



PB97-120778

U.S. Department of Interior

BUREAU OF MINES



Office of Technology Transfer

Current Computer Products of the Bureau of Mines

1995

ORDERING INFORMATION

Thank you for your interest in the U.S. Bureau of Mines. To receive one of the computer products listed on the following pages, or just more information about the product, please follow the directions given for each product in the ADDITIONAL INFORMATION section.

The U.S. Bureau of Mines currently has no central clearing house for computer software, and as such each product of interest must be obtained from the contact/address listed under the ADDITIONAL INFORMATION section.

Regarding NTIS: If a number prefixed with PB is given, the software(or report) may be purchased by check or money order payable to the National Technical Information Service, charged to a deposit account at NTIS, or charged on a VISA, MasterCard, or American Express credit card. For price and ordering information, write to: National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161; or call 703/487-4650. Please order by PB number given.

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U.S. DEPARTMENT OF COMMERCE

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COMPUTER PRODUCTS - 1995

The following computer products are currently available from the Bureau of Mines and/or the National Technical Information Service. Each product listed has instructions for obtaining additional information, or ordering. For items listed as available from the

National Technical Information Service, additional information can be obtained by calling 1-800/553-NTIS (in Virginia and outside the United States, call 703/487-4650).

Helium

● ANALYSIS OF NATURAL GASES, 1917-1993

ABSTRACT: The Bureau of Mines has been conducting annual analyses of natural gases for their helium content since 1917.

TYPE OF PROGRAM/PRODUCT: Database

TYPE OF COMPUTER:

ADDITIONAL INFORMATION: In addition to various publications compiling this information, it has been made available on magnetic tape through the NTIS. The tape referenced above was available as PB 93-504412; however, the tape is updated early each year and prospective purchasers should contact NTIS for current availability and ordering information.

Information and Analysis

● BUREAU OF MINES - BULLETIN BOARD

ABSTRACT: Late in 1989 a computer bulletin board service was introduced by the Bureau of Mines: MINES-DATA. Initial coverage included aluminum, chromium, copper, gold, lead, nickel, platinum-group metals, silver, tin, titanium, vanadium, and zinc. Other commodities have been added since, and in early 1992 other informational services were added to the Bulletin Board. Included in the other services are the monthly listing of "New Publications of the Bureau of Mines", the latest "Technology News Letters", the current listing of "Computer Products of the Bureau of Mines", and "Tip Sheets".

TYPE OF PROGRAM/PRODUCT: Bulletin Board Database

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: RBBS

ADDITIONAL INFORMATION: For information on how to use the service, call 202/501-0406 and leave a message for the systems operator. For accessing the bulletin board, dial 202/501-0373. Use X-Modem protocol, up to 9600 Baud Rate, 8 Data Bits, No Parity, and 1 Stop Bit.

● MINES FAXBACK

ABSTRACT: Current information on mineral publications from the U.S. Bureau of Mines (USBM) is now available through an easy-to-use automated fax response system. The MINES FAXBACK service allows callers to retrieve information and order publications for delivery to their fax machines in minutes, 24 hours a day, 7 days a week. MINES FAXBACK allows the USBM to make its monthly and quarterly *Mineral Industry Survey* publications on mineral commodities available to the public as soon as they are released and sent to the printer, two to three weeks earlier than the date of their mailout.

MINES FAXBACK works from any Group III-compatible fax machine equipped with a touch-tone telephone (either a built-in handset with touch-tone capability or a separate touch-tone telephone plugged into the fax machine's phone jack). After calling MINES FAXBACK, the requester is guided by a series of voice messages that assist the caller in ordering the desired documents. The caller pays for the phone call that also includes the time needed to deliver the requested document to the caller's fax machine.

The first-time caller who is not familiar with the system is briefly instructed, and then is advised to try the service by requesting the MINES FAXBACK catalog. The main catalog lists the catalogs arranged by mineral commodities for which there are publications on the MINES FAXBACK for distribution to the caller's fax machine.

1. Use the touch-tone handset attached to your fax machine, or connect a touch-tone telephone to the fax machine's telephone jack.*
2. Dial 202-219-3644
3. Listen to the menu options and punch in the number of your selection using the touch-tone telephone.
4. After completing your selection, press the start button on your fax machine.

*ISDN (digital) touch-tone telephones cannot be used with fax machines

● CES: BUREAU OF MINES COST ESTIMATING SYSTEM ON THE LOTUS 1-2-3 WORKSHEET

ABSTRACT: This package enables the estimation of engineering costs associated with mining and milling operations. Mine engineering variables are inputted by user. This material is described fully in Open File Report OFR 9-88, which is the documentation of the computerized version of Bureau of Mines Information Circulars 9142 and 9143, entitled "Bureau of Mines Cost Estimating System Handbook."

TYPE OF PROGRAM/PRODUCT: Economic Analysis

TYPE OF COMPUTER: Micro (MS-DOS Based)

COMPUTER PRODUCTS - 1995

PROGRAM LANGUAGE: Lotus 123

ADDITIONAL INFORMATION: The OFR and IC reports are available for reference at various Bureau of Mines locations (contact Bureau of Mines, Chief, Branch of Minerals Availability, 810 7th St., NW., Washington, DC 20241-0002; 202/501-9741. The software and documentation are sold by the NTIS. NTIS order numbers are PB 88-246590 for the documentation and PB 88-246582 for the software diskette.

● COALVAL

ABSTRACT: COALVAL is a menu-driven program that produces a prefeasibility-level cost analysis of mine-planned coal resources. The software contains cost models for each of five coal mining methods commonly employed in Appalachia: auger, contour strip, mountain top removal, continuous miner and longwall. Other models, such as a dragline cost model, will be incorporated as the USBM's Coal Recoverability Program matures. Though the software was developed specifically for use within Appalachian coal fields, it may be modified to evaluate other areas as well. COALVAL allows individuals to input resource data and the various production, operating, and cost variables that pertain to their property. The program can evaluate up to 25 seams, each to be mined with up to 5 different methods, within a given area.

TYPE OF PROGRAM/PRODUCT: Engineering/Economic Analysis

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: Lotus 1-2-3

ADDITIONAL INFORMATION: For additional information or a copy of the software, contact Matthew Plis, Bureau of Mines, Intermountain Field Operations Center, PO Box 25086, Bldg. 20, Denver Federal Center, Denver, CO 80225; 303/236-0423

● DATABASE FOR AVAILABILITY OF FEDERALLY OWNED MINERALS FOR EXPLORATION AND DEVELOPMENT IN WESTERN STATES: NEW MEXICO: 1988

ABSTRACT: This Bureau of Mines database contains the raw and interpreted data on Federal land status and known deposit areas that were collected and processed for the New Mexico Inventory of Land Use Restraints Program Study.

TYPE OF PROGRAM/PRODUCT: Database

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: dBase III

ADDITIONAL INFORMATION: The reports are also sold by the NTIS. NTIS order numbers are PB 89-228878 for the

documentation and PB 89-228860 for the diskettes. As NTIS prices change from year to year, prospective purchasers should contact NTIS for ordering information.

● DATABASE FOR AVAILABILITY OF FEDERALLY OWNED MINERALS FOR EXPLORATION AND DEVELOPMENT IN WESTERN STATES: NEVADA: 1985

ABSTRACT: This Bureau of Mines database contains the raw and interpreted data on Federal land status and known deposit areas that were collected and processed for the Nevada Inventory of Land Use Restraints Program Study.

TYPE OF PROGRAM/PRODUCT: Database

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: dBase III

ADDITIONAL INFORMATION: Documentation is available from NTIS as PB 91-193698. As NTIS prices change from year to year, prospective purchasers should contact NTIS for ordering information.

● HEAPREC

ABSTRACT: HEAPREC was developed as part of the U.S. Bureau of Mines program to provide Federal, State, and local governments with assistance on mineral-related issues. Requirements for reclamation performance bonding of hardrock mining are evolving for most jurisdictions, as are the methods and procedures for determining bond amounts. HEAPREC, a template for LOTUS 123, is a standardized methodology that can be used by Federal and State land-managing agencies to determine justifiable reclamation performance bonds for cyanide heap leach facilities. The template documentation includes appendices to assist the user in making judgments when working with HEAPREC. The appendices provide background and reference information on major reclamation activities and tasks required and, within reasonable terms, how these activities will be carried out.

TYPE OF PROGRAM/PRODUCT: Spreadsheet/Economic Analysis

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: Lotus 123

ADDITIONAL INFORMATION: For further information, contact David Denton, Western Field Operations Center, Bureau of Mines, E. 360 Third Ave., Spokane, WA 99202; (509) 353-2700.

