

The BODC Database Explorer

Introduction

The BODC Database Explorer is a *Windows95* application that provides access to certain types of data held in the OMEX I JET database. It is provided as a complementary tool to Microsoft Access to retrieve certain types of data which require a 3-dimensional cross-tabulation capability unsupported by Access.

The data types concerned are:

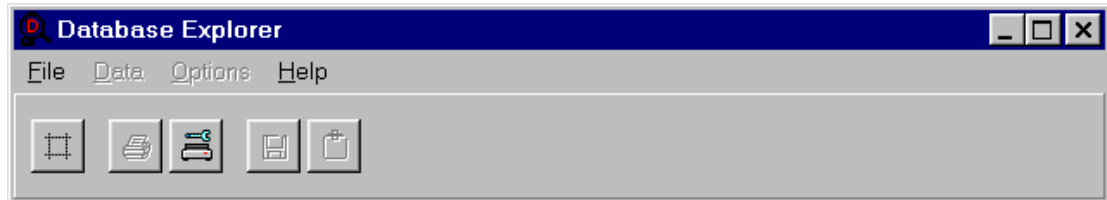
Water and air sample data	(table BOTDATA)
Whole core data	(table CORETOT)
Core profile data	(table COREPROF)
Sediment trap data	(table TRAPDATA)

Access forms are present in the database for each of these data types. However, the lack of the necessary cross-tabulation support means that the parameters measured are listed sequentially in columns and not in rows. The Database Explorer provides the ability to retrieve the data in this more conventional, and useful, format.

The Database Explorer provided with the OMEX I CD-ROM is the first release of the software and as such it has limited capabilities. It is planned to further develop the software to include additional data types and a graphical display capability to release with BODC products planned for 1998. The enhanced version of the software will be both compatible with the OMEX I database and freely available to OMEX I CD-ROM users.

Using the Database Explorer

Launching the Database Explorer brings up a control window which appears thus:



Four pull-down menus, two of which are initially unavailable, plus five universal control buttons are presented. Menu options may be invoked through mouse clicks or by pressing Alt and the appropriate 'hot key'. Hot key characters are underlined in the menus.

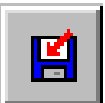
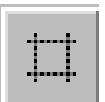
The Database Explorer is designed to operate on any database conforming to the BODC Project Database structure. Consequently, the first operation required is to open the desired JET database using the Open Project option in the **File** pull-down menu. Clicking this gives a list of the BODC project data sets currently installed on your computer. Simply choose the one you require.

Should the program not find the database file it requires, a standard *Windows* Open dialog box is invoked asking you to specify the database file. In the case of OMEX I, the required file is OMEX1V7.MDB which may be found in the DBJET directory on Disk 1. This feature can be useful should you wish to use a copy of the database copied to hard disk to improve performance.

Once the database has been opened, the **Data** and **Options** pull-down menus become active. Please go to the section on the **Data** menu to find out what to do next.

The File Menu

The File menu contains a number of control options which are listed below together with their equivalent toolbar buttons:

Copy to Clipboard	Copies the contents of the current window to the <i>Windows</i> clipboard in either tab, space or comma delimited format. The delimiter is specified via the clipboard format option in the Options menu.	
Save As	Saves the contents of the current window to disk as either a plain ASCII text file or comma separated ASCII. A standard <i>Windows</i> dialog box allows the destination path name and filename to be set up.	
Page Setup	Allows the page margins of the printer to be specified through a dialog box.	
Printer Setup	Allows the properties of the current printer to be adjusted via a standard <i>Windows</i> dialog.	
Print	Sends the contents of the current window to the printer. The standard <i>Windows</i> dialog is opened up, allowing the printer and number of copies to be selected.	

In addition to the above, there are the standard Close (close current window), Exit (quit program) options and the Open Project option discussed in the [Using the Database Explorer](#) section.

