geoCheck

GEOLOGICAL DATA SPECIALISTS

LogCheck User Manual

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CONTENTS

Chapter 1
Introduction to *LogCheck*

By the end of this chapter you will be able to:

- Understand what *LogCheck* does.
- Understand the *LogCheck* user interface philosophy.
- Understand the features of *LogCheck*.

1.1 What is *LogCheck*?

LogCheck is a Windows-based system for the management of coal exploration data. It has been designed and written by experienced coal geologists who understand their colleagues' needs. It includes facilities for:

- data entry, validation, plotting and production of English reports for hole header (location information), drilling, water flow, downhole geological and geotechnical (rock mass unit, defect and point load) data,
- plotting of downhole geophysical data,
- import and export of dictionaries and data to and from geological databases and modelling packages, such as Acquire, Geobank, MineScape (GDB), Vulcan, Minex and Englog,
- production of various audits and summaries, including summaries of: data currently stored for each hole; dictionary code usage; drilling meterage; seams, horizons and samples in each hole; contents of downhole geophysical (LAS) files; rock mass unit characteristics and point load indices.

It complements geological database and modelling packages such as Acquire, Geobank, MineScape (GDB), Vulcan and Minex by providing a system:

- with comprehensive validation facilities,
- which is extremely easy to learn with a user interface similar to other Windows programs such as Excel and thus easily picked up by short term geological contractors employed during drilling programs,
- does not tie up an expensive mining package licence for data entry,
- enables the plotting, in numerous different formats, of any of the data variables stored in it.

1.2 History of *LogCheck*

LogCheck evolved from a DOS-based system called LogBase. This was first developed in 1995 to facilitate the entry and validation of lithology data by coal geologists. It then expanded into generating graphics and providing entry and validation of geotechnical data.

In 2002, the system was rewritten into the Microsoft Windows environment and renamed *LogCheck*. It currently has over 200 users at over 60 sites, chiefly in Australia, but also in Indonesia, Russia and Mongolia.

1.3 *LogCheck's* User Interface Philosophy

LogCheck has a relatively simple user interface, making it very appropriate for use by short-term contracting staff who are not on site long enough to warrant lengthy tuition.

The simplicity of *LogCheck*'s user interface is based on an "object oriented approach". This is one of the current buzz words in computing. In *LogCheck*'s case, it means that there is always a particular set of data open (the "object" in computer jargon) and *LogCheck*'s menus change according to the current data to reflect the actions (the "methods" in computer jargon) that can be performed on that data.

Apart from offering options for all these actions, the menus also provide options to create a new data table for a new hole or open another data set.

1.4 *LogCheck* Data Sets

LogCheck data sets fall into five general categories:

1. Dictionary data:	Dictionaries contain codes and their user-defined meanings. A dictionary is required for each hole data type (see below). Dictionaries can be imported, entered, modified, printed, exported and plotted as a symbol legend.
2. Project data:	Includes the project title to appear on reports, plots etc; rectangular coordinate limits for the project; survey coordinate grid type etc. Can be entered and modified by the user.
3. Hole data:	There is a separate file for each data type for each hole. Current data types include: Headers, Cementing, Casing, Geologists, Drilling, Geology, Water Flows, Coal Quality, LAS (downhole geophysical), Rock Mass Units and Defects, Point Loads, Uniaxial Compressive Strengths (UCS) and Acoustic Scanner Analyses. Hole data can be imported, entered, modified, printed, plotted and exported. The only exception to this is that LAS data cannot be entered or modified via the keyboard.
4. Audit, statistical and summary data:	It includes Project Audits, Hole Audits, Hole Summaries, Seam Summaries, Sample Summaries etc. This data is generated from the hole data. It can be viewed, exported and printed but not modified.
5. Program control data:	This is data that is used by the program when opening or plotting data. It includes definitions for Hole Sets, Hole Intervals, Hole Plans, Downhole Plots, Histograms and Graphical Editor. This data can only be entered and modified.

1.4.1 Data Audits

LogCheck generates a number of data audits that are useful for managing your data. These include the following audits:

- ***Dictionary*** showing for each code in the dictionary, the number of times it has been used in the data and the names of the first and last holes where it has been used;
- ***Codes*** showing where a specified code has been used in the data;
- ***Projects*** showing the number of holes for each data type within each project;
- ***Total depths*** showing the final depth (or blank if no data present) for each data type for each hole;
- ***Uncorrelated Coals*** showing each seam defined in the hole and any occurrences of coal not yet assigned a seam name, that occurs between these seams;
- ***Unsampled Coals*** showing any coals that do not have sample numbers;
- ***Unsampled Seams*** showing any parts of a seam that do not have a sample number;
- ***Horizons*** showing for each hole, the depth of the various horizons such as base of weathering;
- ***Strats*** showing for each hole, the thickness of the various stratigraphic units encountered in it;
- ***Seams*** showing for each hole, the thickness of the various seams encountered in it;
- ***Plies*** showing for each hole, the thickness of the various plies encountered in it;
- ***LAS Files*** showing for each LAS file its: hole name, date logged, logging company, reading spacing, top and bottom depths and recorded geophysical variables (as defined in the header of the LAS file).

1.4.2 Data Summaries

LogCheck generates data summaries that are useful for reviewing your data. These include the following summaries:

- ***Drilling*** showing the start and end date of drilling and the number of metres of each drilling type in each hole;
- ***Seam/Horizon Picks*** showing for each horizon, stratigraphic, seam or ply unit in each hole, its from and to depth and thickness;
- ***Seams/Plies*** showing for each seam or ply in each hole: the depth and elevation of its top and bottom, its thickness, the thickness of coal partings and core loss in the seam, the thickness of either interburden to the seam above, or overburden to the surface, the stripping ratio and the cumulative stripping ratio;
- ***Samples*** showing for each sample in each hole: its sample number, top and bottom depths, top and bottom seams and plies, theoretical mass and lithology;
- ***Seam/Ply Composites*** showing for each seam or ply in each hole: seam, from/to depth thickness, sample number, and the composite analysis results for total moisture, ash, volatile matter, fixed carbon, specific energy, calorific value, total sulphur, phosphorous and chlorine, as derived by compositing the results from individual samples.
- ***Defects*** showing for each core run or Rock Mass Unit (RMU) as defined by the geologist:
  - the rock mass data such as RMU type, weathering, slaking potential, strength, bedding development and mechanical state;
  - the RQD, Hansagi's C Factor, average stick length, fracture frequency, rock mass rating (RMR), Q-index, minimum / maximum defect angle and minimum / maximum defect direction. These are all calculated from the individual defect data;

  - the most common: defect type, origin, continuity, width, infill mode, infill type, infill consistency, surface shape and surface roughness within the core run or RMU;
- ***Defect Spacings*** showing for each defect the distance to the defect above it;
- ***Fracture Frequency*** showing for each defect a fracture frequency value from the defect above to the defect below;
- ***Point Load Indices*** showing the calculated point load index for each test sample;

All data summaries can be listed either as reports or delimited format for output to word processing or spread sheet packages. Data from the non-geotechnical summaries can be plotted on hole plans and data from the geotechnical summaries can be plotted as downhole plots.

1.4.3 Statistics

LogCheck generates statistical reports for the following:

- ***Coded Data Frequencies*** showing for each hole, the frequency of occurrence of a specified dictionary variable – for example, the number of times each lithology occurs in each hole or the thickness of each lithology in each hole;
- ***Interval Thickness Statistics*** showing for each hole, the mean, standard deviation, minimum and maximum of the thickness of the coal intervals in each hole;
- ***LAS Variable Statistics***, including for each variable in each hole, or specified part of a hole, its mean, standard deviation, minimum, maximum and various percentile values.

Coded Data Frequencies can be plotted as histograms and LAS Variable Statistics can be plotted as box and whisker plots.

1.5 Features of *LogCheck*

Some of the features of *LogCheck* include:

- data entry and editing,
- data listings,
- data plotting,
- graphical editing.

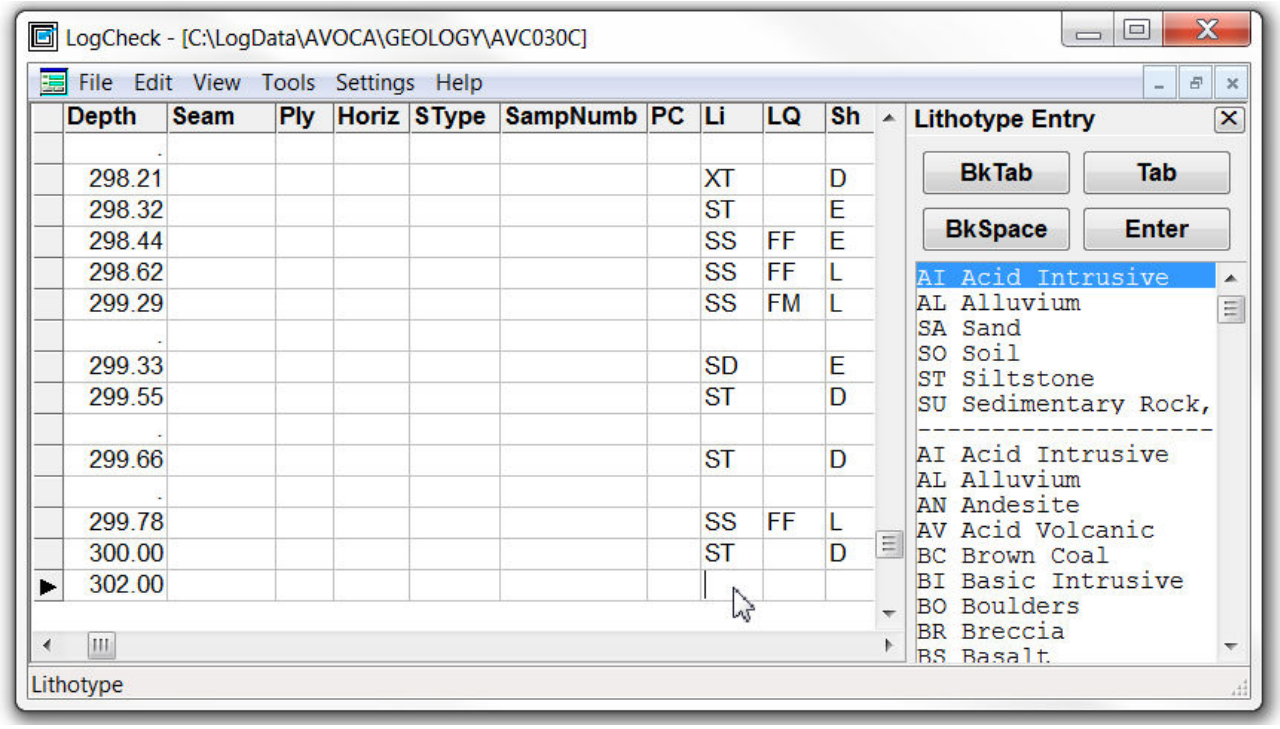
1.5.1 Data Entry & Editing

LogCheck supports a number of widely used data sheet formats or can be tailored to match the client's specific needs. Data can be imported from Geobank, Acquire, MineScape (GDB), Vulcan, Minex, Excel .csv or Englog text files or entered directly. No matter which method is chosen to enter data, it is fully validated before it is accepted into the system. This includes checking that depths are in sequence, compulsory fields such as lithotype are entered, percentages of lithologies add up to 100% and pneumonic codes are contained in the dictionary.

The data editor includes facilities to:

- display the data in grid (like a spreadsheet) or forms (single page per record) format,
- hide certain fields when not required,
- select codes from a menu of valid codes,
- edit English comments using a word processing style editor,
- automatically copy down values of user specified fields onto new lines,
- insert, delete and undelete records,
- search and replace fields,
- add or subtract a constant value to a set of depths,
- expand or contract a set of depths to account for core loss / expansion.

The *LogCheck* editor is shown below:



1.5.2 Data Listings

Data can be listed in its original format or as reports with codes converted to full English descriptions. In either case, the listings can be produced either as PDF's or text files for importing to other software such as Excel or Word. They can be generated for part of a hole, a single hole, a set of holes or all holes in the project. Report formats can be tailored to suit the client's requirements.

An example of a coded data report that has been generated as a PDF file is as follows:

geoCheck
GEOLOGICAL DATA SPECIALISTS

AVOCA
Lithology Log

Hole AVC032
Page 3 of 3

							Lithology Descriptor												Geotechnical							Mechanical			Sedimentology				Minerals			
Calculated Thickness	Interval Base Depth	Seam Name	Ply Name	Horizon Name	Sample Type	Sample Number	% Lithotype	Lithotype	Lithology Qualifier	Shade	Hue	Colour	Adjective #1	Adjective #2	Adjective #3	Adjective #4	Interrelationship	Weathering	Estimated Strength	Bedding Spacing	Defect Type	Defect Intact	Defect Spacing	Defect Dip Angle	Core State	Mechanical State	Texture	Basal Contact	Sedimentary Feature #1	Sedimentary Feature #2	Bedding Dip Angle	Mineral/Fossil	Mineral/Fossil Type	Mineral/Fossil Assex	Gas
2.89	237.00							SS	FM	L		G						M	R4															
3.00	240.00							ST		M		G	IA	SA	BN			M	R4															
6.25	246.25							ST		M		G	CL	LM	TO			M	R3															
1.29	247.54	MAU						CO				K						F																
4.46	252.00							ST		M		C	SA	BN				F	R4		VN													
4.11	256.11							SS	FF	L		G	SP	XC	LM			M	R4															
0.74	256.85	MAL						CO				K						M	R2															
5.15	262.00							SS	FF	M		G						M	R3															
							subangular matrix																													
2.00	264.00							CS		D		G	SI	LM	TO			F	R4															
4.00	268.00							SS	FM	L		G						F	R5															

An example of a geology report is as follows:

geoCheck
GEOLOGICAL DATA SPECIALISTS

AVOCA
Lithology Log

Hole AVC032
Page 3 of 4

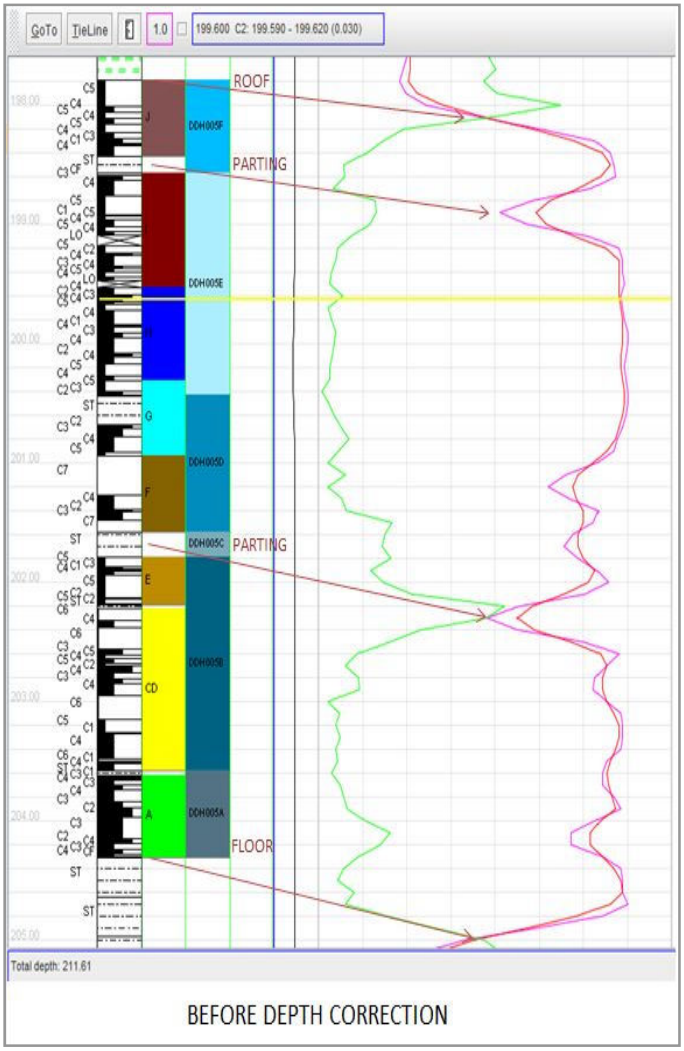
Depth	Thickness	Sample Number	Lithology
207.53	4.53		**SILTSTONE**: medium brownish grey, minor carbonaceous bands rare sandy laminae, fresh, medium strength rock.
			Top of Warkworth 1 Seam
207.91	0.38		**COAL**: black, fresh, medium strength rock.
208.00	0.09		**CLAYSTONE**: coaly, fresh, medium strength rock.
208.20	0.20		**COAL**: black, fresh, very low strength rock.
			Base of Warkworth 1 Seam
			Geological Thickness: 0.67 metres
216.00	7.80		**SILTSTONE**: dark grey, clayey laminae throughout, fresh, medium strength rock.
219.00	3.00		**SILTSTONE**: medium grey, sandy laminae abundant grains throughout, fresh, medium strength rock.
220.47	1.47		**SANDSTONE, fine grained**: light grey, sporadic silty lenses, fresh, medium strength rock.
			Top of Warkworth 2 Seam
223.42	2.95		**COAL**: fresh, very low strength rock.
			Base of Warkworth 2 Seam
			Geological Thickness: 2.95 metres

