U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

MRDS - 4D

Mineral Resources Data System using 4th DIMENSION

by

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Open-File Report OF 95-616

Menlo Park, California
June 30, 1995

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Introduction

The Mineral Resources Data System using 4th DIMENSION (MRDS - 4D) is an Apple Macintosh application for displaying mineral-resource and related earth-science data. The MRDS - 4D graphical interface is a vector-based plotting system developed at the U.S. Geological Survey (USGS). It operates in conjunction with the commercial database manager 4th DIMENSION. The user can display and explore data in a mouse-driven map environment, as opposed to the traditional text-based, command-driven environment. Point localities and polygon features are clickable objects, allowing access to further information on individual map items. The MRDS - 4D data base is capable of containing mineral-site locations, mineral-district outlines, bedrock geology, Wilderness Area, National Forest, political and coastline boundaries, and several other types of files.

MRDS - 4D was formerly called "ROCS" (Resource Oriented Computer System), a database application written by Paul Schruben and Carl Carlson in several versions from 1987 to 1994.

This report is a manual for MRDS - 4D users and describes its capabilities and procedures.

Software Configuration

MRDS - 4D has several major software components:

- **4th DIMENSION** - *a commercially available database manager by Acius, Inc.*
- **Database structure** - *file dictionaries, dialog layouts, and procedures written in 4th DIMENSION database language.*
- **Graphics drivers** - *Pascal graphics driver programs controlling screen, laserwriter, PICT, and pen plotter map plots.*
- **Data** - *graphics and text files derived from many sources.*
- **Ancillary Macintosh software** -
  MacDraw or similar graphics editor for manipulating PICT files.
  Macintosh System 6.x or greater.
  SendPS for sending Postscript files to the laserwriter.

MRDS - 4D Application

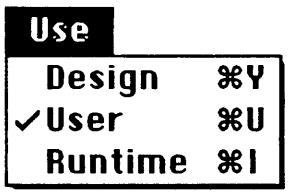
Because of how 4th DIMENSION is marketed, there are several versions of MRDS - 4D. An important concept in understanding the differences between the versions of MRDS - 4D is to keep in mind the three environments that are available in 4th DIMENSION:

- **Design Environment**
  The design environment is used to actually create a database. A custom application, such as MRDS - 4D, is created in the design environment. Versions of 4th DIMENSION that have this capability are the most expensive; consequently, modifications to the data base are made at the USGS in Denver, Colo., which maintains the 4th DIMENSION compiler (The 4th DIMENSION compiler provides full design and structure modification capability.)

- **User Environment**
  The user environment is where data is entered and manipulated and where reports and graphs are created.

- **Runtime Environment**
  This is a special environment that is used to run a custom application. It is termed "runtime" because it can use a low-cost version of 4th DIMENSION called 4D Runtime that can run, but not create, 4th DIMENSION databases. A runtime application is created in the design environment. Note that once the runtime application is created on the full version of 4th DIMENSION, it can be run at locations that do not have the full capability 4th DIMENSION product.

The user can select the environment from the **USE** menu, which is accessed from the menu bar displayed after pressing **Command-Q** while in the Grand Canyon scene. Of course, if that environment is not available in the version of MRDS - 4D being used, it will not appear in bold face in the **USE** menu.



There are three versions of MRDS - 4D:

• **MRDS**	Design, User, and Runtime environments
• **MRDS. comp**	User and Runtime environments
• **MRDS.runtime**	Runtime environment only

MRDS is a version that contains the full capability of 4th DIMENSION. It executes interpretively and is therefore slower than **MRDS.comp**.

MRDS.comp is the compiled version and lacks the Design environment. It can create or modify reports and records but cannot modify programs, files, or layouts. The advantage of **MRDS.comp** is execution speed.

MRDS.runtime lacks both the Design and User environments. This is bundled with the low-cost version of 4th DIMENSION. Data can be entered and modified even though it does not provide the "user" environment. 4th DIMENSION runtime is provided by the user and not distributed by the USGS.

MRDS, MRDS.comp and **MRDS.runtime** are examples of 4th DIMENSION structure files. They point to a data file called **MRDS.data** or **MRDS.data.clone**. **MRDS.data** contains the entire Mineral Site database. **MRDS.data.clone**, is used to create customized user subsets of the Mineral Site database.

A folder containing a clone of **MRDS - 4D** is provided with each release. If the user wishes to work only with a copy of **MRDS - 4D** and a subset of the mineral site database, he or she can create a copy of the clone (It is best to keep one pristine clone folder). The clone folder consists of the following:

MRDS
MRDS.comp
MRDS.data.clone
SendPS substitute
SendPS•1.21
Proc.Ext
Sets

To create a clone, begin by duplicating the clone folder. For reasons described below, it is best to place a copy of 4th DIMENSION in this folder. **MRDS.data.clone** is a skeleton dataset that can be filled with user records that have been transferred from the main Mineral Site database. The records can be transferred from the main database using **Send Records** under the **File** menu. These records can, in turn, be read into **MRDS.data.clone** by using **Receive Records** also under the **File** menu. Sending and receiving records is discussed in the section titled *Transferring Data.* Once the records have been read into **MRDS.data.clone**, they can be accessed by launching the clone of **MRDS.comp** or **MRDS** that resides in the same folder as **MRDS.data.clone.**

4th DIMENSION has some peculiarities about locating a data file on launch. Double clicking on **MRDS** or **MRDS.comp** structure files normally launches the **4th D 2.2.3** application located in the same folder. If it fails to find a copy of **4th D 2.2.3** in the local folder, it searches the default disk drive starting with the root folder and proceeding alphabetically through the folders until it finds the **4th D 2.2.3** application. Unfortunately, it also looks for a data file in the same foreign folder. This can result in data-entry records seeming to go into the "wrong" data file or disappearing from the "correct" data file.

The same phenomenon occurs if you launch by double clicking on the data file. 4th DIMENSION looks for the structure file in the folder where it finds **4th D 2.2.3.** The only exception is **MRDS.runtime** which has **4th D 2.2.3** bundled within it, so it never looks in other folders.

There are two solutions to the problem:

- Copy **4th D 2.2.3** to all MRDS folders as noted above.

- Hold down the option key on every launch, then switch folders to the desired data clone. Note that using the option key allows you to "point" to any desired data clone, even one with a different name than **MRDS.data.clone**. The option key be held down until the **Open datafile.....** dialog box appears.

Hardware Configuration

MRDS - 4D operates in stand-alone mode to take advantage of the Macintosh programming tools and avoid the complications and expense of telephone communications and mainframe computer operations.

Hardware Requirements:

- **Macintosh II** *series computer or newer*
- **5Mb RAM** *minimum, 8Mb recommended*
- **disk drive** - *650Mb (minimum) external drive recommended*
- **color monitor** - *13 inch RGB (red, green, blue) recommended*
- **laser printer** - *Postscript compatible, optional if paper output not required*
- **pen plotter** - *E size, 34 inch by 42 inch, HP compatible, optional if plot not required*

A smaller disk drive can be substituted if the user needs only a subset of the data. 4th DIMENSION occupies 1.4Mb. The MRDS - 4D application with no thematic layers occupies 3Mb. All the layers for a single western state such as Nevada total about 30Mb. The complete application currently occupies 430Mb. Smaller subsets of MRDS - 4D are available. Current prices are available by calling the MRDS - 4D contacts listed in below. No specific commitment for ongoing software support by the USGS can be offered.

Launching MRDS - 4D

The following procedure is used to launch MRDS - 4D on most Macintosh II computers:

- **Turn on the external disk drive, if any.**

Most MRDS - 4D systems use an external disk drive. The ON button is usually a rocker switch located on the drive's back panel. Some drives must be allowed to spin up for a few seconds before the Macintosh itself is turned on.

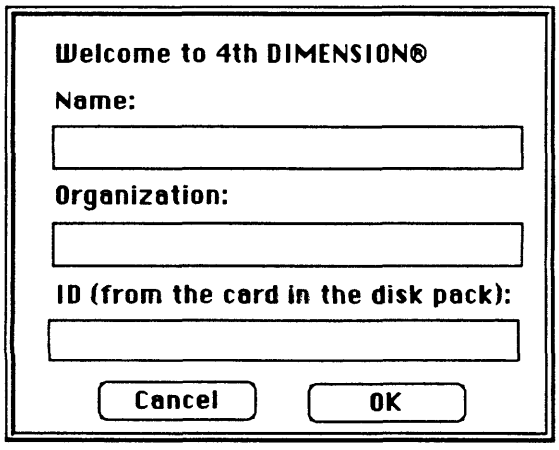
- **Turn on the Macintosh.**

The Mac is turned on via the keyboard. The ON key is marked with a triangle in the upper right-hand corner of the keyboard.

- **Open the folder containing MRDS - 4D.**

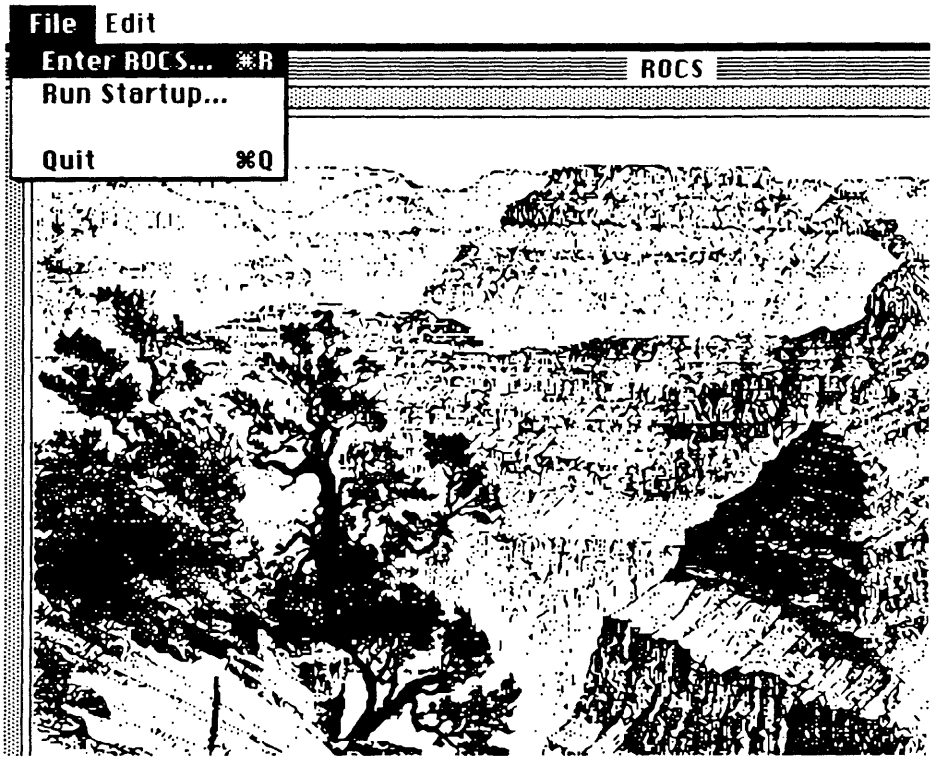
As the installation of MRDS - 4D is dependent upon choices made by the installer, the name of the MRDS - 4D folder and the name of the MRDS - 4D application will vary from computer to computer. Also, MRDS - 4D can be installed in its own folder or it can be installed in the 4th DIMENSION folder. Once the correct folder is found, the MRDS - 4D application will typically have the name **MRDS.runtime.** To begin MRDS - 4D, double-click on **MRDS .runtime**.

If you are launching **MRDS - 4D.runtime** for the first time, you will be asked to provide the following information. This is the registration information that goes along with a legal purchase of 4th DIMENSION.



- **Enter MRDS - 4D.**

After MRDS - 4D loads its variables, the Grand Canyon scene appears signifying that 4th DIMENSION has entered the Runtime environment. Choose menu item **Enter MRDS - 4D**.



- **Using Help.**

After MRDS - 4D is launched, the help facility can be accessed by selecting the menu item **About MRDS - 4D** in the **File** menu.

Selecting **Quit** from the Grand Canyon scene will take the user back to the 4th DIMENSION user environment. To return from the user environment to the runtime environment (the MRDS - 4D application), select **Runtime** under the **Use** menu.

Selecting **Run Startup** will reinitalize MRDS - 4D and display the Grand Canyon scene.

Typical Session

• Enter MRDS - 4D

From the Grand Canyon screen in MRDS - 4D, choose menu item **Enter MRDS - 4D**. This evokes the **Search by Example** layout.

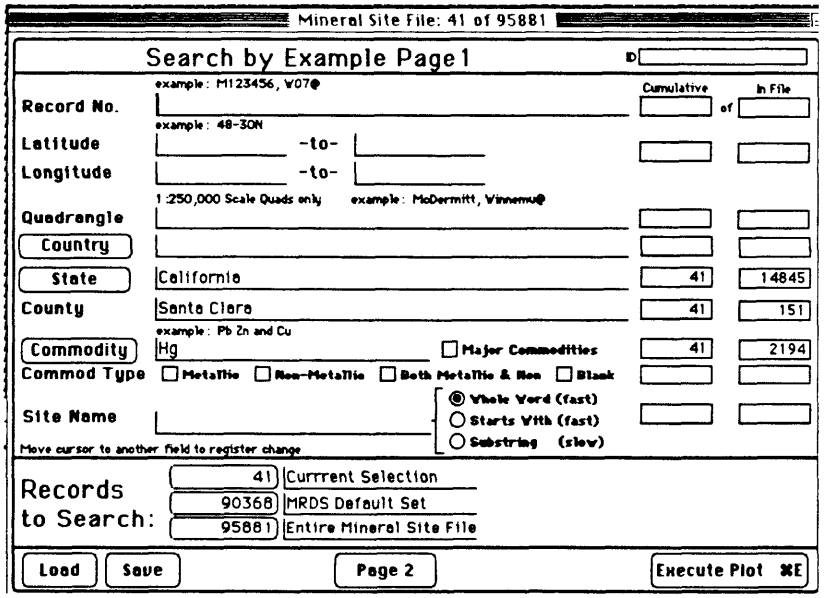
While in MRDS - 4D, the following menu bar is displayed at the top of the window. While progressing through a session from record selection to final plot, choices will made from the menus selected from this bar:

File Edit Enter Select Plot Report

The following is a simple example of using MRDS from the **Search by Example** screen .

Suppose we want to find all sites in Santa Clara County, Calif. that contain the commodity mercury and produce a screen plot of the site locations, geologic formations and certain boundaries. Once the screen plot is available, we can look at record summaries of each site and also at a brief description of the geologic formations.

• Enter the search criteria as shown on the following Search by Example screen.



Next, click on the button associated with **MRDS Default Set** or **Entire Mineral Site File**. The data base is searched until all records meeting the criteria are

found. Now you can look at a columnar listing for the current set by pulling down the **Select** menu and selecting **Show Subset**.