The Data Menu

When a database is first opened, the Data Menu has only one active option, Define, which offers the available data types via a sub-menu that currently has the following options:

Bottle	Water bottle and atmospheric sample data (BOTDATA)
Core	Core profile data (COREPROF)
Whole Core	Whole core and grab data (CORETOT)
Sed Trap	Sediment trap data (TRAPDATA)

Choosing one of these options displays the appropriate Data Selection dialog box. These differ in detail for each data type as different field subsets are available.

The functional description of the Data Selection Dialog Boxes is subdivided into the following sections:

Data Selection Dialog Description

Standard Category Descriptions

Advanced Category Descriptions

Specifying Output Header Columns

Selecting Data

After the OK button on the Data Selection Dialog has been pressed, the program interrogates the database to find the data you have selected and creates a working database on hard disk to speed up subsequent selections.

When this process has finished, choose Show from the Data Menu. This invokes the parameter selection mechanism through a hierarchical series of list boxes. Each of these follows the standard *Windows* criteria for list box selection which are:

- To choose a single item, or the first item of several, click on it.
- To choose a range of items, click on the first item and then click on the last item, pressing the Shift key at the same time.
- To add items to a selected list, click on them, pressing the Ctrl key at the same time.

- To deselect an item from the list, click on it whilst pressing the Ctrl key at the same time.

The first list offered allows you to select parameter categories which are broad groupings of parameters. The general rule here is not to be too conservative with your choices: you can always thin out the results later on. However, if categories are obviously of no interest then exclude them as this will reduce the length of the lists you have to plough through later on.

Once OK is pressed, you will be presented with a list of parameter groups. These are generally readily identifiable parameter names, covering all methods of measurement for that parameter. However, they can be more encompassing. For example the parameter name CORG covers both DOC and POC. The list box includes a floating help box that provides further information on both the parameter name and the data originator. This is useful, but can be a nuisance when making selections. Clicking the Expanded View check box turns it off. Again, the standard *Windows* list selection techniques are used.

Clicking OK brings up the full list of parameter and data originator combinations available. Each record selected from this box will generate a data and flag column in your output data grid. Once again, further information on the parameter code and the data originator is offered via a floating help box and this can again be disabled via the Expanded View check box. A further control button on the dialog, labelled Fields, allows you a chance to change the header columns selected for your output.

Pressing OK causes the data you have selected to be retrieved and displayed as an output grid. This may be saved, printed or copied to other applications using the options available through the **File** menu or the command buttons in the control window.

The header columns included in the data grid may still be modified, even at this late stage. Simply choose the Index Fields option from the Data pull-down menu and a dialog box will be opened that allows header parameters to be added or removed with ease.

Data Selection Dialog Description

The Bottle Data Selection dialog appears thus:



It is essentially divided into two areas called 'Standard Categories' and 'Advanced Categories'. The **Standard Categories** are common to all data types (although the subsidiary choices may vary) and form the main independent variables upon which data selection is based. The **Advanced Categories** are data type specific.

Each field has two buttons associated with it. The Search button controls whether or not the field group is to be considered during data selection. The Show button determines whether or not the field is to be included in the final output grid. By default, no selection criteria are set (therefore all the data in the database will be retrieved) and the position fields appropriate to a point event (latitude and longitude) are included in the output listing.

The red cross in the centre of the buttons when depressed means that there are additional user choices hidden below the button. These may be accessed by clicking on the button to bring up a check list from which items may be chosen.

Standard Category Descriptions

The Standard Fields are:

Position
Date
Cruise
Depth

Position Category

There are nine fields covered by the Position Category that may be revealed by clicking on the Position Show button. These are:

Average latitude of deployment (+ve N)
Average longitude of deployment (+ve E)
Maximum deviation of latitude
Maximum deviation of longitude
Ship's latitude at start time
Ship's longitude at start time
Ship's latitude at end time
Ship's longitude at end time
Fixed station name

The first four fields are point event positions specified as a mean position and maximum deviation from the mean position. The next four fields are the position fields for traverse events. The final field is the site or fixed station name (e.g. OMEX3) that is associated with some of the point events in the database.