1.5.3 Graphical Editing

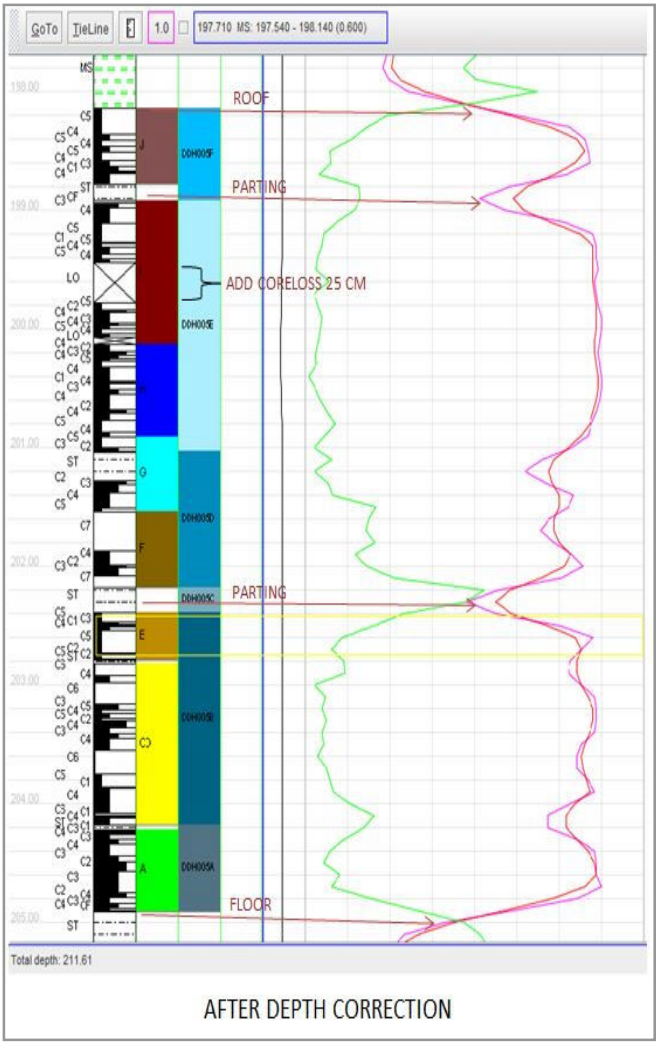
The Graphical Editor (GeoEdit) is used for graphically displaying hole data, and aligning depths of lithologies with the downhole geophysics. GeoEdit reads data from a hole log generated from *LogCheck*, and displays the lithology, seam, ply, sample number, mechanical state and geophysics in a graphical format. The main editing operations are:

- Moving the From depth of an interval(s) either further down or up the hole,
- Inserting a new interval at the top, bottom or within existing units,
- Expanding or contracting units, either by a single group or a set of tie lines,
- Renaming a lithology, seam, ply or sample number.

It maintains a history of edits done during the current session, and allows you to undo each edit. A log of these edits is saved to a text file. Also, the first time that GeoEdit is invoked for a given hole, a raw copy of the data is saved. An example of a hole displayed in GeoEdit before depth corrections on the left and after depth corrections on the right, is shown below:



BEFORE DEPTH CORRECTION



AFTER DEPTH CORRECTION

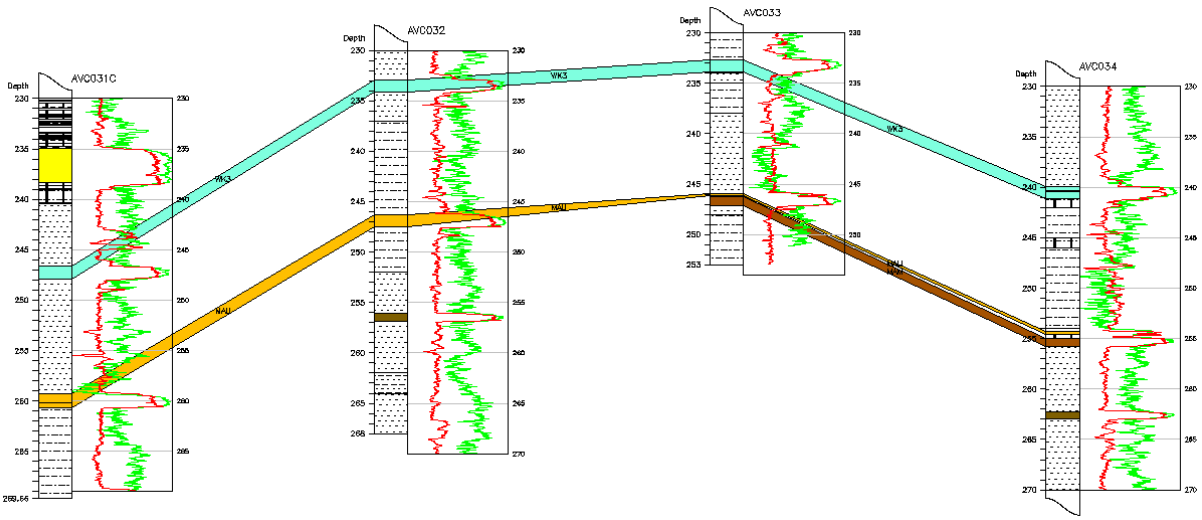
1.5.4 Data Plotting

Plots are generated as industry standard .dxf files which can be displayed, edited and/or plotted from nearly any CAD package – for example, AutoCAD's TrueView, which is available for free. TrueView can be used to view or output a plot, however it does not have the ability to edit the plot. *LogCheck* produces four types of plots:

- drill hole location plans which can also show seam information such as coal thickness, parting thickness and strip ratios;
- downhole plots of any combination of geological, geotechnical and/or geophysical data for part of a hole, a single hole or a set of holes along a section;
- histograms that graph the frequency of occurrence of a variable;
- box and whisker plots showing the ranges and average values of geophysical data within each hole.

In the case of downhole plots, lithological data can be displayed as symbols using the supplied symbol set or you can design your own. Defects can be displayed as planar, stepped or curvy angled lines. Coded data can be displayed as codes (optionally staggered horizontally based on their value), English descriptions or histograms (say, for rock strength). Numeric data can be displayed as traces (lines joining point to point), histograms or numbers. You can either use one of *LogCheck*'s standard sheet layouts for plotting downhole data or design your own.

An example of a plot generated by *LogCheck* and displayed in TrueView is shown below:



1.6 *LogCheck* Availability

LogCheck is available for outright purchase or rent on a shorter-term basis. Maintenance and Support is free for the first twelve months after purchase after which it is charged annually at 15% of the current purchase price. For further information, contact one of the following personnel listed in the following table.

Contact	For	Details
Brett Larkin	Inquiries from New South Wales.	**Email:** brett@geocheck.com.au **Ph/Fax:** +61 2 4385 4829 **Mob:** +61 4 2723 2264
Gary Ballantine	Inquiries from Mongolia.	**Email:** gary@geocheck.com.au **Mob:** +61 4 4753 5041
Gamal Jacob	Inquiries from Indonesia.	**Email:** gamal@geocheck.com.au **Mob:** +62 812 1850 1850
Graeme Hewitt	Inquiries from Queensland and elsewhere.	**Email:** graeme@geocheck.com.au **Ph/Fax:** +61 7 5455 4680 **Mob:** +61 4 2916 7688

1.7 Glossary of Computer Terms

The following chapters assume that you are familiar with database terminology, including:

- ASCII Text: ASCII is a code for representing English characters as numbers, with each letter assigned a number from 0 to 127. For example, the ASCII code for upper case A is 65.
- Column: A column on the screen showing the value of a field over a number of records.
- CSV File: A CSV (comma separated values) file consists of a text file where data values are separated by commas; it is used for transferring data between applications.
- Database: A set of inter-related tables that is held in persistent storage. For example, the *LogCheck* database of drill hole data.
- DBMS: A database management system is the software that maintains the data in a database.
- Field: A discrete value in a record, for example the lithology for an individual interval of a particular hole.
- File: A container for storing data on a computer's disk drive, for example, the geology data for a drill hole is held in a single file.

- File Type: The extension on the end of a file name that indicates to the computer's operating system the kind of data stored in the file. For example, a file extension of .dbf indicates that it is a dBASE database file.
- Folder/ Directory: A file structure that stores other files, for example, C:\Logdata. The terms folder and directory are interchangeable.
- Index: An ancillary data structure to a table that sorts the record in the table, for example, each dictionary has an index file attached to it so that it can be displayed in order.
- Primary key: A field in a table that uniquely identifies each record, for example, the sample number on a set of proximate analysis results.
- Query: A subset of a table that satisfies a set of criteria.
- Record: Composed of a related group of fields. For example, all the proximate analysis results for a single sample.
- Row: A record as displayed on the screen.
- Tab delimited file: A text file where data values are separated by tabs.
- Table: Stores information about an entity, such as a drill hole, in a structure that is composed of records containing fields.
- Validation rules: Specify the criteria that are acceptable before data is entered in a field.
- Variable: A cell in computer memory that can store a single value.

1.8 Acronyms

AMG	Australian Mapping Grid
ASCII	American Standard Code for Information Interchange
LAS	Log ASCII Standard
MGA	Mapping Grid of Australia
RMR	Rock Mass Rating
RMU	Rock Mass Unit
UCS	Uniaxial Compressive Strength.

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Chapter 2
Getting Started

By the end of this chapter you will be able to:

- Install the dBase RunTime.
- Install and start *LogCheck*.
- Install Multiple Versions of *LogCheck* on a single computer.
- Install optional components.
- Set up the *LogCheck* data directory.
- Install a dictionary.
- Set up a new project.
- Set the project details data.
- Enter hole data.

2.1 Introduction

This chapter explains how to install *LogCheck* software and commence using the software as quickly as possible. The steps involved are:

- Install the dBASE Runtime if it is not already installed,
- Install the *LogCheck* software, and optionally the graphical editor (GeoEdit), which requires the Java runtime.
- Setup the *LogCheck* data directory.
- Setup the dictionary, project details and initially enter hole data.

2.2 Installing the dBASE RunTime Engine

LogCheck stores user data in database files that use the dBASE format. It processes them using a version of dBASE that is called the dBASE Runtime Engine. The Runtime engine may be freely distributed and must be installed before *LogCheck* can be installed.

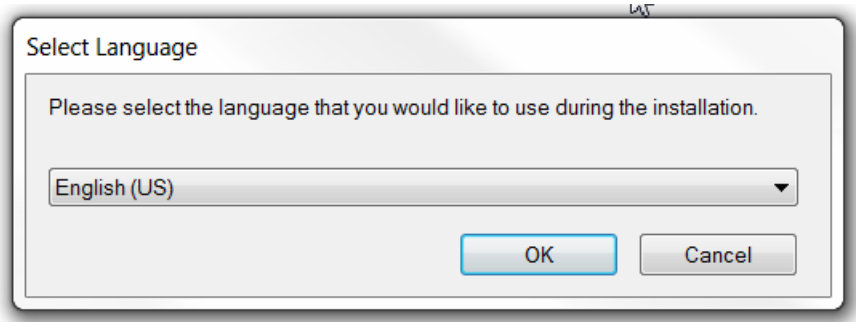
The Runtime engine installation file is called PlusRuntime-b2215_EN.exe and is about 12.5 MB. The program once installed takes up around 75MB. The installation program is downloadable from the web address:

http://www.dbase.com/support/updates

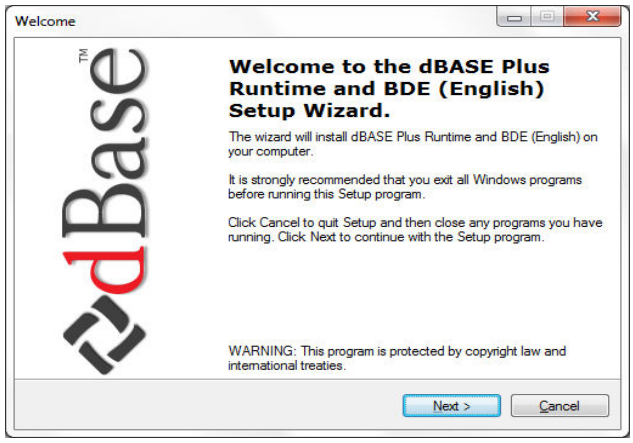
Scroll down until the dBASE PLUS Runtimes section is encountered. Then select dBASE Plus Runtime Version 2.80, and double click the English Runtime Engine link from the dropdown box. This program generally does not need to be upgraded each time LogCheck is upgraded. Occasionally, however, a LogCheck upgrade will also require an upgrade to Runtime. In which case, the user will at the time receive instructions on how to download the new Runtime.

