETRIE, L.M., USBM** and S.E. Paulson

CONTACT: Petrie, Lloyd (612) 725-4662

ABSTRACT:

The U.S. EPA is conducting a significant field test of innovative in-situ remediation for metal-contaminated ground water at the Elizabeth City, NC, Coast Guard Station. High concentrations of ground water chromate (CrO_4^{2-}) are being removed by placing a permeable metallic iron filing "reaction wall" in the plume's path to reduce Cr(VI) to insoluble Cr(III)-Fe(III) hydroxides. USBM Twin Cities Research Center is assisting EPA optimize this process by providing detailed microscopic characterization and geochemical interpretation of chromate reduction at the reaction wall. Key findings are that (1) chromate reductive remediation at iron filings follows a "corrosion-like" mechanism and (2) partial dissolution of aquifer material alumino-silicates is needed to buffer the contaminated ground water pH below 8, a range necessary for chromate reduction to occur. Current work is focused on (1) changes in the reaction wall with time in the aquifer plume and (2) investigation of secondary sorption or precipitation of Cr down gradient from the permeable reaction wall.

TITLE: U.S. BUREAU OF MINES HYDROLOGY MODEL

AUTHOR: SALOVICH, M.E., USBM

CONTACT: Salovich, Michael (612) 725-4671

ABSTRACT:

The U.S. Bureau of Mines (USBM) has developed PowerPC software that simulates groundwater flow in mining regions. This software employs the analytic element method to model two dimensional fluid flow through homogeneous, saturated porous media. The analytic element method differs from finite difference/element techniques in that it defines flow systems in terms of discrete geometric flow components instead of grids. These flow components, called analytic elements, are particularly useful for representing the complex geometry and hydrology of mine features such as underground voids, ore deposits, tailings, wells, and ponds. USBM researchers have used this software to delineate wellhead protection zones, characterize in situ leach systems, assess mine dewatering methods, and analyze acid drainage problems. Although this software was developed to model mining hydrology systems, its functions can be applied to other issues. It can estimate the flow of pollutants from accidents and hazardous waste sites, and assist in the design and assessment of remediation techniques that use groundwater pump-and-treatment methods. Other possible applications include remediation of abandoned landfills, ammunition dumps, and mill tailings.

TITLE: RECLAIMING ABANDONED URANIUM MINES IN ARIZONA

AUTHOR: SANDOVAL, J.P., BOR

CONTACT: Sandoval, John (602) 870-2218

ABSTRACT:

The BOR conducted site investigations at three abandoned uranium mines near Cameron, Arizona to remediate and return ownership of withdrawn land to the BLM. The remediation program is based on similar design and construction practices used by the Navajo Nation. Radiological monitoring was completed by taking two sets of readings on 50 ft centers producing a horizontal and vertical grid. The readings were collected in counts per second and converted into Equivalent Ra-226 Concentrations for environmental ground reading in picocuries per gram and into True Exposures for the 1 meter reading in microrems per hour by correlation equations. The pits and waste piles were categorized into three classes based on radiological emissions. The bulk of the material at the site was categorized as at or near natural background levels with isolated areas of low level radioactive material. Currently, the material is not subject to federal standards because the site is abandoned and has not been milled. Therefore, no approved standards exist in Arizona regulating radioactive substances or emissions from abandoned mine sites. However, this does not negate the concern for radiological hazards at abandoned mine sites nor the need to document the degree of danger and take appropriate remedial actions on withdrawn land.

TITLE: **ENVIRONMENTAL AUDITS AT U. S. FISH AND WILDLIFE FACILITIES - BRIEF REVIEW**

AUTHOR: **SRIDHAR, V.A., FWS**

CONTACT: Sridhar, V. (303) 275-2344

ABSTRACT:

The Service Pollution Control Office has developed a comprehensive environmental assessment manual tailored for U.S. Fish and Wildlife Service facilities. The poster session will deal briefly with the tools required to perform audits in the areas of Solid Waste, Hazardous Materials, Hazardous Waste, Air Emissions, Petroleum Products, Underground Storage Tanks, Drinking Water, Waste Water, Pesticides, and Special Pollutants.