Point and traverse events are fundamental concepts in BODC project database design. Further explanation of the concepts and implications for data selection is included in the sections of this document on [Specifying Output Header Columns](#) and [Selecting Data](#).

Date Category

Two date category fields are common to all data types. These are:

Start Date
End Date

These refer to the start and end times of the data collection event. Note that many events in the database are regarded as 'instantaneous' in which case the end date will be set null. All events have a start date specified.

In the case of sediment trap data, there are two additional date fields available. These are:

Start Date - SedTrap
End Date - SedTrap

These refer to the collection dates of individual trap samples whilst the event start date and end date refer to trap deployment and recovery.

Cruise Category

This category contains a single field: the cruise mnemonic of the cruises initiating the events.

Depth Category

For all data types, this includes the bathymetric depth: i.e. the water depth at the position where the event occurred. Users should be aware that this wasn't known for a significant number of events and in these cases the field was set null.

For water bottle data, three additional depth category fields are available. These are:

Bottle depth (m)
Minimum pressure sampled (db)
Maximum pressure sampled (db)

These fields pertain to the depth at which the sample was collected. All samples have a bottle depth (air samples have negative 'depths') stored. However, only samples collected using a CTD rosette will have the depth stored in terms of pressure. Retrieving both pressure fields provides information on the vertical range over which the sample was collected.

For sediment trap data, an additional depth field, the trap depth, is available.

Advanced Category Descriptions

The list of advanced categories available is dependant upon the data type and they are described by data type in this document.

Bottle

Core

Whole Core

Sed Trap

Bottle Advanced Category Descriptions

BODC Event Number

This is the identifier, a simple integer number, assigned by BODC to each event in the database.

Originator's Event Identifier

This is the identifier, a text field, by which the event was known to the data originator or in the logs of the cruise on which it was collected. Sometimes, no name was given to the event and in this case identifiers have been assigned by BODC.

Gear Code

This is a mnemonic assigned to describe the type of oceanographic hardware deployed during the event. The mnemonic translations are mostly intuitive. If there is any problem, translations may be obtained using the Events form in the Access database.

Bottle Identifier

This is the identifier, a simple integer number, assigned by BODC to each bottle sample in the database.

Bottle Type

The Bottle Type field specifies how the sample was collected. For water bottle data, this field identifies the type of water bottle used through the following codes.

GFnn	GoFlo
LNnn	Lever-action Niskin (external spring)
NI nn	Niskin
NO nn	NIO bottle
NXnn	NOEX bottle
TRnn	Transparent (marine snow catcher)
PPnn	Manually filled polypropylene bottle
KNnn	Knudsen bottle
G300	Large volume (300 litre) radionuclide sampler

The 'nn' specifies the capacity of the water bottle in litres.

A number of other codes are used for other sampling methods:

BWS	Benthic water sampler
SAP	Stand-alone pump
PUMP	Pumped sample (water or air pump)
BUCK	Bucket on a rope
AIRB	Air bottle

Bottle Problem Indicator Code

The Bottle Problem Indicator Code field is used to indicate known problems. The coding convention used is:

B	Filter burst (SAP samples)
L	Contamination through leakage suspected
M	No sample obtained
O	Bottles fired in incorrect order

The 'O' flag requires a little more explanation. This is used to flag stations where there was obvious confusion from the sample data set about which bottle was fired at which depth. These problems have been resolved during data load, but the flag is included to remind users that there may be problems with data from that station obtained outside the database.

Core Advanced Category Descriptions

BODC Event Number

This is the identifier, a simple integer number, assigned by BODC to each event in the database.

Originator's Event Identifier

This is the identifier, a text field, by which the event was known to the data originator or in the logs of the cruise on which it was collected. Sometimes, no name was given to the event and in this case identifiers have been assigned by BODC.