To install Runtime just double click on the installation file once you have downloaded it, progress through the following dialogs, accepting the default values in each case:

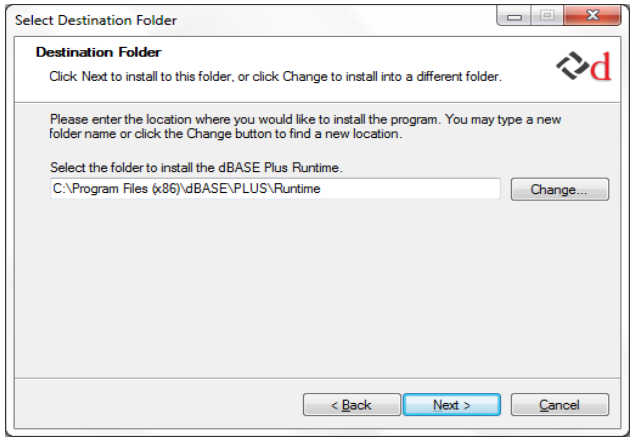
The first dialog requests the language:



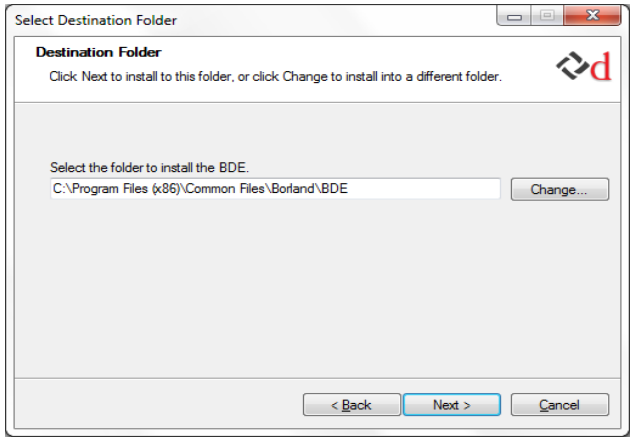
Next, the dialog on the right initiates the installation:



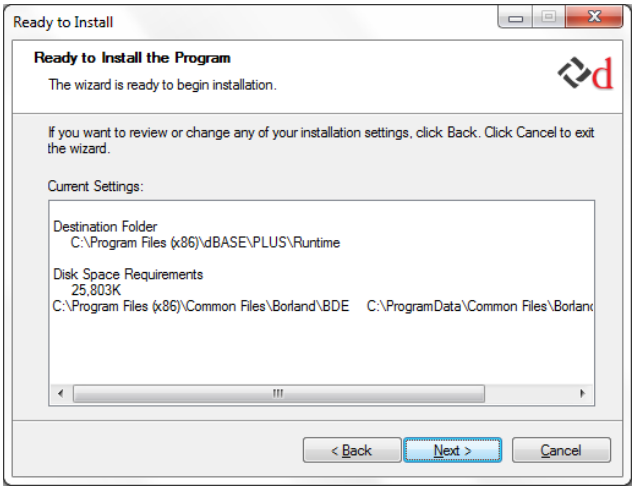
Next, the destination folder for the dBASE runtime is requested, as shown in the the dialog on the right.



Next, the destination folder for the Borland Database Engine (BDE) is requested, as shown on the right.



Lastly, a confirmatory dialog is displayed that summarises the configuration, as shown on the right.

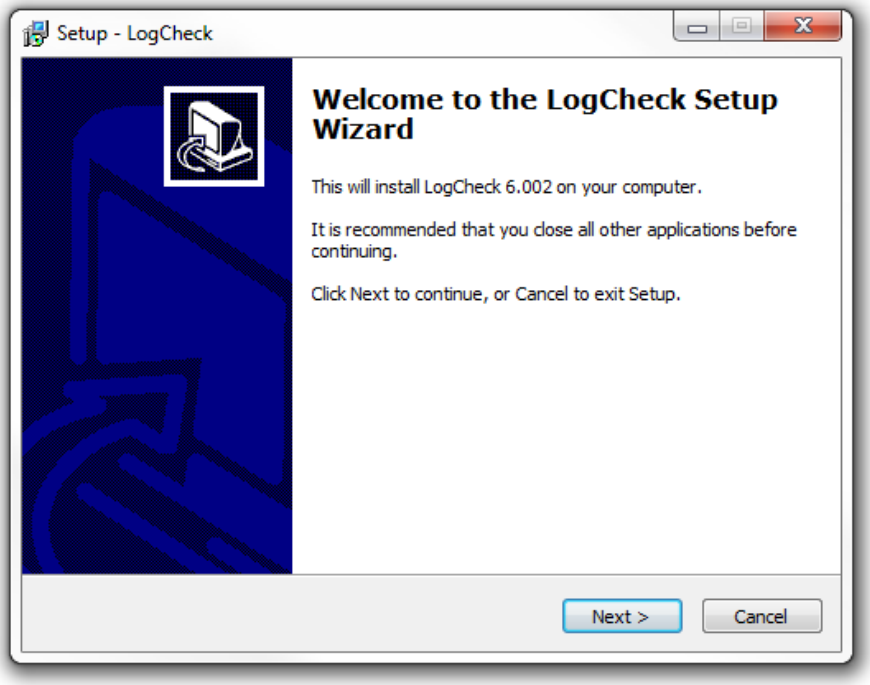


2.3 Installing and Starting LogCheck

LogCheck installation files are around 10MB and can be distributed over the internet using file distribution software such as YouSendIt. This sends the receiver an email that has a link to a web address from which the LogCheck install file can be downloaded.

The installation file for *LogCheck* has a name in the form lcn.nnndataformat.exe where n.nnn is the release number and dataformat is the particular format used for recording geological data in that copy of *LogCheck*. For example, the installation file lc6.002CoalLog.exe will install release 6.002 of *LogCheck* and uses a CoalLog format for the data.

To install *LogCheck* double click on the installation file. The following screen should then appear:



Screens will then appear prompting for:

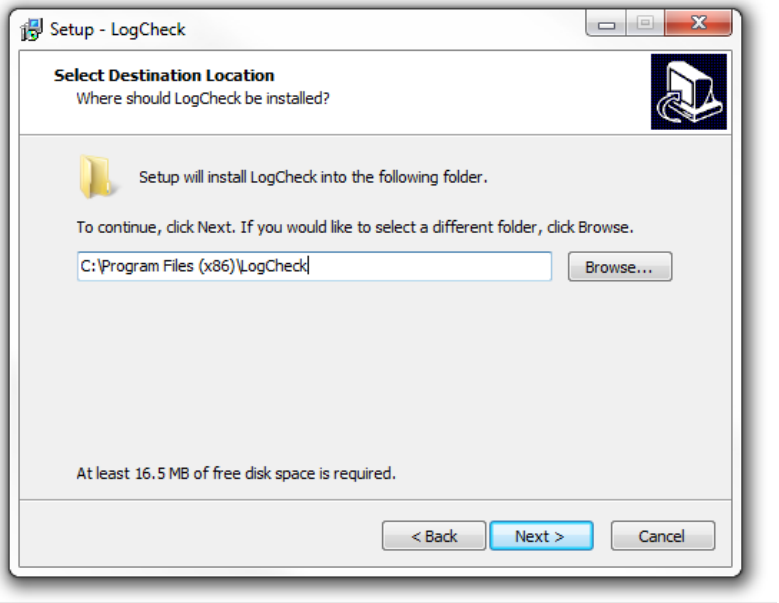
- where to store the program,
- where to include it on the start menu and
- if you would like an icon for it on the desktop.

It is preferable but not necessary to choose the defaults when prompted for this information. Once installed, to start *LogCheck*, double click on the icon (as shown below) on your desktop.

2.4 Installing Multiple Versions of *LogCheck* on a Single Computer

Some users with a number of clients with different data formats may need to have multiple versions of *LogCheck* on their computer. To install a second copy of *LogCheck*, first determine the directory where the current version is installed. If the default was chosen during the installation process this will be c:\Program Files (x86)\LogCheck for the 64-bit version of Windows, and C:\Program Files\LogCheck for the 32-bit version of Windows.

Now when installing the second version of *LogCheck* and the window to the right appears:



Enter a different directory name to the first, for example, if the first is called:

C:\Program Files (x86)\LogCheck

the second could be called:

C:\Program Files (x86)\LogCheck CoalLog

If this new directory name does not exist the installation program will create it. Then progress through the installation windows by selecting the Next buttons.

On installing the second version of *LogCheck*, the desktop icon for the first version will be overwritten by the icon for the second version. To recreate a desktop icon for the first, perform the following steps:

1) Go to the desktop and single click with the right-hand mouse button on the *LogCheck* icon

2) Select Copy from the popup menu,

3) Point the cursor to the place on the desktop where you want to place the second icon and then single click with the right-hand mouse button,

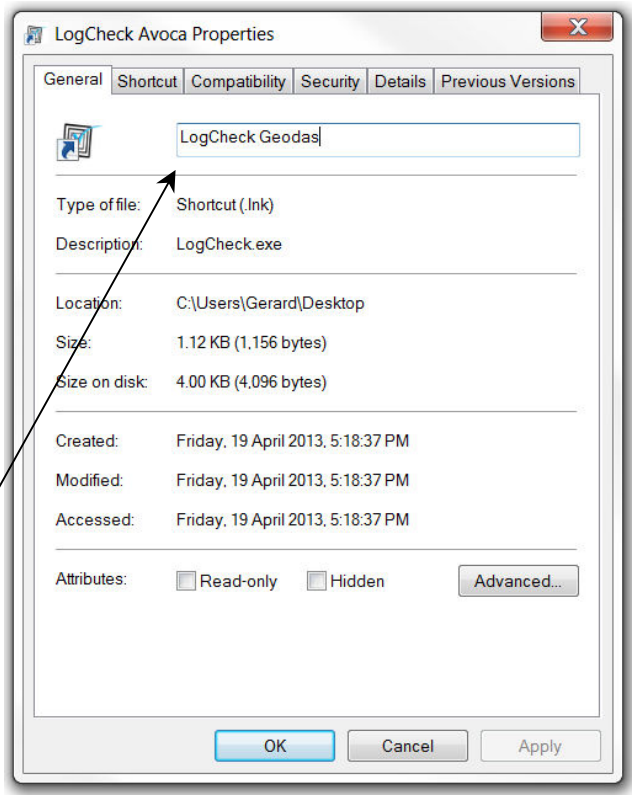
4) Select Paste from the popup menu.

There should now be two *LogCheck* icons on the screen and both will start the second version of *LogCheck*. To set one to point to the first version perform the following steps:

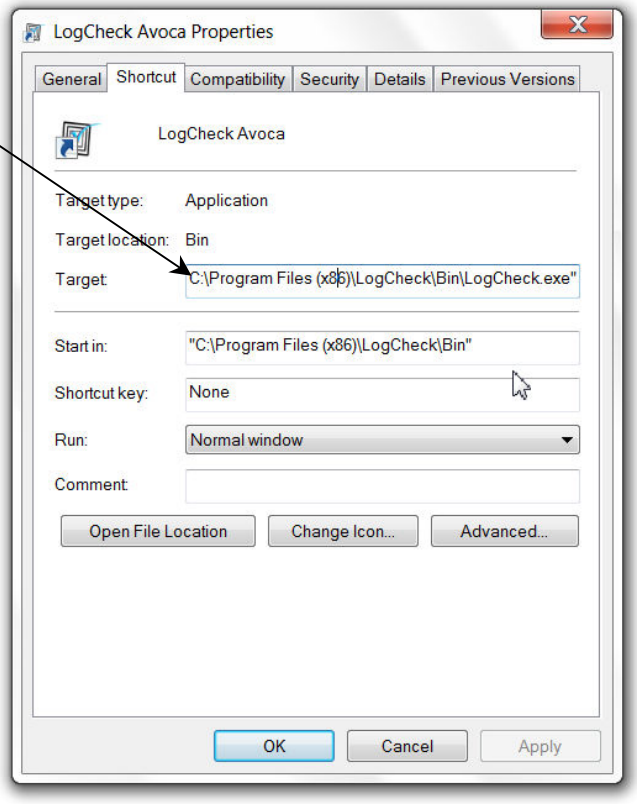
1) Select which icon should be modified to start the first version of *LogCheck* and single click with the right-hand mouse button on this icon,

2) Select Properties from the popup menu. An icon properties window like the one on the right should appear. This window would look slightly different on computers running Windows XP,

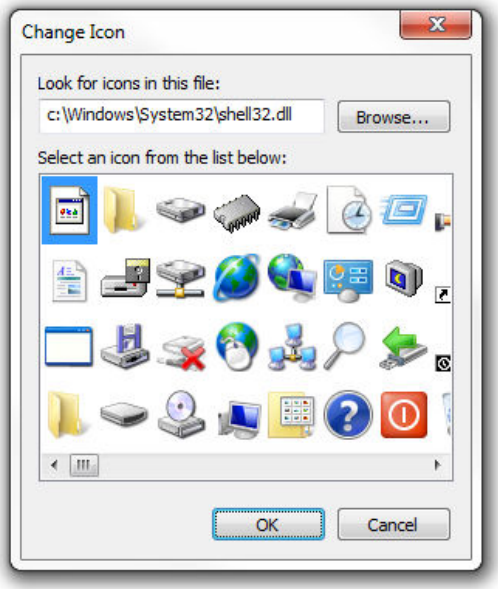
3) Select the General tab from the properties window and change the icon name in the top box to whatever is appropriate, for example *LogCheck Geodas*:



4) Select the Shortcut tab from the properties window and set the Target to the initial version of *LogCheck* including its full path name. If there are any blanks in the path or file name then the full path and file name need to be enclosed in double quotation marks:



5) The icon can be changed by selecting the "Change Icon…" button. After which the window to the right appears:



To change the icon, select the appropriate icon from the displayed list and then select OK. If none of those displayed suit, further icons can generally be found in the files moricons.dll, pifmgr.dll and shell32.dll in the Windows System32 folder. If the name of the file in which icons can be found is changed the new ones are not displayed until clicking on the box containing the icons;

6) Once satisfied with the icon, its name and its target, click on the OK button on the *LogCheck* Properties window.

After making the appropriate changes to the icon for the first version, any changes to the icon type and name for the second version can be made using the same steps as described above.

2.5 Installation of Optional Components

The *LogCheck* installation program may also optionally install driver software for dongles. If your licence also includes GeoEdit, then it is also automatically installed. In this case, you will also need to have the Java runtime environment installed – this is usually already installed on most computers.

To determine if Java is installed, open Windows Explorer and navigate to C:\Program Files, or C:\Program Files (x86) for Windows 64-bit operating system. If there is a folder there named Java, then it has already been installed. If Java is not installed, go to the following web address for a free download:

http://java.com/en/download/

2.6 *LogCheck* Data

LogCheck data falls into five general categories:

1. Dictionary data: Dictionaries contain codes and their user-defined meanings. A dictionary is required for each hole data type (see below). Dictionaries can be imported, entered, modified, printed, exported and plotted as a symbol legend.
2. Project data: Includes the project title to appear on reports, plots etc; rectangular coordinate limits for the project; survey coordinate grid type etc. Can be entered and modified by the user.
3. Hole data: There is a separate file for each data type for each hole. Current data types include: Headers, Cementing, Casing, Geologists, Drilling, Geology, Water Flows, Coal Quality, LAS (downhole geophysical), Rock Mass Units and Defects, Point Loads, Uniaxial Compressive Strengths (UCS) and Acoustic Scanner Analyses.

4. Audit, statistical and summary data: It includes Project Audits, Hole Audits, Hole Summaries, Seam Summaries, Sample Summaries etc. This data is generated from the hole data. It can be viewed, exported and printed but not modified.

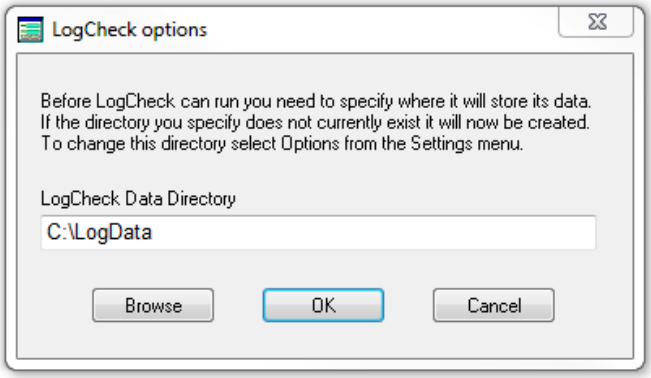
5. Program control data: This is data that is used by the program when opening or plotting data. It includes definitions for Hole Sets, Hole Intervals, Hole Plans, Downhole Plots, Histograms and Graphical Editor. This data can only be entered and modified.

Data entered into *LogCheck* is of three basic types:

- Numerical data, such as a hole depth, hole coordinates and coal quality results.
- Character string data, such as hole names and sample numbers.
- Coded data that is chosen from a dictionary, such as lithotypes and grain size.

