

The Western Reclamation Group

ITINERANT RECLAMATION NOTES

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COMPUTER APPLICATIONS OF THE NORTH DAKOTA AML AND REGULATORY PROGRAMS BY

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Those of us who work in state regulatory and AML programs contend with massive amounts of data, analyses, and other information on a daily basis. Fortunately, computer applications in our environment enable more efficient and timely analysis and review as part of the decision-making process.

The North Dakota Public Service Commission, which administers the state regulatory and AML **program, began its commitment** to extensive computer applications in 1984. At that time, a task force comprised of an engineer from the Siting Division, a scientist from the Reclamation Division, and a member of the computer support group made several ambitious proposals for expansion of computer systems to the Commission. After much discussion and many refinements the Commission began a program of adding and upgrading computer hardware and software. Now, after 3 years of rapid expansion of computer systems the Commission has four IBM 3270PC's, two 3270 PCGX's, and two PCXT 370's, all interconnected to the state's IBM 4381 and 3090 mainframes. In addition the commission has upgraded their Wang word processing system to implement electronic office communications including electronic mail, PACE database, and word processing.

The following discussion is meant to familiarize the reader with current and proposed computer applications of the North Dakota regulatory and AML programs. It is hoped that the exchange of ideas will be helpful to other regulatory and AML agencies and mining companies. Further information can be obtained by contacting the Commission.

DEAR REV- I

Approximate Original Contour (AOC) determination is one facet of permit review which entails the use of computer graphics. Pre- and post-mine topographic maps are provided by the coal companies with their permit applications. The Reclamation Division digitizes these maps, along with coal and overburden isopachs. The resultant files are processed through Data Entry And Review (DEAR REV-1) software which resides on an IBM Model 4381 mainframe under CMS.

DEAR REV-1 is a **computer** modeling system designed to assist in the analysis of post-mine topography on surface mine lands. The system was developed on a Harris 500 minicomputer (Harris Corporation, Inc.) by integrating portions of SEAMPLAMI and STAMPEDEY software with resident graphics and plotting routines, utilizing DISPLAY (ISSCO Graphics, Inc.) graphics routines, and adding routines to increase system flexibility. The system was then modified to operate on an IBM 4341 under IBM's CMS operating system with additional routines to expand its capabilities. Presently the system is split with high CPU usage, non-graphics programs operating on an IBM PC/XT 370 and the remaining graphics modules on the IBM 4381.

Data Input

Data is entered into the DEAR REV- I system by continuous digitization of map contours, point digitization of Z values, or by keyed inputs of XYZ coordinates. The operator has the option of reviewing and changing the data with screen graphics and a mouse.

Grid Approximation

Once data have been selected surface approximation is accomplished by superimposing an array of square grid cells (400 x 400 maximum) on the x-y plane. Missing values (cells not defined by a data value) are determined by utilizing adjacent data points. The accuracy of the surface approximation can be determined by plotting the initial data file over the grid file. If necessary the grid file can be interactively adjusted until an acceptable surface approximation is developed.

Window

The DEAR REV- I system has a windowing option whereby a subarea can be isolated and analyzed independent of the original surface. The user can define the area by screen digitizing or by input of (X,Y) coordinates (see Figure 1).

