Rerum Naturalium Fragmenta
No. 455

QVOL
Quick Volumetrics for
Windows
User's Guide
Part I.
by
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Chapter 1
INTRODUCTION

The QVOL Quick Volumetrics program system includes program functions for automatic planimetry, computation and plotting of area/depth and volume/closure curves. The programs will input, edit and display data sets, perform depth, thickness, area and volume unit conversions, compute, list and plot areas and volumes.

Menu options include programs for the entry of geological models, the validation of model parameters, and the graphic display and printing of the results.

The package is set up to run on IBM PC compatible microcomputers under Windows 95, 98 or NT. While most graphics functions are resolution independent some will benefit from higher resolution: 600*800 or higher modes are recommended for the display of graphs.

Access to QVOL

Switch on the PC. Select the QVOL icon from the Windows desktop or the program menu.

Double-click on the QVOL icon to run the program.
The initial screen of QVOL appears, with a menu on top of the main screen listing the main function groups.

The QVOL menu

The main functions shown are File, Horizon, Structure, Options, Print, Exit and Help.

Some of the options lead to a further selection of functions. When you select one of these a group of functions is displayed as a drop-down menu. Menu functions can be selected by clicking on them or by Alt- key combinations. For example, Help can be selected by pressing Alt-H. Most utility functions are accessible from the File menu.
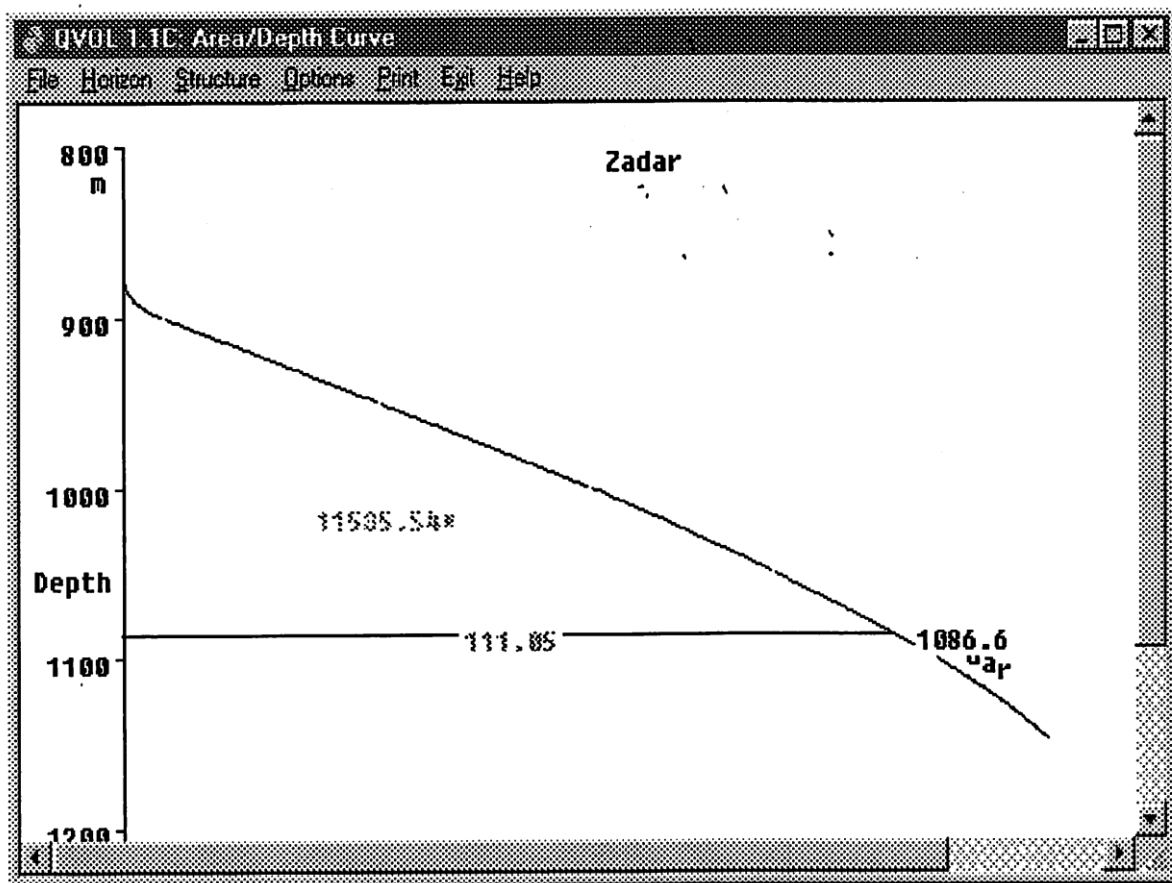