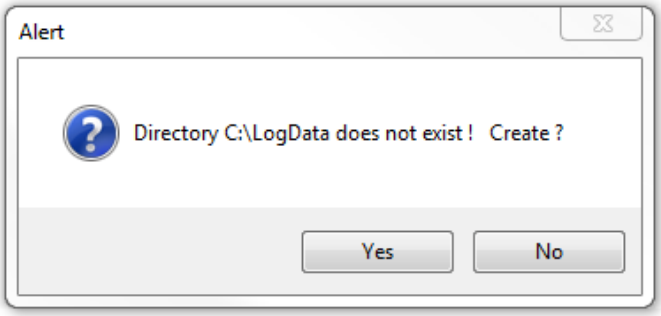
2.7 Setting up the *LogCheck* Data Directory

The first time that *LogCheck* is started the window to the right prompts for the name of the drive and directory where data is to be stored:



To accept the default, click the OK button. However, if the data is to be stored in another location, you can either type in the path, or click the Browse button to navigate to the required folder.

As the prompt states, the directory will be created if it does not exist. It can later be changed by selecting Settings > Options from *LogCheck*'s menu. It is possible to have more than one such data directory but *LogCheck* will only see data in whichever one is the current one. Even when running multiple versions of *LogCheck* for different clients it is not necessary to set up multiple data directories as all projects can be stored in the one data directory. *LogCheck* though will only see those projects that were created using the currently running version.



Multiple data directories are most useful where some *LogCheck* data for a project is to be stored locally and some on a server, for example, working data could be stored locally and finalized data on the server. Apart from LAS data, all *LogCheck* data sits in project subdirectories off a single data directory usually called LogData.

2.8 *LogCheck* Dictionaries

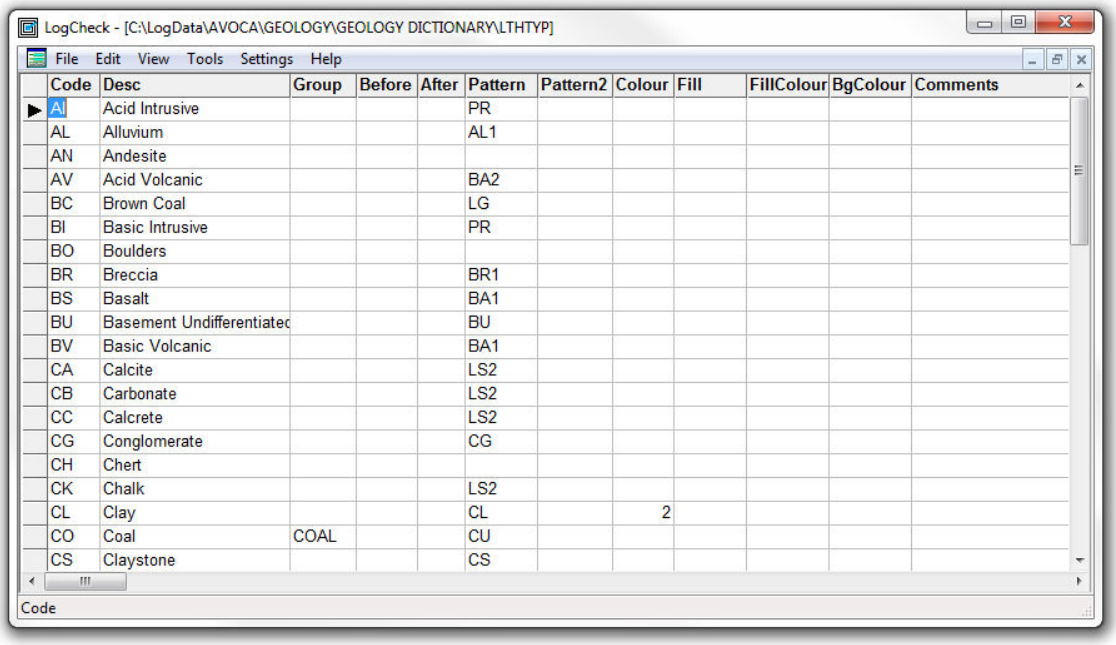
If a *LogCheck* data type includes coded data, that is all data types except Cementing, Geologists, Coal Quality and UCS, then a dictionary of the codes is required before any data of that type can be entered into *LogCheck*. In addition, if you are using CoalLog format, before entering geology data, you will need a local seam dictionary as well as the CoalLog geology dictionary. Each dictionary consists of two files with names of the form:

- *Data Type* Dictionary.dbf and
- *Data Type* Dictionary.mdx.

For example, the geology dictionary files will be called:

Geology Dictionary.DBF a dictionary of the categories, their codes and descriptions;
Geology Dictionary.MDX an index into the dictionary of code names.

The following example shows the first few lines of the Lithotype category of a Geology dictionary:



All *LogCheck* dictionaries contain twelve columns (these are described in detail in Chapter 3 of the *LogCheck* User Manual):

- Code: An abbreviation used by the geologist when entering data;
- Desc: The full description that the code represents. This is what will appear for the code in reports, and in plots where descriptions are being displayed;
- Group: Used to group certain dictionary entries. It is used for various purposes by various parts of *LogCheck*. For most dictionary categories it is not required but in the case of the Seam/Horizon category, the group is required and can only have the values HORIZ, SEAM and STRAT. HORIZ being a zero thickness unit. SEAM a non-zero thickness unit that is economic and STRAT a non-zero thickness unit which is non-economic;
- Before: A Y indicates that when the entry appears in a full English description, a comma should be included before the word, otherwise it is not included;
- After: A Y indicates that when the entry appears in a full English description, a comma should be included after the word, otherwise it is not included;
- Pattern: The name of the primary pattern that will be used for plotting (see Appendix C of the *LogCheck* User Manual);

- Pattern2: The name of the secondary pattern for plotting – if specified, it is combined with the primary pattern;
- Colour: An AutoCAD colour number – a number between 1 and 255 (see Appendix E of the *LogCheck* User Manual);
- Fill: The name of the fill that will be used for plotting (see Appendix D of the *LogCheck* User Manual);
- FillColour: An AutoCAD colour number that will be used for drawing the fill;
- BgColour: An AutoCAD colour number that will be used for drawing the background;
- Comments: Provided so that the user can enter reminder notes that they may need when doing dictionary housekeeping. This field is not used by *LogCheck*.

2.8.1 Where are Dictionaries Stored?

When *LogCheck i*s searching for a dictionary for a particular data type it first looks in the directory for that data type within the current project. If it does not exist it then searches the directory called Dictionaries sitting in the *LogCheck* data directory. For example, when looking for the geology dictionary for the project AVOCA it would look for:

c:\LogData\AVOCA\Geology\Geology Dictionary.dbf

and if this file does not exist it would look for:

c:\LogData\Dictionaries\Geology Dictionary.dbf.

This search procedure enables the user to have a single Geology (or any other data type) dictionary covering most projects but have a special dictionary for a particular project.

2.8.2 Setting up a Dictionary

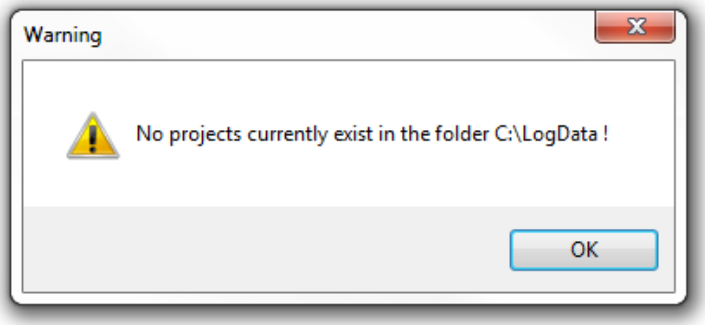
The simplest way to get started is to copy a *LogCheck* dictionary from somewhere else – for example, another project, or obtain one from GeoCheck Pty Ltd. Other ways to create a dictionary are described in Chapter 3 of the *LogCheck* User Manual.

2.9 Setting up a New Project

Each project has a single directory that sits in the *LogCheck* Data Directory. All the data, apart from LAS data, for a project sits in subdirectories off the project directory. These subdirectories are named according to the type of data they contain and are created as required by *LogCheck*. For example, when the first hole of Water Flow data is entered into *LogCheck* for a project, *LogCheck* automatically creates a subdirectory called WaterFlows in which the data is stored.

New project directories can only be created by *LogCheck* but once created can be renamed or deleted using Windows Explorer. To copy the data for a project to another computer running *LogCheck*, simply copy the project directory and all its subdirectories to the *LogCheck* Data Directory on the other computer. Be aware that within each project directory there is a file called project.mem. This file contains the details for the project. If it is renamed or deleted *LogCheck* no longer recognizes the directory as a *LogCheck* project directory.

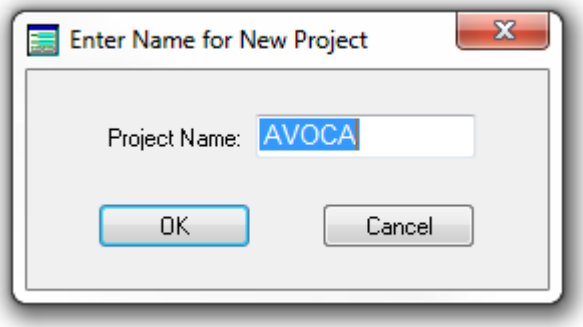
If no projects exist in the *LogCheck* data directory when *LogCheck* is started the warning to the right is displayed:



Next the prompt to the right is displayed for a name for the initial project:

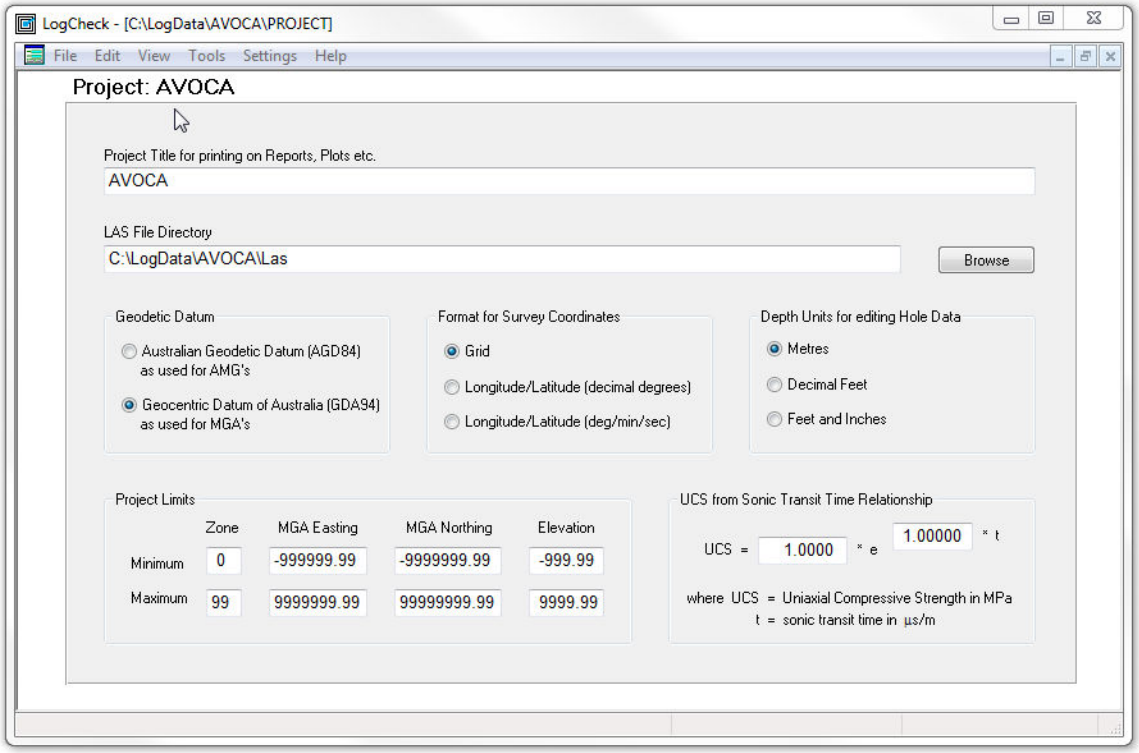
The name for a project directory is restricted to a maximum of eight characters and cannot contain blanks. Once the project has been created *LogCheck* displays its Project Details for editing.

Further new projects can be created at any time by selecting File > New > Project from *LogCheck*'s menu.



2.10 Project Details Data

Once a project is created the Project Details for the project becomes the current data set. An example of the Project Details for a project named AVOCA is:



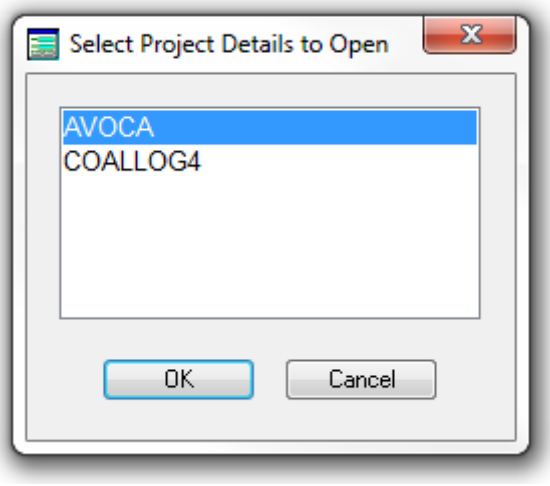
The following is a brief description of the project data (seen Chapter 4 of the *LogCheck* User Manual for more details):

- Project Title: This is the title for printing on reports, plots etc. The Project Title can contain blanks and can be of any length.
- LAS Directory: The LAS data can reside anywhere on the user's computer or attached network, unlike all the other *LogCheck* data, which must reside inside the project folder. If this field is blank, *LogCheck* looks for the LAS data in the LAS folder of the project. *LogCheck* will also search for LAS data in all lower directories under the specified folder.
- Geodetic Datum: Currently *LogCheck* stores coordinates for project limits and drill holes as AMG's and MGA's.
- Survey Format: Specifies the survey coordinate format, using the currently selected datum. All data is stored in grid format but can be displayed in longitude and latitude.
- Depth Units: Specifies the unit of measurement that is used for editing hole data. Upon entering, the data is stored in metres and all reporting, plotting and exporting of the data is in metres. The selected depth unit is only displayed in the editor. This option can be changed at any time so that the Hole Data stored on the machine can be displayed in the required format.
- Project Limits: A rectangular set of limits against which survey coordinates are validated.
- UCS: Parameters specific to the project for converting sonic values to UCS (Uniaxial Compressive Strength).

2.10.1 Opening Projects

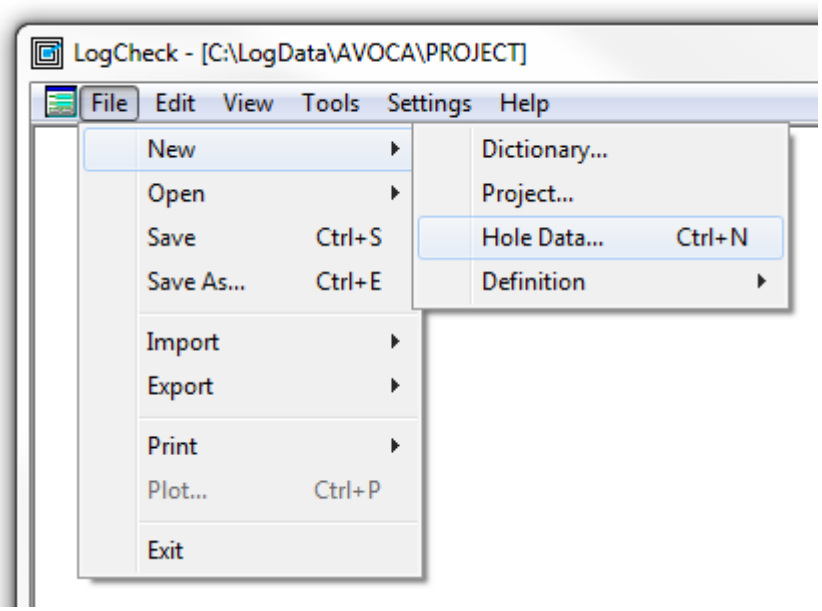
Where there is more than one project, to change between projects, go to File > Open >Project, and select the required project.