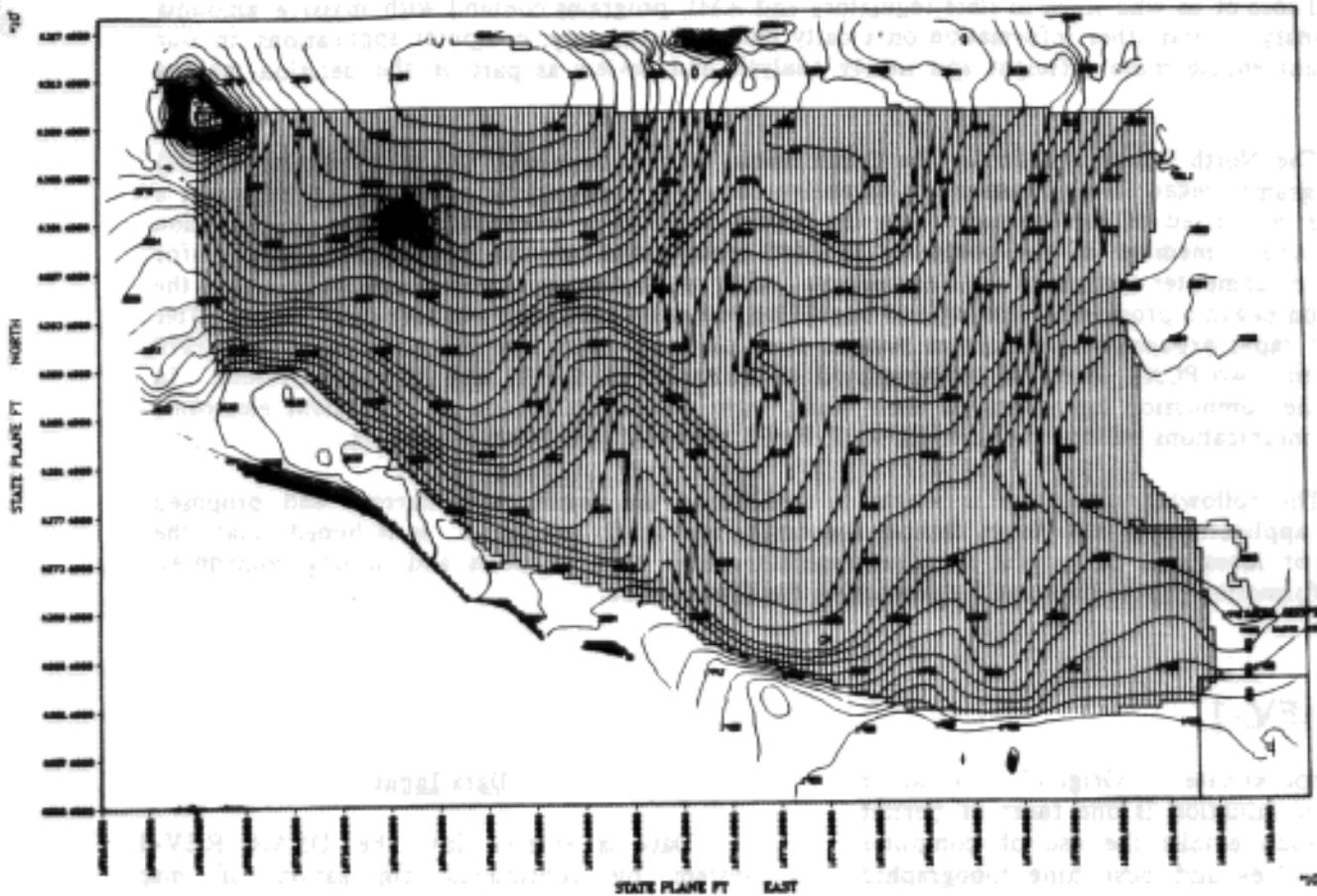


Figure 1

Operations

DEAR REV- I provides the user with standard mathematical functions (+,-,*,/) which can be applied as operations within or between grids. These mathematical functions can be used to modify existing grids or create new grids. The user has the option to calculate volumes and areas above or below a given surface. This option is utilized to estimate coal reserves and overburden quantities from an isopach grid file. A cross-section option is available which allows the user to develop N-S or E-W cross sections of up to three different surfaces at intervals equal to the grid size.

The area-slope function of DEAR REV-1 calculates the maximum slope across each grid cell and provides a tabular printout of the area within each user-defined slope category (see Table 1). An area slope map can be plotted which displays each slope category by shading individual cells with varying color and density of lines orientated in the direction of maximum slope (see Figure 2).

Table 1. Result of Area Slope Integration.