Figure 1.1: The main menu

When a drop down menu is displayed Menu items can be selected by moving to the item using the arrow keys and clicking on the highlighted item. An item can also be selected by

pressing the corresponding key (the letter or number indicated by underlining) and then pressing Enter.

Utility functions

Frequently used utility functions include Help, Print, Exit and Options. Exit is the way out; select Exit at the end of the session to close the application.

Printing

Every time the program produces screen graphics it records the plot data in a file. Select the Print option from the menu to send the plot file to the printer.

Temporary plot files can be saved to permanent files for later use by the Save Graphics File option. Such saved files can be plotted using the Plot From File option. You can use these two options in case the plots are generated on a machine not connected to a high quality (e.g. laser or inkjet) printer. By saving the plot to a disk file you can transfer and plot it later on a computer connected to a high quality printer.

Help

Select Help for the online help facility. You can read the help file chapter by chapter using the contents list or look up a particular subject detail by the index.

Chapter 2
PLANIMETRY

QVOL computes the areas and volumes from contour data. Contour map data can be input in several ways: either by scanning the contours on a scanner and passing the resulting graphic file to QVOL for processing, or by reading digitised contour data from a file in the Zycor format.

Scanning maps

The input to this option consists of graphic images generated by the scanner. Use the graphic package you normally use to scan images. Scan in the contours in black/white ('line art') mode, this gives better results than scanning as greyscale or colour - it is also faster and requires less memory and disk space.

When the image appears on the screen, the contours should be black, the rest of the screen white.

If the structure is simple, as in Fig. 2.1 and the black lines of the contours are not broken but properly connected then this black & white (monochrome) image can be used in QVOL if saved as a BMP, PCX, or GIF file.