Projects can also be opened from the Open Hole dialog (see the following chapter).

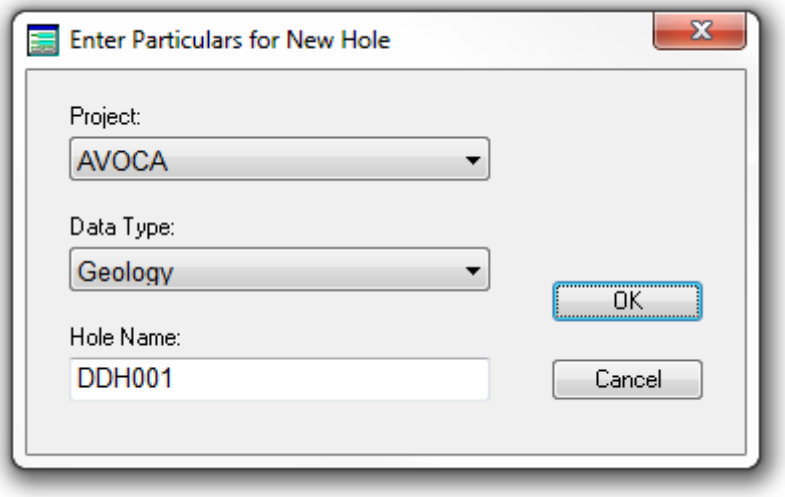


2.11 Creating New Data for a Hole

Once a dictionary has been created for a particular data type, such data can be entered into *LogCheck*. The first step in this process is to create a new table of this data type for the hole by selecting File > New > Hole Data from the *LogCheck* menu:



Then the dialog box shown on the right will appear. After selecting the Project, Data Type, entering the Hole Name for the new hole data and clicking OK, *LogCheck* will create the new table.

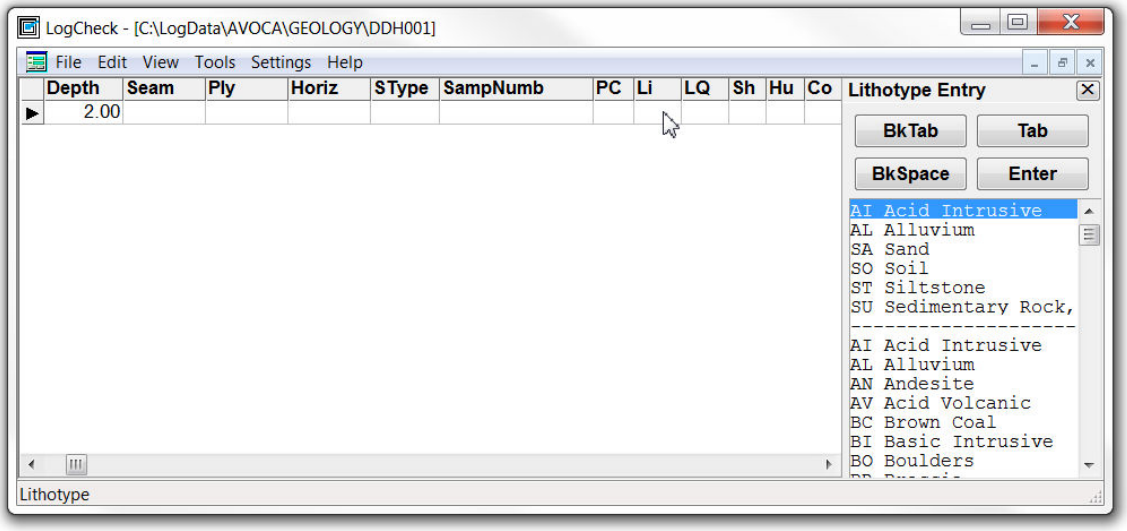


It will be placed in the directory named after the data type and sitting in the project directory and uses the hole name as its filename with a .dbf extension. Hole names in *LogCheck* are always upper case and cannot contain blanks. Hole names are generally restricted to a maximum of eight characters, but can be up to sixteen characters if specifically requested.

For example, in the case above, *LogCheck* will create a file named DDH001.dbf. *LogCheck* uses the hole name as its filename with a .dbf extension. If the data type directory does not exist, *LogCheck* will create it. If tables of the particular data type also contain any comment fields then an additional file with the same filename but extension .dbt will also be created for storing the comments. The files will be placed in the directory named after the data type located in the project directory, for example:

C:\LogData\AVOCA\Geology\DDH001.dbf

Following creation of the table, it will then be opened in the *LogCheck* editor, as shown below:



In the above figure, the first depth of 2.00 m has been entered, and the cursor is currently in the Li (Lithotype) column. The Tab key moves to the next field, or the mouse can be used to select a column. For those data values that have an associated dictionary, the dictionary entries are displayed on the right-hand side of the editor – in this example, Lithotype entries are displayed. Pressing the down-arrow key commences a new row. The *LogCheck* editor is described in more detail in Chapter 7 of the *LogCheck* User Manual.

Hole data can be deleted, renamed or moved to another project or computer by using Windows Explorer. Currently the filenames of all data types for a hole are the same therefore care must be taken when moving files to ensure that they are placed in the directory for that data type in the destination project. For example, the geology data for hole DDH001 will be stored in a file named DDH001.dbf, in the Geology folder – the full path is as follows:

C:\LogData\AVOCA\Geology\DDH001.dbf

The header data for the same hole has the same name, DDH001.dbf and is stored in a file named DDH001.dbf, in the Headers folder – the full path is as follows:

C:\LogData\AVOCA\Headers\DDH001.dbf

Where there is a .dbf file and a corresponding .dbt file it is essential that any deletion, renaming or moving is applied to both files. If not, the comments for the hole may be lost.

Chapter 3
Management Tools

By the end of this chapter you will be able to:

- Switch from general user to Manager mode.
- Set the Manager password.
- Understand the three levels at which *LogCheck* validates data.
- Setup optional validations for geologist, drilling, geology, defect and point load data.
- Create a new dictionary from scratch.
- Copy a dictionary into a project.
- Import a dictionary into a project.
- Open a *LogCheck* dictionary in the Editor form.
- Understand the structure of a *LogCheck* dictionary.
- Understand the use of the Group column of a *LogCheck* dictionary.

3.1 Introduction

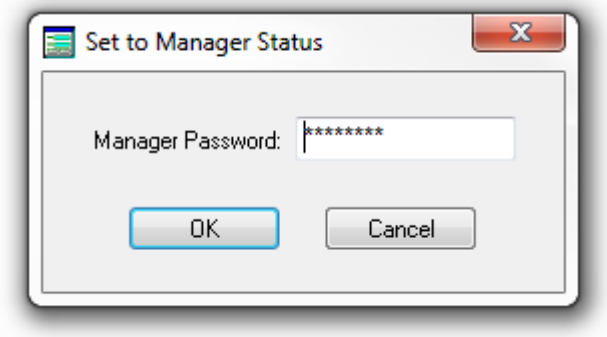
This chapter describes management tools such as setting validation levels and options, and maintaining the dictionaries for a project. To access the management tools, the user needs to switch to Manager mode.

3.2 The Manager Option

The Manager option of the Settings menu allows you to switch mode from General User mode to Manager mode. When in Manager mode you have privileges that allow the importing or modification of the dictionary, importing patterns and fills, customising data validations and changing the Manager password.

3.2.1 Switching to Manager Mode

Each time *LogCheck* is started it operates in User mode. To change to Manager, select Settings > Manager from the *LogCheck* menu. A prompt for the manager password will then appear:



The default manager password is logcheck and is not case sensitive.

3.2.2 Changing the Manager Password

When in Manager mode the Settings menu displays an additional item, Change Password, that allows you to set a different Manager password.

The Change Password dialog is displayed on the right:

Enter the old password, enter the new password, then re-enter it to confirm that it is the same as in the previous field.

3.3 *LogCheck* Validation

Validation is a process that verifies that the data and procedures of a system adhere to its rules. Validation is a general term – it can be applied to computerised and non-computerised systems and procedures. Validation within the software is used to validate the rules of the application. Prevention of errors is better than curing them.

Validation plays a crucial role in ensuring the accuracy and integrity of the *LogCheck* data. There are three broad types of validation of input data in *LogCheck*:

1) Validations performed when a field is modified:
    a. The data input by the user satisfies its fundamental type, such as validating that a number has the correct format for a number and that a date has a day, month and year in the correct order.
    b. Enforce a minimum or maximum number of characters or digits in a text field. For example, the number of characters in a hole name is up to 8 characters.
    c. Check the range of a value, for example, that dips are between 0 and 90 degrees.
    d. Checking that coded data, such as lithotype, is valid by checking that it is in the dictionary.
2) Validations performed when the user moves between rows. These include checks for mandatory fields and checks where the valid value in a field depends on the values in one or more other fields on the same row. For example, in headers data that the hole completion date is not before the start date, or for drilling data that the core size is less than the hole size.
3) Validations performed when the user attempts to save their data. These include checks which require comparing fields between rows. For example, checking that each successive base depth is not less than the previous base depth or where two or more lithotypes are specified for a unit, each has a percentage and these add up to 100%.

Most validation checks in *LogCheck* are embedded in the software and cannot be turned off, however, there are a small number of checks in categories 2 and 3 above which the manager can set.

3.4 Validation Settings

User-specified validation settings can be accessed from the menu by going to Settings > Validations. In order for this menu item to appear, you need to have changed to Manager mode, as it is not available for the General User. There are three levels of validation:

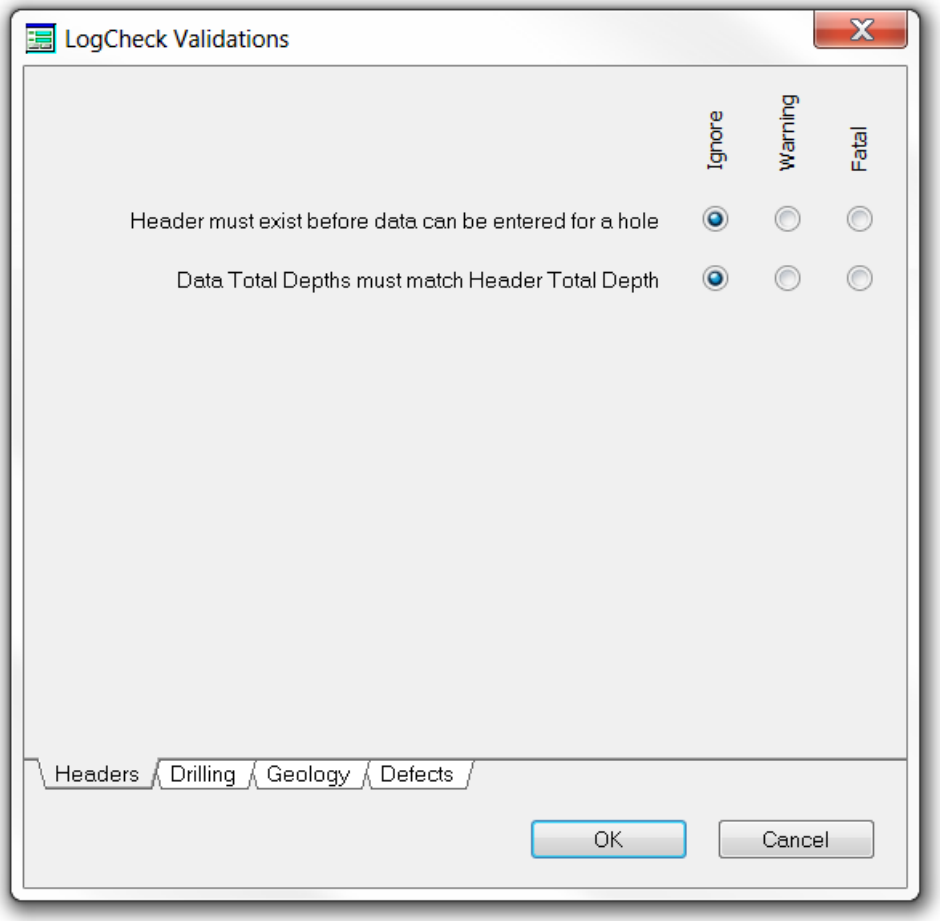
1. **Ignore**: No action is taken;
2. **Warning**: A warning message is posted – the user can ignore it;
3. **Fatal**: An error message is displayed and the current data item cannot be saved;

Validation options are available for the following data:

- Headers
- Drilling
- Geology
- Defects.

3.4.1 Headers Tab

The validation settings that relate to headers are displayed below:

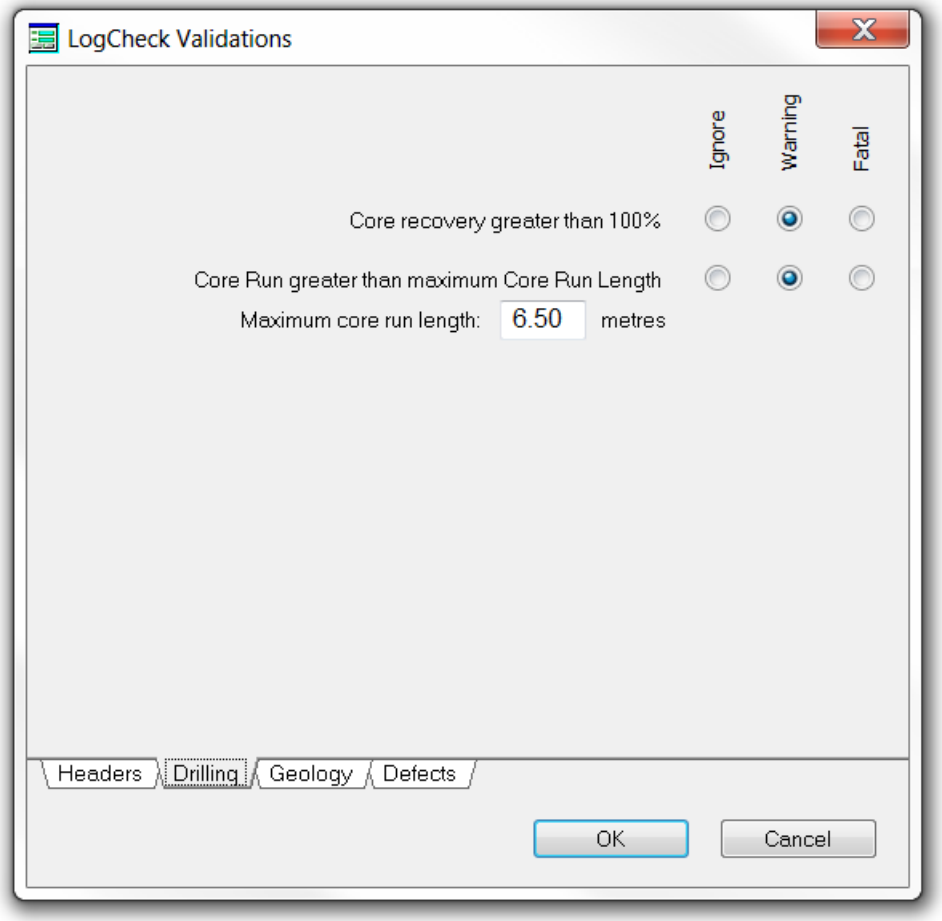


Validation settings that relate to headers are:

- Header must exist before data can be entered for a hole: a header file must exist before other data, such as geology, is entered.
- Data Total Depths must match Header Total Depth: The last base depth in the drilling, geologists, geology, point loads and the last RMU base depth in the defect data is compared to the total depth as recorded in the header. This test checks that the last base depth is equal to the header total depth for all these data types, except point loads where it checks that it is less than or equal to it.