COMPUTER PRODUCTS - 1995

● IMCI: INTERNATIONAL MINING COST INDEX

ABSTRACT: The IMCI consists of 12 mining cost indexes for each of 95 countries, including the United States. The index was designed to allow analysts to consider costs of mineral operations from development through production. The price indexes, which are based on local currency costs, are used to estimate changing cost of production over time in U.S. dollars. Indexes are available for labor, both construction and mining, plant and equipment, steel, timber, fuel, explosives, tires, construction materials, chemicals, transportation, and electricity.

TYPE OF PROGRAM/PRODUCT: Spreadsheet
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: Lotus 123

ADDITIONAL INFORMATION: A copy of the latest Lotus spreadsheet data and a copy of the accompanying Information Circular 9158 can be requested by contacting the Bureau of Mines, Chief, Branch of Minerals Availability, 810 7th St., NW, Washington, DC 20241-0002; 202/501-9741.

● MAS

ABSTRACT: The Minerals Availability System (MAS) database, located on a minicomputer, contains comprehensive engineering and economic data on mineral operations throughout the world. The MAS

information currently describes over 3,000 major mines, deposits, and minerals processing plants around the globe. For each of the 3,000 evaluated properties, the ore body or feed is delineated, engineering and economic analysis of the mine and mill or of the processing technology used is developed, and the associated costs of production are estimated. Availability appraisals are derived by aggregating sets of deposit evaluations and distinguishing important factors in the cost distribution of resources.

Appraisals completed to date cover 33 different mineral commodities. Standard computer printouts contain one-liner information on operation name, operator, owner, location, product, and byproducts. More comprehensive printouts can be tailored to specific requests. Data can be sorted on almost any field, usually by location or product. Public access to the data base is limited to data that are not company proprietary.

TYPE OF PROGRAM/PRODUCT: Database
TYPE OF COMPUTER: UNIX Workstation
PROGRAM LANGUAGE: ORACLE

ADDITIONAL INFORMATION: Listings of operations in the Minerals Availability System (MAS) database are available upon request to the Bureau of Mines, Chief, Minerals Availability Field Office, P.O. Box 25407, Denver Federal Center, Bldg. 53, Denver,

CO 80225-0086; 303/236-5200. Interested parties should be able to send a 2400 ft., 9 Track, 6250 BPI Tape.

● MCIS: MINING CLAIMS INFORMATION SYSTEM

ABSTRACT: The Mining Claims Information System (MCIS) was developed by the Bureau of Mines to provide a real-time, PC-based tool for obtaining active mining claim data in Alaska. The MCIS consists of a searchable database system made up of Bureau of Land Management and State of Alaska computerized mining claim records. MCIS allows searching of active mining claims by a number of keys, including claim serial number, KARDEX number (assigned by the Alaska Division of Mining), claim name, owner, and public land survey. The user can search by a full or partial key to rapidly locate the data of interest. This version of MCIS contains mining claims that were active as of February 1990. There are 73,142 claims on the database, consisting of 42,376 State and 30,766 Federal mining claims.

TYPE OF PROGRAM/PRODUCT: Database
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: DBase III (Stand Alone)

ADDITIONAL INFORMATION: For additional information contact Gary Sherman, Bureau of Mines, Alaska Field Operations Center, 3301 C St., Suite 525, Anchorage, AK 99503-3935; 907/271-2455.

● MILS

ABSTRACT: The Mineral Industry Location System (MILS) is a subset system of MAS, the Minerals Availability System. This database contains identification and location information for approximately 200,000 mineral locations in the United States. Undeveloped, operational, and abandoned sites are covered.

TYPE OF PROGRAM/PRODUCT: Database
TYPE OF COMPUTER: Mini (PRIME)
PROGRAM LANGUAGE: ORACLE

ADDITIONAL INFORMATION: MILS information requests for the States should be directed as indicated:

Washington, Oregon, Idaho, Nevada, and California - contact Mrs. Frances L. Baker, Bureau of Mines, Western Field Operations Center, East 360 Third Ave., Spokane, WA 99202-1413; 509/353-2738.

Montana, Wyoming, Colorado, New Mexico, Arizona, and Texas - contact Uldis Jansons, Bureau of Mines, Intermountain Field Operations Center, P.O. Box 25086, Denver, CO 80225-0086; 303/236-3400.

COMPUTER PRODUCTS - 1995

Alaska - contact Donald Baggs, Bureau of Mines, Alaska Field Operations Center, 3301 C St., Suite 525, Anchorage, AK 99503-3935; 907/271-2455.

● MINSIM

ABSTRACT: MINSIM (Mining Simulation) is a comprehensive computer model capable of evaluating the economics of mineral recovery operations including exploration, acquisition, infrastructure, mining, milling, smelting, refining, transportation, taxation, and return of and on capital. The site-specific engineering and economic analyses from the MAS database are used by this economic analysis program.

TYPE OF PROGRAM/PRODUCT: Economic Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: FORTRAN (Stand Alone)

ADDITIONAL INFORMATION: For further information on this FORTRAN version of MINSIM, contact the Bureau of Mines, Chief, Minerals Availability Field Office, P.O. Box 25407, Denver Federal Center, Bldg. 53, Denver, CO 80225-0086; 303/236-5200. Cost of the MINSIM source program and documentation is \$80. (See also PC-MINSIM).

● PC MINSIM

ABSTRACT: PC MINSIM is a discounted cash flow rate of return (DCFROR) template on LOTUS 123. It is a comprehensive personal computer model capable of evaluating the economics over the life of a mineral recovery operation, including exploration, acquisition, infrastructure, mining, milling, smelting, refining, transportation, taxation, and return of and on capital.

TYPE OF PROGRAM/PRODUCT: Economic Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: Lotus 123

ADDITIONAL INFORMATION: For further information on PC-MINSIM, contact the Bureau of Mines, Chief, Branch of Minerals Availability, 810 7th St., NW., Washington, DC 20241-0002; 202/501-9593.

● PC/ADIT

ABSTRACT: PC/ADIT contains nonproprietary information from the Bureau of Mines Minerals Availability System, including site-specific engineering and economic information on over 4,700 mineral operations worldwide. Allows sorts on multiple criteria including location, operator, products, operating status, etc.

TYPE OF PROGRAM/PRODUCT: Database
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: dBASE/Clipper (Stand Alone)

ADDITIONAL INFORMATION: A software copy of the latest PC/ADIT can be requested by contacting the Bureau of Mines, Chief, Branch of Minerals Availability, 810 7th St., NW., Washington, DC 20241-0002; 202/501-9605.

● PREVAL: MINERALS PROPERTY EVALUATION AT THE EARLY EXPLORATION STAGE

ABSTRACT: As part of the Bureau of Mines efforts in evaluation of mineral potential on federally managed lands, a software package (PREVAL) used to evaluate the potential economics of a mineral property from selection of mining method through year-by-year cash flow analysis has been developed. The software was developed on a Lotus 1-2-3 spreadsheet.

This presentation covers all of the basic criteria necessary to systematically evaluate the economics of a mineral property, explains which criteria have been included in the Bureau's software, and describes generalized analytical techniques. Evaluation criteria include mine and mill selection, mine life optimization, capital and operating cost estimation, material balances, transportation, smelting and refining, commodity pricing, and economic analysis. Sensitivity analysis can also be performed to help identify the items that have the most impact on property economics. All this can be accomplished when very little is actually known about a mineral property, but a thorough knowledge of the assumptions and limitations within PREVAL is necessary.

TYPE OF PROGRAM/PRODUCT: Economic Evaluation
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: Lotus 123

ADDITIONAL INFORMATION: For additional information contact Craig R. Smith, Intermountain Field Operations Center, Bureau of Mines, P.O. Box 25086, Denver Federal Center, Bldg. 20, Denver, CO 80225-0086; 303/236-0423.

COMPUTER PRODUCTS - 1995

● PRIMARY ALUMINUM PLANTS, WORLDWIDE, PART ONE - DETAILS

ABSTRACT: Part 1 of this two-part Bureau of Mines report, which is updated annually, details the ownership and sources of energy and aluminum raw materials for most foreign and domestic primary aluminum plants, including those in countries with centrally planned economies. Tables give production capacities for each plant for the past 3 years and the present year, and production capacity projections for the next 4 years. A special remarks section highlights important developments that could affect present or future production at individual plants and the timing of planned changes in capacity. The publication is based on current data collected by the Bureau from a variety of domestic and foreign sources. Up-to-date, comprehensive information on the world's aluminum producers will help professionals in both Government and industry spot trends that could affect domestic supplies of this essential industrial commodity.