Scanned Contours

17.Mar.97 Quartz Scientific Project: PEXAMPLE File: Falkirk4

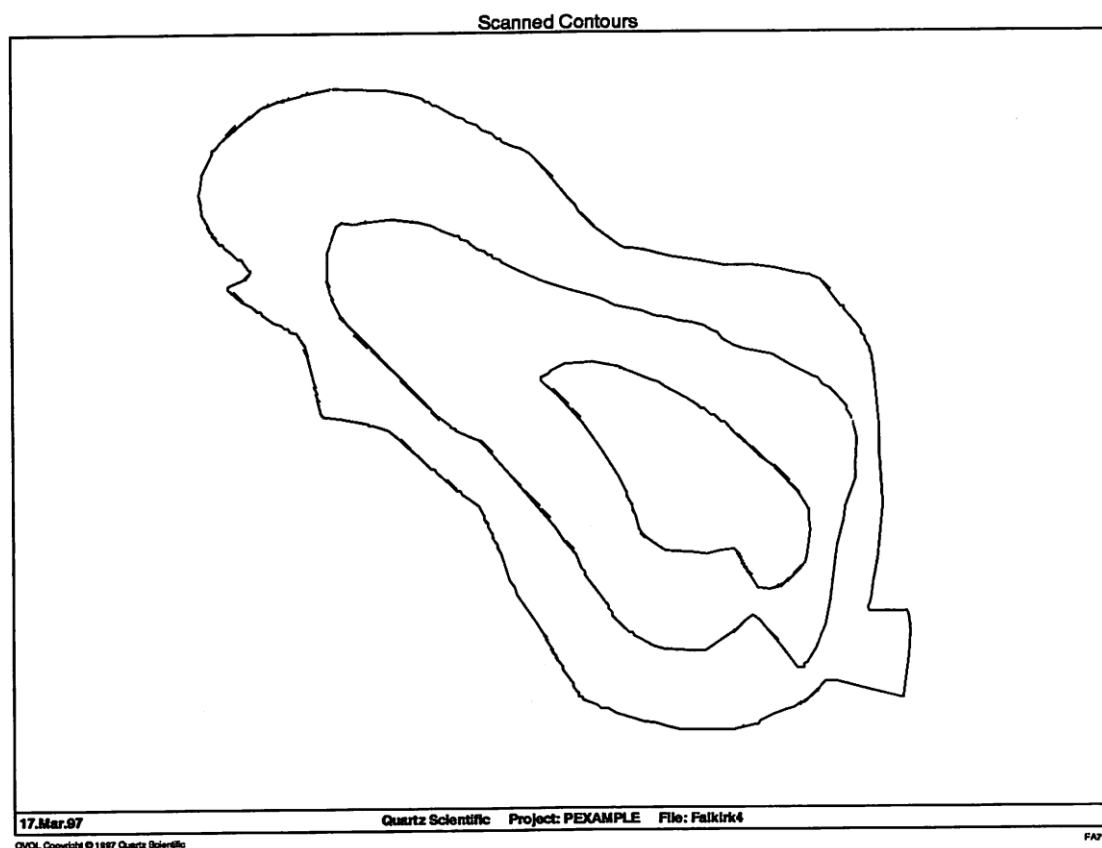QVOL Copyright © 1997 Quartz Scientific FA?G

Figure 2.1: Simple contour map scanned and saved in b/w

Maps of complicated structures as in Fig 2.2 should be colour filled. Convert the image to 16-colours, and fill the white areas with colours (do not use white or black for filling - use the other 14 colours) to create a coloured contour map. The colouring helps QVOL to identify areas belonging to the same contour interval and also serves as a useful check to see that the contour lines are unbroken: any break in the line will be indicated by the colour fill leaking through.
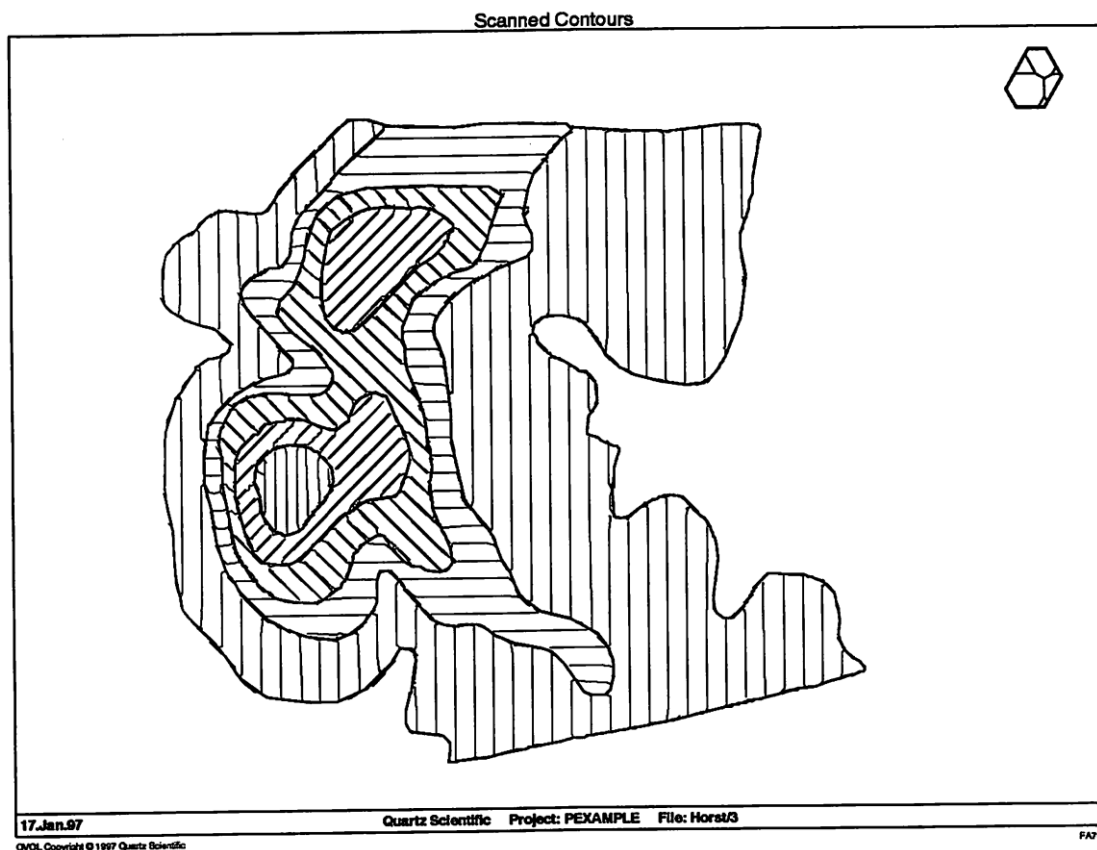
Figure 2.2: Scanned map (Stripe patterns indicate colour fill)