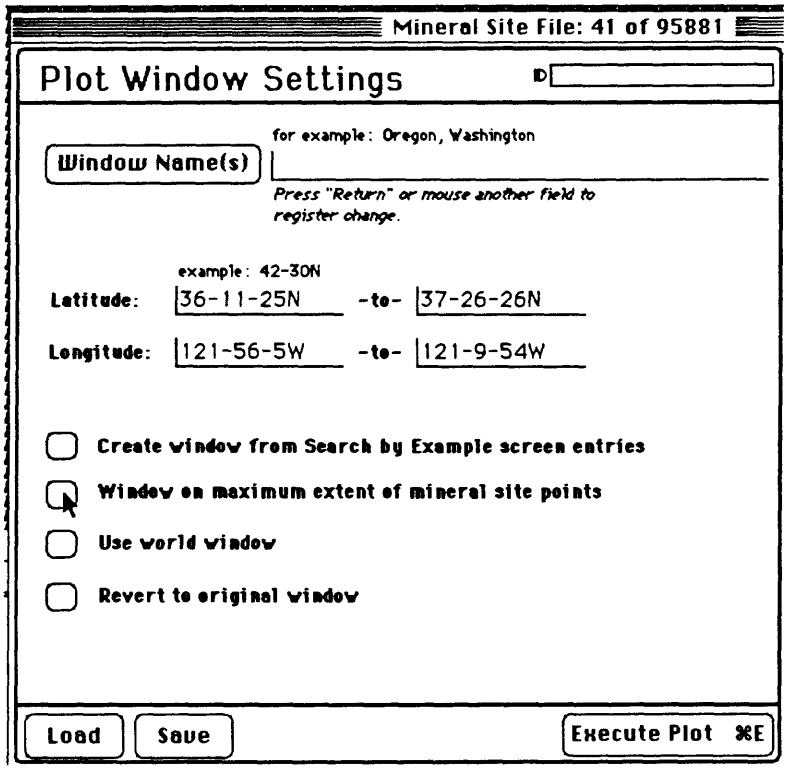
The columnar listing will appear as follows. The full data entry records for any of these sites can be selected by double-clicking on the desired record, displayed, and modified if desired.

Mineral Site File: 41 of 95881

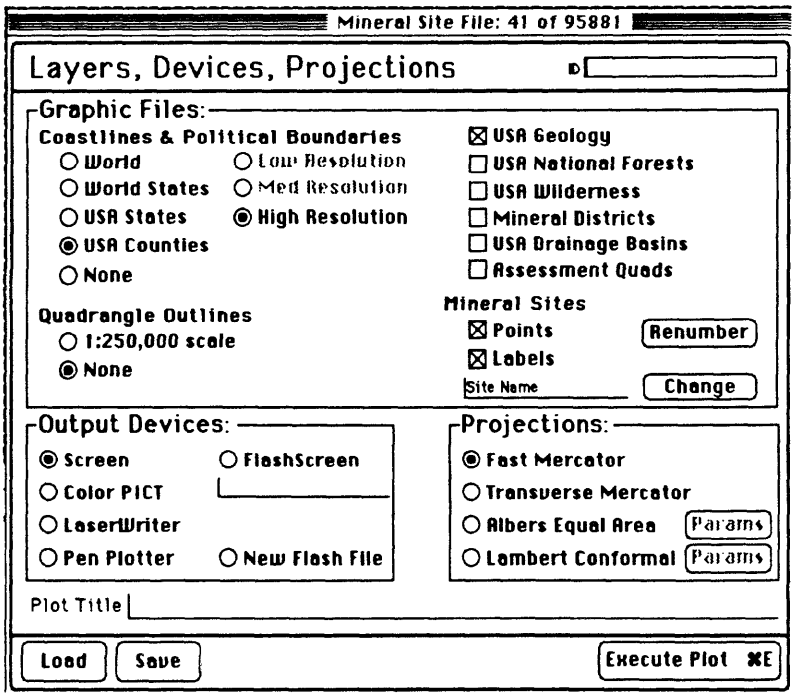
Record No.	Site Name	District	Latitude	Longitude	Ctry	St	Cty/Prov	Commodities Present	Majc
M055599	NEW ALMADEN DISTRI	NEW ALMADEN			US	CA	SANTA CL	HG CR MN CU STN:	HG
M055600	BERNAL	NEW ALMADEN	37-13-12N	121-47-32W	US	CA	SANTA CL	HG	HG
M055601	BRAINARD		37-10-41N	121-53-08W	US	CA	SANTA CL	HG	
M055602	BOWIE		37-08-34N	121-51-30W	US	CA	SANTA CL	HG	HG
M055603	CHABOYA - HILLSDAL		37-17-19N	121-51-20W	US	CA	SANTA CL	HG	HG
M055604	GUADALUPE	NEW ALMADEN	37-12-38N	121-53-59W	US	CA	SANTA CL	HG	HG
M055605	NEW ALMADEN	NEW ALMADEN	37-10-46N	121-50-30W	US	CA	SANTA CL	HG	HG
M055606	NEW ALMADEN - COR/	NEW ALMADEN	37-10-27N	121-50-07W	US	CA	SANTA CL	HG	HG
M055607	NEW ALMADEN - HARI	NEW ALMADEN	37-10-38N	121-50-22W	US	CA	SANTA CL	HG	HG
M055608	NEW ALMADEN - VELA	NEW ALMADEN	37-10-45N	121-50-24W	US	CA	SANTA CL	HG	HG
M055609	NEW ALMADEN - CENT	NEW ALMADEN	37-10-31N	121-50-18W	US	CA	SANTA CL	HG	HG
M055610	NEW ALMADEN - VICT	NEW ALMADEN	37-10-46N	121-50-30W	US	CA	SANTA CL	HG	HG
M055611	NEW ALMADEN - NORT	NEW ALMADEN	37-11-06N	121-50-32W	US	CA	SANTA CL	HG	HG
M055612	NEW ALMADEN - SOUT	NEW ALMADEN	37-10-45N	121-50-48W	US	CA	SANTA CL	HG	HG
M055613	NEW ALMADEN - SAN	NEW ALMADEN	37-10-24N	121-50-40W	US	CA	SANTA CL	HG	HG
M055614	NEW ALMADEN - SAN'	NEW ALMADEN	37-10-27N	121-50-46W	US	CA	SANTA CL	HG	HG
M055615	NEW ALMADEN - SAN	NEW ALMADEN	37-10-36N	121-50-48W	US	CA	SANTA CL	HG	HG
M055616	AMERICAN	NEW ALMADEN	37-10-52N	121-51-10W	US	CA	SANTA CL	HG	HG
M055617	PROVIDENCIA	NEW ALMADEN	37-11-21N	121-51-57W	US	CA	SANTA CL	HG	HG
M055618	ENRIQUITA	NEW ALMADEN	37-11-35N	121-52-01W	US	CA	SANTA CL	HG	HG
M055619	SAN ANTONIO	NEW ALMADEN	37-12-02N	121-52-46W	US	CA	SANTA CL	HG	HG
M055620	SAN MATEO	NEW ALMADEN	37-11-59N	121-52-33W	US	CA	SANTA CL	HG	HG
M055621	SENATOR	NEW ALMADEN	37-12-34N	121-53-33W	US	CA	SANTA CL	HG	HG
M055622	DEEP GULCH PLACER	NEW ALMADEN	37-10-25N	121-49-25W	US	CA	SANTA CL	HG	HG

- **Establish the plot parameters.**

To establish the plot parameters, pull down the **Plot** menu and select **Plot Window.** In this example, the latitude and longitude have been calculated by selecting the **Window on maximum extent of mineral site points** box. Although the **Execute Plot** button appears in many dialog boxes, a plot window must be established before plotting.



Now pull down the **Plot** menu again and select **Layers, Devices, Projections..**

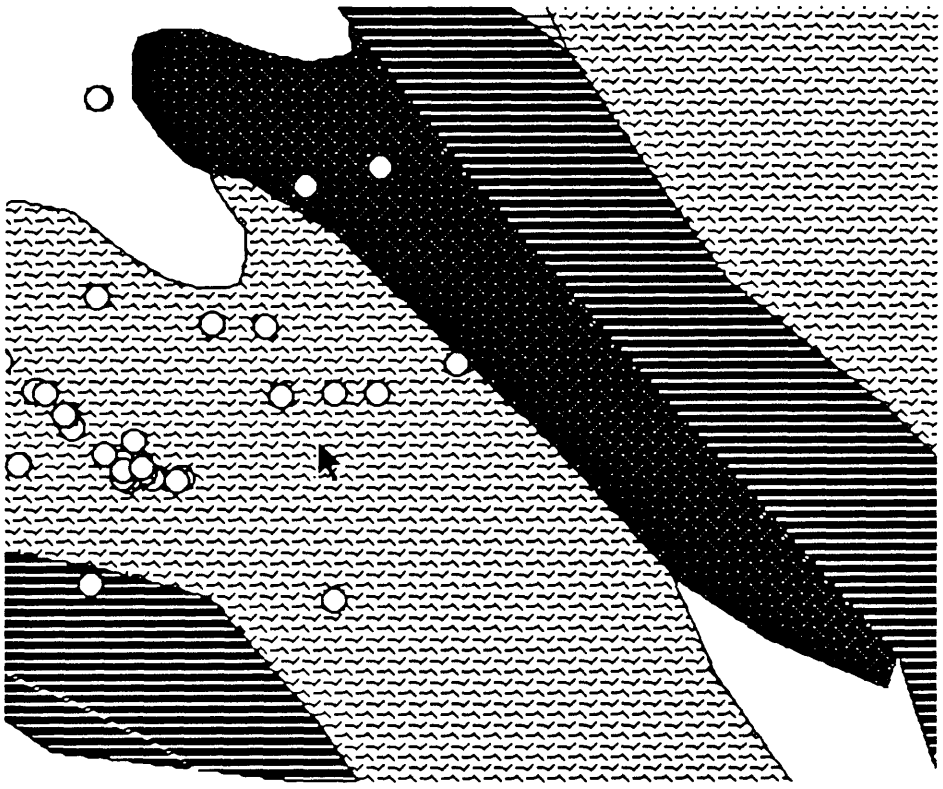


To display the boundaries of counties adjoining Santa Clara county, select **USA Counties**. Select **1:250,000 scale** quadrangle outlines if you want these displayed. Select **USA Geology** for the geologic formations, **Points** to plot the

mineral sites as circles, and **Labels** for site names. The output device will be **Screen**, and the projection will be **Fast Mercator**.

•Execute the plot.

Click on the **Execute Plot** button. Shown below is part of the screen plot for this example. As explained later in this manual, site and formation names can be determined by passing the mouse over the circular points and geologic formations. Also site records and geologic information can be displayed by mouse selection.

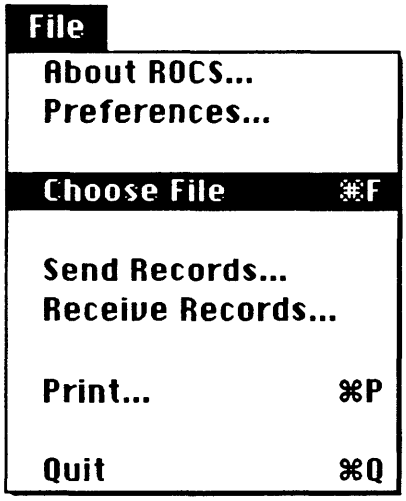


Above: Partial screen plot of Santa Clara county mercury sites

A mouse click outside of the map area allows you to quite the map.

The Mineral Site File

Text files available in MRDS - 4D are listed under the **File** menu, **Choose File** item. The Mineral Site File is the one most frequently accessed and is the default file when MRDS - 4D is entered.



The following files are available from **Choose File**:

file	use
Assessments	*AMRAP and CUSMAP projects and references*
Commodity Specialists	*USGS commodity personnel and references*
Districts	*mineral districts outlines and descriptions*
Inventory	*a tabulation of entries in the requests file*
Mineral Site File	*MRDS records, Major mines and other mineral site data and other mineral site data*
Plot Parameters	*contains all the information required to perform a plot*
Postal Address	*applies to Commodity Specialists file*
Projects	*USGS Geologic Division projects*
References	*applies to Districts file only*
Requests	*logs official inquiries to MRDS - 4D users*
Specialists	*used by the Commodity Specialist file*
Upgrades	*describes edits and changes to Mineral Site file*
Wilderness Explanation	*Wilderness area descriptions*

Only the Mineral Site file is discussed in this manual.

Choosing the Mineral Site File causes MRDS - 4D to display the column listing. The column listing can not be directly edited and may not display all the fields. A full screen layout is needed to edit the records. The edit layout is evoked by double-clicking on an individual record in the

column listing or by single-clicking on a record, then selecting , **Modify Record** from the **File** menu. If an empty file screen is displayed instead of the column listing, go to the **Select Menu** and select **Show All**.

The Mineral Site File is identical in content to the USGS Mineral Resource Data System (MRDS) file on Data General using uniVerse in Reston, Va. The following fields in the Mineral Site File are indexed for rapid searches and sorts. They appear in bold print in the 4th DIMENSION Design environment. Knowledge of the MRDS data base structure is required to effectively use field names in the sort and search editors. Its easier to use the **Search by Example** screen for most applications. The fields that are indexed vary from version to version and can be changed by users with **Design** capability. Also, the database field names are not necessarily identical to the names used in the columnar or long form reports.

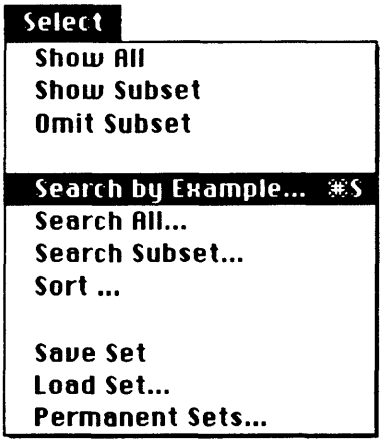
field	use
CommodPreSort	*stores commodities as a single string*
Country Name	*30 characters maximum*
Country Code	*2 characters*
County	*first 20 characters*
Deposit Size	*1 character, Large, Medium, Small (L, M, or S)*
Desc Workings	*1 character, Surface, Underground, Both (S, U,or B)*
Latitude DecDeg	*calculated by MRDS - 4D*
Longitude DecDeg	*calculated by MRDS - 4D*
CommodMajSearch	*individual commodities, 4 characters maximum each*
Quad250	*1by 2 degree 1:250,000 scale quadrangle name*
Record Number	*7 characters*
Site for Sort	*first 20 characters, total field stored in Site Name Long*
State Code	*2 characters maximum*
State Name	*20 characters maximum*
Status Activity	*codes 1 through 8*
USGSModel first	*40 characters maximum*
Dep. Type first	*first 20 characters, total field stored in Dep Typ Long*
AgeMineralizatn	*first 10 characters, total field stored in Age Min Long*
Host Rock Type	*first 20 characters, total field stored in Host RkTyp Long*
Host Rock Age	*first 10 characters, total field stored in Host RkAge Long*
Commod Type	*code indicating metallic or non metallic or both (M,N, or B)*
Production	*code indicating small, medium, large, or undetermined (S,M,L, or U).*

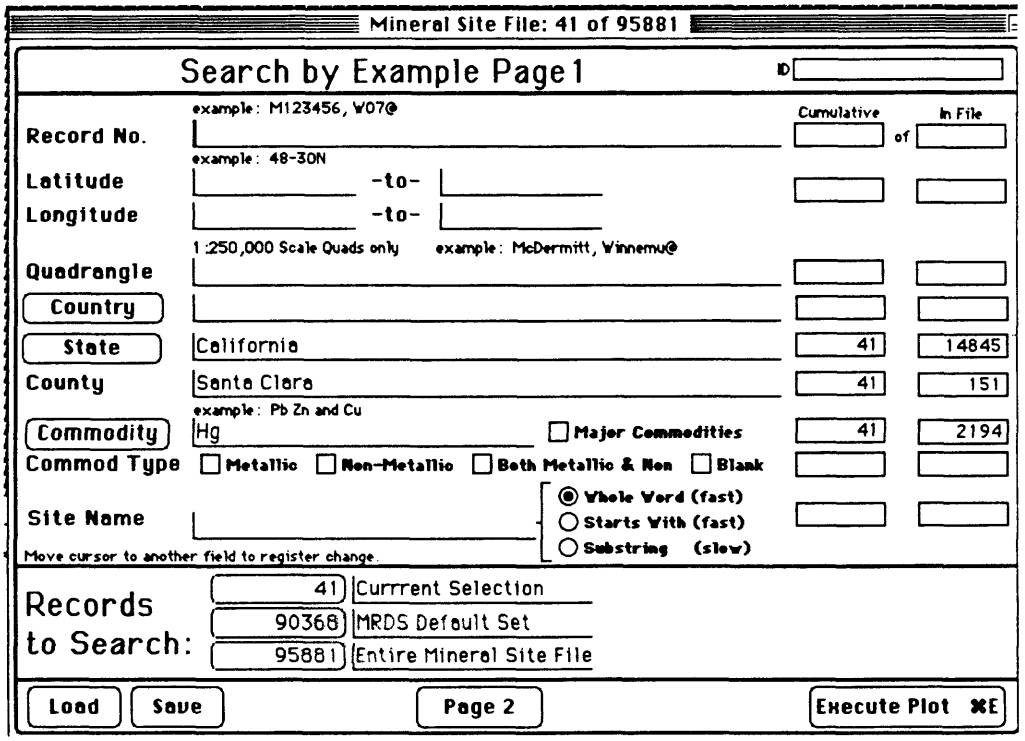
Searching and Selecting Records

Search by Example

If MRDS - 4D is entered from the Grand Canyon scene, the **Search by Example** layout is evoked. The **Search by Example** layout can also be evoked from the **Select** menu. This is useful for returning to the **Search by Example** layout from other menu-selected layouts.