TYPE OF PROGRAM/PRODUCT: Database
TYPE OF COMPUTER:

ADDITIONAL INFORMATION: Part 1 of "Primary Aluminum Plants, Worldwide" may be ordered at a cost of \$15.00 (includes shipping) from the Bureau of Mines, Chief, Division of Finance, Denver Federal Center, Bldg. 20, Denver, CO 80225-0086. Make check or money order payable to "Dept. of Interior-Bumines". Please do not send cash or postage stamps. Please include your ZIP code.

● PRIMARY ALUMINUM PLANTS, WORLDWIDE. PART TWO - SUMMARY

ABSTRACT: Part 2 of this two-part report, which is updated annually, covers only capacity data. In this section worldwide production capacities by plant and country are summarized for the past 3 years and present year, and projected for the next 4 years.

TYPE OF PROGRAM/PRODUCT: Database
TYPE OF COMPUTER:

ADDITIONAL INFORMATION: Part 2 of "Primary Aluminum Plants, Worldwide" may be ordered at a cost of \$5.00 (includes shipping) from the Bureau of Mines, Chief, Division of Finance, Denver Federal Center, Bldg. 20, Denver, CO 80225-0086. Make check or money order payable to "Dept. of Interior-Bumines". Please do not send cash or postage stamps. Please include your ZIP code.

● SDIAS: SUPPLY DISRUPTION IMPACT ANALYSIS SYSTEM

ABSTRACT: This analytical system is designed to provide users with a useful tool for evaluating the economic impacts of a mineral supply disruption.

TYPE OF PROGRAM/PRODUCT: Economic Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: BASIC

ADDITIONAL INFORMATION: For further information, contact the Bureau of Mines, Chief, Branch of Economic Analysis, 810 7th St., NW., Washington, DC 20241-0002; 202/501-9736.

Office of Public Information

● BUREAU OF MINES - INTERNET SERVICE

ABSTRACT: The Bureau of Mines is now offering information on research results and other B.O.M. topics (like Cooperative Research and Development Opportunities (CRADAs), over the INTERNET. Information currently available includes Technology News Letters, Bimonthly Lists of Publications, *this* Software Catalog, Technology Transfer Updates, the B.O.M.'s Cooperative Research and Development Agreement's Booklet, and special publications like our biannual Abandon Mine Lands Status Reports.

TYPE OF PROGRAM/PRODUCT: INTERNET Access
TYPE OF COMPUTER:
PROGRAM LANGUAGE: Gopher Client Software

ADDITIONAL INFORMATION: For further information, contact Matt Kleemann, Bureau of Mines, ADP Network Support, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-6499., Pittsburgh, PA.

● COAL COUNTRY - EDUCATIONAL PROGRAM

ABSTRACT: As an interactive, educational computer program, its purpose is to provide mineral education, specifically on coal, to elementary school children, although pilot presentations have shown that COAL COUNTRY appeals to all ages. Teachers can use this program to supplement and broaden existing curriculum or as an enrichment program. The program includes four modules: (1) How Coal is Formed (2) Where Coal is Found (3) How Coal is Mined, and (4) How Coal is Used.

TYPE OF PROGRAM/PRODUCT: Educational Program
TYPE OF COMPUTER: Micro (MS-DOS Based)
Macintosh

ADDITIONAL INFORMATION: "Coal Country" comes on 5 diskettes. The INSTALL utility program, which resides on Disk 1, should be used to install Coal Country to your hard disk. This utility can also be used to uninstall (remove) Coal Country from your hard disk. Coal Country requires at least 8 MB of memory (4 MB may be sufficient if no sound card is used). Coal Country requires at least 13 MB of hard disk space. Coal Country is available in either Windows(ver 3.1 or later) or Macintosh formats. **Price—\$7.50 including shipping.**

For a copy of Coal Country, contact one of the following:

- ▶ SME Foundation, 8307 Shaffer Parkway, Littleton, CO 80127, Tel: 303-973-9550 Fax: 303-973-9550
- ▶ The American Coal Foundation, 1130 Seventeenth St. NW, Suite 220, Washington, D.C. 20036 Tel: 202-466-8630 Fax: 202-466-8632

Research - Advanced Mining Systems

● BOMCRATR

ABSTRACT: BOMCRATR (Bureau of Mines Curved Ray Tomographic Reconstruction) performs tomographic analysis of seismic travel time data to reconstruct a two-dimensional representation of seismic velocities. It uses the simultaneous iterative reconstruction technique (SIRT) with curved ray paths. Velocity is assumed to vary linearly with position within triangular pixels, with velocity specified at the corners. Ray bending is analytic within each pixel. Curved-ray tomographic reconstruction is much slower than straight-ray reconstruction, so an 80386 computer is recommended. This program has application to geologic structures and deposits within any mineral and mining setting coal, metal, or nonmetal.

TYPE OF PROGRAM/PRODUCT: Geophysical Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: FORTRAN

ADDITIONAL INFORMATION: For further information, contact Daryl Tweeton, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4670.

● BOMSPS

ABSTRACT: BOMSPS was developed for the manipulation and analysis of individual acoustic signals. Operations such as gain control, muting, normalization, polarity change, randomization, scaling, shifting, stacking, smoothing, and windowing account for the basic time-domain operations available. Higher order time-

domain enhancement capabilities involve convolution, deconvolution, autocorrelation, and cross correlation. Frequency-domain attributes such as the real and imaginary transform, relative amplitude, power, and phase spectra can be determined. Frequency-domain filter capabilities permit the investigator to employ a half sine or cosine window, notch, bandpass, and high-cut or low-cut filter, while interactively defining the roll-off of either a linear or cosine taper. Calculation of time-domain trace attributes such as the quadrature, instantaneous amplitude, and instantaneous phase is also available.

TYPE OF PROGRAM/PRODUCT: Signal Processing
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: FORTRAN

ADDITIONAL INFORMATION: For further information, contact Michael Friedel, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4738.

● BOMTOM

ABSTRACT: Developed by the Bureau of Mines as a means for analyzing seismic crosshole data to predict and monitor the flow of leach solution during in situ mining, BOMTOM (Bureau of Mines Tomographic Reconstruction) performs tomographic analysis of seismic travel time data to reconstruct a two-dimensional representation of seismic velocities. It uses the simultaneous iterative reconstruction technique (SIRT) with straight ray paths. Velocity is assumed constant within rectangular pixels. Source and receiver positions can be in any configuration. It is efficient in use of memory and execution speed, and can be run on an XT computer. Comments in the source code specify data formats. BuMines RI 9159 describes the program and lists the source code.

BOMTOM provides special constraints to help obtain unique solutions with crosshole data. (Crosshole data without constraints cannot provide a unique solution.) Optional constraints include upper and lower velocity limits, fixed velocities at the boreholes, and others. Uniqueness can be tested by varying the pattern of the initial velocity guesses for the pixels to start the iterative solution procedure. A unique solution will be independent of the initial velocity guesses.

TYPE OF PROGRAM/PRODUCT: Geophysical analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: FORTRAN.

ADDITIONAL INFORMATION: For further information, contact the Technology Transfer Officer, Twin Cities Research Center, Bureau of Mines, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4562.

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● COMPUTER MODEL OF IN SITU LEACHING HYDROLOGY

ABSTRACT: This Bureau of Mines computer program simulates the hydrologic activity associated with in situ mining. Various user options enable modeling of many of the site-specific geologic conditions and well field specifications that affect the hydrology of solution mining.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Mini

ADDITIONAL INFORMATION: This program is available, but is considered outdated (1981). However, an update of this program for the PC, with many improvements, is available as "MINEFLOW".

For further information, contact the Technology Transfer Officer, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4562.

● MIGRATOM

ABSTRACT: MIGRATOM (Migrating wavefront Tomography) is the third in a series of computer programs produced by the Bureau of Mines for tomographic imaging of the seismic velocity distribution between sets of boreholes. This program implements two new approaches to maximize the use of available site information. First, it ensures that all measured travel times are used in the calculations. Prior programs are in some cases unable to determine the source-receiver ray path for some of the source-receiver pairs. MIGRATOM avoids that problem by modeling the migration of the entire wavefront, which assures that ray paths for all source-receiver pairs can be determined. Second, MIGRATOM allows the uncertainty in site information to be incorporated into the calculations by the use of "fuzzy" constraints based on fuzzy logic.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (Macintosh)
PROGRAM LANGUAGE: FORTRAN

ADDITIONAL INFORMATION: For further information, contact Michael Jackson, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4538.