TITLE: **RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) WASTE MANAGEMENT REGULATIONS TRAINING COURSE - A BRIEF REVIEW**

AUTHOR: **SRIDHAR, V. A., FWS**

CONTACT: Sridhar, V. (303) 275-2344

ABSTRACT:

The Service Pollution Control Office is conducting a training course on RCRA Waste Regulations Management for all Regions of the U.S. Fish and Wildlife Service in FY95. The two-day course focuses on the knowledge of compliance requirements needed for day-to-day operation of refuges and hatcheries. It is tailored to facility managers/project leaders, maintenance personnel, and personnel dealing with federal facility compliance responsibilities. This poster session will present the description of the course and up-to-date information on training that has been conducted.

TITLE: REMOTE ENVIRONMENTAL MONITORING SYSTEMS

AUTHOR: WATSON K.W., BLM

CONTACT: Watson, Kip (208) 387-5726

ABSTRACT:

The BLM's Remote Sensing Support Unit located at the National Interagency Fire Center (NIFC) in Boise, ID., is currently involved in the maintenance and operational support of over 1200 systems throughout the U.S. These systems can provide real time data in many applications of environmental monitoring and safety. Projects include, but are not limited to; the remote monitoring of the water level in an abandoned low level uranium mine, soils monitoring in waste sites containing fire debris and pesticides, disaster preparedness assessments in the event of accidental releases of radio active materials, atmospheric conditions effecting the releases of airborne asbestos particulates, gamma radiation levels, lightning and thunderstorm detection, ecosystems management, visibility and smoke management, air and water qualities, runoff and erosion control, and cloud height and frequency detection. The technological advancements and use of "SMART SENSORS" can provide many opportunities for real time data from the field.

TITLE: SOIL-GAS SAMPLING AND ANALYSIS WITH THE GEOPROBE MOBILE LABORATORY AND SAMPLING PROBE

AUTHORS: WEAVER, J.H., BOR and C.L. Dunn

CONTACT: Weaver, Jeff (702) 293-8177

ABSTRACT:

The Lower Colorado Region of the BOR, with analytical assistance from the Mid-Pacific Region, owns and operates a mobile laboratory designed by Geoprobe Systems for soil-gas sampling, screening analysis, and collection of discrete subsurface soil samples. The mobile laboratory is equipped with a vehicle mounted hydraulic ram, two gas chromatographs, four different detectors (FID, PID, ECD, TCD), and an IBM compatible PC with printer. The LC Region utilizes their Geoprobe for various projects including soil-gas BTEX screening at UST sites and soil-gas monitoring of landfill sites for determination of methane gas presence. The hydraulic ram is capable of driving stainless steel rods to a maximum depth of one hundred feet allowing for sampling of soil, soil-gas, and in some cases, aqueous samples for immediate screening on the gas chromatographs. Installation of permanent soil-gas implants allows for repeat soil-gas sampling at the same location over time. The detector capabilities of the gas chromatographs allow immediate on-site testing of soil-gas for a variety of organic volatile compounds commonly found at hazardous waste sites.

TITLE: **ENVIRONMENTAL CRIMES TASK FORCES**

AUTHORS: **WILEY, W.T., BLM,** J.W. Key and C.L. Gunn

CONTACT: Key, John (909) 697-5383

ABSTRACT:

With today's shrinking budgets, environmental crimes task forces, comprised of representatives of federal, state, and local agencies, are one of the most effective tools for the investigation and prosecution of violations of laws associated with hazardous materials cases. These task forces offer an opportunity to collect and share expertise, information, test data, other evidence, and associated expenses with other agencies representatives who are dedicated to the enforcement of environmental crimes. Task forces are an efficient, systematic, and predictable means of transfer and cooperation that reduce the delay and confusion of other methods and bureaucratic systems. They offer the ability to mobilize investigative, technical, legal and specialty resources which may not be available to individual agencies and are a valuable benefit of using a task force approach to serious environmental investigations. A task force may be a small group of individuals or a large more formal group who meet on a weekly, monthly or on a case-by-case basis. However organized, they can provide one of the most cost effective and powerful tools in the enforcement of environmental law, especially as they relate to hazardous materials cases

TITLE: **REDUCING MINERAL RELATED IMPACTS ON NPS LANDS: A GIS APPLICATION**

AUTHORS: **ZIEGENBEIN, M., NPS** and P. Budde

CONTACT: Budde, Peter (303) 987-6624

ABSTRACT:

A GIS database was developed by the Denver Service Center GIS Branch to identify and track minerals activities on NPS and adjacent federal lands. Information depicting NPS, BLM, and USFS administrative boundaries, and base cartographic features were obtained and compiled into a single, consistent Arc/Info© data set. These data were then transferred to a PC-based ArcView© system which allows NPS personnel to display and query available information, as well as generate maps, graphics, and tabular reports. MMB has used the ArcView© software and the associated GIS coverages for the following projects:

- a nationwide compilation of planning schedules for BLM and USFS lands. The software generated maps and tables showing planning year, address, and telephone numbers of the adjacent land management agencies;
- location maps for abandoned mineral land reclamation projects, an analysis of oil and gas pipelines in NPS units, and other MMB reports;
- daily queries regarding mineral exploration or development proposals and their proximity to National Park units.

SPECIAL

PRESENTATIONS

GEOPROBE MOBILE LABORATORY - East Parking Lot

The Geoprobe mobile laboratory is a premiere sampling unit used in four continents for sampling of soil-gas, soil, and in some cases, aqueous samples for immediate screening utilizing on-board gas chromatographs. The four-wheel drive sampling unit/mobile laboratory on display has been used for hazardous waste investigations of landfills and underground storage tank (UST) sites in both the Mid-Pacific and Lower Colorado regions of the Bureau of Reclamation. Its sampling and analytical screening capabilities will be displayed and technical representatives will be on hand to answer questions. For those who have ten minutes to spare and an interest in trying a hand at screening analysis, the equipment and assistants will be waiting to walk you through a sample injection/analysis for benzene, toluene, ethylbenzene, and xylene (BTEX). If you are successful in your analysis, the chromatogram is yours to keep!

The display Geoprobe is equipped with a vehicle mounted hydraulic ram, two gas chromatographs, four different detectors, (FID, PID, ECD and TCD), and an IBM compatible PC with printer. The hydraulic ram has been used to collect samples from as deep as 100 feet (optimal subsurface conditions). The detector capabilities of the gas chromatographs allow for testing of soil-gas for classes of organic volatile compounds such as halogenated hydrocarbons, aromatic hydrocarbons, and organic gases. Soil testing capabilities include halogenated pesticides and herbicides, PCB's, and organic solvents.

WEDNESDAY, APRIL 26, 1995 12:00 p.m. - 3:30 p.m.

HAZARDOUS MATERIALS RESPONSE TRUCK - East Parking Lot

The city of Colorado Springs recently acquired a new hazardous response truck with the following instrumentation and capabilities: weather equipment for determining hazardous materials plums and evacuation plans, cellular phone for contacting manufacturers of hazardous chemicals and chemical associations, on-board computer for assessing chemical data bases, gas detectors, Teflon response suits, spill kits, pads for absorbing chemicals including flammable and petroleum products, and recovery drums. The response unit is equipped with a winch and boom for extracting materials and accessing response sites.

WEDNESDAY, APRIL 26, 1995 12:00 p.m. - 3:30 p.m.

SAFETY MANAGEMENT INFORMATION SYSTEMS - Foothills Room

An SMIS Computer Lab will be operational and available to all attendees for instrucrtion in and help on the DI-134 program, generation of SMIS reports and other areas.

TUESDAY, APRIL 25, 1995	8:00 a.m. - 5:00 p.m.
WEDNESDAY, APRIL 26, 1995	8:00 a.m. - 5:00 p.m.
THURSDAY, APRIL 27, 1995	8:00 a.m. - 2:00 p.m.

SUMMITVILLE SOLUTION - Silver Plume Room

This 21 minute video produced by the Bureau of Reclamation for EPA details water treatment and construction activities to date, leading to final remediation and reclamation of the Summitville Mine Site in Southwest Colorado. Following abandonment of the site on December 16, 1992, by the bankrupt Summitville Consolidated Mining Co., Inc., EPA took immediate control of the site and empowered Reclamation to utilize its contractor, Environmental Chemical Corporation, to continue operation of the water treatment plants and begin remediation activities. Reclamation personnel will be available to answer questions after each showing of the video.

TUESDAY, APRIL 25, 1995	1:30 p.m. 2:15 p.m.	3:30 p.m. 4:15 p.m.
WEDNESDAY, APRIL 26, 1995	8:30 a.m. 9:15 a.m.	10:30 a.m. 11:15 a.m.

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