The Search by Example menu item automatically sets **Choose File** to the Mineral Site File (Refer to the previous section, *The Mineral Site File*).





Search by Example field descriptions

There are two Search by Example screens in MRDS - 4D. A search is conducted on all the criteria in *both* pages every time a search button is selected. Only the **AND** logic is employed between fields except for the **Deposit Size** and **Production Size** fields on **Search by Example Page 2**. To conduct a search with **OR** logic between fields use the Search Editor as described later in this section under the topic *The Search Editor.* Search text strings are not case sensitive.

Record Number *W@, 1234567,W12345@*

Any leading part of a MRDS seven-digit number is acceptable. Separate individual record numbers with commas. To select a large number of records, the ID's can be prepared in a text editor such as Microsoft Word and pasted into the Search by Example field which can hold 32k bytes or approximately 4,000 MRDS record numbers. Lists of ID's from PC's and other computers can be imported using the clipboard.

Latitude, Longitude *108-15-30W* or *108-15W* or *108W*

All four fields must be filled in for a valid search. Coordinate order is unimportant. Range is interpreted so as to not cross the poles or the 180° meridian. The values are converted to decimal degrees and used to search the LatitudeDecDeg and LongitudeDecDeg fields. If chosen in the **Preferences** dialog of the **File** menu, these items automatically set the plot window as well as the search area.

Quadrangle *Ely, Elko*

Most of the MRDS records in the U.S. have 1:250,000 scale quadrangle names in the Quad250 field. Separate individual names with commas. This item automatically sets (if chosen in the **Preferences** dialog of the **File** menu) the plot window as well as the search area.

Country *United States, Canada*

Select the **Country** button for help with country names. Not all names appear on the help maps. If the name is present, clicking on it automatically sets the plot window as well as the search area. If the necessary name is missing, **Cancel** from the help maps and type the name as listed in the MRDS Applications Guide. Separate individual names with commas.

State *Nevada*

Select the **State** button for help with state names. All states for the U.S. are present. This item automatically sets the plot window as well as the search area. If names are typed in, separate them with commas.

County *Elko, Eureka*

Separate individual counties with commas.

Commodity *Au GRF Ni*

A help screen is available by selecting the **Commodity** button. An **OR** is implied between commodities. **AND** connectors must be typed in. Multi-criteria search logic is strictly left-to-right, no grouping of criteria is supported. **AND** and **OR** have equal precedence. The retrieval set from the first criterion is **AND**'ed or **OR**'ed with the retrieval set from the next criterion, and so on until the list is exhausted.

Site Name *Carlin, Bingham*

- **Single Word** option. Enter a single entire word such as *Bingham* or a wildcard such as *Bing@*. Do *not* enter more than one word such as *Bingham Mine*.
- **First 20 Characters** option. Enter the first 20 characters of the entire site name, or a wildcard such as *Bingham Mi@*. Characters typed beyond 20 will be ignored.
- **Substring** option. Enter any portion or all of the Site Name, for instance *gham mi*. **Substring** option searches slowly, about 400 records per minute. First narrow your search using other fields on the layout. Then use **Current Selection** (top button of **Records to Search**), as opposed to **MRDS Default Set** or **All MRDS Set** (middle and bottom buttons of **Records To Search**). Note that the exact name of the data set that appears opposite the buttons depends upon the set or sets selected for search.

Cumulative, In File

The two columns on the right hand side of the screen display search tallies. The left column titled **Cumulative** shows cumulative matches; that is, the number of records meeting the criteria on the current line **and** all preceding criteria to the top of Page 1. Thus, the number of records selected never increases down the page.

The right column titled **In File** shows the total number of matches in the entire database for that criteria alone.

Both columns are recalculated after performing a search or **Load set.**

Records to Search

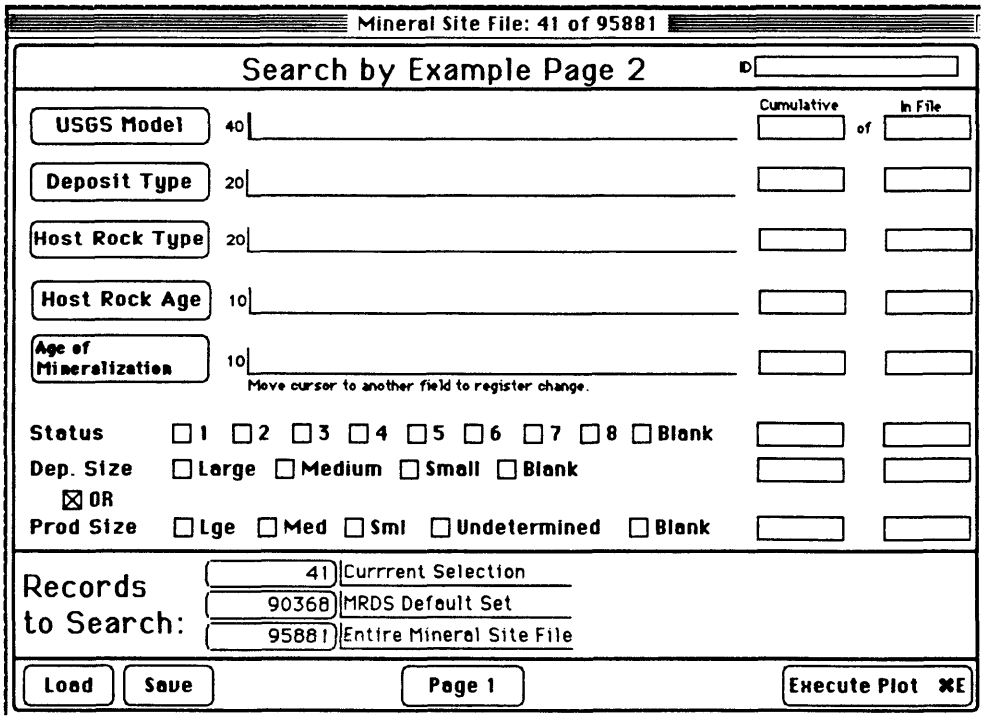
The **Current Selection** button is used to specify a search of the current subset. You can enter the name of a previously saved subset by typing the name on the line adjacent to the button or you can further refine the results of a preceding search. **Current Selection** looks at only the current set, equivalent to a logical **AND** with the previous search. It always results in a lesser or equal number of records, never more records, than the previous selection.

The number of records in the current selection is listed in the document title just below the menu bar. For example, **Mineral Site File: 38 of 95881** indicates 38 records in the current selection. These will be the only records considered during a **Current Selection** search.

The middle button is the current MRDS set (selected from the **Permanent Sets** dialog of the **Select** menu). If a permanent set is not specified in the **Permanent Sets** dialog, the middle button defaults to **All MRDS Set**, which is equivalent to the entire mineral site file. Whatever selections are made in the **Permanent Sets** dialog will be saved upon exit from MRDS - 4D and reset at the next startup.

The bottom button is always set to select the entire mineral site file.

Page 2 of Search by Example:



The numbers listed to the left of each field on page 2 of Search by Example are the maximum number of characters necessary to fully define the data in that field. When typing less than the maximum, append with an "@" symbol, as in *Stratab@*. Characters exceeding the maximum will be ignored.

Deposit Size and Production Size searches can be connected by a logical **OR**, which is the default setting. When this option is unselected, **AND** logic is employed.

The results of a search using the **Search by Example** layout can be displayed by selecting **Show Subset** in the **Select** Menu. This displays the columnar listing for the **Current Selection**. If a **Show All** is selected at this point, the columnar listing for the set or sets identified by the middle button (current MRDS set, as selected in the **Permanent Sets** dialog) is displayed. However, you can't display the subset unless you execute the search again.

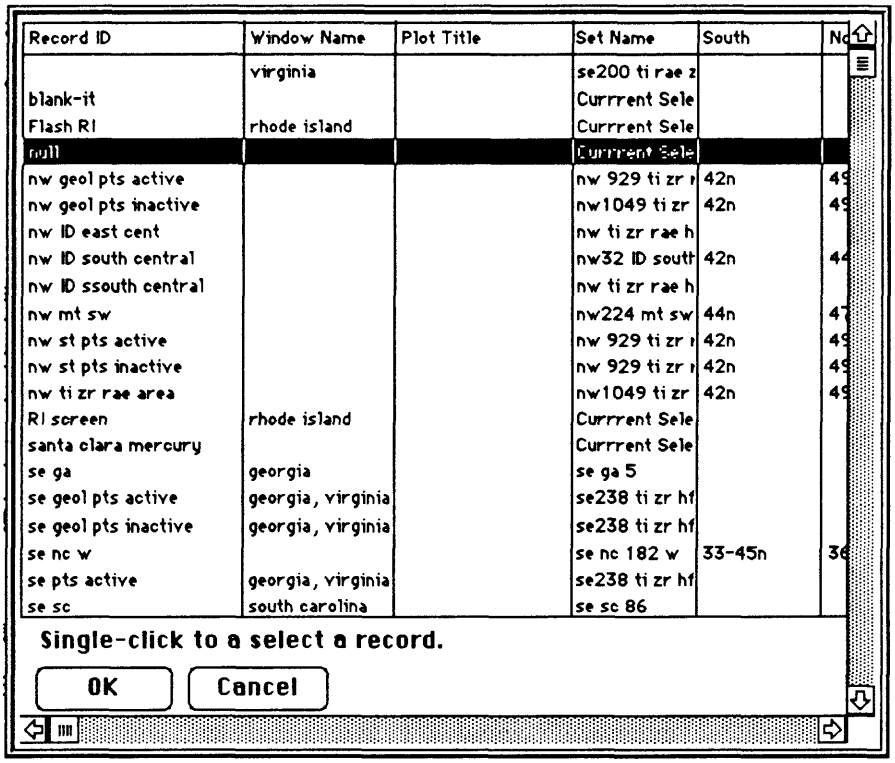
To show a columnar listing of the entire mineral site file, go to the **Search by Example** layout and click on the bottom button of **Records To Search** in the **Search by Example** layout. This establishes the entire mineral site file as the **Current Selection**. Then choose **Show Subset** for the columnar listing.

At this point attempting to change search criteria and search a larger set of records (that is, **All MRDS Set**) is not possible without reinitializing the search. This is most easily done by saving a "null" copy of the **Search by Example** layout as it appears when first entering MRDS - 4D. This copy can then be used to reset the layout for a new search. The procedure is as follows:

- Enter MRDS - 4D from the Grand Canyon scene. You will now be in the **Search by Example** layout.

- Press the **Save** button and follow the dialog box instructions to save the null criteria. Whenever you want to begin a new search,

- Press the **Load** button and specify the null layout as the file to be loaded,



- Press the middle button to make the current MRDS set (e.g. **All MRDS Set**) the **Current Selection**,

- Type the new search criteria and proceed with the search.

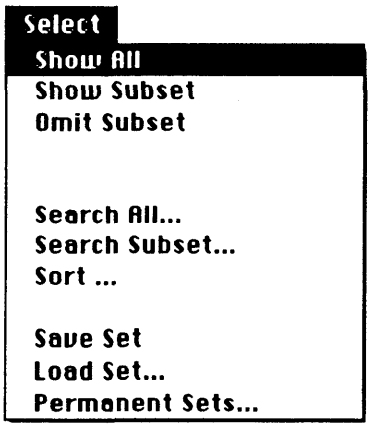
Selecting Records with the mouse in the column listing

Using the mouse to select records from a columnar listing is useful for several operations including using the search editor and displaying the full content of individual records.

Show All displays a columnar listing of the currently chosen **Permanent set** (as displayed in the middle button of **Records To Search** in the **Search by Example** layout). **Show Subset** displays the columnar listing for records in the **Current Selection**, or to establish, as the **Current Selection,** those records selected with the mouse.

A **Sort** (discussed later in this section) can increase the effectiveness of selecting records with the mouse.

For example, choose **Show All** to produce a columnar listing of the current MRDS set:



The columnar listing will appear on the screen:

Mineral Site File: 41 of 95881

No. Set	Record No.	Site Name	District	Latitude	Longitude	Ctry	St	Cty/Prov	Commodities Present
	M055599	NEW ALMADEN DISTRI	NEW ALMADEN			US	CA	SANTA CL	HG CR MN CU S
	M055600	BERNAL	NEW ALMADEN	37-13-12N	121-47-32W	US	CA	SANTA CL	HG
	M055601	BRAINARD		37-10-41N	121-53-08W	US	CA	SANTA CL	HG
	M055602	BOWIE		37-08-34N	121-51-30W	US	CA	SANTA CL	HG
	M055603	CHABOYA - HILLSDAL		37-17-19N	121-51-20W	US	CA	SANTA CL	HG
	M055604	GUADALUPE	NEW ALMADEN	37-12-38N	121-53-59W	US	CA	SANTA CL	HG
	M055605	NEW ALMADEN	NEW ALMADEN	37-10-46N	121-50-30W	US	CA	SANTA CL	HG
	M055606	NEW ALMADEN - COR/	NEW ALMADEN	37-10-27N	121-50-07W	US	CA	SANTA CL	HG
	M055607	NEW ALMADEN - HARI	NEW ALMADEN	37-10-38N	121-50-22W	US	CA	SANTA CL	HG
	M055608	NEW ALMADEN - VELA	NEW ALMADEN	37-10-45N	121-50-24W	US	CA	SANTA CL	HG
	M055609	NEW ALMADEN - CENT	NEW ALMADEN	37-10-31N	121-50-18W	US	CA	SANTA CL	HG
	M055610	NEW ALMADEN - VICT	NEW ALMADEN	37-10-46N	121-50-30W	US	CA	SANTA CL	HG
	M055611	NEW ALMADEN - NORT	NEW ALMADEN	37-11-06N	121-50-32W	US	CA	SANTA CL	HG
	M055612	NEW ALMADEN - SOUT	NEW ALMADEN	37-10-45N	121-50-48W	US	CA	SANTA CL	HG
	M055613	NEW ALMADEN - SAN	NEW ALMADEN	37-10-24N	121-50-40W	US	CA	SANTA CL	HG
	M055614	NEW ALMADEN - SAN	NEW ALMADEN	37-10-27N	121-50-46W	US	CA	SANTA CL	HG
	M055615	NEW ALMADEN - SAN	NEW ALMADEN	37-10-36N	121-50-48W	US	CA	SANTA CL	HG
	M055616	AMERICAN	NEW ALMADEN	37-10-52N	121-51-10W	US	CA	SANTA CL	HG
	M055617	PROVIDENCIA	NEW ALMADEN	37-11-21N	121-51-57W	US	CA	SANTA CL	HG
	M055618	ENRIQUITA	NEW ALMADEN	37-11-35N	121-52-01W	US	CA	SANTA CL	HG
	M055619	SAN ANTONIO	NEW ALMADEN	37-12-02N	121-52-46W	US	CA	SANTA CL	HG
	M055620	SAN MATEO	NEW ALMADEN	37-11-59N	121-52-33W	US	CA	SANTA CL	HG
	M055621	SENATOR	NEW ALMADEN	37-12-34N	121-53-33W	US	CA	SANTA CL	HG
	M055622	DEEP GULCH PLACER	NEW ALMADEN	37-10-25N	121-49-25W	US	CA	SANTA CL	HG

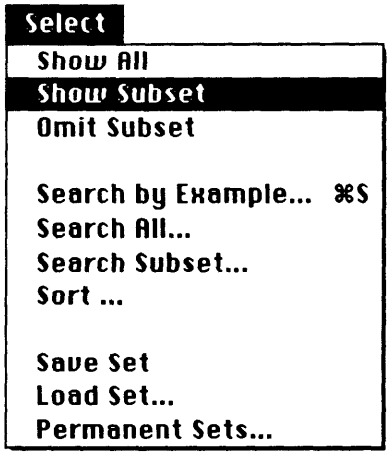
Renumber this Set | Form Reference List

Select records with:

click	*at the beginning of a group*
shift-click	*at the end of a group*
⌘-click	*any number of isolated records*

Only one **shift-click** group is allowed. However, an unlimited number of individual **⌘-click** records can be selected. You may remove a chosen record from your selection by pressing **⌘-click**. However, this can be done only one record at a time.