● GENERIC IN SITU LEACH COPPER MINING COST MODEL

ABSTRACT: The program is a menu-driven cost model that may be used to estimate costs for commercial-scale in situ mine designs for copper oxide deposits. This model permits the user to make cost inputs and other operational inputs that are converted to mine design elements. Outputs that are generated include specific design parameters and capital and operating costs. Other outputs include a pretax selling price or discounted cash flow rate of return and a discounted cash flow table.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: FORTRAN (Stand Alone)

ADDITIONAL INFORMATION: For further information, contact Joseph Pugliese, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4569.

● LONGWALL PRODUCTION ASSISTANT

ABSTRACT: A user-friendly simulator to investigate the most efficient changes an operator can make to a longwall mining system. Continuous modeling between the shearer and face conveyor identifies material flow bottlenecks. Cut sequence is defined through a coordinate system to provide the user with total control of the shearing machine.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: FORTRAN

ADDITIONAL INFORMATION: The program diskette(s) can be ordered free of charge from Fred Kissell, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-6679. Blank diskette(s) required.

Documentation on how to use the program is on the diskette in a DOS text file. Also a DOS text file is present for assisting the user with diagnosing and correcting user problems.

● LONGWALL PRODUCTION SIMULATOR

ABSTRACT: The Longwall Production Assistant is a flexible user-friendly simulator developed to investigate and evaluate the most efficient changes an operator can make to a longwall system. The simulator uses a continuous modeling strategy among all the systems components (shearer, face conveyor, shields) to allow for continuous interactive performance monitoring among these components. The simulator also allows the user total control over

the shearer's mining sequence, providing the ability to optimize standard mining practices and to simulate creative mining methods. The user conducts computer experiments by changing system parameters and running the simulator to determine the effect on production. The user can then best evaluate the most efficient changes for production optimization.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Mini (VAX 8300), PC (286)
PROGRAM LANGUAGE: FORTRAN-77

ADDITIONAL INFORMATION: For additional information, contact John Organiscak, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-6675.

● SIMPLE, COMPUTERIZED DECISION SUPPORT SYSTEM FOR MANAGING COAL MINE PRODUCTIVITY

ABSTRACT: The methodology is a simple, computer-assisted decision making system for managers to statistically evaluate production problems and develop possible solutions.

TYPE OF PROGRAM/PRODUCT: Regression Analysis
TYPE OF COMPUTER:

ADDITIONAL INFORMATION: For additional information about this modeling methodology, contact Robert Randolph, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-4360.

● TWOD: TWO DIMENSIONAL FINITE ELEMENT ANALYSIS OF VARIABLY-SATURATED FLOW USING SIMPLEX ELEMENTS

ABSTRACT: TWOD is a comprehensive unsaturated fluid flow simulator developed by the U.S. Bureau of Mines. TWOD solves for either a vertical or horizontal, transient or steady-state solution in variably saturated, heterogeneous, anisotropic porous media using the Galerkin finite-element approach. Simplex triangular elements are used. Moisture retention characteristics are described by specifying either the Brooks and Corey, Brutsaert, or Van Genuchten power functions, with hysteresis described using the Maulem model. Boundary conditions may include any combination of time-varying seepage, pressure along solution domain boundaries and/or at internal node points, unit hydraulic gradient at the lower boundary, and a uniform source and/or sink.

TYPE OF PROGRAM/PRODUCT: Scientific Analysis
TYPE OF COMPUTER: Micro (MS DOS Based)
PROGRAM LANGUAGE: FORTRAN 77

ADDITIONAL INFORMATION: For further information, contact Michael Friedel, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4738.

Research - Environmental Technology

● GIS DATABASE FOR AML IN THE COLORADO SPRINGS AREA

ABSTRACT: The basis for evaluating abandoned mine land (AML) sites with remote-sensing techniques comes from past and ongoing Bureau ground control research using remote-sensing data to identify potential hazards caused by geologic structures (faults, joints, etc.) above active underground coal mines. Research showed that lineament (linear feature) analysis of Landsat Multispectral Scanner (MSS) images could indicate locations of fractures and fracture trends that had varying, but significant, impacts on the stability of mine openings. The general study area used in this research was the northern and northeastern Colorado Springs, El Paso County, CO, area, where coal mining was active from the 1870's until 1957. The original ARC/INFO GIS data base is approximately 75 Mbyte. The total size of the ARC/INFO EXPORT-format data base is approximately 100 Mbyte. The total size of the DXF-format data base (Drawing Interchange File) is approximately 110 Mbyte.

TYPE OF PROGRAM/PRODUCT:
TYPE OF COMPUTER:

ADDITIONAL INFORMATION: Digital copies of the data base in ARC/INFO EXPORT (with no compression) or DXF format can be obtained on nine-track tapes at densities of 1,600 or 6,250 bpi or on 8-mm helical-scan tapes. Tapes must be supplied by the requestor.

Requests for more information on the contents of the GIS data base or copies of the data base, and on nonstandard output formats, on the Colorado Springs AML study site should be directed to Douglas C. Peters, Denver Research Center, U.S. Bureau of Mines, P.O. Box 25086, Bldg. 20, Denver, CO 80225; telephone: 303-236-0772; fax: 303-236-0828.

● MINEFLOW

ABSTRACT: Mineflow is Bureau-developed software designed to assess the impact of mining on hydrologic balance. It employs analytic elements to represent hydrologic mining features such as wells, streams, permeability zones, and mine workings. The analytic element method, a variant of the boundary integral element method, is a relatively new modeling technique that is quick and relatively straightforward to use. Its solutions are powerful enough

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to solve the complex hydrologic boundary value problems present in mine settings, while being practical enough to be applied to field studies conducted by engineers and environmental specialists.

TYPE OF PROGRAM/PRODUCT: Scientific Analysis
TYPE OF COMPUTER: Micro (MS DOS Based)
PROGRAM LANGUAGE: FORTRAN

ADDITIONAL INFORMATION: For further information, contact Michael Salovich, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4671.

● NUTSA: DIGITIZING AND ANALYSIS OF TDR SIGNATURES

ABSTRACT: Time domain reflectometry (TDR) is an electrical pulse testing technique originally developed to locate breaks in power transmission cables. Recently, this technique was adapted to monitor caving of rock induced by underground mining. Coaxial cables are grouted into the rock mass which is expected to cave and the progressive rock movement deforms the cable. Consequently, there is a progressive change in cable deformation which produces changes in the TDR pulse reflection signatures, and these changes can be quantitatively related to the location and magnitude of rock mass movements, including the ability to distinguish between shear movement and tensile movement. The principle of time domain reflectometry (TDR) is being used by the U.S. Bureau of Mines to monitor strata displacements induced by mining. The Northwestern University TDR Signature Analysis (NUTSA) Program was developed under contract with the Bureau to allow for visual comparison of three TDR waveforms quickly and easily. This program is interactive, and on-line help is available. The Northwestern University Remote Control TDR Data Acquisition System and Modification of Tektronix SP232 Host Application Program (NUMOD) was then developed to allow acquisition of TDR waveforms from a remote cable tester via modem.

TYPE OF PROGRAM/PRODUCT: Scientific Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: Quick BASIC

ADDITIONAL INFORMATION: The NUMOD system utilizes commercially available software while the NUTSA program is available from the Bureau of Mines. For further information, contact Kevin O'Connor, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4731.

● OPMHS/2: A COMPUTER SIMULATION MODEL FOR SURFACE MINE RECLAMATION PLANNING

ABSTRACT: This computer program is a modified and updated version of the Open Pit Materials Handling Simulator first developed in 1971, and modified in 1975. The present (1985) version provides a direct link between the geology and reserves system, incorporating a flexible method of describing various equipment, sequence of operations, place changes, and interactions between these elements to allow for study of mining equipment selection, mining method analysis, and reclamation planning.

TYPE OF PROGRAM/PRODUCT:
TYPE OF COMPUTER: Mainframe

ADDITIONAL INFORMATION: Research was done under contract J0295005 by Pennsylvania State University. A nine-track, 800BPI, EBCDIC, odd-parity tape is sold by the NTIS. The NTIS number is PB 87-204863 (computer tape plus four volumes of documentation; price code T08; contact NTIS for current price).

● SUBPRO

ABSTRACT: The subsidence prediction model was developed using field data acquired from 17 monitoring sites in the Northern Appalachian Coal Field. The model incorporates the novel use of a variable subsidence coefficient. A computer program has been developed that permits use of the model on a personal computer. The program requires input information that is readily available and does not require the user to have a knowledge of subsidence theory. The program output includes subsidence, inclination, and curvature developed along a line extending from the centerline of the mined-out panel to a point beyond the unmined rib. The program also gives an estimate of the horizontal strains developed along this line.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: BASIC

ADDITIONAL INFORMATION: For further information on the computer software, contact Paul Jeran, Bureau of Mines, Pittsburgh Research Center, Cochrans Mill Rd., P.O. Box 18070, Pittsburgh, PA 15236-0070; 412/892-6530.