Slope Range (%)	Area (Acres)
0 to 3	476
3 to 6	220
6 to 9	23
9 to 12	2
12 to 15	1

3-Dimension

Three dimensional representation of surface topography can be generated from the grid file (see Figure 3). The user can generate a drawing to the screen or to a plotter by selecting the "vantage point" as well as the simulated elevation. The DEAR REV- I system automatically generates a "recommended value" for the elevation.

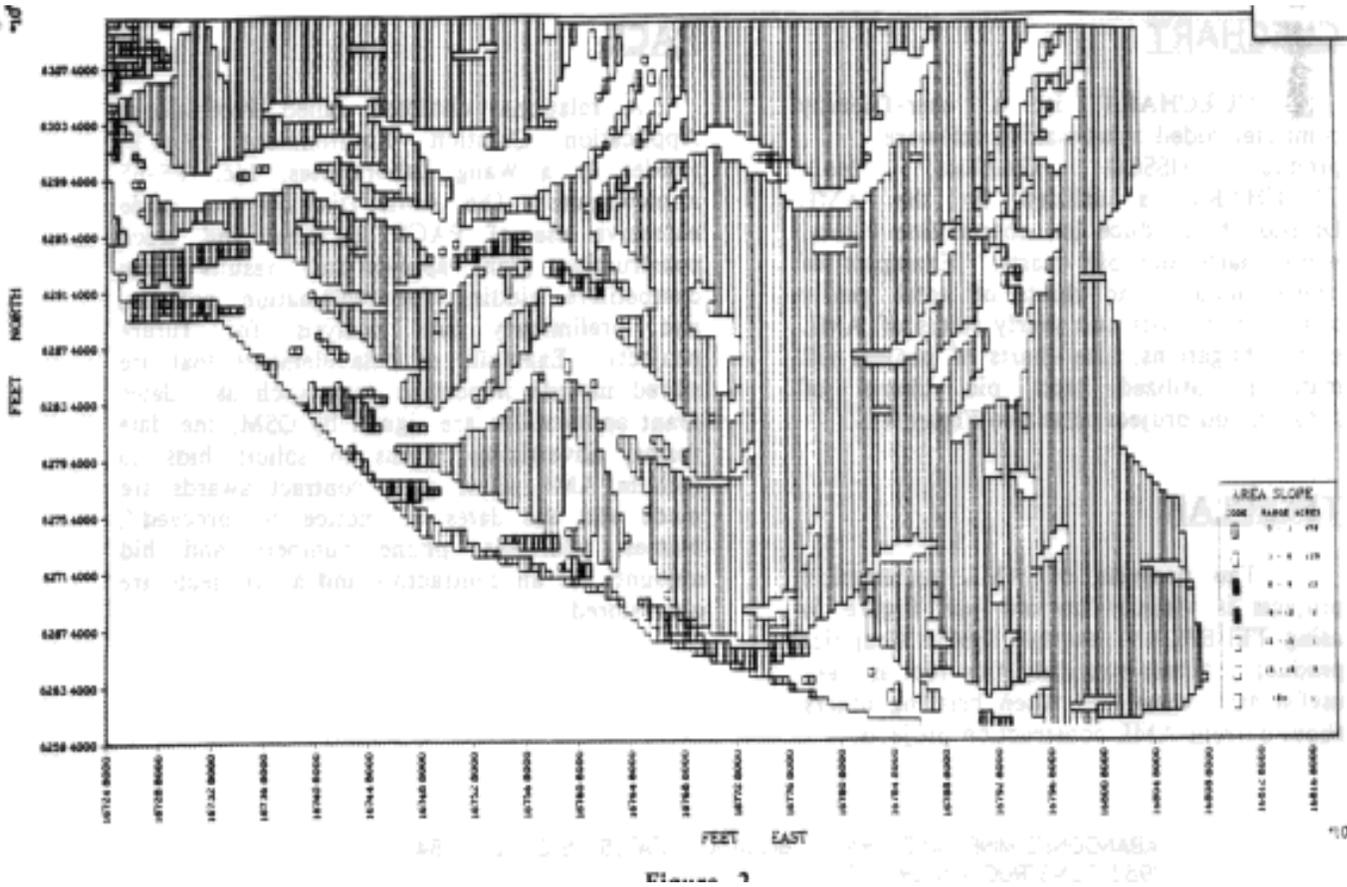


Figure 2

CT8203PO

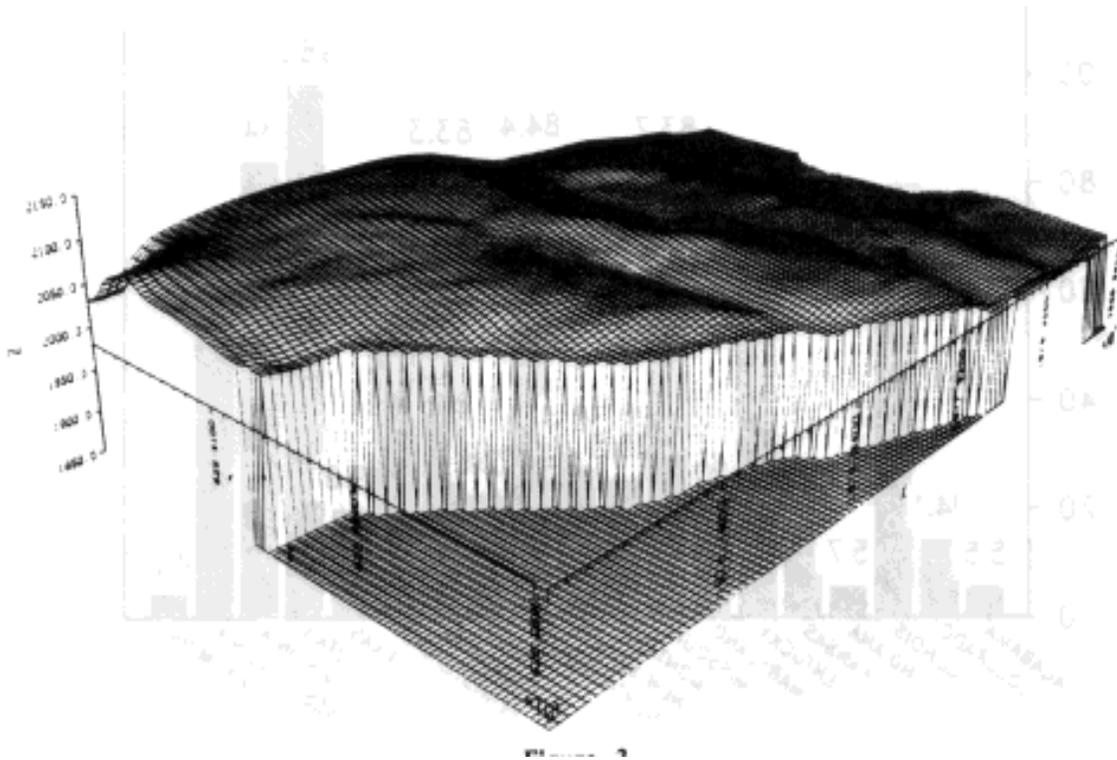


Figure 3

CUECHART

CUECHART is a user-friendly **computer-aided chart making** software product (ISSCO Graphics, Inc.). CUECHART is utilized by the AML Division to produce bar charts, line charts, word charts and pie charts. Examples of charts include bar charts of total yearly construction costs and yearly status of AML grant obligations, line charts of project fill materials utilized, and pie charts of construction project costs (see Figure 4).

TELEPLAN

The progress of AML reclamation projects is visually tracked (see Figure 5) using TELEPLAN, another ISSCO Graphics product. Administratively this tool is very useful as a visual aid when briefing others about current AML construction projects.