Selected records will be highlighted. Choose **Show Subset** from the **Select** menu to establish the selected records as the **Current Selection**.



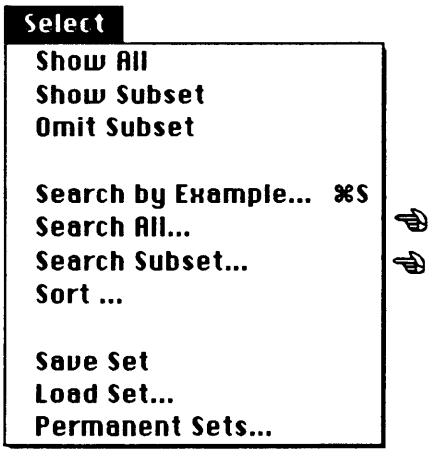
Note:
Omit Subset displays those records *not* selected.

The **Renumber this set button** is used to renumber the current set of the Mineral Site file as displayed in the **No. Set** column (if **Columns Numbered Set** is selected in the **Preferences dialog**). The numbers will appear on plots and printouts. See the section titled *Layers, Devices, Projections* for more information on the use of these numbers.

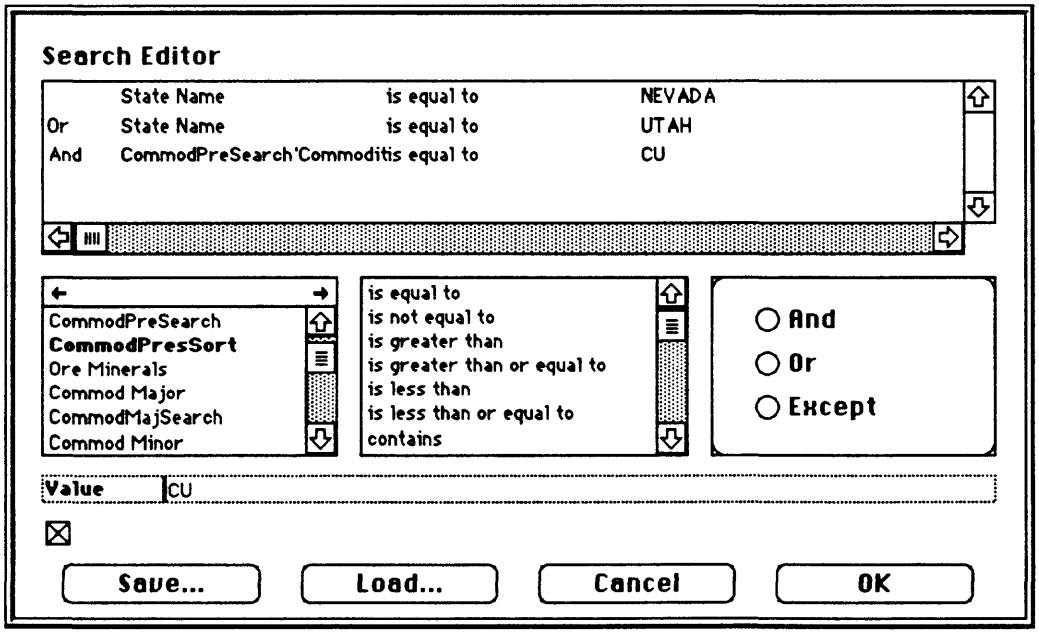
Initially the **No. Set** entries are blank, but individual numbers can be typed into the data entry layouts for the Mineral Site file. However, if a **current set** is renumbered, all records in that set will be renumbered beginning with the number one at the top of the columnar listing. Also, if the **current set** has no numbers displayed in **No. Set**, renumbering will begin with one. Whatever records are numbered, the numbers will remain so until erased, overwritten manually or renumbered in a subsequent list.

The **Form Reference List** feature at the bottom of the columnar listing display is not yet implemented.

The Search Editor



The 4th DIMENSION Search Editor is evoked from the **Search All** or **Search Subset** menu items. **Search Subset** searches only the records in the **Current Selection** and always results in a selection of records that is less than or equal to the **Current Selection**. The Search Editor is also available in the **User** environment. After searching, **Show Subset** displays the results of the search in column mode.



Establish search criteria in the Search Editor by first selecting the field name (left box) and operator (middle box). Finally enter the matching text (not case sensitive) or number. Then select the connector. For instance:

field name	operator	match text	connector
State Name	*is equal to*	*NEVADA*	
			OR
State Name	*is equal to*	*UTAH*	
			AND
CommodPreSearch	*is equal to*	*CU*	

Multiple criteria may be connected in a single search with **AND**, **OR**, or **EXCEPT** ("not") logic. The **AND** connector is equivalent to performing consecutive single criterion searches. Multi-criteria searches with **OR** connectors must be accomplished in a single search.

Multi-criteria search logic is strictly top to bottom; no grouping of criteria is supported. **AND** and **OR** have equal precedence. The retrieval set from the first criteria is **AND**'ed or **OR**'ed with the retrieval set from the next criteria, and so on until the list is exhausted except for indexed fields which *always* search the entire file. This can lead to unexpected results. For instance, the intention in the following search is to find all the copper records in Utah and Nevada:

CommodPreSearch	*is equal to*	*Cu*	
			AND
State Name	*is equal to*	*Utah*	
			OR
State Name	*is equal to*	*Nevada*	

First, 4th DIMENSION searches the entire file for copper records. Then it finds all the Utah records and performs a logical **AND** with the previous set to form a copper-Utah set. Finally, because State Name is indexed, 4th DIMENSION searches the *entire* file for Nevada records and **OR**'s the Nevada set with the copper-Utah set. Unfortunately, *all* the Nevada records meet the criteria, not just the Nevada-copper records. This is obviously not what was intended.

The correct results can be obtained by placing the **OR** clause first as in the following example:

State Name	*is equal to*	*Nevada*	
			OR
State Name	*is equal to*	*Utah*	
			AND
CommodPreSearch	*is equal to*	*Cu.*	

Indexed fields are usually searched more rapidly than non-indexed fields. For a list of indexed fields, see the section titled *The Mineral Site File.* The **contains** operator forces 4th DIMENSION *not* to use the indexes if any exist. For instance:

Site for Search contains Bingham

searches the current subset and is usually much slower than:

Site for Search is equal to Bingh@

which searches the entire file using the indexes. For this reason, it is advisable to narrow the selection as much as possible with indexed fields before a **contains** search.

The use of the 4th DIMENSION @ wildcard character for matching trailing characters is valid for alpha-numeric fields, but not for numeric fields such as LatitudeDecDeg.

Search criteria can be saved and reloaded at a later time. Select the **SAVE** button and enter a file name at the prompt. Alternatively, search results can be saved with the **Save Set** menu item.

Field Structure and Searching

Be careful when searching certain fields such as Commod Pres with the search editor, because database field names are not necessarily identical to the names used in the column listings. Commod Pres is represented by the name Commodities Present in the column listing. The structure of Commd Pres is not obvious from the columnar listing. It is not an 80-character field as is Commod Major, but rather a series of 4-character codes (maximum) separated by a blank. Each of the 4-character "subfields" must meet the criteria of the search. Also, if more than four characters were originally entered in the record, the fifth character will be accepted and placed where the blank should be. However, this fifth character is not considered during a search.

Thus, if the code COA1 (anthracite) is entered with a question mark as "COA1?", the question mark will appear in the listing, but a search for equality on COA1? will fail. A search for equality on COA1 will find all entries with COA1 and COA1?.

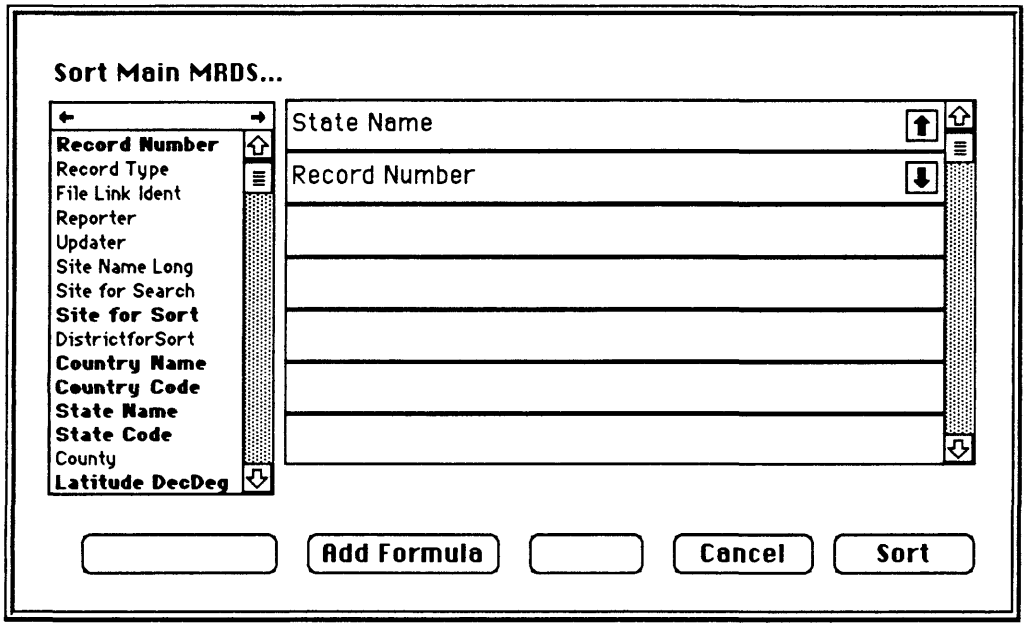
It is also possible that the data were entered as "COA1 ?". In this case the question mark becomes the next code in the series as if a question mark were a commodity code. This is because upon data entry, a blank terminates a commodity code and the next character typed is assumed to begin another commodity code.

These problems do not exist when searching the Commod Major field because the field is structured as an 80-character string. An equality search will only be logically true if the character string in the field ***exactly*** matches

the string specified in the search command. Of course a "contains" search can be used to find substrings within the 80-character field.

Sorting Records

Sort evokes the 4th DIMENSION sort editor. Click the arrow icon on the right hand side of the screen to change from ascending to descending sorts. Sorts on indexed fields are much faster than sorts of non-indexed fields. For a list of indexed fields see the section titled *The Mineral Site File*



Set Operations

Sets allow rapid access to a group of records in a file. Sets store pointers to records, not the data themselves. Each pointer occupies only one bit. Consequently, sets are very compact and load rapidly, making them very useful for speeding up demonstrations or for executing several different searches from a common subset.

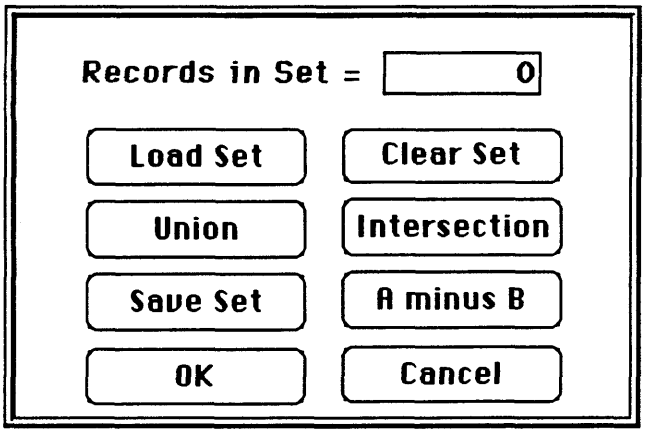
However, there are some disadvantages to sets. Because they are merely pointers to the first field in each record in the file and do not contain the record id, sets are not generally valid in databases other than the one in which they were created. Thus, sets are not necessarily transferable to other databases. Also, pointers may become invalid if some records are deleted *and* others are added that occupy the previous "holes" in the file.

Save Set

This operation saves pointers to records in the current selection of the current file to disk. The user must remember to which file a given set

applies. Choose a very descriptive set name, such as **Set Sites Reno Quad Au** and remember the folder you place the set in. If you have just placed a file in a folder other than the Sets folder, the next **Save Set** will default to that folder.

Load Set



The **Load Set** menu item under the search heading starts with the current record selection, which for this discussion will be called set **A**. Set **A** can be removed as the current set with the **Clear Set** button. The **Load Set** button replaces the current set with any selected set previously stored on disk, for example, **Set B**.

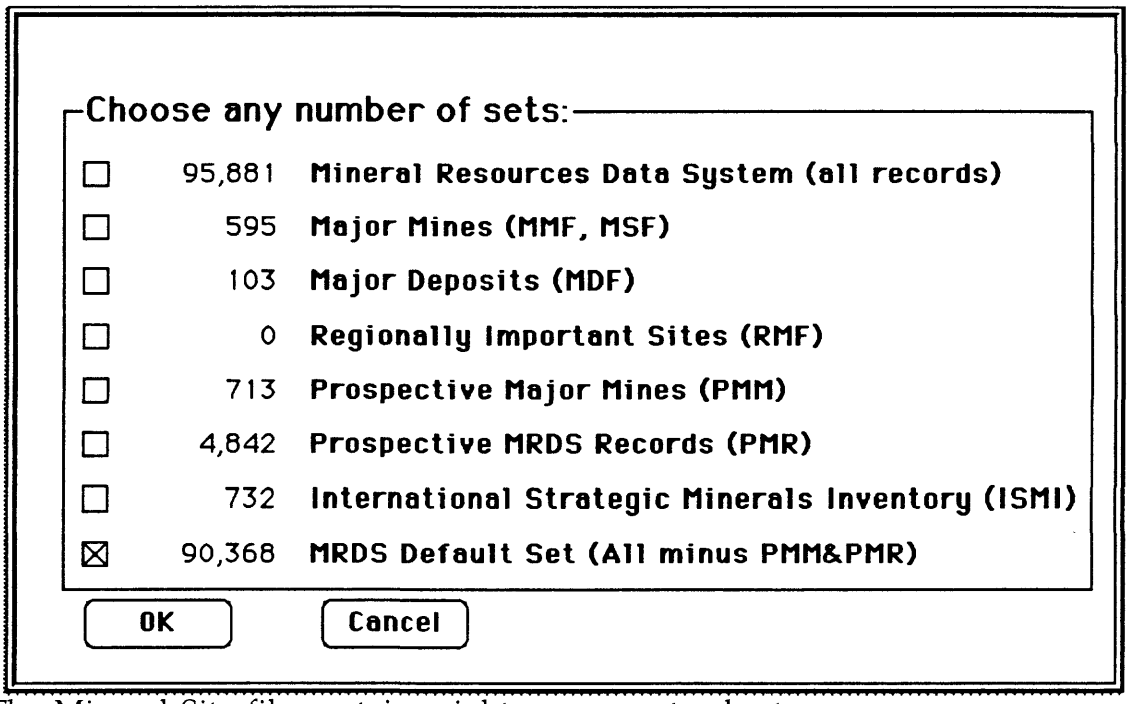
Save Set writes the set pointers to a disk file which you are asked to name. **OK** exits the dialog and makes set **A** the current set. **Cancel** also exits the dialog but reverts to the set in use before the **Load Set** menu item was evoked. The original set remains accessible with a **Cancel** regardless of how many operations have been conducted in the dialog.