● TILTCALC

ABSTRACT: The Bureau of Mines is studying foundation response to mine subsidence for the development of economic mitigation and repair techniques. For monitoring foundations and ground movements, commercially available tiltmeters are being evaluated for use as a cost-effective monitoring technique. The tiltmeter

system consists of a portable sensor, digital indicator, and tiltplate. Readings are obtained by aligning the sensor on the tiltplate in four orthogonal directions; thus, tilts are obtained in all four directions as a function of the sine of the angle that the tiltplate makes with the horizontal. It calculates tilt angle and direction from the input and stores them in files and displays graphs of scaled vectors showing magnitude and direction of tilt relative to time and position of the tiltplate. The program is written in BASIC using low-resolution graphics and will run on most personal computers.

TYPE OF PROGRAM/PRODUCT: Scientific Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: BASIC

ADDITIONAL INFORMATION: For further information, contact Larry Powell, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-3469.

Research - Health & Safety Ground Control

● ALPS: ANALYSIS OF LONGWALL PILLAR STABILITY

ABSTRACT: The Bureau of Mines has developed a method and computer program for longwall pillar design that can predict the strength of longwall pillar systems as well as the loading that will be applied during all phases of longwall mining.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: BASIC

ADDITIONAL INFORMATION: For additional information and a diskette, contact Christopher Mark, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA. 15236-0070; 412/892-6522.

● ARMPS: ANALYSIS OF RETREAT MINING PILLAR STABILITY

ABSTRACT: Preventing pillar squeezes, massive pillar collapses, and bumps is critical to the safe and efficient recovery of coal during room-and-pillar retreat mining. To help prevent these problems, the Bureau of Mines has developed the Analysis of Retreat Mining Pillar Stability (ARMPS) computer program. ARMPS calculates stability factors (SF) based on estimates of the loads applied to, and the load-bearing capacities of, pillars during retreat mining operations. The program can model the significant features of most retreat mining layouts. The program may be used to evaluate bleeder designs as well as active workings. A data base of 110 pillar retreat

mining case histories has been collected across the United States to verify the program.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)

ADDITIONAL INFORMATION: The program is free. You can get a copy by contacting Dr. Chris Mark, U.S. Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236, phone (412) 892-6522

● LAYOUT: A BUMP HAZARD ASSESSMENT MODEL FOR ROOM-AND-PILLAR COAL MINING

ABSTRACT: The Bureau of Mines developed a stress control design protocol to minimize coal mine bumps--the violent failure of overly stressed coal pillars. The protocol was developed for room-and-pillar retreat mining conduct with available continuous miner technology. A pseudoductile coal pillar strength model was used to develop unlimited-width and limited-width section design criteria. This spreadsheet program, LAYOUT, was developed to summarize and provide for efficient utilization of the bump control design protocol. Based on overburden thickness coalbed thickness, and coal pillar dimensions entered by the user. "Layout" calculates a stability factor for the first and second pillar rows outby the ex-gob for unlimited-width sections. If overburden and coalbed thickness conditions do not allow an unlimited-width section design, the program suggests a limited design.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: Lotus 123

For a copy of LAYOUT please contact: Dr. Alan A. Campoli, U.S. Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236. Phone (412) 892-6525.

● MULSIM/BM: A STRUCTURAL ANALYSIS COMPUTER PROGRAM FOR MINE DESIGN

ABSTRACT: The Bureau of Mines developed MULSIM/BM, an improved computer program listing the boundary-element approach for geomechanical analysis of mine plans in single or multiple coal seams. In addition, an interactive graphics mesh generator program was written to accompany MULSIM/BM.

TYPE OF PROGRAM/PRODUCT: Geomechanical Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based) Mini (VAX)

ADDITIONAL INFORMATION: For information about diskettes containing this program, contact Douglas Donato (Micro version) or Nicholas P. Kripakov, Bureau of Mines, Denver Research Center, Denver Federal Center, Bldg. 20, Denver, CO 80225-0086; 303/236-0765. A nine-track computer tape containing the program

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is sold by the NTIS. NTIS order number is PB 88-129465. As NTIS prices change from year to year, prospective purchasers should contact NTIS for current ordering information.

● **MULSIM/PC: A STRUCTURAL ANALYSIS COMPUTER PROGRAM FOR MINE DESIGN**

ABSTRACT: The MULSIM/PC system consists of four programs: PREMUL, the preprocessor or mesh generator; MULSIM/PC, the actual numerical modeling program (number cruncher); MUL3D, a three-dimensional postprocessor; and MUL2D, a two-dimensional postprocessor. These programs were specifically designed to operate on IBM-compatible (DOS-based) personal computers so that the transferring of this technology to the mining industry and academia will be more universally accepted. MULSIM/PC uses a subvariation of the boundary-element method, namely the displacement-discontinuity technique for linear-elastic geomechanical analysis of mine plans in one or two parallel underground tabular deposits. Results calculated by this technique include stresses and displacements as they relate to changing mine geometries and materials.

IC 9325 describes the MULSIM/PC program, its features, and provides a detailed example model. This report also documents the associated preprocessing and postprocessing programs that are part of the MULSIM/PC system. User's guides for all the programs are contained in the appendices following the main report.

TYPE OF PROGRAM/PRODUCT: Geomechanical Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)

ADDITIONAL INFORMATION: For information about diskettes containing this program, contact Douglas Donato (Micro version), Bureau of Mines, Denver Research Center, Denver Federal Center Bldg. 20, Denver, CO 80225-0086; 303/236-0769.

● **POTENTIAL HAZARD PREDICTION BY REMOTE-SENSING/SATELLITE IMAGERY ANALYSIS**

ABSTRACT: The Bureau of Mines has developed a scientific means of delineating potential ground control hazards in underground mine workings, using a lineament analysis of fractures on the Earth's surface that have been extracted from remotely sensed data such as satellite images and aerial photographs. The ultimate product of the analysis is a potential hazard map depicting areas of potential concern on a mine property. These maps can be used by mine personnel as ground control planning tools to improve safety and efficiency in the mine.

TYPE OF PROGRAM/PRODUCT: Geologic Analysis
TYPE OF COMPUTER: Mini
PROGRAM LANGUAGE: FORTRAN, ASSEMBLER, ARC

ADDITIONAL INFORMATION: For additional information about the Bureau's remote-sensing research, contact Doug Peters, Bureau of Mines, Denver Research Center, Denver Federal Center, Bldg. 20, Denver, CO 80225-0086; 303/236-0772.

● **UTAH2/PC**

ABSTRACT: UTAH2/PC uses a finite element method (FEM) on the PC with AutoCad for convenient display of two-dimensional modeling results important to excavation safety and the stability of mine excavations. The FEM analysis incorporated into UTAH2/PC is a user friendly design tool which allows easy inputting of data related to regional geology and tabulation of mine rock properties, in situ stresses, and excavation geometry. Program guidelines assist in mesh preparation and definition of finite elements. Program execution gives element stresses, strain, and safety factors, as well as displacements.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: FORTRAN, with AutoCad

ADDITIONAL INFORMATION: For further information, contact Mel Poad, Bureau of Mines, Spokane Research Center, East 315 Montgomery Ave., Spokane, WA 99207-2291; 509/484-1610.

● **STRESSOUT - A DATA REDUCTION PROGRAM FOR INFERRING STRESS STATE OF ROCK HAVING ISOTROPIC MATERIAL PROPERTIES**

ABSTRACT: Researchers at the U.S. Bureau of Mines have developed a FORTRAN computer program that can calculate stress states from overcoring measurements obtained from hollow inclusion cells, triaxial cells, strain gauges installed on the wall of a bored raise, doorstopper gauges, borehole deformation gauges, or a combination of any of these gauges. Such stress states are calculated with reference to global and principal coordinates systems. Difficulties associated with numerical calculations of principal stresses and directions are discussed in the user's manual. Threshold values for detecting these problems are described; these values may be changed by the user as desired.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: FORTRAN

ADDITIONAL INFORMATION: The program package can be ordered free of charge from Mark Larson, Bureau of Mines, Spokane Research Center, East 315 Montgomery Ave., Spokane, WA 99207-2291; 509/484-1610. Blank diskette required.