Look out for the bleeding of colours - the contours should be closed. If necessary, edit the image by adding a few black dots (pixels) to eliminate gaps. Often it is easier to mark the original map or make a tracing by black pencil or ink of the contours only for scanning. Do not make the contours too thick. Minor white spots e.g. unfilled areas can be ignored.

Save the scanned image to file in BMP, PCX or GIF format.

Choose scanning resolution according to the size of the area so the image fits the graphics screen (640 x 480 for VGA, 1024 x 768 for VESA compatible SVGA). The size of the saved colour BMP file size should be about 100 - 400 k bytes. The disk space required depends on the format: PCX and GIF files are more

compact than BMP; and monochrome images take less space than colour ones. Note that GIF files in QVOL are limited to 640 * 480 even if the PC has super-VGA (SVGA) graphics.

Make a note of the scanning resolution (dtp = dots per inch). If the scanned image is not saved in the original size (100 %) but it was magnified or reduced before saving then note the magnification or reduction as percentage (e.g. 70%) of original size. Some graphics programs do not record the resolution information in the file correctly.

Processing scanned maps

In QVOL select Horizon/Scanned Map input to access the Scanned Map processing functions.

Select the format (whether BMP, PCX, GIF files wanted) and the filename. The image will be loaded to the screen and colour filled if necessary (not yet coloured).

After counting the pixels of the contour intervals the program will present a set of coloured boxes, one for each interval, on the right hand side. Enter the top, in metres or feet, as appropriate, for each interval. Usually the intervals are listed in the expected top to bottom order.