Gear Code

This is a mnemonic assigned to describe the type of oceanographic hardware deployed during the event. The mnemonic translations are mostly intuitive. If there is any problem, translations may be obtained using the Events form in the Access database.

Core Identifier

This is the identifier, a simple integer number, assigned by BODC to each sub-core in the database.

Core Sample Identifier

This is the identifier, a simple integer number, assigned by BODC to each core sample in the database. A core sample results when a core or sub-core is cut into sections or a point measurement is made along the length of a core.

Core Flag

This flag is set to 'F' if the corer failed to return a sample or to 'S' if the corer obtained stones and no sediment. It is blank for all cores that returned useful data.

Distance From Core Top

This is the distance (in cm) from the top of the core to the mid-point of the core sample. It therefore provides the independent variable for the core profile.

Thickness of Segment

The segment thickness (in cm) is an expression of the resolution of the core profile. If the profile was obtained by sectioning a core, then this is the thickness of the slices obtained. For point measurements, such as electrode profiles, it is set to zero.

Whole Core Advanced Category Descriptions

BODC Event Number

This is the identifier, a simple integer number, assigned by BODC to each event in the database.

Originator's Event Identifier

This is the identifier, a text field, by which the event was known to the data originator or in the logs of the cruise on which it was collected. Sometimes, no name was given to the event and in this case identifiers have been assigned by BODC.

Gear Code

This is a mnemonic assigned to describe the type of oceanographic hardware deployed during the event. The mnemonic translations are mostly intuitive. If there is any problem, translations may be obtained using the Events form in the Access database.

Core Identifier

This is the identifier, a simple integer number, assigned by BODC to each sub-core in the database.

Core Flag

This flag is set to 'F' if the corer failed to return a sample or to 'S' if the corer obtained stones and no sediment. It is blank for all cores that returned useful data.

Sediment Trap Advanced Category Descriptions

BODC Event Number

This is the identifier, a simple integer number, assigned by BODC to each event in the database.

Originator's Event Identifier

This is the identifier, a text field, by which the event was known to the data originator or in the logs of the cruise on which it was collected. Sometimes, no name was given to the event and in this case identifiers have been assigned by BODC.

Gear Code

This is a mnemonic assigned to describe the type of oceanographic hardware deployed during the event. The mnemonic translations are mostly intuitive. If there is any problem, translations may be obtained using the Events form in the Access database.

Sample Identifier

This is the identifier, a simple integer number, assigned by BODC to individual trap samples.

Originator's Sample Identifier

This is the identifier given by the data originator to individual trap samples. It is of particular importance for moored sediment traps with a sample carousel.

Sample Collection Time

This is the duration (in days) of trap sample collection.

Specifying Output Header Columns

By default, the only header fields that will be included in the data grid generated by the Database Explorer will be latitude and longitude. It is down to you, the user, to add whatever fields from the Standard and Advanced Categories are required.

This is a simple, painless procedure. Clicking the appropriate Show Button will either cause it to depress (indicating that a single field has been included) or provide a list of the fields available within that category. Simply check the fields you require from the list by clicking on them. When you have completed this, click on any part of the window that isn't a button. The list will disappear leaving the button, displaying the 'Red Cross' graphic, depressed.

If you don't like this way of doing things (or if you want to change your mind about the fields you've selected later on) then there is another way. Choose the Index Fields option from the Data pull-down menu. This opens up a dialog box showing all the available fields with adjacent check boxes to allow them to be selected and deselected with ease.

Selecting Data

The Search buttons in the Data Selection Dialog allow you to retrieve a subset of the data held in the database on the basis of space, time or operational parameters. At this stage, the program is only concerned about which samples in the database are of interest to you. Choosing which measurements you require on those samples comes later.