Union adds records in set **B** to those in set **A**. More sets can be added by selecting **Union** again. The resulting set needs to be saved (click **Save Set**), to the name **Set A** or any other name, if it is to be loaded again. Otherwise click **OK** to exit the dialog and make it the current set.

Intersection forms a set of only those records common to sets **A** and **B**. More sets can be intersected by selecting **Intersection** again. The resulting set needs to be saved (click **Save Set**), to the name **Set A** or any other name, if it is to be loaded again. Otherwise click **OK** to exit the dialog and make it the current set.

A minus B performs a difference operation, finding records unique to **A**. It creates a set composed of those records in Set **A** which are not also in set **B**. More sets can be subtracted by selecting **A minus B** again. The resulting set needs to be saved (click **Save Set**), to the name **Set A** or any other name, if is to be loaded again. Otherwise click **OK** to exit the dialog and make it the current set.

Permanent Sets



The Mineral Site file contains eight permanent subsets:

- **MRDS** - *The entire Mineral Site file.*
- **Major Mines** - *Includes only mines with large current or past production.*
- **Major Deposits** - *Large reserves or resources but no current or past production, code MDF.*
- **Regionally Important Sites** - *Important production or reserves with respect to a specific country, state or region but not necessarily world-class sites, code RMF.*
- **Prospective Major Mines** - *Mines thought to be large but containing incomplete information. code PMM.*
- **Prospective MRDS Records** - *Records containing incomplete information, code PMR.*
- **International Strategic Minerals Inventory** - *Major mines and deposits of selected mineral commodities compiled as part of a six-nation cooperative program, code ISMI*
- **MRDS Default Set** - *The MRDS set minus the Prospective sets PMM and PMR.*

If multiple boxes are selected, the sets will be combined and called the **User Set** in the middle **Records to Search** button of the **Search by Example** layout.

Changing **Permanent Sets** selections sets the **Current Selection** equal to the set shown in the middle button of the **Search by Example** layout.

Certain operations can change the record count in permanent sets; therefore, a **Repair Sets** operation (under the **Enter** menu) should be performed after:

- Adding records via the **New Record** menu item.
- Changing entries in the File Link ID field.
- Deleting records in the **User** environment.
- Receiving records to a previously empty clone.

MRDS - 4D automatically **Repairs Sets** after:

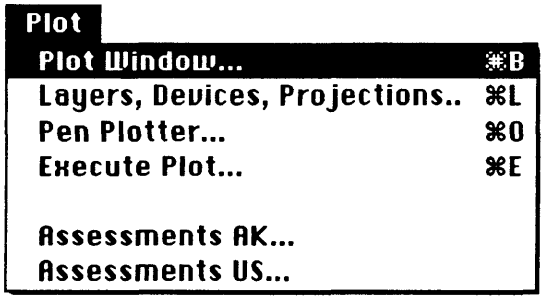
- **Receive Records** under the **File** menu
- **Delete Subset** under the **Enter** menu

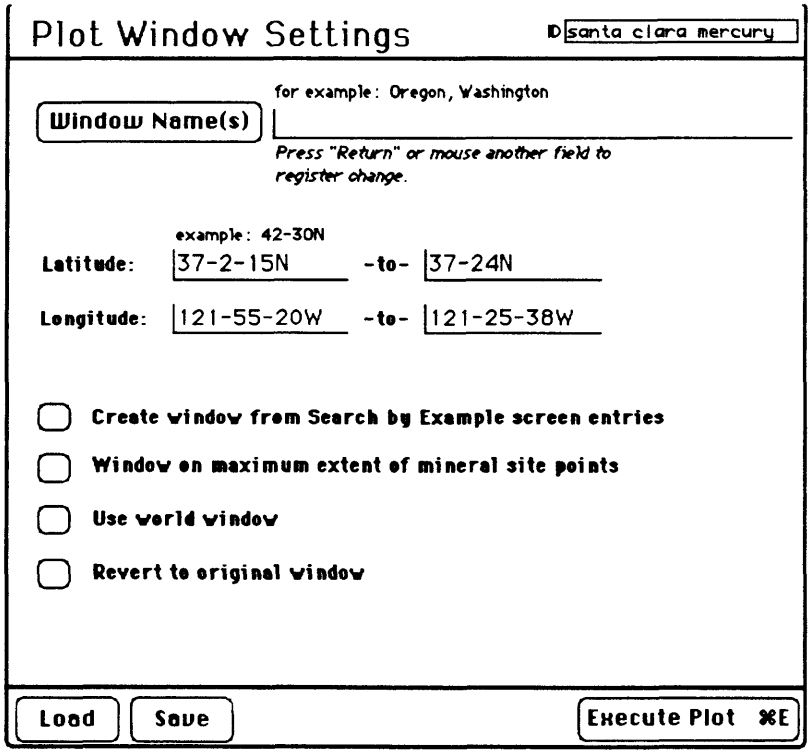
Plotting

The process of plotting requires that certain plot parameters be specified before executing the plot. These can be established by progressing through the **Plot** menu from **Plot Window** to **Execute Plot** (or the **Execute Plot** button). In actual practice, you will probably jump back and forth through the various menus as you produce a number of searches and plots. The key thing to remember is that you cannot execute a plot until a plot window is defined.

Selecting a Plot Window

From the **PLOT** menu in the menu bar, select **Plot Window.**





This will display the **Plot Windows** Dialog (above).

The plot window represents the actual geographic area to be plotted, expressed in degrees, minutes, seconds. The plot window can differ from the search area specified in the **Search by Example** screen. MRDS - 4D plots the area specified in **Search by Example** or the **Plot Window**, whichever was most recently visited. The plot window must be specified before trying to execute the plot from any dialog under the **Plot** menu.

Window Name(s)

The **Window Name(s)** button allows users to select areas by name with the mouse. Alternatively, one or more names, separated by commas, can be typed in. The user must press *tab*, *return*, or click on another field or button to register the entry. MRDS - 4D attempts to compute the latitude and longitude limits from a table of names. If MRDS - 4D is unsuccessful, either due to the name not being in the table or to a misspelling, an error message is displayed.

Latitude/Longitude

A third alternative for window selection is to type in the latitudes and longitudes. All four fields must be filled in for a valid window. Coordinate order is unimportant. Range is interpreted so as to not cross the poles or the 180° meridian. The user must *tab*, *return*, or click on another field or button to register the coordinates. The **Execute Plot ⌘E** menu item will **not** register the last coordinate typed if the cursor is left in the coordinate field.

Create window from Search by Example screen entries

MRDS - 4D derives an initial plot window from information in the **Search by Example** screen fields: latitude/longitude, quadrangle, country, or state. This computation takes place automatically every time **Search by Example** is visited, if so specified in the **Preferences** dialog. The **Create window...** button forces the calculation, and can be used if the preference item is turned off or if you have changed the **Plot Window** settings and wish to revert to the **Search by Example** settings.

Window on maximum extent of Mineral Site points

MRDS - 4D searches the current selection of Mineral Site points for their maximum latitude/longitude extent and adds 5 percent at each edge.

Use world window

This choice sets latitude/longitude to the MRDS - 4D default world window, which is currently set for latitudes 75N to 60S and longitudes 180W to 180E.

Revert to original window

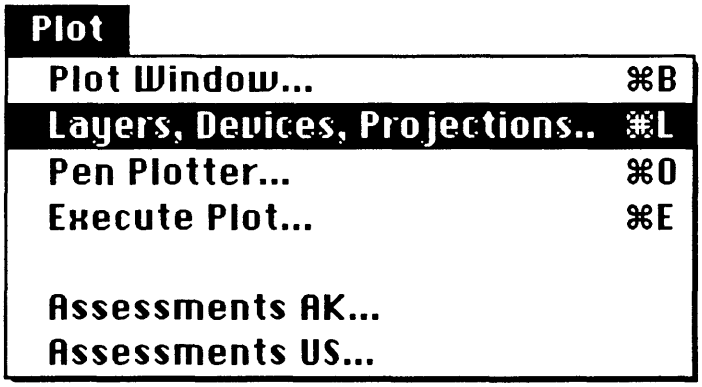
Resets the window parameters to those that existed when the **Plot Window** dialog was evoked.

Load and Save buttons

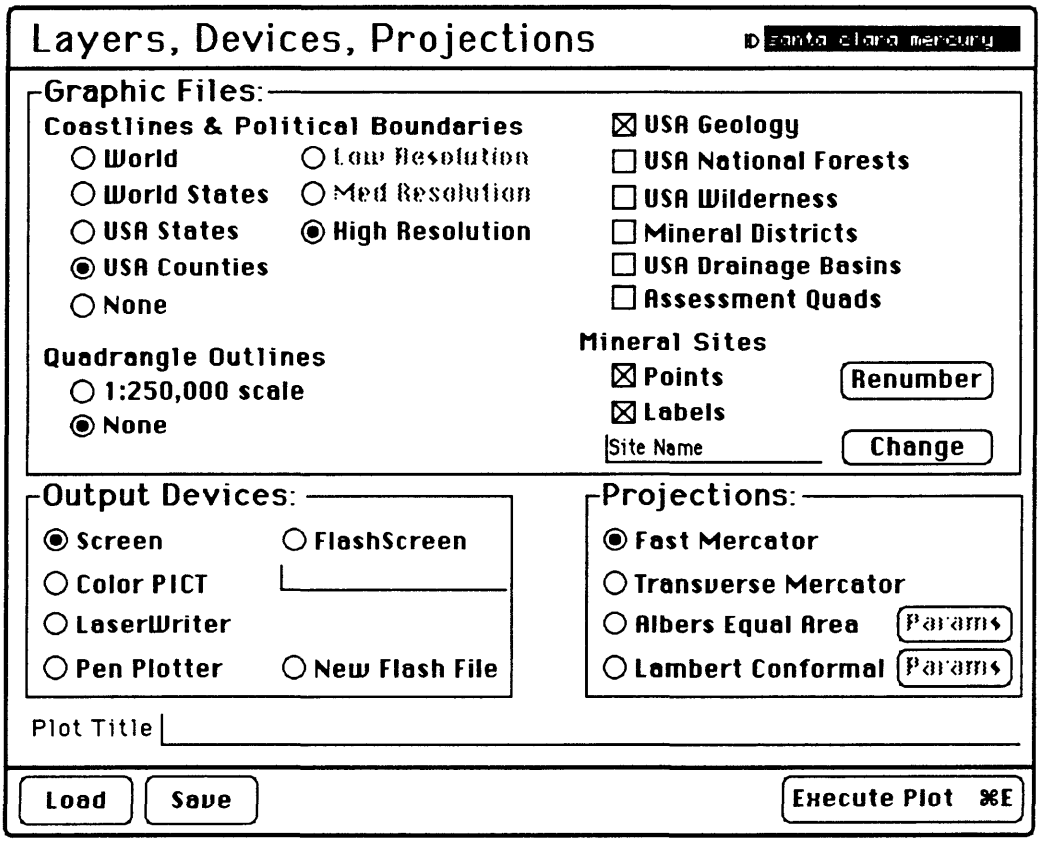
The **Save** button is used to save the contents of the **Plot Window dialog** to a file. Conversely, the **Load** button is used to load a previously saved **Plot Window Settings** dialog from the file identified in the **ID** box.

Layers, Devices, Projections

From the **Plot** menu of the menu bar, select **Layers, Devices, Projections**.



This displays the **Layers, Devices, Projections** dialog.



Graphic Files Selections

World

The world file is available in three resolutions. Originally from the CIA World Data Bank I file, it was generalized in ARC/INFO and exported to MRDS - 4D. The low-resolution version plots the fastest, but is too generalized for plots of areas covering less than 80 degrees. Medium resolution is useful down to approximately 5 degrees.

USA States

The USA States file is also available in three resolutions. It is based on U.S. Geological Survey National Mapping Division 1:2,000,000 scale DLG maps, generalized in ARC/INFO and exported to MRDS - 4D. Low resolution is suited mainly for large areas. Medium resolution remains useable down to state-size plots.

Counties

County boundaries originated as a U.S. Geological Survey National Mapping Division 1:2,000,000 scale DLG file which was generalized in

ARC/INFO. On MRDS - 4D, it is available in high resolution only and plots as black lines (white on screen plots) with the state outlines in red.

'1:250,000 - Scale Quadrangle Outlines'

1 by 2 degree quadrangle outlines can be selected. They plot as gray lines on screen plots. There is no text file associated with the quadrangles. The quadrangle name appears in the inset box as the cursor passes over a quadrangle boundary.

USA Geology

The geology file is a digitized version of the USGS Geologic Map of the United States (King and Beikman, 1974). It was created by both hand-digitizing and scanning, then converted to ARC/INFO for editing and exported to MRDS - 4D. The unit designations for the formations are shown in the inset box as the cursor is moved across the map. The formations are accompanied by a brief description of the unit excerpted from the King and Beikman explanation. This description is obtained by single clicking in the formation pattern.

The 160 geologic units are distinguished on the screen by a combination of pattern and color. The PICT and laserwriter patterns differ from the screen patterns so they can be distinguishedin black and white and take advantage of the higher resolution on the laserwriter.

USA National Forests

The USA National Forest file in MRDS - 4D is currently available only for Oregon. The screen plot shows forest boundaries in green unless the geology is also plotted, in which case the forest boundaries are white outlines. The areas are accompanied by a text description of the forest, which is obtained by single clicking when the forest name appears in the inset box. The forest names appear as the cursor crosses the forest boundary.

USA Wilderness

The current USA Wilderness file covers Nevada, Idaho and Oregon. Boundaries plot on the screen in yellow unless the USA Geology is also plotted, in which case boundaries are white. The wilderness areas are accompanied by a text description of the area with selected references, which is obtained by single clicking within the wilderness boundary. The wilderness name appears in the inset box when the cursor is within a wilderness boundary.

Mineral Districts

The Districts and References files refer to groups of mineral sites with common features. For Arizona, the only state entered, the districts refer to mineralized areas with common metallogeny. Some districts overlap. A screen plot of a particular district is available in its data-entry layout in the district file. The data entry layout is evoked by double clicking a record in the column listings. District outlines can also be plotted by selecting the Mineral **Districts** check box in the **Layers....** dialog.

The district outlines were digitized at a scale of 1:1 million and are somewhat inaccurate at larger scales such as 1:250,000.

USA Drainage Basins

The USA drainage basins plot as blue outlines. They originated as USGS National Mapping 1:2,000,000 scale DLG data and constitute the 20 major basins of the conterminous U.S.

'Mineral Sites: Points and Labels'

MRDS - 4D displays the deposit points as small white circles with black outlines on the screen. The first 27 characters of the site name are displayed in the inset box as the cursor passes over the circle. Selecting a round button with a single click evokes an abbreviated text record describing the deposit. To display the entire record, click on the **Long Form** button of the text record screen.

On Laserwriter and Color Pict plots the deposits appear as "+" symbols with an optional label if the **Labels** box is clicked in the **Layers....** dialog. Hewlett Packard pen plots can display as many as seven symbols for data values or nested symbols for multiple commodities.

For all output devices, the optional label can be changed to any of the Mineral Site file fields, such as Major Commodity or Host Rock Type, displayed in the list that appears when you click the **Change** button.