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● USBM WOOD CRIB PERFORMANCE MODEL

ABSTRACT: Wood cribs are used extensively by the mining industry to stabilize mine openings. While the cost per crib is relatively low, their extensive use can result in annual mine costs of over \$1 million. In an effort to improve the utilization of these supports and to reduce ground control hazards, the U.S. Bureau of Mines has developed interactive computer program for wood crib performance analysis. This software employs engineering methods to assist mine operators in wood-crib design and employment. Design and employment criteria are established based on the strength, stiffness, and stability of the crib structure in relation to the load conditions imposed by the mine environment. These models permit the comparison of the loading characteristics and costs of employment of different crib designs and, in conjunction with roof behavior models, provide a means to determine the optimum design and employment strategy.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)

ADDITIONAL INFORMATION: For additional information and a diskette, contact Thomas Barczak, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA. 15236-0070; 412/892-6557.

Research - Health & Safety Human Factors

● ADA: ACCIDENT DATA ANALYSIS

ABSTRACT: The ADA program developed by the Bureau allows the user to access mine accident data for both coal and metal for any year or combination of years back to 1975. Any subset of data may be selected, stored, and analyzed for relevant patterns in risk and frequency distributions. This program has proven very valuable in planning mine safety research programs.

TYPE OF PROGRAM/PRODUCT: Data Analysis
TYPE OF COMPUTER: Mini (PRIME)
PROGRAM LANGUAGE: FORTRAN 77

ADDITIONAL INFORMATION: For further information, contact Elaine Cullen, Bureau of Mines, Spokane Research Center, East 315 Montgomery Ave., Spokane, WA 99207-2291; 509/484-1610.

● ACIM: ACCIDENT INJURY INDICATOR MODEL

ABSTRACT: From the MSHA accident statistics, ACIM assigns a cost estimate to each reported accident and provides a fast retrieval capability. The cost elements included are loss in personal income, compensation of wages from State, Federal, and union funds for disabling injuries, benefits for injuries resulting in death or permanent disability, medical treatment and hospital care, immediate and post accident losses as a result of a fatality or amputation injury, and finally, investigation of a fatal accident. The parameters required to estimate these elements are updated on an annual basis. The estimated costs had been compared to actual costs with an accuracy of 10%. Narratives of accidents and production data as provided by MSHA can also be accessed by ACIM. The database contains the closed-out data covering the period from 1975 to 1988. The retrieval software is user-friendly.

TYPE OF PROGRAM/PRODUCT: Database
TYPE OF COMPUTER: Mini (VAX-8300)
PROGRAM LANGUAGE: FORTRAN-77

ADDITIONAL INFORMATION: Model was originally developed under contract JO255031, "Accident Cost Indicator Model To Estimate Costs to Industry and Society From Work-Related Injuries and Deaths in Underground Coal Mining." Contractor was FMC Corp., Engineering Systems Division. Final Report, 1976, 3-vol set. NTIS order numbers are Vol I - PB 264 438, Vol II - PB 264 439, Vol III - PB 264 440. Vol I- "Development of a Cost Indicator for Underground Coal Mine Accidents" details the model.

The program has changed substantially since the original contract effort. Current information on the software and related products can be obtained by writing or calling the Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-6502.

● CAPS-CREWSTATION ANALYSIS PROGRAMS

ABSTRACT: The Crewstation Analysis Programs (CAP) is a package of computer programs that can be used to analyze some human engineering aspects of crewstation design (such as visibility and illumination) that have particular significance in underground mining. It was developed by the U.S. Bureau of Mines (USBM) Health, Safety and Mining Technology program at the Pittsburgh Research Center, Pittsburgh, PA.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (MS DOS-based)

ADDITIONAL INFORMATION: For additional information about this program, contact Thomas Baraczak, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-6557.

COMPUTER PRODUCTS - 1995

● LINEAR MODELING TOOL FOR REDUCING MINER ABSENTEEISM

ABSTRACT: The linear modeling methodology described in the appendix of Information Circular 9219 is an effective and relatively simple way to address job absenteeism using statistical modeling techniques. The report describes a modeling technique using multiple linear regression analysis of data sets, input variables, and a discussion of output results. The example analysis described in the report was done on a microcomputer, using Lotus 123. However, the methodology is not dependent on a particular software program or type/size of computer.

TYPE OF PROGRAM/PRODUCT: Regression Analysis

ADDITIONAL INFORMATION: For additional information about this modeling methodology, contact Robert Randolph, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-4360.

● MADB: MINE ACCIDENT DATABASE

ABSTRACT: This software provides a menu-driven user interface to access the three data files provided by the Mine Safety and Health Administration (MSHA). They are the Accident/Injury, Employment/Production, and Narrative files. They contain information on each injury sustained in mining operations. The current database contains files covering the period from 1975 through 1988.

TYPE OF PROGRAM/PRODUCT: Database

TYPE OF COMPUTER: Mini, DEC/VAX

PROGRAM LANGUAGE: FORTRAN

ADDITIONAL INFORMATION: For additional information about these database files, contact Laura Crabtree, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-4104.

Research - Health & Safety Mine Disaster Prevention

● COMPUTER-IMPLEMENTED COALBED METHANE DATA BASE

ABSTRACT: The Bureau of Mines has formatted coalbed methane data into a computer-implemented data base with software developed for storing, retrieving, and generating files of selected

data in response to information requests and for statistical analysis of relationships among various coal parameters.

TYPE OF PROGRAM/PRODUCT: Database

TYPE OF COMPUTER: Mini (Vax)

ADDITIONAL INFORMATION: For further information on the computer software, contact David M. Hyman, Bureau of Mines, Pittsburgh Research Center, Cochrans Mill Rd., P.O. Box 18070, Pittsburgh, PA 15236-0070; 412/892-6565. Specific coalbed methane data requests should be sent to William P. Diamond, Pittsburgh Research Center, same address; 412/892-6551.

● COMPUTER ASSISTED SENSOR SPACING AND ALARM LEVELS (CASSAL)

ABSTRACT: To readily account for the ventilation complexities around conveyor belt entries, a flexible, user-friendly, personal computer (PC)-based program called "CASSAL" was developed. It takes information entered by the user and constructs air velocity and cross-sectional area profiles of the conveyor belt entry. The profiles are then used to determine the appropriate CO alarm thresholds and smoke sensor class (see RI 9380) for sensors installed in the belt entry. Within the framework of this program, it is possible to handle extremely complex ventilation airflows and entry configurations.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis

TYPE OF COMPUTER: Micro (MS-DOS Based)

ADDITIONAL INFORMATION: For additional information and a diskette, contact Charles Litton or Carrie Lucci, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; (412) 892-6752/4308.

● COMPUTER PROGRAM FOR PLANNING MINE VENTILATION AND PREDICTING REAL-TIME SPREAD OF CONTAMINANTS

ABSTRACT: To provide mine operators with a method of using a personal computer to plan mine ventilation and to determine the spread of contaminants on a real-time basis, the Bureau of Mines adapted a mainframe mine ventilation computer program for personal computer use.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis

TYPE OF COMPUTER: Micro (MS-DOS Based)

ADDITIONAL INFORMATION: For additional information, contact Fred Kissell, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-6751.

● **EXPERT SYSTEM FOR THE PREDICTION OF SPONTANEOUS COMBUSTION POTENTIAL OF COAL**

ABSTRACT: SHT is an expert system software program that predicts the spontaneous combustion potential of a coal. Many factors contribute to the spontaneous combustion potential of coal. One of the most significant is the self-heating tendency of the coal. A statistical analysis of the laboratory results was made and a relationship derived that can predict the minimum self heating temperature (SHT) of a bituminous coal. This allows the assignment of the relative self-heating potential of a bituminous coal, without the need for detailed and costly experiments. The Bureau developed the SHT expert system program for on-site use by the mining industry to assess the spontaneous combustion potential of a coal. The program is written in Level 5 Production Rule Language (PRL) for use on IBM (or compatible) microcomputers.

TYPE OF PROGRAM/PRODUCT: Scientific Analysis
TYPE OF COMPUTER: Micro (MS DOS Based)
PROGRAM LANGUAGE: Level 5 PRL

ADDITIONAL INFORMATION: For additional information about this software program or ordering information, contact Alex Smith, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-6766.

● **LFIRE**

ABSTRACT: LFIRE is used in conjunction with a network of fire detection devices in an underground mine to specify the network branch in which a fire is located.

TYPE OF PROGRAM/PRODUCT: Scientific
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: FORTRAN

ADDITIONAL INFORMATION: For further information, contact the Technology Transfer Officer, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4562.

● **METHPRO**

ABSTRACT: MethPro is a knowledge-based expert system designed to provide a solution to the problem of determining the optimum methane control strategy for underground coal mines. The system considers both naturally existing conditions such as coalbed gas content and mining-induced conditions such as type of mining. Data files are maintained where appropriate, and facts, regulatory requirements, and rule-of-thumb are available to provide solutions.