Using the Search buttons allows you to build up a filter query that is used to select the samples of interest to you. Please note that this is progressive. In other words, the sub-queries defined by each Search Button, or field within a category, are combined using the AND operator. In other words, if you specify that the bathymetric depth must be <1000 m and that the bottle depth must be >1000 m then you're not going to find any data. At present, there is no facility included in the program to allow the OR operator to be built into queries.

In general, the specification of searches that return a predictable result is straightforward. However, there is inevitably an exception which in this case pertains to the inclusion of traverse events in position searches. In order to understand what is meant by this, some explanation is required.

The BODC project data model is based on two fundamental types of event. Point events are those which happened at what may be regarded as a fixed point. Traverse events are those, such as instrument tows, which may not. In the database, point events have their positions defined in the latitude and longitude fields: traverse fields have their start and end positions defined in the start and end latitude and longitude fields.

For reasons of practicality the definition of a point event is extended as far as possible. If we have continuous navigation available during a traverse event then a 'point position' may be determined with the variation fields set so they define a box within which the event occurred. In these cases, both the point and traverse event position fields are defined giving rise to what may be termed schizophrenic events. However, there are cases where this was not possible due to the lack of the necessary navigation data.

The result of this in practice is that it is possible for a position search on the latitude and longitude fields to miss out traverse events that may contain data of interest. It is therefore recommended that if you want to be sure that you have found all of the data of interest then you should instigate three searches on latitude and longitude, start latitude and longitude and end latitude and longitude. Although this may seem a chore, it takes less time to do in practice than it does to read and understand this description of the problem.

Pressing a Search Button opens up one of four types of dialog box that allow the search criteria to be specified. These are:

Geographic Search Dialog

Date Search Dialog

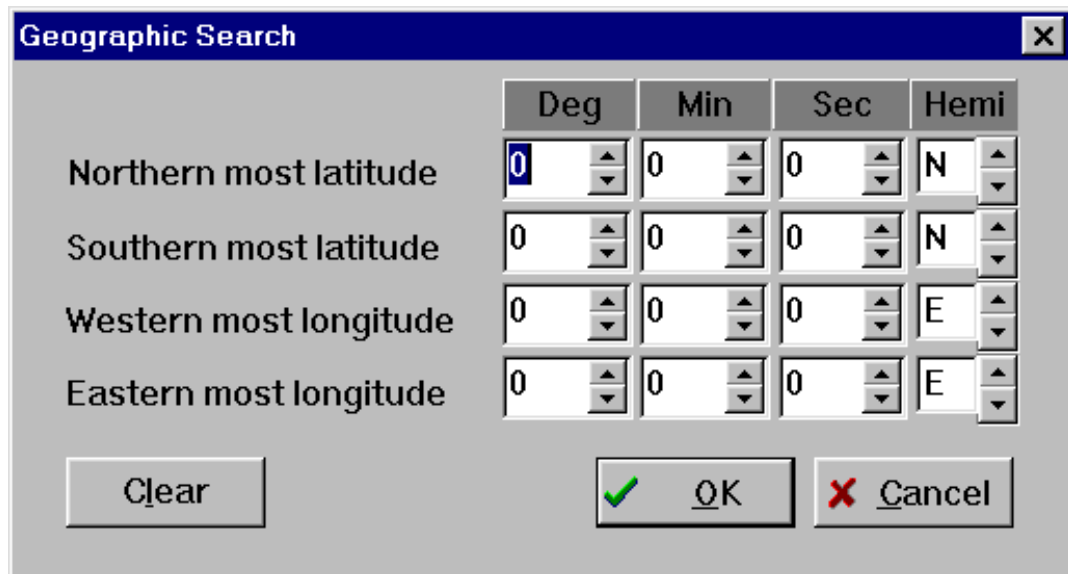
List Box Search Dialogs

Numeric Value Dialogs

Text Entry Dialogs

Geographic Search Dialog

The Geographic Search Dialog allows the limits of a box search to be specified in terms of latitude and longitude. The dialog box appears thus:



	Deg	Min	Sec	Hemi
Northern most latitude	0	0	0	N
Southern most latitude	0	0	0	N
Western most longitude	0	0	0	E
Eastern most longitude	0	0	0	E

Clear OK Cancel

By default, the box co-ordinates are specified in terms of degrees, minutes and seconds. It is, however, possible to configure the dialog to accept any of the following:

- decimal degrees
- degrees and decimal minutes
- degrees, minutes and decimal seconds.