Renumber

Clicking this button performs the same numbering function as clicking on **Renumber This Set** on the column listing screen. The numbers remain stored in the record until erased or overwritten by new numbers or a new version of MRDS - 4D. Once numbered, records can be sorted by any other field in the record yet still plot with the correct number. They can be sent using **Send Records** with the **Tab text** format.

To plot the numbers, select the **Change** button and then select the *Number in Set* field. The *Number in Set* field is actually composed of two fields in the data structure:

(1) As a right justified *numeric* field called *No in Set Numer* that displays and sorts correctly in the column listings

(2) As a left justified *character* field called *No in Set Alpha* that plots quickly because it does not have to be converted to a string.

Output Device Selection

Screen

The default output device is the monitor. Active screen objects are round buttons or polygon buttons. The round buttons are discussed in the previous section under *Mineral Sites: Points and Labels.*

Screen plots of polygonal features such as National Forests, Wilderness Areas, USA Geology, or Mineral Districts are overlaid with buttons that follow the polygon outlines. The polygon name appears in the inset box when the cursor passes over the active area. Clicking once within the polygon displays a text description of the area. For example, if USA Geology is selected as a layer, clicking once in the polygon will display text from the King and Beikman explanation. The 1 by 2 degree quadrangle names also appear but have no accompanying text file. Mouse-click outside the map area to exit the map.

Color Pict

Color PICT plot files can be edited and printed in separate graphics programs such as MacDraw, Canvas, or LaserPaint. When printing wide plots, it is sometimes desirable to rotate the plot to better fit the page. However, rotating a plot to landscape mode in **Page Setup** can cause lengthy print times. Use the following procedure in MacDraw to rotate documents *before* printing:

- Select **Layout** menu, **Turn Autogrid Off** item.
- Select the **zoom-in** box, which is the larger of the two mountain icons in the lower left.
- **Pull** apart **labels**. Optional step to separate the overlapping MRDS point labels, if any. The practical upper limit is about 50 labels. To make it easier, ⌘A to select all the labels, then change text size to 9.
- Select the **zoom-out** box, which is the smaller of the two mountain icons in the lower left. Zoom-out until the document is about 1/4 of the screen size.
- Select **Layout** menu, **Drawing Size** item. Change width from 8 to 16 inches.

- Select **Edit** menu, **Select All** item. Then select anywhere inside the document and drag it away from the upper and left hand page limits a small distance.

- Select **Arrange** menu, **Group** item.

- Select **Arrange** menu, **Rotate** item. Then hold down the shift key and drag the lower left corner to the right. It will pause at 45°, then as you continue to drag, it will stop at 90°. Press ⌘T to turn off Rotate. Drag the entire document back near the left hand edge of the window.

- Select menu **File,** item **Page Setup.** Change *Reduce or Enlarge* to 120%. Do not switch to landscape mode!! Select OK, then re-center the document in the page by dragging.

- Select menu **File,** item **Print.** In *Pages From to* , type *1 tab 1*, then select OK. It should print in about five minutes.

Laserwriter

A laserwriter file is a PostScript plot file that can be sent to the laser printer as a background task with a separate program such as SendPS•1.21 or the desk accessory TOPS Spool.

Flash Screen

The **FlashScreen** option offers a rapid method of creating a screen plot using a previously saved Flash File. All layers and projections are stored in the flash file except **Points and Labels**, which must be redrawn on top of the FlashScreen. They must be respecified in the **Plot Parameters** dialog. Also, the correct plot window and projection must be selected for the points to correctly overlay an existing FlashScreen. You must remember the correct parameters for each FlashScreen.

New Flash File

New Flash File creates FlashScreen files for storage and later use with the **Flash Screen** option. Use careful file naming conventions. For example, the name "Flash Reno Wild" could be used to represent a flash file of wilderness areas in the Reno 2-degree quadrangle. At present, flash files should be saved in the local MRDS - 4D folder rather than the Flashfile folder. This may be corrected at a later date.

Pen Plotter

A pen plotter file contains Hewlett Packard Graphics Language (HPGL) commands for HP 7550A or later pen plotters capable of producing E size plots. The plotter file can be sent to an HP compatible plotter using a communications program (via the modem port) such as Red Ryder or by using the **Send to Plotter** button in the **Pen Plotter Symbols** dialog box. Red Ryder can be run as a background task; however, multitasking is not available with the **Send to Plotter** feature.

Projections

Fast Mercator

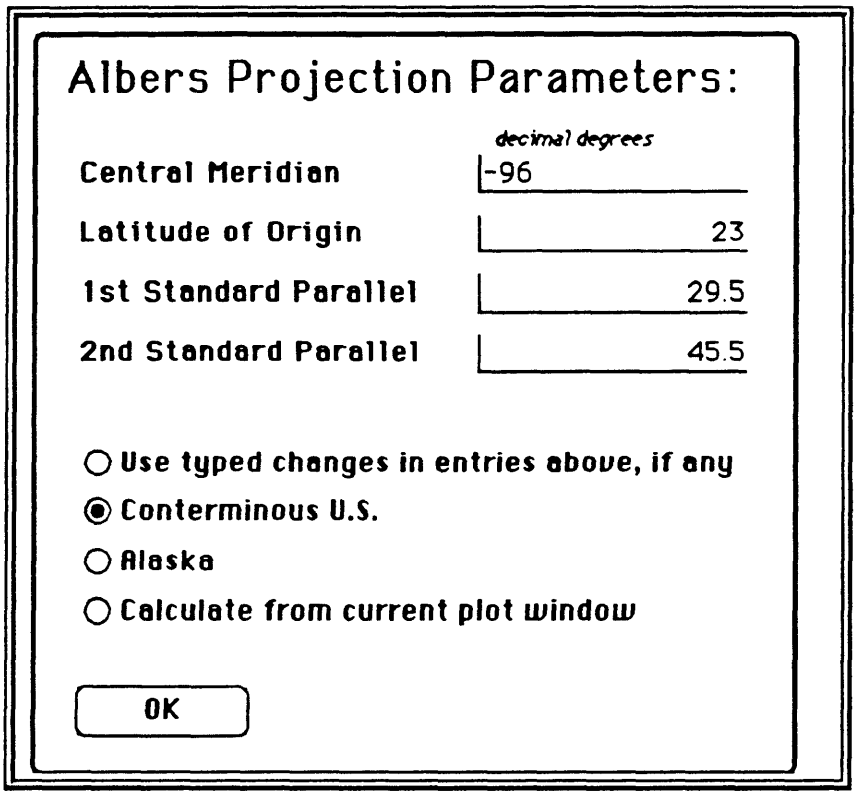
The Fast Mercator projection is executed quickly and can be used to display large areas such as a hemisphere or the world. The meridians are parallel, latitude lines are parallel but not equidistant. Scale is true at the equator. Distortion becomes great near the poles.

Transverse Mercator

Transverse Mercator has less distortion near the poles and can be used for maps of greater north-south extent. Scale is correct along a central meridian. Transverse Mercator projections overlie USGS quadrangle topographic maps at scales of 1:2,500,000 to 1:24,000. They also overlie polyconic projection maps. Use the **Pen Plotter** output device to generate overlays for USGS quadrangle maps.

Albers Equal-Area Conic

The following dialog is available with the **Params** button:

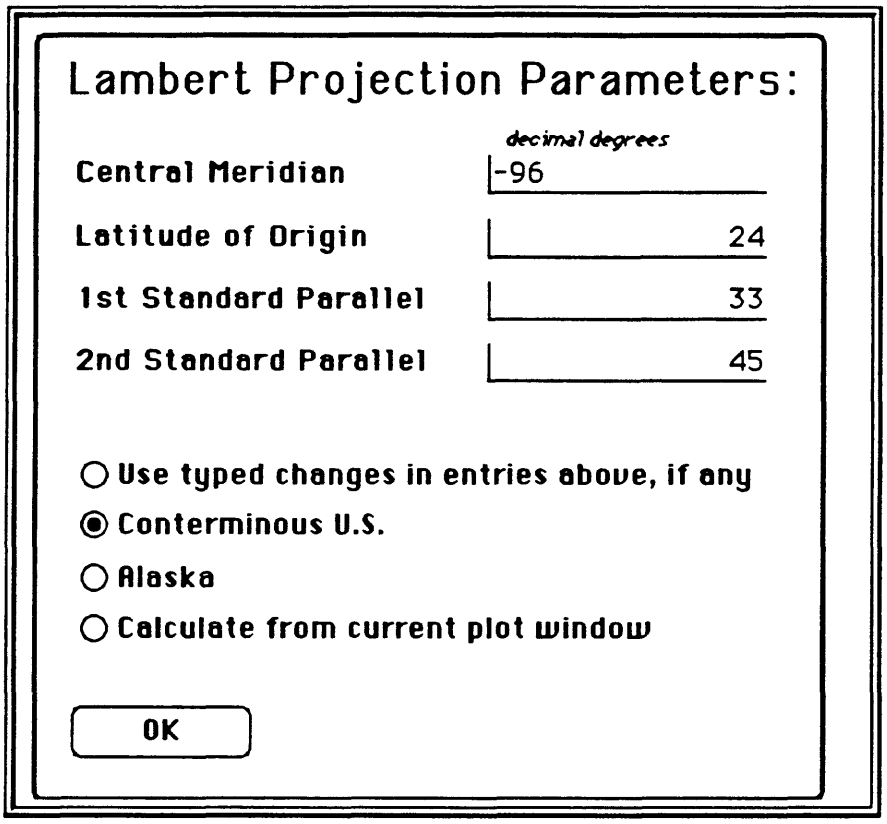


The Albers Equal-Area Conic projection is used for large areas oriented predominantly east-west. MRDS - 4D Albers plots overlie the King and Beikman (1974) map if the standard settings for the U.S. are used. The **Conterminous U.S.** option skews states far from the central meridian. To avoid the skewed appearance, select the **Calculate from current plot window** option, which is the default. Suggested U.S., Alaska, and Hawaii values are shown below:

parameter	U.S.	Alaska	Hawaii
• central meridian	96°W	154°W	157°W
• latitude of origin	23°N	50°N	3°N
• first standard parallel	29.5°N	55°N	8°N
• second standard parallel	45.5°W	65°N	18°N

Lambert Conformal Conic

The following dialog is available with the **Params** button:

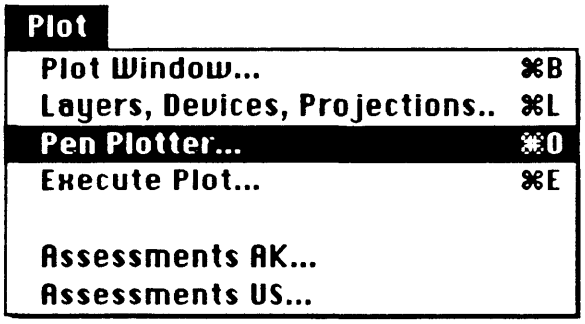


Lambert Conformal Conic projection may be used on large areas oriented predominantly east-west. MRDS - 4D pen-plotter plots made with Lambert projection overlie the State base maps of the U.S. at 1:500,000 scale if the standard U.S. parallels are used with the correct central meridian for that state. The **Conterminous U.S.** option tends to skew states far from the central meridian. To avoid the skewed appearance, select the **Calculate from current plot window** option, which is the default. Suggested U.S. and Hawaii values are shown below:

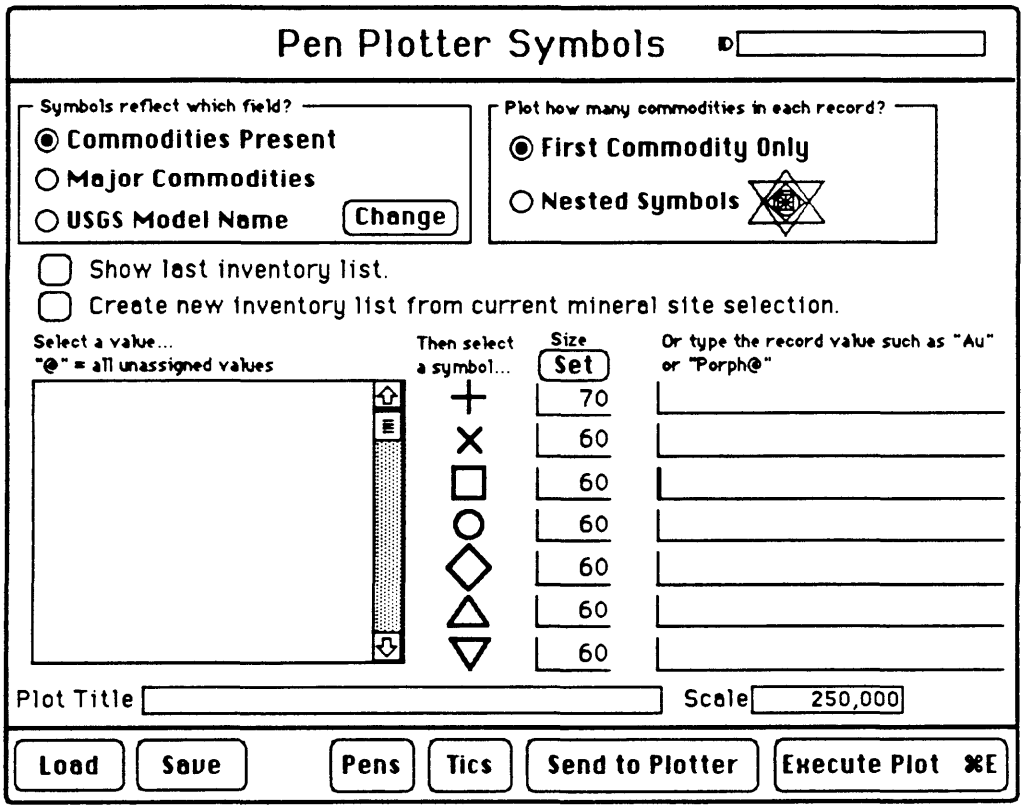
parameter	U.S.	Hawaii
• central meridian	96°W	157°W
• latitude of origin	23°N	3°N
• first standard parallel	33°N	20°40'N
• second standard parallel	45°W	23°20'N

Pen Plotter Symbols Dialog

From the **Plot** menu of the menu bar, select **Pen Plotter**.

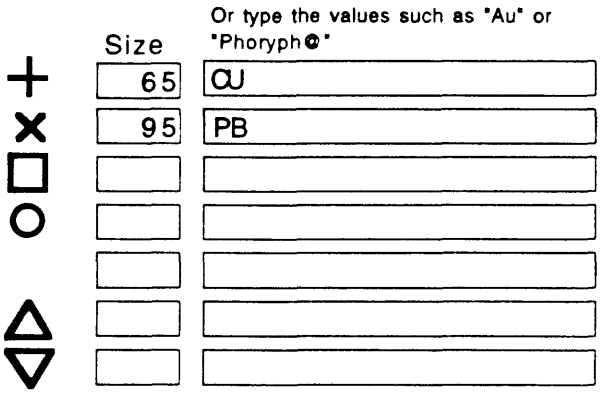


This displays the **Pen Plotter Symbols** dialog.



Pen Plotter Symbol Sizes:

The pen plotter symbol sizes are user definable in the **Pen Plotter Symbols** dialog. MRDS-4D alternates between two arrays of symbol sizes depending on whether **Nested Symbols** is selected. The **Set** button stores the currently displayed values in non-volatile memory as defaults. The two sets of default values, one for nested and one for single symbols can be set independently. The numbers represent hundreths of an inch.



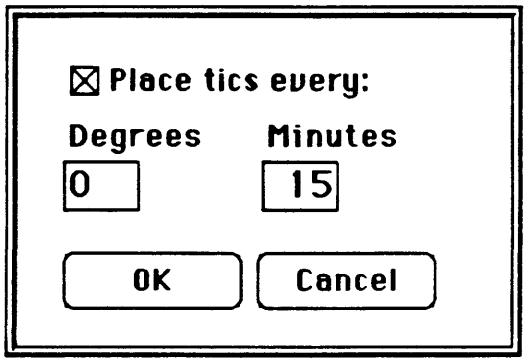
Plot title

Enter the plot title. The length is limited only by the paper size. This is the same title on the **Layers, Devices Projections** dialog.