3.4.2 Drilling Tab

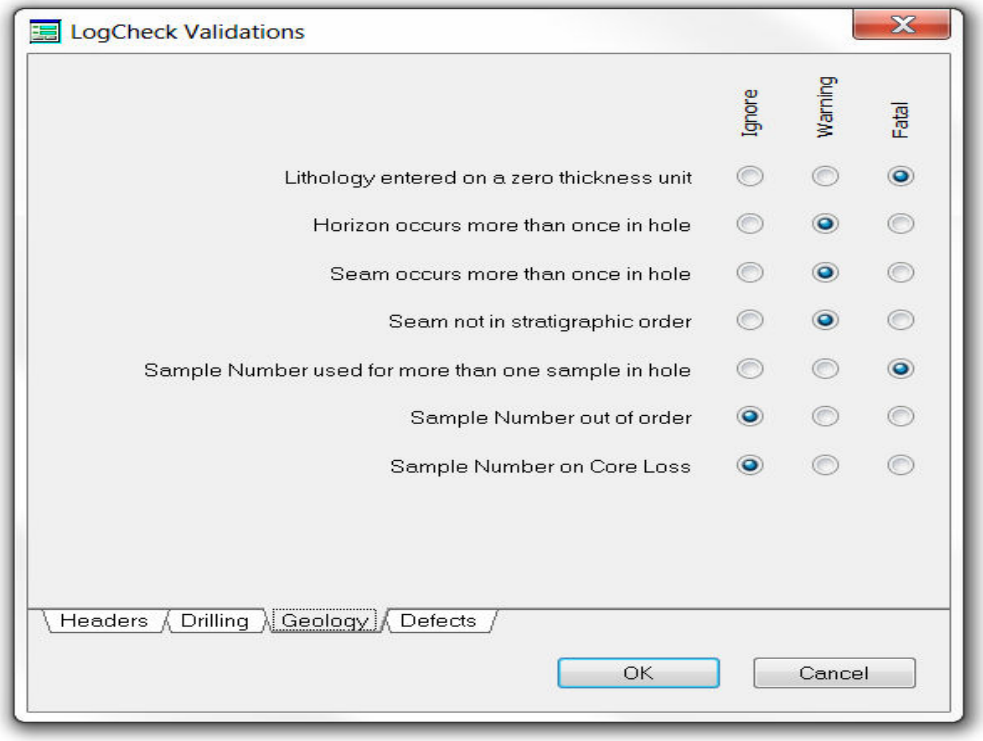
The validation settings that relate to drilling are:



- Core Recovery Greater than 100%: This checks that core recovery in the Drilling data does not exceed 100%. Generally, this will be set as a warning, as the core recovery may be greater than 100% if there has been stick-up resulting from the previous run but the user should at least be warned so that they can ensure that it is not a data entry error.
- Core Run greater than maximum Core Run: This checks that the length of a core run entered in the Drilling data does not exceed the value specified here as being the maximum core run. This is a useful check to ensure that the user has entered each separate core run.

3.4.3 Geology Tab

The validation settings that relate to geology are:



- Lithology entered on a zero thickness unit: this would be an error if the data is being exported to most packages, apart from Vulcan which expects a lithology on every unit including those with a zero-thickness.
- Horizon occurs more than once in hole: generally you would expect horizons such as Base of Weathering or Base of Tertiary to only occur once in a hole.
- Seam occurs more than once in hole: a seam should only occur once in a hole, but it should generally be a warning rather than fatal, as seams may be repeated if there is reverse faulting in a hole.
- Seam not in stratigraphic order: to implement this check, a Seam dictionary must first be created. When creating this, the seams should be entered in stratigraphic order. To perform this validation, *LogCheck* looks at the sequence of seams as they exist in the Seam dictionary. Again, this should generally be a warning rather than fatal, as seams may be out of order if there is reverse faulting in the hole.
- Sample Number used for more than one sample in hole: a sample number should be only used for one contiguous set of units in a hole. Examples of this type of error are:

  a) It appears that 1001 has been used for more than one sample, but is probably the result of mis-keying 1001 as 101.

CO	1001
CO	101
CO	1001

  b) In this example, there are gaps in the sampling, but non-contiguous samples are given the same sample number. This situation may exist in historical data, but is usually an error.

CO	1001
CO	
CO	1001

- Sample Number out of order: normally this will not be an error, but at some sites where sample books are used, this could denote a mis-keying.
- Sample Number on Core Loss: there are two approaches here:

  a) some companies specify that a core loss should indicate a boundary between samples and thus does not have a sample number, in which case this should be set to Fatal.

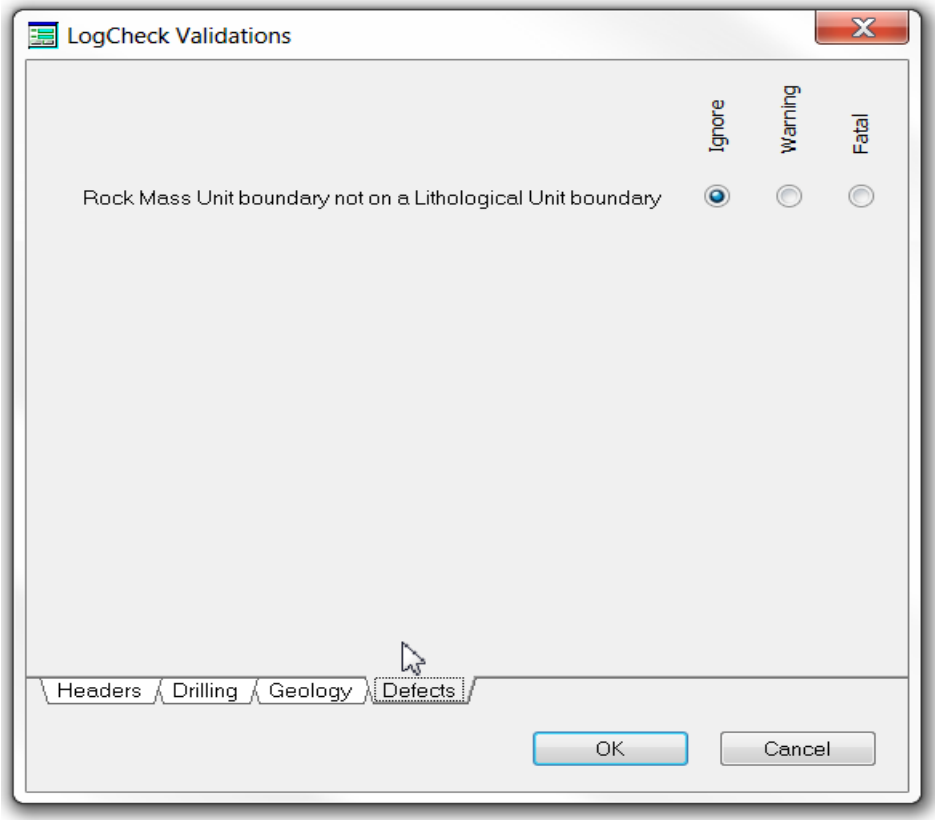
CO	1001
LO	
CO	1002

  b) whereas others will continue a sample number across a core loss in which case this test should be set to ignore. In this example, two coal units are separated by a core loss and have both been given the same sample number (1001), in which case this should be set to ignore.

CO	1001
LO	1001
CO	1001

3.4.4 Defects Tab

The validation settings that relate to defects are displayed below:



- Rock Mass Unit boundary not on a Lithological Unit boundary. A rock mass unit (RMU) is not the same as a lithological unit. A RMU is a unit or set of units with a common set of geotechnical characteristics (strength, weathering, degree of fractures, plasticity, etc). The general convention is that an RMU may contain multiple lithologies but a lithology may not contain multiple RMUs. In the rare case where a lithology unit does contain multiple RMUs then it should be broken up into separate lithology units. This check is most useful for ascertaining if the geology data for a hole has been adjusted to the geophysics but the defect data has not. Set the level to Fatal if this validation is required, otherwise set it to Ignore.

3.5 *LogCheck* Dictionaries

A dictionary consists of a set of user-defined codes and their descriptions that are used to validate entry of drill hole data into *LogCheck*. This chapter describes three ways to create a dictionary, the data format used in a dictionary and the dictionary file structure. Editing a dictionary is briefly described here and in more detail in Chapter 7.

A dictionary is required for each hole data type that contains coded data, that is: Headers, Drilling, Geology, Seams, Water Flows, Defects and Point Loads. As Geologists, Cementing, Coal Quality and UCS do not have any coded fields, they do not require dictionaries.

3.6 Creating a Dictionary

In *LogCheck,* a dictionary is a list of codes and their descriptions. A dictionary can be generated in three ways:

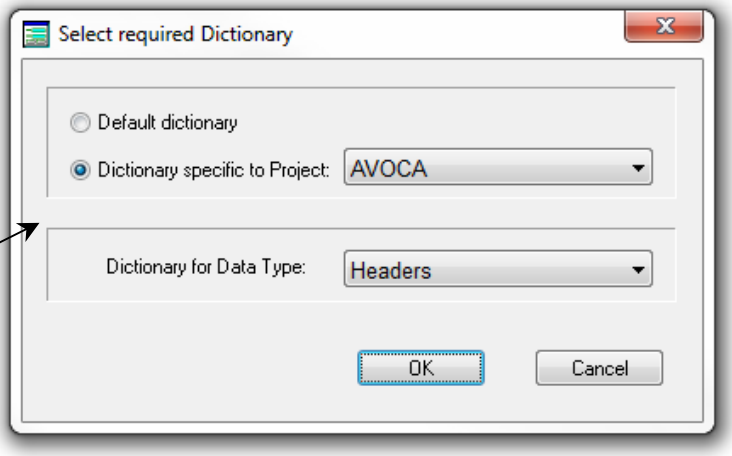
- Creating from scratch.
- Copying dictionary files from another project.
- Importing a dictionary from a text file.

These are described in the following sections. The location of dictionaries is described in Chapter 11.

LogCheck also automatically creates a dictionary in the directory called LAS for the LAS files. This contains a list of all the variable names and units used in the project's LAS files. This dictionary can be viewed but not modified. In order to create a new dictionary, you need to be in Manager mode – see Section 3.2.1 of this chapter for how to set the Manager mode.

3.6.1 Creating a Dictionary from Scratch

A new dictionary can be created by: selecting File > New > Dictionary from the *LogCheck* menu. The prompt to the right will then appear. Note that the Dictionary menu item only appears on the File > New menu if the user is in Manager mode.



Chose between a default dictionary, or one specific to a project

In this dialog, you need to choose between a default dictionary, or one that is specific to a project. A default dictionary should be chosen for codes that will be available for many projects, whereas a dictionary specific to a project for codes that will only be used in one project, for example a Seam Dictionary.

On selecting the Project and Data Type, and then clicking OK, the new current data set in *LogCheck* will be the entire dictionary for the selected data type, that is all categories. However, being a new dictionary, there will be nothing in any of the categories. To enter dictionary data open each category in turn by selecting File > Open > Dictionary… from the *LogCheck* menu.

Be aware, it has been known for users to have a default dictionary and then to accidentally create a new project dictionary with nothing in it. They are then mystified as to why their dictionary, that is the default dictionary, has "disappeared".

3.6.2 Copying Dictionary Files

A dictionary file can be created by copying the dictionary files *Data Type* Dictionary.dbf and *Data Type* Dictionary.mdx from another computer or project. Copying dictionaries is the most common way to obtain dictionaries.

The dictionary files can be copied from a fixed disk drive, memory stick or CD using Windows Explorer or saving them where they have been sent as email attachments. Project-specific dictionary files need to be copied to their corresponding data folder for the project; for example, a Geology dictionary is copied to the Geology folder, and is named Geology Dictionary.dbf. The file locations for dictionaries are described in detail in Chapter 11 and an example is.

C:\LogData\AVOCA\Geology\Geology Dictionary.dbf

Default dictionaries should be copied to the Dictionaries folder in the *LogCheck* data folder, usually C:\LogData\Dictionaries.

3.6.3 Importing a Dictionary from a Text File

A dictionary can be created in a project by importing from a text file. This file must have a category column containing a six character abbreviation of the category. A list of the abbreviations used for any particular version of *LogCheck* can be obtained from the *LogCheck* distributors. The text file may be in the following formats:

- Delimited, for example comma (`.csv`) or tab (`.txt`) delimited. It does not have to contain all the *LogCheck* dictionary columns but it must contain the Category and Code columns;
- Fixed Width, this must contain all the *LogCheck* dictionary columns although columns apart from Category and Code may be blank. The columns must have the following starting positions and widths:

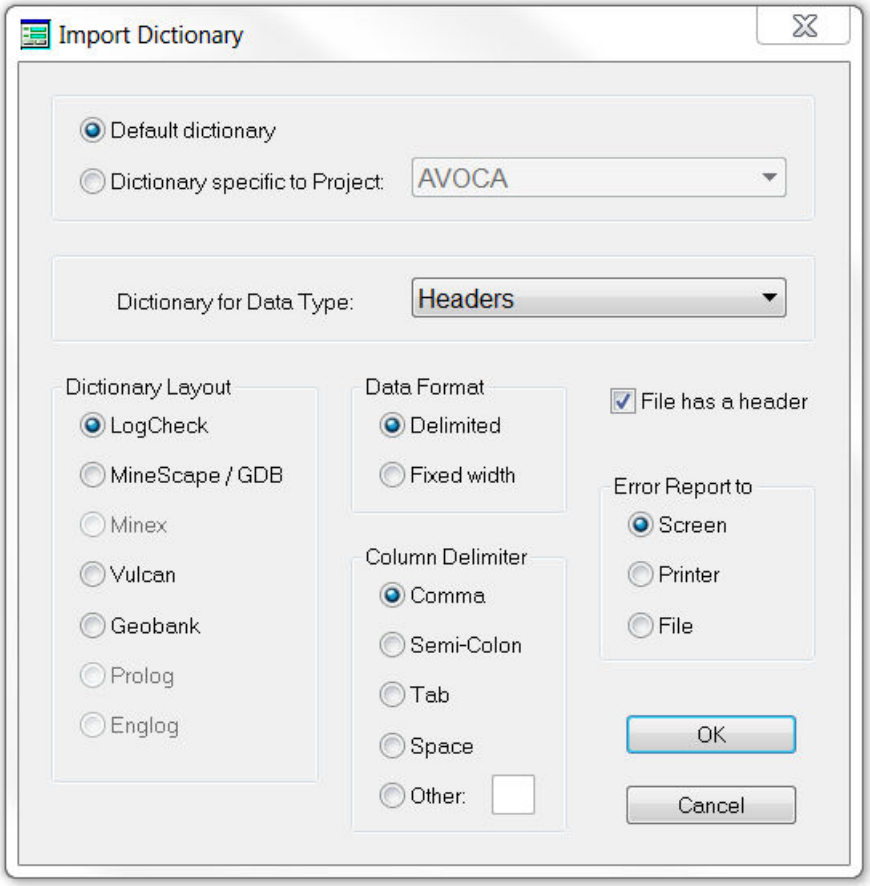
Variable	Category	Code	Desc	Before	After	Pattern	Pattern2	Colour	Fill	FillColour	BgColour	Comments
Start Position	1	7	27	77	78	79	83	87	90	94	97	100
Width	6	20	50	1	1	4	4	3	4	3	3	40

- Geobank dictionary export (`.csv`)
- MineScape (GDB) dictionary dump (`.dmp`)
- Minex dictionary (`.dic`)
- Vulcan dictionary (`.dcl`)

To import a dictionary from a text file, go to the File > Import > Dictionary menu, where the following dialog is displayed:

Selecting a Dictionary Layout option other than *LogCheck* sets the default values for Data Format and Column Delimiter.