If on occasion an interval is listed out of depth sequence, entering the right top value will restore the correct order in the next processing stage.
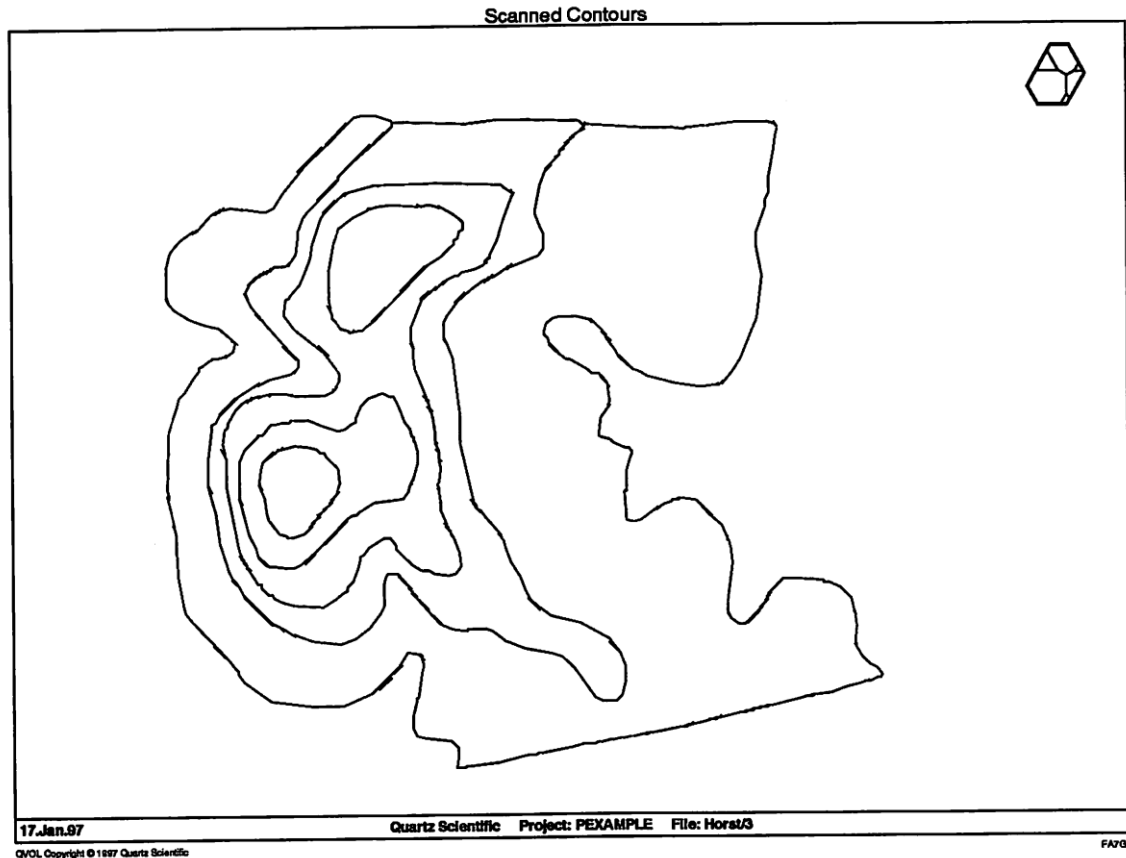
Figure 2.3: Contours extracted from scanned image

The contour lines themselves and occasional smudge marks are left black or white after the colouring; these are ignored by the program and their pixels allocated to the surrounding areas. If the legend on the right hand side of the screen shows extra colour boxes that do not correspond to visible contour intervals of the map, you can tell the program to ignore these by entering -1 for the 'top' value.

Near the last box, the program will display 'OK'. When you reach this box, press Enter to proceed. The program will prompt for the map scale. If the input file was in the GIF format, the program will also prompt for the scanning resolution. This information is recorded in BMP and PCX format files, but not in GIF files. This is one of the reasons for preferring the BMP or PCX formats to GIF.

Using the map scale and scanning resolution information the pixel counts will be converted into area units and the integrated areas will be displayed as a table on the screen, as well as saved to a QVOL data file.

Zycor data

You can read digitised contour data from Zycor format files. Select Zycor file read from the Horizon menu. Specify the name of the data file and other parameters as for digitising. The program will ask for the name of the file containing digitised contour data. Note, that Qvol needs closed contours to compute areas, so ensure that each contour is a closed curve. You can check the contours by the Show surface option.

Show Surface

The outlines of digitised contours are saved by the program. The contours can be displayed on screen or plotted by printer at a later date. Note that the graphics data of digitised contours will not reflect some of the changes made if the dataset is subsequently modified by the editor program.

Select Show Surface from the Horizon menu to display the digitised contours of a surface on the screen. Select the file and how the contours are to be labelled: labels can be posted above, under, left or right of the contour line.

A scale bar, showing 1 km and 1 mile, is displayed in the bottom left comer of contour plots to indicate scaling. Contour lines of the same contour value are shown in the same colour and line style.