To change the configuration, simply click on the appropriate column heading label.

The dialog field values may be specified using the increment and decrement buttons provided or by simply placing the cursor in the appropriate box and typing in the required value.

Don't forget to check that the hemispheric indicator boxes are set up as you require, especially for longitude.

If the Position Search button doesn't depress when you quit the dialog box then a syntax error has been detected and no search criteria have been set.

Date Search Dialog

The first stage in the specification of date/time criteria is to choose whether you wish to specify a date before which the event occurred, after which the event occurred, on which the event occurred, or within which the event occurred. This is done by selecting the appropriate option from the list offered.

The Date Search Dialog opens up thus to allow the date to be specified.

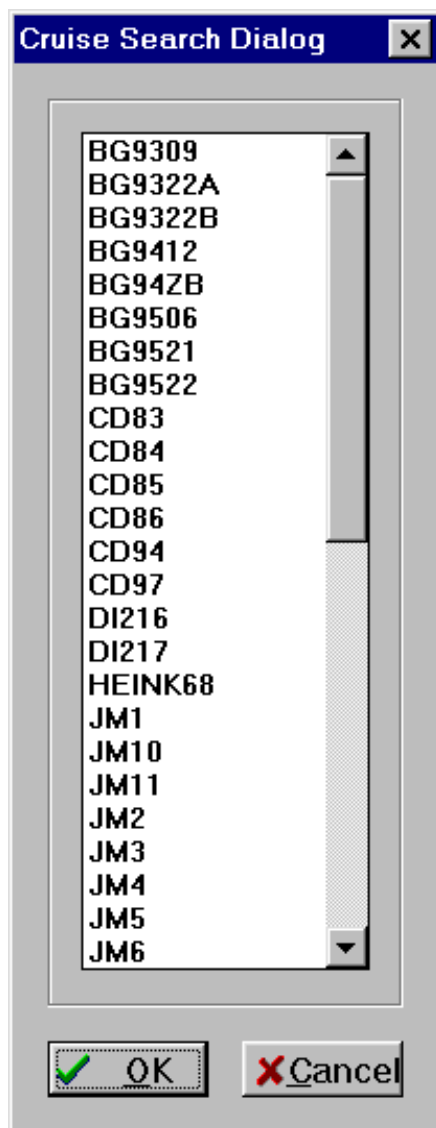
Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

To specify a date, first specify the year. Next choose the month by modifying the month number or selecting from the month name list box. Finally, set the day by modifying the numeric field or clicking on the calendar.

If the date range option is selected then the dialog box presented is doubled up allowing both the start and end dates to be specified.

List Box Search Dialogs

The List Box Search Dialogs allow you to choose one or more items from an available list. A typical example, for the Bottle Type field appears thus:

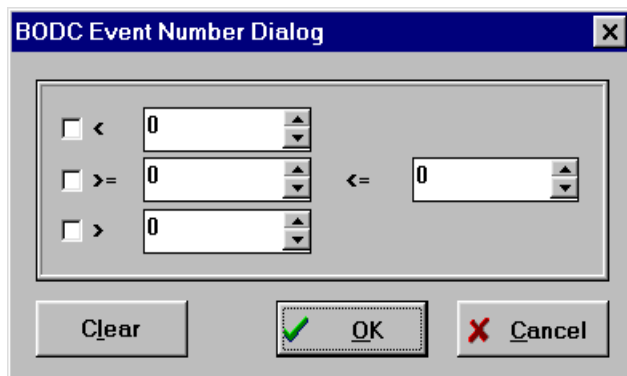


Choosing the items you require follows the normal *Windows* conventions namely:

- To choose a single item, or the first item of several, click on it.
- To choose a range of items, click on the first item and then click on the last item, pressing the Shift key at the same time.
- To add items to a selected list, click on them, pressing the Ctrl key at the same time.
- To deselect an item from the list, click on it whilst pressing the Ctrl key at the same time.