If *LogCheck* is chosen as the Dictionary Layout, then the Data Format can be either Delimited or Fixed width, and the Column Delimiter can be one of comma, semi-colon, tab, space, or some other character.

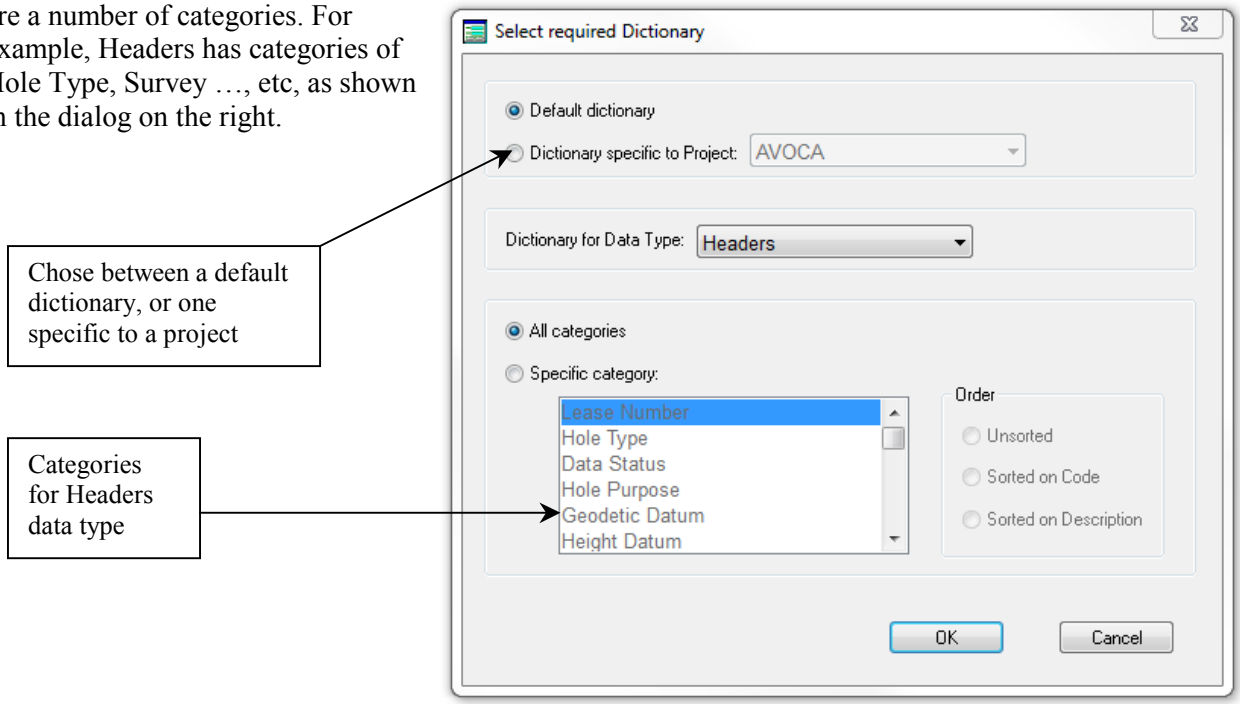


The difference between the terms *copying* and *importing* a dictionary file is that with the former, the file is already a *LogCheck* database file, whereas the latter is in some other format.

3.7 Opening a Dictionary in the Editor Form

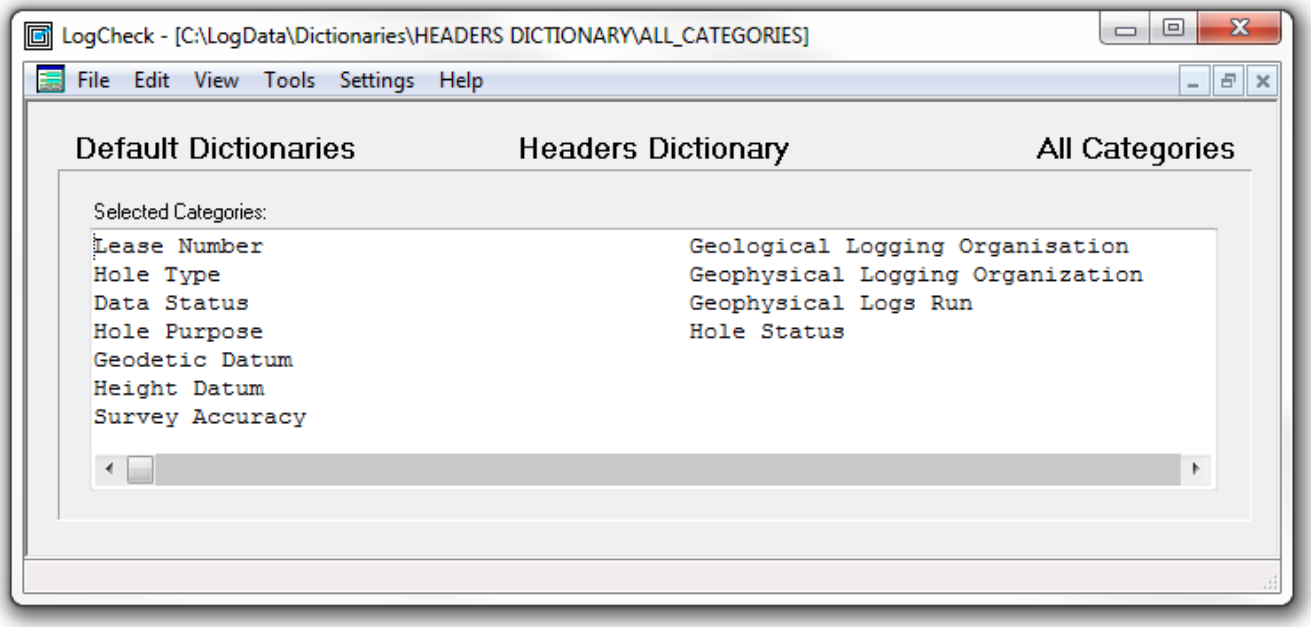
To open a dictionary, go to File > Open > Dictionary, where the dialog below is displayed. This dialog allows you to either select the default dictionary in C:\Logdata\Dictionaries or a specific dictionary for a data type, and for that data type, to select either all categories, or a specific category.

For each dictionary data type, there are a number of categories. For example, Headers has categories of Hole Type, Survey …, etc, as shown in the dialog on the right.



3.7.1 Selecting *All* Categories

If the All Categories option is selected, on clicking the OK button, a list of all the categories in that dictionary is displayed, for example:



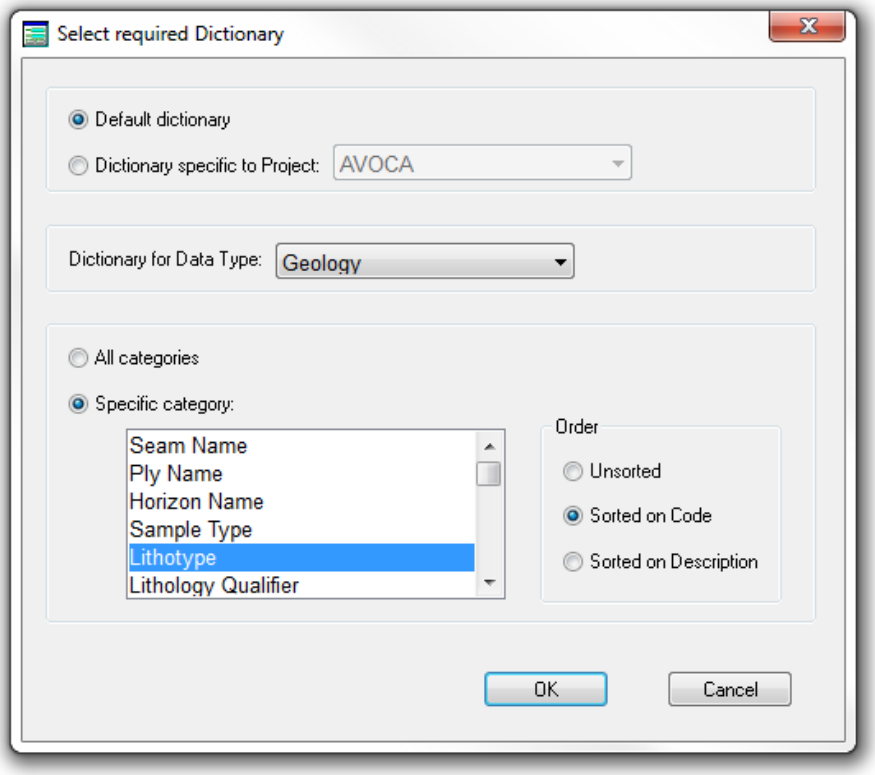
Open All Categories to print a dictionary report or to export it to other software. To print a dictionary, from the main menu, go to File > Print, then choose either Data or Report. Exporting dictionary data is described in Chapter 9.

3.7.2 Selecting a *Specific* Category

Selecting a specific category from the dictionary allows viewing/editing of the data in that category. In this case, one of the three Order options can be selected:

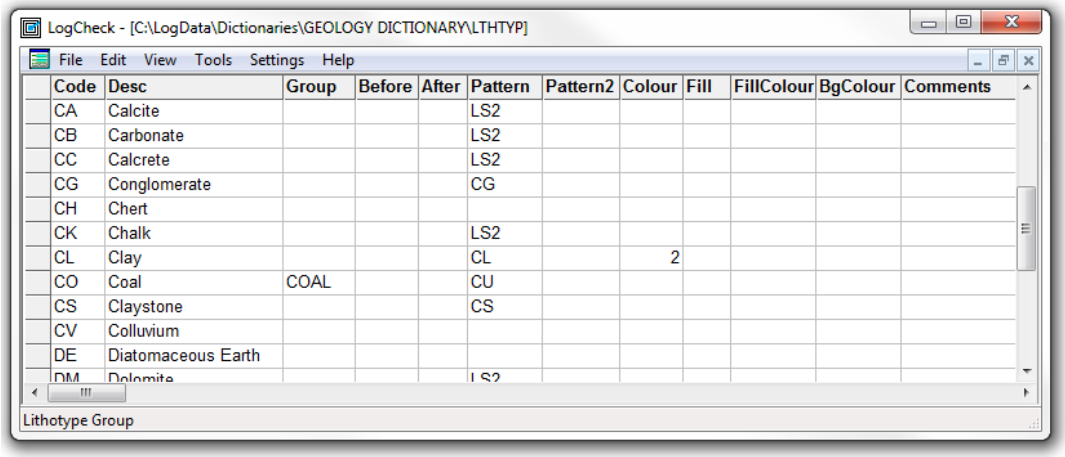
- Unsorted,
- Sorted on code or
- Sorted on description.

The Unsorted option displays the entries in the order they were added to the dictionary. For example, if you want *LogCheck* to ensure that seams are in stratigraphic order, then you first need to enter them into *LogCheck* in that order.



3.8 Modifying a Dictionary

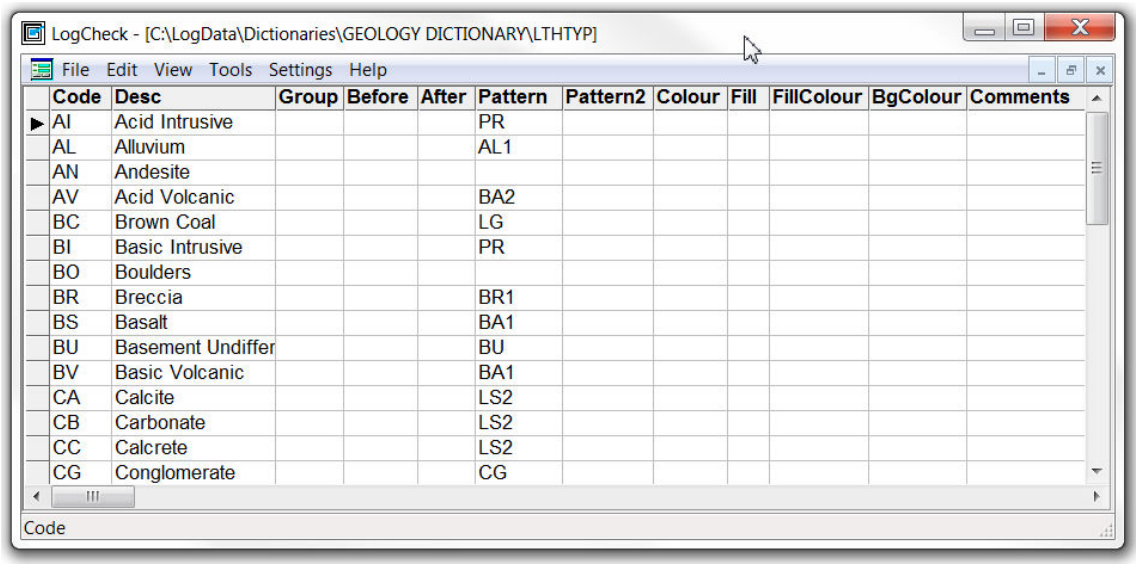
In order to modify a dictionary, you need to be in Manager mode. The Manager option of the Settings menu allows you to switch from General User mode to Manager mode. When in Manager mode, you can modify a dictionary in the current project or import a dictionary from some other source. The figure below shows a lithotype dictionary opened in Manager mode:



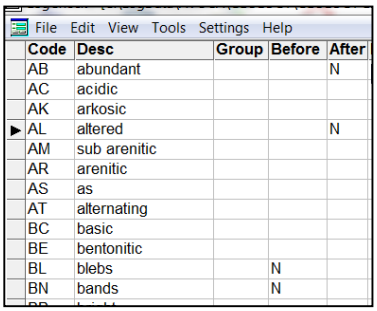
In User mode, the dictionary is read-only. This is indicated in the Title bar of the *LogCheck* editor and by all the text being grey. If a Sorted option is selected, entries can only be appended to the data set – although after each record is completed, it is placed in sorted order in the edit form.