After displaying on the screen, a paper plot can be generated by selecting Print. On black and white plots the contours are plotted with different line-styles. On colour printers the contours are printed in the same colours as on screen.
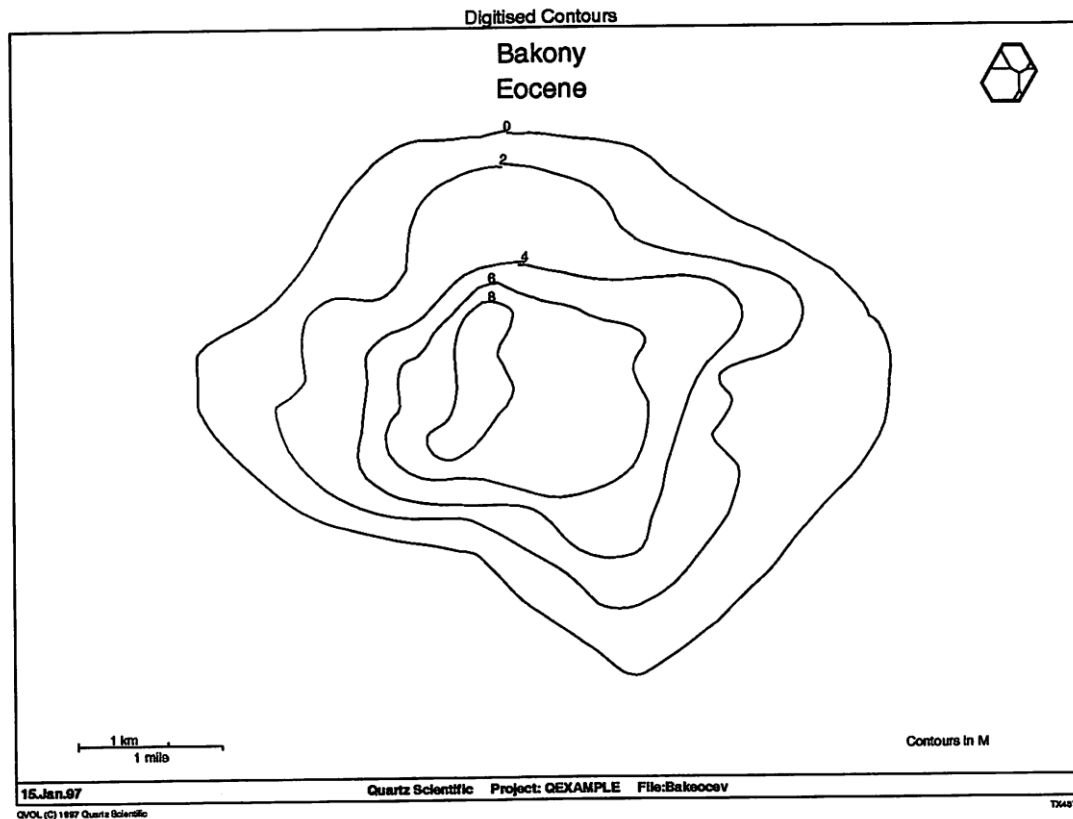

Figure 2.4: Thickness contours

A map plotted at the same scale as the original can be used as a control plot to check the accuracy of digitising. The size of the plot is A4 and so it can only show a map of A4 size without folding at the edges.

You will get a warning if the digitised area is too big to fit on an A4 plot. Then you can choose between clipping the plot or scaling it down. Use a scale of 0.5 to show an A2 sized area on screen and plots. If the digitised map is less than A4 in size then the program will display it without scaling. The default

for scaling is depends on the value of the Scaling option – to change this and other options, select Options from the main Qvol menu.

Chapter 3
HORIZON EDITING

Select Edit from Horizon menu to access the data editing functions. Select the horizon file to be edited from the alphabetic list of digitised data sets.

The selected dataset will be presented for editing in a window showing the editable data fields.