The validity of the system has been checked and verified based on actual case histories.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis/Data Base
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: Insight 2+

ADDITIONAL INFORMATION: The program diskette(s) can be ordered free of charge from Fred Kissell, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412-892-6679. Blank diskette(s) required.

Documentation on how to use the program is on the diskette in a DOS text file. Also a DOS text file is present for assisting the user with diagnosing and correcting user problems.

● **MFIRE: MINE FIRE AND VENTILATION SIMULATOR**

ABSTRACT: MFIRE is a mine fire and ventilation simulator. It is capable of solving routine ventilation network problems and also analyzing networks under the influence of thermal disturbances such as fires or cooling stations. In addition, MFIRE calculates the concentration and time-dependent spread of contaminants in a mine ventilation network. Unlike other network models, MFIRE is capable of analyzing both steady-state and transient conditions.

TYPE OF PROGRAM/PRODUCT: Scientific
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: FORTRAN

ADDITIONAL INFORMATION: For further information and/or a FORTRAN diskette, contact Linn Laage, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4624 or 612/725-4500.

● **MODELING OF TRANSIENT FLAME PROPAGATION**

ABSTRACT: The unsteady, one-dimensional, compressible-flow equations have been solved numerically for a deflagration propagating through a gallery of finite length closed at the ignition end and open at the opposite end. These equations were solved for two situations wherein (1) the propagating flame was extinguished after 0.1 second or before the return of aerodynamic disturbances reflected from the open end, and (2) the flame was allowed to propagate a full 0.8 second until it was extinguished. It was found that the process of sudden flame extinguishment creates rarefaction waves that, upon entering the burned zone, produce resonance within the burned cavity. For the relatively small value of the product of the expansion ratio (8.5) and the effective burning velocities of 7.4 meters per second for the first experiment and 4.9

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meters per second for the second experiment, it was found that the acoustic approximation provides an adequate estimate of the pressures developed ahead of the flame during the system's early history.

TYPE OF PROGRAM/PRODUCT: Scientific Analysis
TYPE OF COMPUTER: Mini (VAX)

ADDITIONAL INFORMATION: Current information on the software and related products can be obtained by writing or calling Theoretical Support, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-6502.

● SEALED GOB ASSISTANT

ABSTRACT: Examines seals and abandoned areas of coal mines. It provides an in-depth analysis of air exchange in sealed gobs. It also supplies projected yearly gas leakage values, recommendations to minimize leakage across seals, and recommendations on control measures for spontaneous combustion and/or methane.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)
PROGRAM LANGUAGE: Quick BASIC

ADDITIONAL INFORMATION: The program diskette(s) can be ordered free of charge from Fred Kissell, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-6679. Blank diskette(s) required.

Documentation on how to use the program is on the diskette in a DOS text file. Also a DOS text file is present for assisting the user with diagnosing and correcting user problems.

● SPONCOM - SPONTANEOUS COMBUSTION RISK ASSESSMENT FOR COAL

ABSTRACT: The program is designed to obtain information from the user on the coal properties, geologic conditions, mining conditions and practices, and spontaneous combustion history for a mining operation. The program uses a series of interactive data-input screens to prompt the user. During the input process, "expand" screens are available to provide specific information on each input parameter with respect to its particular effect on the overall self-heating risk. The final section of SPONCOM assesses the effects of mining practices on the spontaneous combustion risk. The mining practices are the only factors that can be directly controlled by the operator. The program output gives the self-heating risk of the coal and provides details on each of the factors that increase the risk of spontaneous combustion in the mining operation.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (MS-DOS Based)

ADDITIONAL INFORMATION: The program diskette can be requested free of charge from Alex Smith, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-6766.

Research - Health & Safety Mine Safety Systems

● ELECTRICAL CABLE SOFTWARE

ABSTRACT: The U.S. Bureau of Mines investigated the performance of portable power cables under laboratory conditions. This research defined the thermal characteristics of mine trailing cables and produced a computer model for drag cables and another for reeled cables. An empirical model for type G-GC trailing cables was incorporated into an interactive computer program to assist in the selection of an appropriate size trailing cable. The model indicates conductor temperature versus time for selected cable sizes and duty cycles. A second program, for reeled trailing cables, allows the appropriate derating factor to be selected for 6 AWG and 4 AWG cables in flat and round configurations for a variable duty cycle. An ampacity derating factor is computed that keeps the maximum conductor temperature at or below 90 degrees C for the selected conditions and indicates the hottest layer on the reel.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis
TYPE OF COMPUTER: Micro (MS DOS-based)

ADDITIONAL INFORMATION: Current information on the software and related products can be obtained by writing or calling Gregory P. Cole, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Rd., Pittsburgh, PA 15236-0070; 412/892-6744.

● INSLOPE-3

ABSTRACT: The operation of mine haulage trucks near the crest of stockpiles and waste dumps is a potentially hazardous practice often resulting in a localized slope failure and a dump point accident. The Bureau of Mines has developed a computer code (INSLOPE3) based on the kinematic method of limit analysis which determines an admissible truck weight (upper bound value) for varying distances from the slope edge. The program takes into account the material strength parameters, slope geometry, and inertial forces induced by vehicle braking. The program can be utilized to assist in the determination of safe operating distances for a haulage truck from a slope edge, the development of safe vehicle operating procedures, and the admissible weight for a static concentrated loading near the crest of an otherwise stable slope. This

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report provides information on the use of INSLOPE3, interpretation of the results for mining applications, and instructions for acquiring a copy of the software.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis

TYPE OF COMPUTER: Micro (MS DOS-based)

PROGRAM LANGUAGE: Turbo BASIC

ADDITIONAL INFORMATION: For further information, contact Jim May, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4656.

Research - Health & Safety Occupational Health

● **COMPUTER MODELING CONTINUOUS MINER CUTTING SYSTEMS FOR DUST GENERATION**

ABSTRACT: The Cutting System Model (CSM) program has been developed to analyze relative dust generated by a continuous miner (coal). This interactive program provides relative dust, cutting forces, and production values for any given set of mining machine parameters, specific seam conditions, and operator-controllable parameters. Expanded versions of the program provide a dynamic evaluation of the effects of bit wear, over time, on production.

The program provides operators with the option of looking at proposed changes in the cutting system before the system is shut down. With this program an operator can evaluate, in advance, the potential effect of any change, saving actual machine down time and production loss. The program has been tested against field data to validate the techniques used. Excellent correlation has been found between the model and field test data.

TYPE OF PROGRAM/PRODUCT: Engineering analysis

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: BASIC

ADDITIONAL INFORMATION: For further information, contact Bruce Hanson, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4782.

● **COMPUTER MODELING OF DUST AND FORCES FOR LONGWALL MINING SYSTEMS**

ABSTRACT: The Cutting System Model (CSM) program has been developed to analyze relative dust generated by a double-drum, ranging-arm, longwall shearer (coal). This interactive program

provides relative dust, cutting forces, and production values for any given set of mining machine parameters, specific seam conditions, and operator-controllable parameters. Expanded versions of the program provide a dynamic evaluation of the effects of bit wear, over time, on production.

The program provides operators with the option of looking at proposed changes in the cutting system before the system is shut down. With this program an operator can evaluate, in advance, the potential effect of any change, saving actual machine down time and production loss. The program has been tested against field data to validate the techniques used. Excellent correlation has been found between the model and field test data.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: BASIC

ADDITIONAL INFORMATION: For further information, contact Bruce Hanson, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4782.

● **COMPUTER PROGRAM FOR CONTROLLING DUST GENERATED BY DRUM-TYPE MINING MACHINES**

ABSTRACT: To provide mine operators with a quick means of identifying the effect of cutting system changes on relative dustiness at the mine face, the Bureau of Mines developed an interactive computer program for drum-type coal mining machines. The program simultaneously evaluates machine parameters, coal seam parameters, and mine-operator-controlled parameters.

TYPE OF PROGRAM/PRODUCT: Engineering Analysis

TYPE OF COMPUTER: Micro (MS-DOS based)

PROGRAM LANGUAGE: BASIC

ADDITIONAL INFORMATION: For further information, contact Bruce D. Hanson, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417-3099; 612/725-4782.

● **DRUMPRO FOR LONGWALLS**

ABSTRACT: Provides longwall operators with advice on longwall drum design. The program analyzes and diagnoses drum design problems by examining drum design parameters for obvious flaws, seam conditions, and loading performance during cutting.

TYPE OF PROGRAM/PRODUCT: Expert System

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: Insight 2+

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Research - Minerals & Materials Science

● CURVE FITTING USING A GENETIC ALGORITHM

ABSTRACT: Genetic Algorithms (GAs) are search techniques based on the mechanics of natural genetics. A GA was employed to fit curves to a given set of data. Three types of curves were involved. The first was a least squares curve fit to a straight line. The second curve type was a parabola. The third type was the Ree-Eyring equation.