PACE

A relational database called Professional Application Creation Environment (PACE) resides on a Wang Laboratories, Inc. VS-65 minicomputer. The AML Division has made extensive use of PACE to store and track construction grant applications, results from competitive bidding for reclamation projects, and preliminary site analysis for future projects. Examples of data elements that are stored include **important dates** such as dates grant applications are signed by OSM, the date formal advertising begins to solicit bids to reclaim AML sites, dates contract awards are made and the dates of "notice to proceed." Names, addresses, phone numbers and bid amounts for all contractors and all projects are also stored.

ABANDONED MINE LAND GRANT OBLIGATION STATUS AS OF 12/31/84
1983 CONSTRUCTION GRANTS
PERCENTAGE OBLIGATED

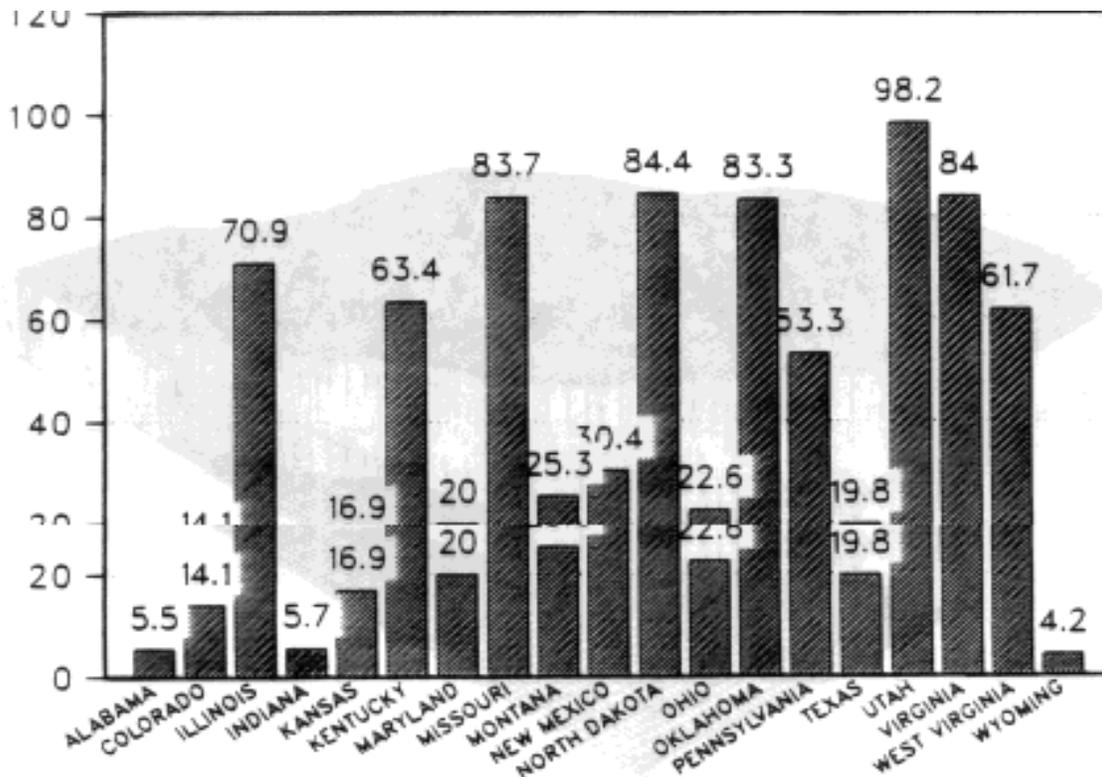


Figure 4

DBASE III+

The **Reclamation Division uses DBASE III+** (Ashton-Tate Corporation) for both database and programming applications. Databases on DBASE III+ include Notice of Violation (NOV) data, a list of blasters who are certified by the Commission, and a summary of performance bonds. These databases are used to generate reports on request from staff members. A list of sediment ponds which has recently been developed may be used in semiannual pond inspections and reviews of surface water management plans.