The editing functions can be used both to change an individual data values and to apply changes or corrections to every contour in a dataset.
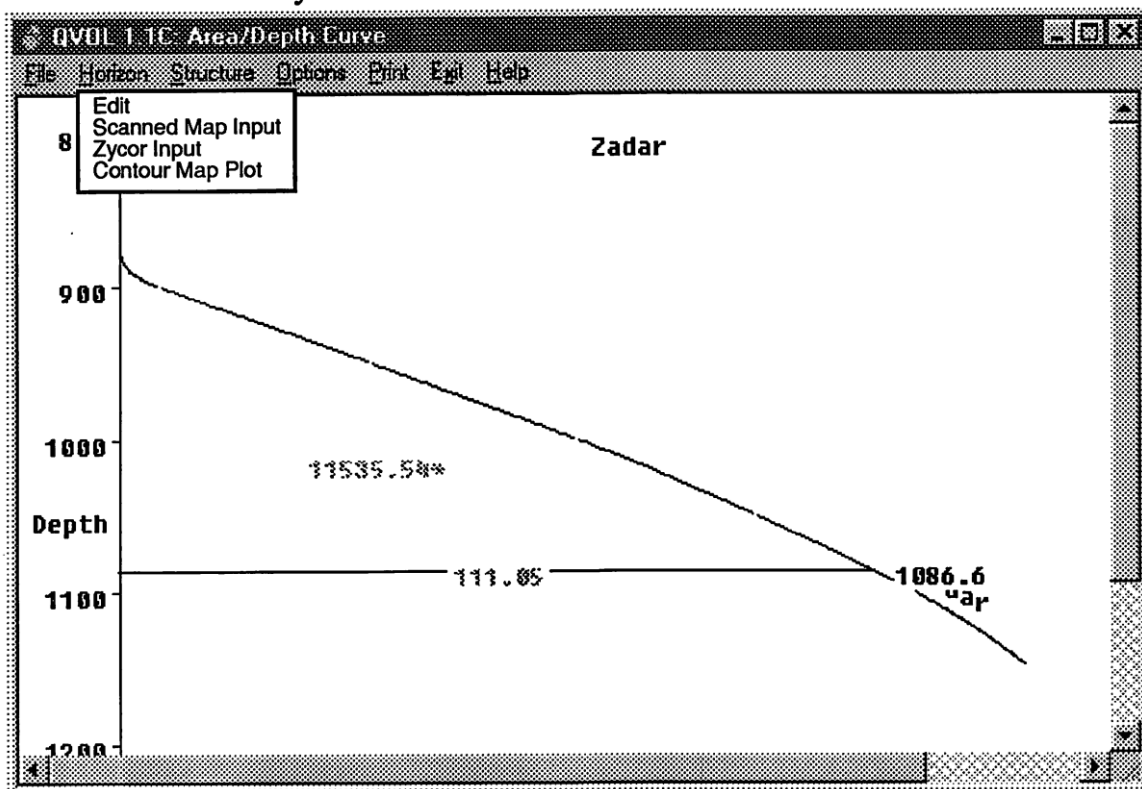