TYPE OF PROGRAM/PRODUCT: Artificial Intelligence

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: Pascal

ADDITIONAL INFORMATION: For further information, contact the Dr. Donald Stanley, Bureau of Mines, Tuscaloosa Research Center, University of Alabama Campus, P.O. Box L, Tuscaloosa, AL 35486-9777; 205/759-9467.

● DIELECTRIC PROPERTIES DATA ACQUISITION

ABSTRACT: There are several programs written to operate together to automate data retrieval and storage from an Hewlett-Packard HP8753A Network Analyzer. The information acquired from the network analyzer is stored in usable data format for later retrieval into programs designed to calculate dielectric property data.

TYPE OF PROGRAM/PRODUCT: Laboratory Automation

TYPE OF COMPUTER: Mini and Micro (MS-DOS Based)

PROGRAM LANGUAGE: BASIC, FORTRAN

ADDITIONAL INFORMATION: For further information, contact the Bernie Scheiner, Bureau of Mines, Tuscaloosa Research Center, University of Alabama Campus, P.O. Box L, Tuscaloosa, AL 35486-9777; 205/759-9434.

● FACTOR ANALYSIS

ABSTRACT: The factor analysis program was designed with two objectives in mind: 1) to eliminate error and/or noise from data and 2) to help in predicting data. The first objective was met by using the factor analysis technique described in "Factor Analysis in Chemistry" by E.D. Malinowski and D.G. Howery. The second objective was met by using principal components regression described in "Partial Least-Squares Regression, A Tutorial" by P. Galadi and B.R. Kowalski in Analytica Chimica Acta, vol. 185, 1986, pp. 1-17.

TYPE OF PROGRAM/PRODUCT: Statistics

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: C

ADDITIONAL INFORMATION: For further information, contact the Bernie Scheiner, Bureau of Mines, Tuscaloosa Research Center, University of Alabama Campus, P.O. Box L, Tuscaloosa, AL 35486-9777; 205/759-9434.

● FLOTATION KINETICS MODEL

ABSTRACT: The program calculates the flotation response using data containing the fluid velocity profile, power consumption, bubble size distribution, and particle size distribution. The flotation rate constants are calculated, and the flotation response with time is calculated.

TYPE OF PROGRAM/PRODUCT: Scientific Analysis

TYPE OF COMPUTER: Mini

PROGRAM LANGUAGE: FORTRAN

ADDITIONAL INFORMATION: For further information, contact the Dr. Donald Stanley, Bureau of Mines, Tuscaloosa Research Center, University of Alabama Campus, P.O. Box L, Tuscaloosa, AL 35486-9777; 205/759-9467.

● FUZZY LOGIC CONTROLLER FOR A LIQUID LEVEL SYSTEM

ABSTRACT: A fuzzy logic controller (FLC) is a system for controlling a process based on fuzzy logic. FLCs have been used to control many processes. The one drawback of using FLCs is the selection of the membership functions that give meaning to fuzzy linguistic variables. The general process for selecting membership functions cannot always guarantee optimum performance. A genetic algorithm was employed to learn membership functions for an FLC designed for a liquid level vessel.

TYPE OF PROGRAM/PRODUCT: Process Control

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: Pascal

ADDITIONAL INFORMATION: For further information, contact the Dr. Donald Stanley, Bureau of Mines, Tuscaloosa Research Center, University of Alabama Campus, P.O. Box L, Tuscaloosa, AL 35486-9777; 205/759-9467.

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● FUZZY LOGIC CONTROLLER; MATRIX METHOD

ABSTRACT: A rule-based fuzzy logic controller (FLC) using matrices to represent membership sets was developed to control a liquid level vessel. The controller accepts the current height of the liquid and the true rate of change in height and outputs the appropriate change in height. The advantage in using matrices to represent membership sets is that it conforms closely to fuzzy logic theory. The disadvantage, however, is that the inputs are quantized.

TYPE OF PROGRAM/PRODUCT: Process Control

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: C

ADDITIONAL INFORMATION: For further information, contact the Dr. Donald Stanley, Bureau of Mines, Tuscaloosa Research Center, University of Alabama Campus, P.O. Box L, Tuscaloosa, AL 35486-9777; 205/759-9467.

● IMPROVED FUZZY PROCESS CONTROL OF SPACECRAFT AUTONOMOUS RENDEZVOUS

ABSTRACT: A fuzzy logic controller (FLC) was developed to control a mathematical model simulating the autonomous rendezvous of a spacecraft. The problem with FLCs is that the selection process for choosing membership functions does not always yield optimum performance. A genetic algorithm was employed to learn more efficient membership functions.

TYPE OF PROGRAM/PRODUCT: Process Control

TYPE OF COMPUTER: Mainframe

PROGRAM LANGUAGE: Pascal

ADDITIONAL INFORMATION: For further information, contact the Dr. Donald Stanley, Bureau of Mines, Tuscaloosa Research Center, University of Alabama Campus, P.O. Box L, Tuscaloosa, AL 35486-9777; 205/759-9467.

● PHOSPHATE FLOTATION EXPERT SYSTEM

ABSTRACT: The program takes 10 readings from remote sensors in the plant (data file for demonstration) and compares them with accepted values, within a given range. The program prompts the user to enter his visual determination of the quality of the product streams (low, ok, high). Based on the sensor readings and the quality of the products, the program identifies problem areas and prompts the user to check various operating conditions in the plant and suggests appropriate changes.

TYPE OF PROGRAM/PRODUCT: Expert System

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: Expert System Shell

ADDITIONAL INFORMATION: For further information, contact the Bernie Scheiner, Bureau of Mines, Tuscaloosa Research Center, University of Alabama Campus, P.O. Box L, Tuscaloosa, AL 35486-9777; 205/759-9434.

● RARE EARTH DECONVOLUTION FOR EDX X-RAY ANALYSIS

ABSTRACT: Commercial EDX units cannot handle more than 15 elements and require extensive trial and error in setting up for deconvolution of a complicated rare earth spectrum. This program runs 29 of the most common elements found with the rare earths plus the 14 naturally occurring rare earths. There is no set up procedure, and the running time is about half that of the commercial programs. The program runs on an IBM computer. The spectrum after background correction is transferred to the IBM computer for analysis.

TYPE OF PROGRAM/PRODUCT: Scientific Analysis

TYPE OF COMPUTER: Micro (MS DOS Based)

PROGRAM LANGUAGE: QUICK BASIC

ADDITIONAL INFORMATION: For more information, or to order the software, contact Arnold Adams, Bureau of Mines, Albany Research Center, 1450 Queens Ave. SW., Albany, OR 97321-2198; 503/967-5840. Requires a PC with 640K memory. In the compiled form it does not require QUICK BASIC be present in the PC. Cost: Free; send two 5 1/4" diskettes for exchange.

● SSPEC: PERSONAL COMPUTER CALCULATION OF IDEAL EQUILIBRIA CONCENTRATIONS FOR STAINLESS STEEL PICKLING SOLUTIONS

ABSTRACT: To improve the efficiency of stainless steel pickling (chemically cleaning) operations by providing the industry with a quick and convenient method to estimate pickling solution behavior, the Bureau of Mines developed a mathematical model that provides quick and convenient information regarding ideal equilibria concentrations of the various cations and anions in the pickling solution. SSPEC requires a PC with a math coprocessor, 256 kilobytes of memory, and 1 disk drive; a printer is recommended.

TYPE OF PROGRAM/PRODUCT: Scientific Analysis

TYPE OF COMPUTER: Micro (MS-DOS Based)

PROGRAM LANGUAGE: BASIC (Stand Alone)

ADDITIONAL INFORMATION: For further information about SSPEC, contact Jim B. Stephenson, Bureau of Mines, Rolla Research Center, P.O. Box 280, 1300 Bishop Ave., Rolla, MO 65401-0280; 314/364-3169.

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● VELOCITY PROFILE MEASUREMENTS

ABSTRACT: Program supervises data gathering for electrochemical velocity measurements of a fluid. The calibration and measurement sequence is controlled to make the measurements and prompt the technician to change the electrode position. The program converts the voltage measurements to fluid velocity and stores it in a database.

TYPE OF PROGRAM/PRODUCT: Scientific Analysis

TYPE OF COMPUTER: Mini

PROGRAM LANGUAGE: BASIC

ADDITIONAL INFORMATION: For further information, contact
Cy Jordon, Bureau of Mines, Salt Lake City Research Center, 729
Arapahoe Dr., Salt Lake City, UT 84108-1283 801-584-4100