DBASE III+ also has been used to develop programs for converting groundwater data which is submitted by mining companies into parameters which are tracked by the Reclamation Division. The programs are based on programs which were developed by Knife River Coal Mining Company (KRCMC). The programs convert the raw data and generate text files which can be used to transfer the data to ADABAS on the IBM 4381 mainframe. The Reclamation Division hopes to develop similar programs which will enable the transfer to ADABAS of surface water and groundwater data which is submitted by other mining companies from **DBASE** or other databases.

Lotus 1-2-3

Lotus 1-2-3 (Lotus Corporation) software is used by the AML and Reclamation Divisions on both Wang and IBM PC's. AML uses include

detailed budget tracking of contracts and grant expenditures and bid summary information.

Lotus AML worksheets have been transmitted electronically to the OSM Field Office in Casper, Wyoming using PC-Talk communications software. Communications of this nature are not cost effective and, consequently, are only used when time is of the essence.

Lotus 1-2-3 has been used by the Reclamation Division to develop BOND COST, a spreadsheet for calculation of performance bond amounts. The bond amounts are calculated on a worst-case basis, which represents the maximum liability which could occur.

Components which are used to calculate the bond amount include: (1) equipment type and productivity, (2) equipment ownership and operating costs, (3) **spoil grading quantities**, (4) topsoil and subsoil respread quantities, (5) revegetation costs, and (6) miscellaneous and administrative costs. Machinery, fuel, labor, seed, and tillage costs are updated annually from standard sources.

A bond cost estimating spreadsheet can be completed for each permit and can be modified with each revision. The spreadsheet also can be split into separate, smaller worksheets to increase efficiency. The BOND COST spreadsheet will continue to be revised to reflect changes in assumptions and to account for various bond scenarios.

SUMMARY

The computer systems and applications described above allow the Commission to serve the public more efficiently and effectively. With continued systems integration and application development, it is expected that productivity will continue to be enhanced. As a bonus, integration of computers in the workplace provides a creative stimulus and increases employee awareness and interest in computers.

References

1. D. F. Gibson, E. L. Mooney, T. E. Hehman and F. L. Schillings, "SEAMPLAN Overview," U.S. Forest Service, Montana State University, Vol. 1(1), 1979.
2. D. W. Gusson, R. J. Hunder, H. Korfage and B. Pellant, "Surface Techniques, Annotation and Mapping Programs for Exploration, Development and Engineering (STAMPEDE)," IBM Manual 360.D-17.4.001, IBM Corporation, Hawthorn, New York, 1968.

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ITINERANT RECLAMATION NOTES

WIN "ITINERANT"

The word 'itinerant' means travelling from place to place. And that's just how these notes will work. Because each month, the *Itinerant Reclamation Notes* will be contributed by a different person. These contributors will be people who have something to say about important topics in western reclamation—a new technique, a regulatory concern, a cost-saving innovation—something that can be shared with others with similar interests. The Notes will be free-wheeling and informal—a memo, and editorial, or perhaps some unpublished data.

Each month's contributor will prepare his or her Notes for mailing. Mailing lists and labels will be provided by WRG to each contributor. Each month's contributor will photocopy and mail the review to the people on the WRG mailing list. In addition, each month's contributor will arrange for a new contributor for the following month.

HOW MUCH?

Costs each month for producing the *Notes* will be borne by each contributor. Depending on the growth of the mailing list, it is anticipated that it will cost between \$20 and \$40 to produce and mail a monthly issue.

MORE

Each winter, WRG will send out an annual newsletter. The newsletter will include a return card to allow WRG to update its mailing list. In addition, a complete list of titles, subjects, authors, and key words compiled from the past year's *Notes* articles will be published to allow easy referencing and to provide contacts for reprints and further information.

You can be a part of this new and innovative effort. If you would like to contribute to or receive *Itinerant Reclamation Notes* contact

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