Pen Assignments

The **Pens** button at the bottom of the **Pen Plotter** symbols dialog, allows changing pen number assignments. The settings revert to the following default settings (for an 8 pen carousel) when MRDS - 4D is launched. The MRDS - 4D standard for associating pen number, color and feature represented is discussed under the topic *PenTypes*, later in this section .

The **Tics** button at the bottom of the **Pen Plotter Symbols** dialog is used to select the placement of latitude and longitude tic marks on the plot.



Commodities Present, Major Commodities, USGS Model Name, Change

This feature associates values based on the contents of a field to a symbol type. For example, an inventory list for the field **Commodities Present** might contain the values **AU, AG,** and **CU**. Any of the symbol types displayed in the dialog box may be associated with any value. Note that symbol type is distinct from symbol label, which is a text item as defined in the **Layers...** dialog box and is plotted next to the symbol. The third button defaults to **USGS Model Name** but can be changed with the **Change** button. This evokes a list of Mineral Site fields, any one of which can be associated with a symbol type.

The association between field value and symbol type is made as follows:

1. Display the desired inventory list (that is, values).

2. Click on a field value.

3. Click on the symbol to associate with the field value.

4. The field value will appear opposite the symbol at the right of the dialog box.

Do not use the **Change** button to choose a commodity field. Full implementation of the commodity fields for plotting is achieved only by using the **Commodities Present** or **Major Commodities** buttons in the dialog box. For example, individual commodities can be chosen and associated with the desired symbols only by using the **Commodities Present** button. If **Commodities present** is chosen from the **Change** list, the entire field is plotted as a unit, not as separate commodities.

First Commodity Only or **Nested Symbols**

The **First Commodity Only** option plots a single symbol based on the first commodity listed in the field. The **Nested Symbols** option plots up to seven symbols at each site.

Show last inventory list, or **Create new inventory list**

The current selection of Mineral Site file records can be inventoried to list the entries for the chosen field. The current limit on the number of records inventoried is about 500. An inventory list appears in the scrollable area. The list is blank on evoking the dialog. **Show last inventory list** displays the most recent inventory conducted; this list may or may not apply to the current Mineral Site file selection.

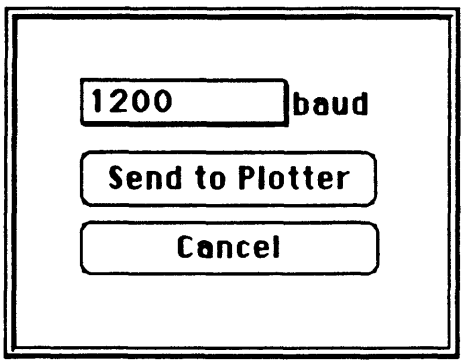
Enter the commodities as you wish them to appear in the explanation. Alternatively, select a commodity from the list in the scrollable area. Then select a symbol with the small boxes to the left of the symbols. Keep in mind the commodities will appear in the explanation exactly as typed in the boxes next to the symbols. They may be retyped in lower or upper case to improve the appearance of the legend without affecting the retrieval.

Executing the pen plot

Preparing a screen plot before making a pen plot file can sometimes be useful to verify that the correct deposits have been chosen. After the plot has been checked on the screen, change output devices to **Pen Plotter**. To execute the plot, click on **Execute Plot** or press ⌘E. MRDS - 4D prompts for an output file name. Be sure to select the correct folder in the pop-down menu above the scrollable area. Then type a new file name or reuse the old name. MRDS - 4D displays the scale (defaults to 250,000 but can be changed by the user in the **Pen Plotter** dialog) and suggested paper size

When the plot file is complete, load the plotter with paper as shown under **Operating the Plotter.** Then prepare the pen carousel as described under **Pens**.

The send pop-up menu shown below appears after creating a plot file. Also, a send button is located in the **Pen Plotter** dialog. The baud rate is adjustable. Click on **Send to Plotter** to select plot file and intiate plot.



If you wish to avoid tying up MRDS - 4D during long plots, launch Red Ryder and check its settings as follows:

- Click in the upper-center box of the main screen until it says **2400-N-8-1-FULL.**
- **File** menu, **TEXT File Transfer Preferences...** item. Turn off all the items in the dialog by deselecting the four check boxes on the left. Click OK.
- Send the plot file to the plotter with **File** menu, **Send TEXT File** item.

Pen Types

Ceramic-tip pens

Ceramic-tip pens are a good compromise between the line quality of rapidograph and the ease of use of fiber-tip.

Fiber-tip pens

Fine-point fiber-tip pens are the best all-around choice for most paper plots. They produce reasonable line quality and color. Their disadvantages are:

(1) **Drying out in the carousel.** For overnight storage unload the pens from the carousel and replace the small black cap. The seal in the carousel can be improved by cleaning the receptacle as recommended in the manual.

(2) **Drying out while plotting.** Test the pens by hand, particularly before long plots to see if they are low on ink. The ink reservoir is small, geared to the expected tip life. Replace pens frequently to avoid having them dry out in the middle of a plot. The manual test is sometimes less than definitive, because a pen may lack sufficient flow during rapid plotting.

If a pen runs out of ink during a plot, it may be possible to save the plot by leaving the paper exactly where the plot finished, removing all the pens, replacing the expired pen and re-sending the plot file.

(3) **Fuzzy line quality.** Fiber-tip pens are fragile. On HP DraftMaster models, the pen force is set with the carousel column setting. Turn the center column until the white line points to the fiber-tip pen icon on the top, otherwise premature wear can occur. On the HP 7585B model, each carousel has a fixed pen type and is so marked in the center of the carousel stem.

Roller-ball pens

Roller-ball pens are very rugged and have a large ink capacity but give lesser line quality and color. They tend to skip in later life. However, for a production-oriented shop, they are the pen of choice.

Rapidograph

Both the disposable and refillable rapidograph pens tend to clog, even when stored capped with the tip down. The only solution is to place the tip in an ultrasonic cleaner for a few minutes. Generally, the inconvenience of rapidograph pens is only justified for plots on mylar base.

The carousel

The carousel must be matched with the correct pen type. On HP DraftMaster models, the carousel with the short pen holders accommodates fiber-tip and roller-ball pens. The carousel with rubber extensions on the holders is for rapidograph pens. The carousel stem must be set for the correct pen type. Turn the center column until the white line points to the correct pen icon on the top. This sets the correct pen speed and force. On the HP 7585B model, each carousel has a fixed pen type and is so marked in the center of the stem.

The pens can be loaded in any order; however, the MRDS - 4D default is the following:

Holder/Color	Plotted Feature
1 = black	coastlines, countries, plot title
2 = red	scale bar, lat/long tics
3 = green	national forests
4 = blue	Mineral Site file symbols, legend
5 = purple	mineral districts
6 = yellow	counties
7 = orange	wilderness

8 = brown state boundaries

Plotter Settings

HP DraftMaster model

The following settings are made from the keypad on the front panel:

1) Choose a function with the **Next** key which is marked **1 2**.
2) Modify the function with **f1** to **f4** keys.
3) Save the setting with the • key.

The best settings are:

Rotate	Off	
Invert	Off	
Expand	Off	
Emulate	Off	
Group	1	
Sort	On	
Serial	Dataflow	press **f1** to Remote
		press **f4** to Standalone
	Baud	2400
	Parity	0
	Hardwire	Off
press the **Next 1 2**		button to see these four options:
	Bypass	Off
	Monitor	Off
	Duplex	Full
	Auto-Disc	Off

The only parameter that differs from the default setting is Serial Hardwire. The default settings can be restored by holding the **Cursor Control** button while turning on the machine.

HP 7585B model

Most settings are accomplished via the back panel dip switches. The parameters are similar to those for the DraftMaster model. The plotter must be turned off then back on to register changes.

Operating the Plotter

HP DraftMaster model

- Turn the plotter on and lift the tinted carriage cover by its handle in the center. Disengage the pinch wheels by pulling the lever on the right towards you. Insert the paper under the pinch wheels.
- Smooth the paper against the stops on the right. Paper should be just touching both front and back guides. If the paper is not perfectly square with the machine, the pinch rollers will run off the edge and destroy it.
- Engage the pinch wheels by pushing the lever on the right away from you. Lower the tinted carriage cover. The plotter automatically finds the paper size.
- Connect the plotter to the Mac with the appropriate cable (see **Cable**) or switch box and send the plot file with MRDS - 4D, Red Ryder, or some other communications program.
- When the plotter is finished drawing, disengage the pinch rollers with the lever on the right. The pinch rollers deteriorate if left engaged for long periods of time.

HP 7585B model

- Turn the plotter on and lift the tinted carriage cover by it's handle on the left. Insert the paper under the pinch wheels.
- Smooth the paper against the stops on the left. Paper should be just touching both front and back guides. If the paper is not perfectly square with the machine, the pinch rollers will run off the edge and destroy it.
- Lower the tinted carriage cover and press **HOLD** then **REMOTE**. The plotter automatically finds the paper size.
- Connect the plotter to the Mac with the appropriate cable and send the plot file with MRDS - 4D, Red Ryder or some other communications program.
- When the plot is done, press **VIEW** and **UNLOAD** to disengage the pinch rollers. The pinch rollers deteriorate if left engaged for long periods of time.

Cable Connection

The standard Mac-modem cable, also called the System Peripheral cable can be connected to the HP-PC cable which is then connected to the plotter. For longer distances, a serial cable can be fabricated with 4 conductor round telephone wire. The pin assignments are as follows:

Mac System Peripheral 8 cable 25 pin male.

2 3 7 8
| | | |
3 2 7 20

HP Plotter 25 pin RS232 female.

The cable is not symmetrical and cannot be switched end for end.

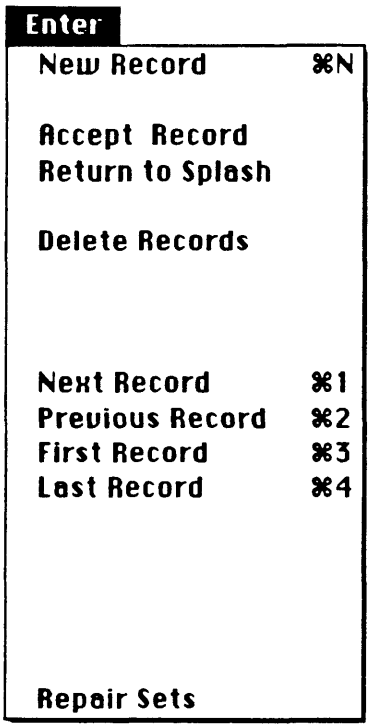
Assessments AK and **Assessments US**

These features are not fully implemented, therefore the menu items will not be discussed in this manual.

Entering Data

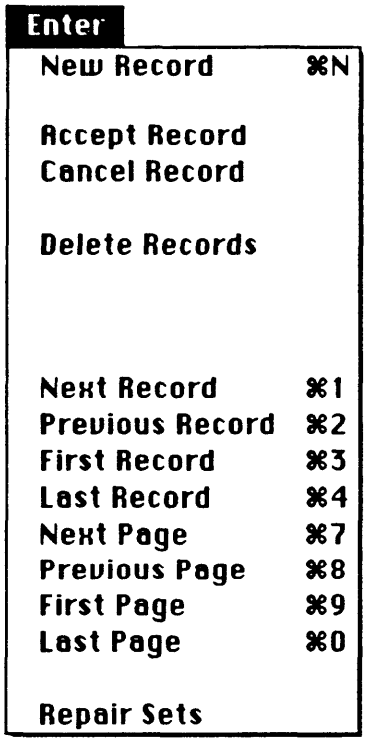
The items available under the **Enter** menu when displaying a columnar layout are different from those in the **Enter** menu when displaying the data entry layouts (title bar displays: **Modifying Record.**) When working from the columnar layout, it is recommended that you use only **New Record, Delete Record**, and **Repair Sets.** The other operations are more easily performed by using the buttons at the top of the data entry layouts. Even the **Enter** menu items available in the data entry layouts have limited usefulness.

Enter Menu Items Available from Columnar Layout



The menu item **Return to Splash** returns the user to a full screen display of the USGS buffalo logo. The usefulness of this is questionable; however, you can proceed by selecting from the Menu bar. The term "splash" is from the 4th Dimension language and simply means a display or announcement created by the data base designer.

Enter Menu Items Available from data entry Layout:



New Record *menu* item

New Record (used from either the columnar layout or data entry layout) opens an input layout for data entry. After opening a record, direct access to any of the 14 pages of the layout is provided by the buttons that appear at the top of the input layout.

For the Mineral Site file, latitude and longitude must be entered as formatted items with leading zeros:

dd-mm-ssN or S	*latitude*
ddd-mm-ssW or W	*longitude*

MRDS - 4D converts these items to decimal degrees as they are entered. If the decimal degrees readings disagree with the degree-minutes-seconds fields, check the format of the latter.

Cancel *button*

Clicking the **Cancel** button avoids saving any changes made to the current (new or modified) record, then exits the record. The **Cancel Record** menu item under the **Enter** menu performs the same operation.

Enter *button*

Clicking the **Enter** button saves the current (new or modified) record and then exits the record. The **Accept Record** menu item under the **Enter** menu performs the same operation.

Delete Records *menu* item

Deletes the current record or the current selection.

WARNING

The **Delete Records** operation cannot be undone! **Delete Records** permanently alters the disk file. Deleted records can only be recovered from backups or from another copy of MRDS - 4D.

First Record, Previous Record, Next Record, Last Record *buttons*

The **First Record, Previous Record, Next Record,** and **Last Record** buttons (left to right as shown above) allow navigating between records without going to the columnar listing. This can save time. If changes were made to a record, clicking these buttons is the same as clicking the ENTER button, which will save all changes. These buttons are not active during initial data entry, but only for records already present in the database. Again, it is preferable to use these buttons rather than the equivalent items under the **Enter** menu.

Page ***buttons and menu items***

These buttons are for navigating to pages (screens) within a record. Each record is composed of 14 pages. Navigating can also be done from the **Next Page, Previous Page, First Page,** and **Last Page** selections under the **Enter** menu. Again, it is preferable to use these buttons rather than the **Enter** menu items.

Apply Formula *menu item*

This feature is not implemented yet. Use the **Apply Formula** under the **Enter** menu in the **User** environment. It allows making global changes to a field in every record in a selection.

Repair Sets menu item

Adds or deletes records in the eight Permanent Sets, which are under the **Select** menu. **Repair Sets** should be done after:

- Adding records via the **New Record** menu item.
- Changing entries in the File Link ID field.
- Deleting records in the **User** environment.
- Receiving records to a previously empty clone.