Figure 3.1: The Horizon menu

Entering data

Every item shown can be hand edited by moving around with the cursor and overtyping where you want to change. When the changes are entered press OK to save the changes and return to the main program. Pressing Cancel leaves the data unchanged.
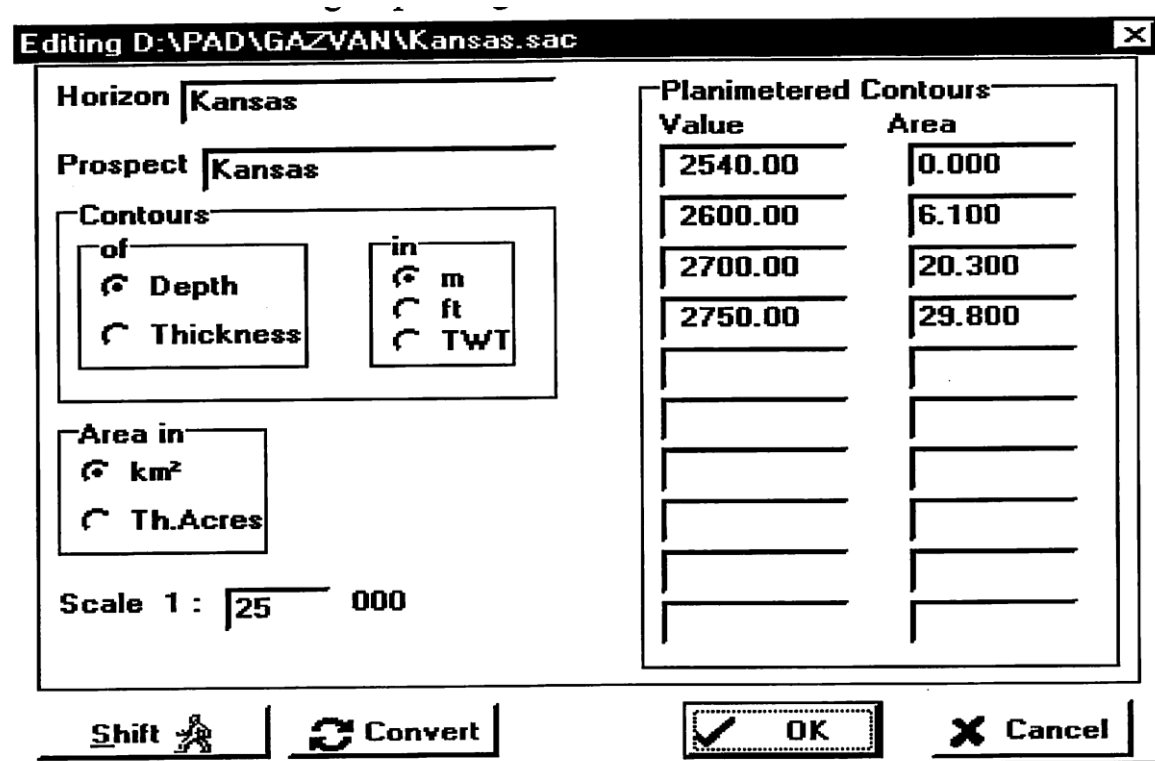
Creating datasets

The editor options can be used to create datasets. The easiest way to create a new horizon file is to edit an existing one and use the Save As option. E the specified input file does not exist, the program now defaults to using the 'Blank' dataset as input.

Plot headings

The two headings shown on the top of plots can be both changed. In the horizon editing window they appear as Horizon and Prospect. Horizon has to be entered as it is needed for posted values.

If the Prospect field is left blank then the plots will have one line of heading only.

You can enter longer names in the Horizon and Prospect boxes than the space shown but these may be truncated when saving or plotting.

Figure 3.2: Horizon editing

Entering areas

When you enter areas via the editor, the areas can be in square km or in thousand acres.

Do not mix different units in the same file. If you want to add a contour area in acres to a file that already stores areas in square km then use the the Transform program to convert areas to the new units before entering the new contour. Area units used in plots and tabulated results can be specified at run time regardless of the units used when area values were entered.

Unit Conversion & Depth Shift

QVOL allows conversion between units of depth and area and also to shift all depth values by the same amount.

An easy way to create the bottom horizon of a reservoir from its top is to edit the top, apply the appropriate depth shift and save the horizon as a new file. All depth and area values will be automatically computed and all you have to correct is the Horizon name.

Area conversion

Click on Convert and select Area to convert area units. The program will convert the area units from acres to square kilometres or back.

Depth conversion

Click on Convert and select Depth to convert depth units. The program can convert the depth units from feet, metres or milliseconds to feet or metres. You have to specify the data set name and the unit to convert to. Converting metres and feet into each other is straightforward using the built-in constants. For conversion from milliseconds, you have to supply the conversion constants according to the formula on the screen.

Depth Shift

This option asks for the depth shift to be added to each contour value. To deduct from the depth, enter the required depth shift with a minus sign.

This option can be used to create data for parallel surfaces like the top and bottom of a formation.

After the top has been defined the base can be created by depth shifting and saving as another file.

(Qvol for Windows User Guide, Quartz Scientific, Watford, 2000)