Numeric Value Dialogs

These are used to allow numeric values to be specified, generally the BODC identifier fields or depths. The dialog appears thus:



The screenshot shows a dialog box titled "BODC Event Number Dialog". It contains three rows of controls, each with a checkbox and a numeric input field with increment/decrement arrows. The first row has a checkbox for "<" and a value of "0". The second row has a checkbox for ">=" and a value of "0". The third row has a checkbox for ">" and a value of "0". To the right of these is a "<=" checkbox with a value of "0". At the bottom are four buttons: "Clear", "OK" (with a green checkmark icon), "Cancel" (with a red X icon), and a small "x" button in the top right corner.

First click one of the check boxes to determine whether you want to choose values less than your specification, greater than your specification, or values that fall within a specified range. The desired value or values are then entered into the appropriate box by either typing or using the increment and decrement buttons.

Note that if you want to specify an exact match to a particular value then use the range value with both boxes set equal. This will in fact happen automatically if you set one box and then move the mouse cursor out of it.

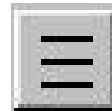
Text Entry Dialogs

These are by far the simplest of the Selection Dialogs. Simply enter the required text into the box supplied. Remember, that you must get the text exactly right, including case and any punctuation.

The Options Menu

The Options Menu comes into play once your selection of data has been retrieved into the data grid. The first option group controls the appearance of the data grid. The options, shown with their equivalent toolbar buttons are:

Horizontal Lines: Toggles the horizontal lines in the data grid on and off.



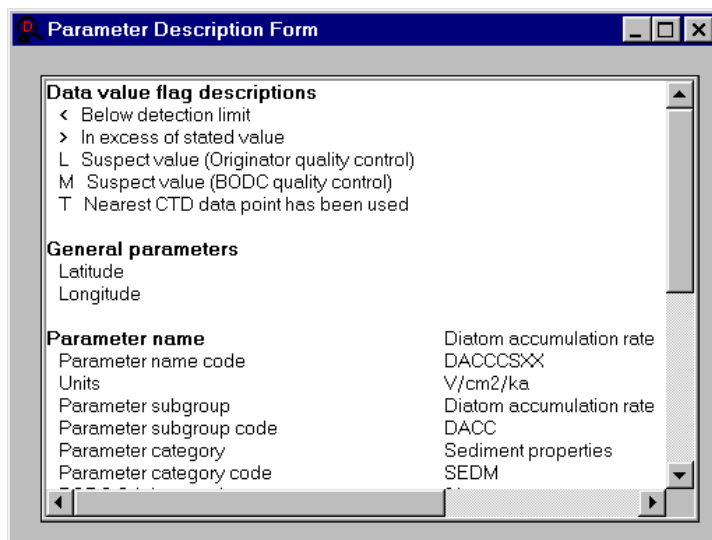
Vertical Lines: Toggles the vertical lines in the data grid on and off.



Font: Allows the size, colour and font of the text in the data grid to be specified through a standard *Windows* dialog box.



The second group contains two options, Description and Clipboard format. Checking the Description option opens an information window thus:



This contains the full descriptions of all the quality control flag definitions, parameter codes and data originators included in the data grid. The contents of this window may be printed, saved or transferred to other applications through the options available in the **File** menu.

The Clipboard format option controls the field delimiter used when data are copied across to the *Windows* clipboard. This may be set to be either a tab (more suited to spreadsheets), space (more suited to word processors) or comma.

The third option group in the Options menu, ToolBar, is available at all stages of the program. It simply toggles whether the toolbar and its buttons are shown or hidden.