MRDS - 4D automatically **Repairs Sets** after:

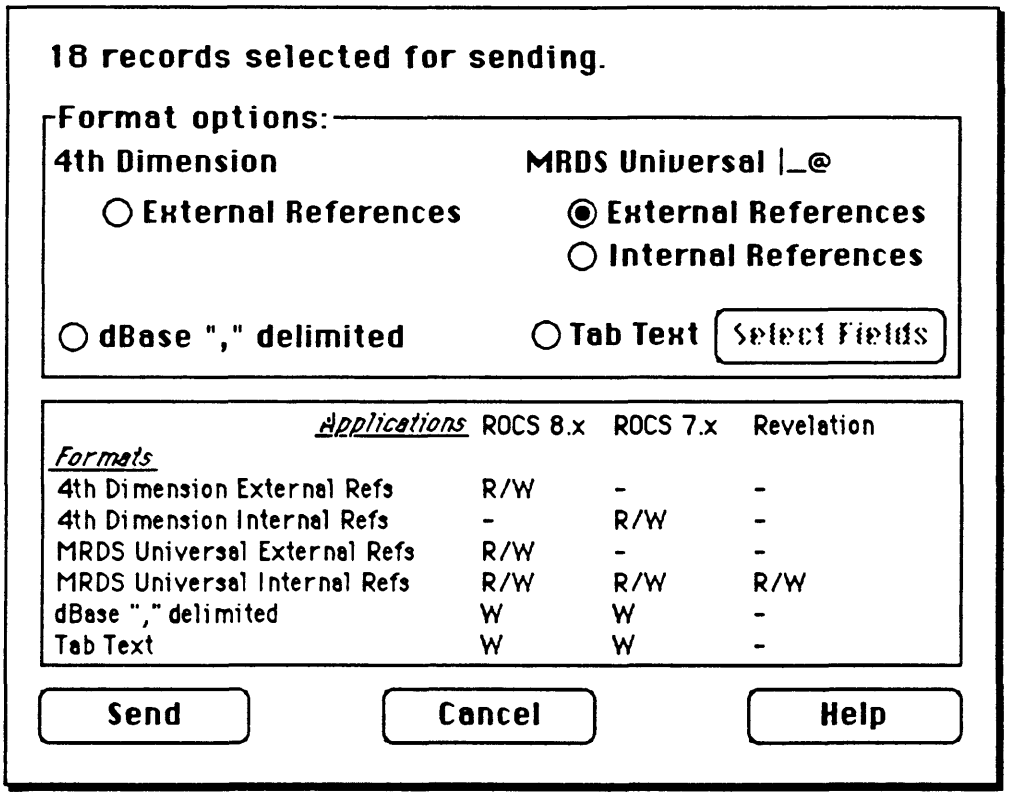
- **Receive Records** under the **File** menu
- **Delete Subset** under the **Enter** menu

Transferring Data

Send Records

Send Records item under **File** menu uses the **current set** regardless of how it is established. The **current set** can be established from the **Search by Example** screen, by selecting records from the **columnar listing** with the mouse, or by loading previously saved sets.

The send records dialog box is accessed from the **File** menu.



Send Records has four output file options. The **4th Dimension** and **MRDS Universal** formats require the user to chose between external or internal reference format. The distinction between the two reference formats is how these reference fields were structured in the various versions of MRDS - 4D and the use of a references file external to the MRDS records.

*The simplest way to proceed is to follow the chart in the dialog box. The **Help** button also provides more information on the various formats.*

The four output file options are summarized as follows:

1) **4th Dimension** format - Creates a file that can be loaded into another MRDS - 4D database with **Receive Records**, provided the file structures are identical. Select **4th Dimension** format only when transferring between MRDS - 4D databases that are 8.0 or later. Also, if the databases do not have identical structures, the transfer can crash the database. In this case, the safe alternative is the **MRDS Universal, External References** format, which is slower but less likely to ruin a database.

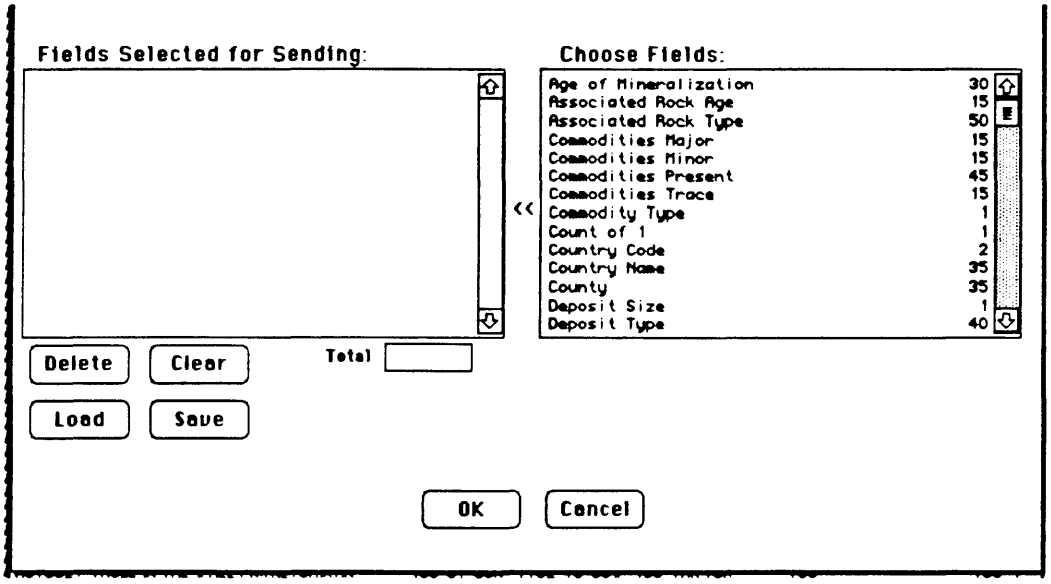
The **4th Dimension** format transfer file is binary so there is little point in reading it into a word processor or spreadsheet program. The **Tab/Text** format discussed below is available for exporting information to word processors and spreadsheets. The **4th Dimension** format is also incompatible with the Revelation and uniVerse versions of MRDS - 4D, so **MRDS Universal** format must be used according to the guide in the dialog box.

For non-Mineral Site files, the **4th Dimension** format is the only option available in the **Runtime** environment. If the structure of the destination database has been modified, use the Export/Import option in the **User** environment.

2) **MRDS Universal** format - Features a text file readable in all three MRDS environments, Data General uniVerse, Advanced Revelation, and 4th DIMENSION. This option is only available for the Mineral Site file. The structure is as follows:

- Variable length fields and records.
- The fields are in Data General uniVerse and Advanced Revelation dictionary order.
- "@" = record separator.
- "_" = field separator.
- "|" = subfield separator.
- Each logical record is split into physical records of 80 characters.

3) **Tab Text** format - The **Tab Text** format is used for converting to tab -delimited compatible spreadsheets and word-processor applications. Currently this option is available only for the Mineral Site file. The desired fields are selected in the dialog box accessed by clicking on the **Select Fields** button in the **Send Records** dialog box. The fields are truncated at the lengths set in the data base structure file and indicated in the **Choose Fields** list. They can be set to 32,754 bytes maximum by modifying the structure file in the **User** environment. Alternatively use the 4th Dimension Export option in the **User** environment. This option displays all the fields and offers other output formats.



4) **dBase** - A comma-delimited text file containing a subset of 59 MRDS fields convertible to dBase. The MRDS fields in dBase format are as shown below. All fields are type character with the indicated dBase field length shown.

	FIELD LABEL	LENGTH		FIELD LABEL	LENGTH
1)	RECORD_NO	7	31)	IG_RK_TYPE	50
2)	REPORTER	50	32)	IG_RK_AGE	15
3)	REP_DATE	5	33)	ORE_CTRL	50
4)	REP_AFFIL	25	34)	TECTONICS	50
5)	UPDATER	50	35)	ALTERATION	50
6)	UPD_DATE	5	36)	CONCENTRAT	50
7)	UPD_AFFIL	25	37)	ORE_MINS	254
8)	SITE	50	38)	NONORE_MIN	203
9)	SYNONYM	50	39)	COMMENTS	254
10)	DISTRICT	50	40)	PROD1	80
11)	REC_TYPE	1	41)	PROD2	80
12)	COUNTY	35	42)	PROD3	80
13)	STATE_CODE	2	43)	CUM_PROD1	80
14)	COUNTRY_CD	2	44)	CUM_PROD2	80
15)	QUAD	25	45)	CUM_PROD3	80
16)	QUAD1	25	46)	PR_COMMENT	80
17)	LATITUDE	9	47)	RESERVES1	80
18)	LONGITUDE	10	48)	RESERVES2	80
19)	COMMODS	49	49)	RESERVES3	80
20)	PROD	1	50)	RESV_COM	80

21) STATUS	1	51) REF1	254
22) OWNER	50	52) REF2	254
23) OPERATOR	50	53) REF3	254
24) DEP_TYPE	50	54) REF4	254
25) DEP_FORM	50	55) REF5	254
26) DEP_SIZE	1	56) STATE_NAME	35
27) SURF_UNDG	1	57) COUNTRY_NM	35
28) HR_TYPE	50	58) MODEL_NAME	40
29) HR_AGE	15	59) MODEL_NUM	5
30) AGE_OF_MIN	15		
		total characters =	4001

Convert to dBase using the following procedure:

- Send the text file to an IBM/PC compatible computer by either of the following methods:
  1) Via Modem, serial port link, Ethernet, or Appletalk/TOPS:
     Make sure the communications program is set to append line feeds to the carriage returns at the end of each line.
  (2) Via Macs equipped with external 5.25 inch floppy drives **or** Mac IIx, cx, ci, fx, si, and so on equipped with 3.5-inch 1.4Mb Superdrives.
     Launch **Apple File Exchange**:
     Select the *Mac to MSDOS* menu, *Text Translation* item
     In the Text Translation dialog:
     Carriage Return/Line Feed:
     Check *Replace CR with CRLF.*
     Special Characters:
     Select *Change to closest single character.*
     Tab Character:
     Select *Neither.*
     Insert the destination floppy disk, select the source file,
     Select the >>*Translate*>> button.
     Mac II's only translate about 20 records per minute!

- On the IBM/PC compatible, name the text file MRDS.TXT.
- Obtain the MRDS.DBF structure file from the MRDS - 4D authors and copy it to the dBase directory.
- Launch dBase. Then type **USE MRDS**.
- Type **APPEND FROM MRDS DELIMITED**.

For the Commodity Specialists file it is necessary to send three files: Commodity Specialists, Specialists, Postal Address.

Receive Records

Receive Records operates only on files created by **Send Records** in **4th Dimension** or **MRDS Universal** format. It cannot read **dBase** or **Tab Text** files. The file structure in source and destination files must be identical, otherwise defective records will be created in the destination file. Receiving records from a different numbered version of MRDS - 4D can cause corrupted files.

IBM-PC's and other computers

MRDS Universal format is compatible with Kermit file transfer protocol for transmitting over phone lines to PC's running MRDS-AREV or to the Data General uniVerse. **Tab Text** is Kermit compatible if the line length is less than 250 characters. If lines are longer, use XMODEM or some other type of transmission protocol.

To write these files directly to IBM-PC compatible floppy disk, Mac II's require an external 3.5-inch or 5.25-inch drive or a high density internal drive. Later model Mac IIcx, x, ci, si, fx, and so on are equipped with IBM-PC compatible 3.5-inch floppy drives.

Reports

Standard Listings

The **Print** command under the **File** menu prints the default output layout for each file. In the case of the Mineral Site file, the long or columnar layouts are selectable in the **Preferences** dialog. Other layouts are available only in the **User** environment at this time.

For all files, the entire selection can be printed or a subset of the current selection can be printed using techniques described in "Selecting records with the mouse".

The only disadvantage to selecting records with the mouse before printing, is that they will *not* be printed in sorted order. To print mouse-selected records in sorted order the user must:

- **Select** menu, **Sort** item (use desired sort).
- **File** menu, **Print** item.

The selection but not the sort order can be saved in advance with **Select** menu, **Save Set** item.

If a sorted printout of a loaded set is desired, a sort must be done each time a set is loaded.

Graphs

The **Graphs** selection under the **Report** menu is used to create bar charts, scatter plots and pie charts of certain fields for records in the current file. The creation of graphs is best learned from the **4th Dimension** tutorial and user reference documentation.

Quick Report

Custom reports can be prepared with **Quick Report** under the **Report** menu. Quick reports allow flexibility in field choice, column widths and order as well as break items.

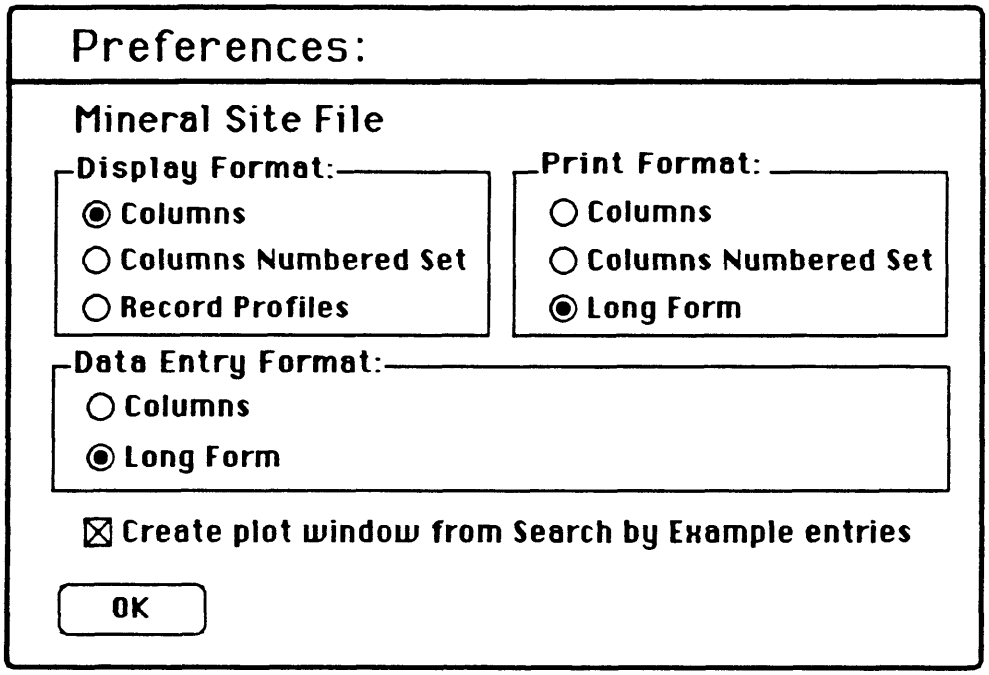
Selecting **Quick Report** displays a new layout - you can begin creating a report immediately. Use **Open** under the **File** menu to modify an existing report.

In the **Quick Report** dialog, drag the fields from left to right. With the **Auto column width** selected, the maximum width of each field is controlled by the actual width of the data in the current selection *or* the column title,

whichever is longer. To insert and delete entire columns, use the **Insert Column** and **Delete Column** menu items under the **Edit** menu. Columns can be designated for sorting by dragging the **<<Add Sort>>** phrase from the sort list onto the desired column. Multi-level sorting is possible.

Other File Menu Items

Preferences



(1) **Display Format:**

This option controls the appearance of the screen listings of the Mineral Site file after **Show All** or **Show Subset** menu items are invoked. The numbering system (discussed under the topic *Renumber* in the section titled *Layers, Devices, Projections*) allows users to add temporary numbers for plotting. The **Record Profiles** selection provides a statistical summary for management use.

2) Print format

The print options control the laserwriter output format. The column listings can be either numbered or unnumbered. The long form prints all nonblank fields for each selected record. Normally, the printout consists of about two pages.

3) Data Entry Format:

- **Long Form** - Double-clicking on a record in a column listing displays the first page of the full 14 page data entry layout.

- **Columns** - Double-clicking on a record in a column listing allows editing of the following fields: No. Set, Record No. Site Name, District, Latitude, Longitude, Country, State, Provence, and Commodity. Scrolling or flipping pages to other fields is not currently available.

4) Create plot window from Search by Example screen entries:

MRDS - 4D attempts to determine the actual area to be plotted from information in the **Search by Example** screen. Specifying four coordinates, or a country, state, or quadrangle name usually allows MRDS - 4D to create a plot window.

If MRDS - 4D is successful in determining a plot window, the parameters in the **Plot Window** screen are updated.

Unselecting this option tells MRDS - 4D *not* to update the **Plot window** screen regardless of what is specified in the **Search by Example** screen. The settings in the **Plot Window** screen remain unchanged until directly modified by the user.

Quit

The **Quit** menu item returns to the Grand Canyon display screen. Another **Quit** exits to the **User** environment (if available). A third **Quit** exits 4th DIMENSION.

Shortcut: **⌘Q ⌘Q⌘Q**, exits 4th DIMENSION quickly.

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