3.9 Dictionary Structure

All *LogCheck* dictionaries have the same twelve column structure. As an example, the following diagram shows the first few lines of the Lithotype category of a Geology dictionary:



1. **Code:** Used by the geologist when entering data;
2. **Desc**: The full description that the code represents. This is what will appear for the code in reports, and in plots where descriptions are being displayed;
3. **Group**: Is used to group certain dictionary entries. It is used in various parts of *LogCheck*, and is discussed in more detail in the following section;
4. **Before**: Indicates that when the entry appears in a full English description a comma should be included before the word. For example (as shown on the right), in the Lithological Adjectives dictionary there is an N for No in the Before column of entries for blebs and bands as, in general, the words blebs and bands will probably be proceeded by another qualifier such as sandy;



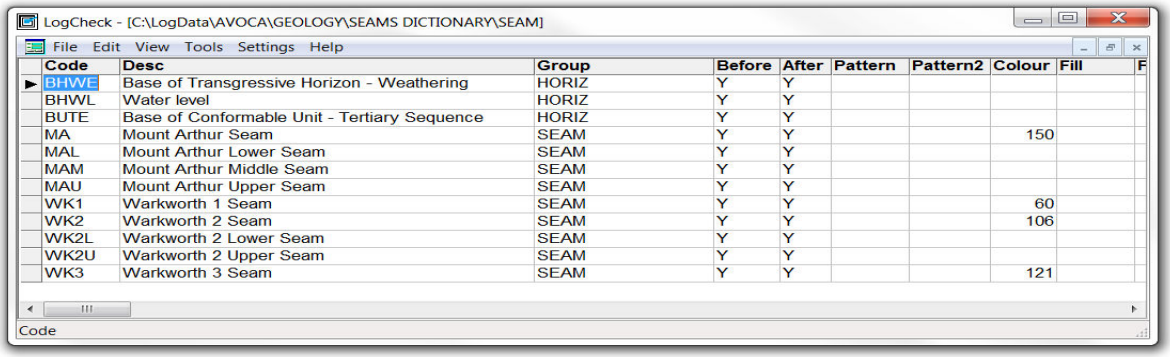
5. **After**: Indicates that when the entry appears in a full English description a comma should be included after the word. For example, in the dictionary above there is an N for No in the After column of *abundant* and *altered*, because generally the words *abundant* and *altered* will probably be followed by other qualifiers such as fractures.

   When there are two qualifiers together, if the value for After for the first is different to the Before value of the second, the N(No) takes precedence.

6. **Pattern:** The primary pattern that will be used for plotting (see Appendix C for a full list of standard patterns).

7. **Pattern2:** The secondary pattern for plotting – if specified, it is combined with the primary pattern (see Appendix C for a full list);

8. **Colour**: This can contain a number between 1 and 255 which represents an AutoCAD colour number (see Appendix E for a full list of AutoCAD colours). For example, in the dictionary shown in the following section containing a number of lines from the Seam/Horizon category of a Geology Dictionary, the WK1 Seam (Warkworth 1) has Colour set to 60. When using *LogCheck* to plot sections this seam will have a colour of 60 which translates to a brownish-yellow colour;



9. **Fill:** The type of fill that will be used for plotting (see Appendix D for a full list of standard fills);

10. **FillColour:** An AutoCAD colour number that will be used for drawing the fill (see Appendix E);

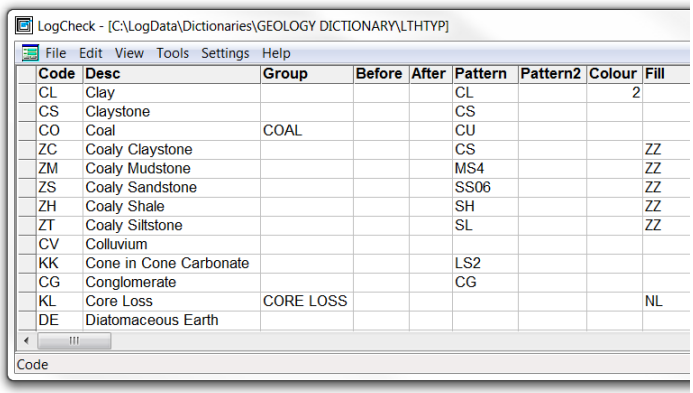
11. **BgColour:** An AutoCAD colour number that will be used for colouring the background (see Appendix E);

12. **Comments**: This is not used by *LogCheck*. It is provided so that the user can enter reminder notes that they may need when doing dictionary housekeeping.

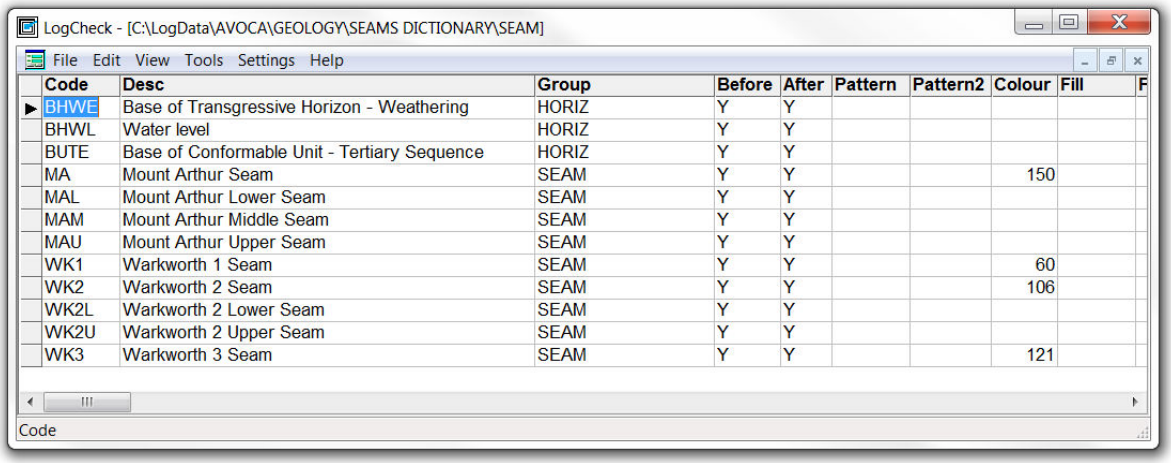
3.10 The Group Column

The Group column is used by *LogCheck*'s audits, summaries and statistical tools – it allows you to define your own groups when performing statistical analysis of the data. As well as this, *LogCheck* uses the information in the Group column for generating audits and summaries. For most dictionary categories it is not required, however it is required in the following circumstances:

(a) The Group column of the Lithotype dictionary needs COAL against anything that is coal and CORE LOSS against any core losses, as shown to the right. This enables *LogCheck* to calculate items such as the amount of coal in a seam and the percentage recovery.

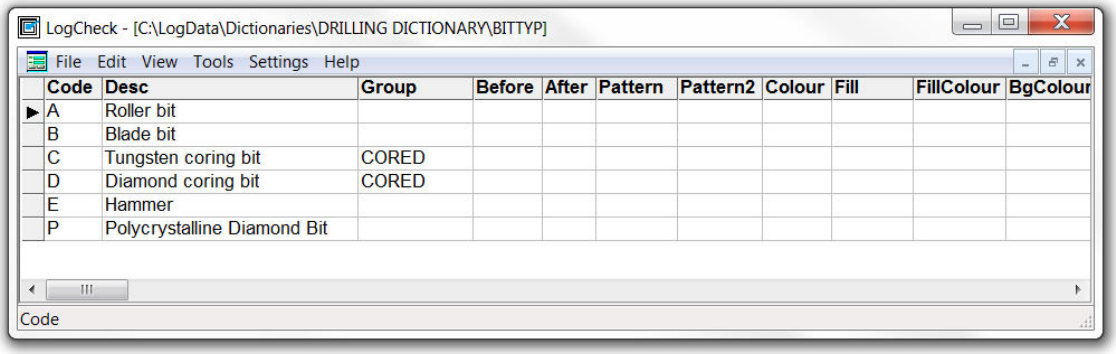


(b) In the case of the Seam/Horizon dictionary category as shown below, the Group is required and can only have the values HORIZ, SEAM or STRAT. HORIZ being a zero thickness unit. SEAM a non-zero thickness unit that is economic and STRAT a non-zero thickness unit which is non-economic.



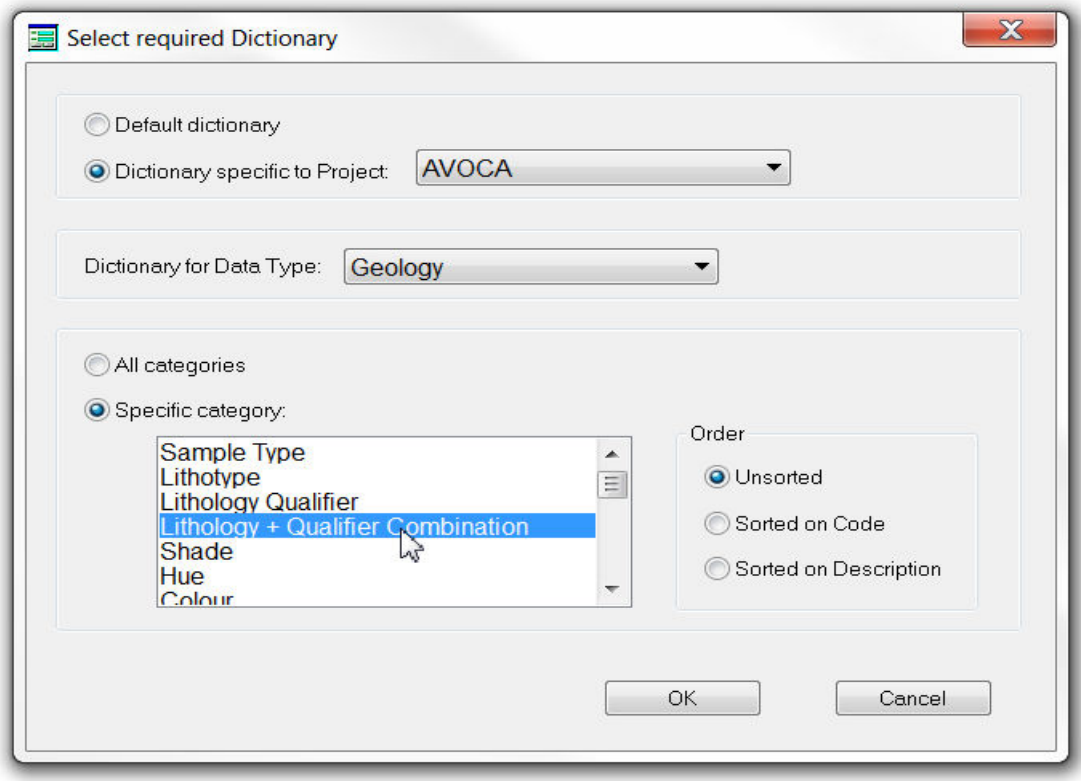
Note that if using the CoalLog version of *LogCheck*, the Horizon is not stored in the seam column, but has its own column and category and as such does not require a group.

(c) In the drilling dictionary, the Bit Type category needs CORED against any bit types that produce core rather than chips. This enables *LogCheck* to know which parts of a hole have been cored and which have not. An example is shown below:



3.11 Geology Dictionary in CoalLog Version

In the CoalLog version of *LogCheck* there is a Lithotype and Lithology Qualifier category. Lithotype is a broader term, for example, all coal has a Lithotype code of CO, and its detailed characteristics are specified by its Lithology Qualifier code. Because some Lithology Qualifiers only relate to particular Lithotype entries, there is an additional category of Lithotype + Qualifier Combination which is used to specify the valid combinations. The patterns and fills for the combinations are also defined in this category. The Select Required Dictionary dialog with the three categories is displayed below.



The Lithotype + Qualifier Combination dictionary is shown below.

File Edit View Tools Settings Help

Code	Desc	Group	Before	After	Pattern	Pattern2	Colour	Fill	FillColour	BgColour	Comments
COSY	Coal, stony							CN1			
COWE	Coal, weathered							CI			
GVCC	Gravel, coarse grained				GV						
GVCL	Gravel, clayey				GV	CL					
GVFC	Gravel, fine to coarse grainec				GV						
GVFF	Gravel, fine grained				GV						
GVFM	Gravel, fine to medium graine				GV						
GVMC	Gravel, medium to coarse gra				GV						
GVMM	Gravel, medium grained				GV						
GVSA	Gravel, sandy				GV	AL1					
GVSI	Gravel, silty				GV						
SACC	Sand, coarse grained				AL1						
SACL	Sand, clayey				AL1	CL					
SAFC	Sand, fine to coarse grained				AL1						
SAFF	Sand, fine grained				AL1						
SAFM	Sand, fine to medium grained				AL1						

Chapter 4
Project Details

By the end of this chapter you will be able to:

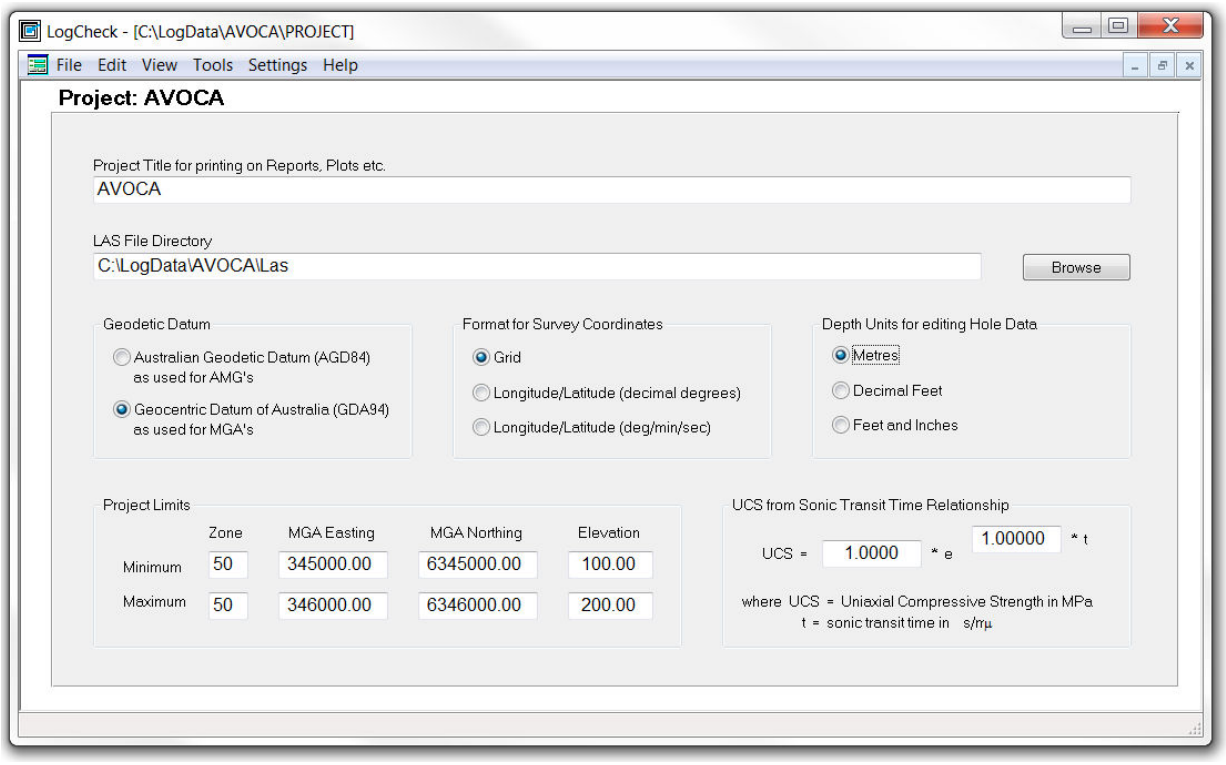
- Enter the project details data.
- Specify the LAS file directory for a project.
- Specify the datum and format of survey coordinates for a project.
- Specify the project limits.
- Specify the depth units for a project.
- Specify the UCS calculation parameters for a project.

4.1 Project Details Data

Once a project is created the Project Details for the project becomes the current data set. The project data consists of the following entities:

- Project title.
- LAS (geophysical logs) File Directory.
- Geodetic Datum,
- Survey Coordinates Format,
- Depth Units,
- Project Limits,
- UCS (Uniaxial Compressive Strength) formula for the project.

An example of the Project Details for an example project named Avoca is shown below:



These fields are described in the following sections (note that only the default values are shown above).

4.1.1 Project Title

This is the title for printing on reports, plots etc. The Project Title can contain blanks and can be of any length. The Project Title is provided because the Project Name used by *LogCheck* can only be a maximum of eight characters and can not contain blanks. This field enables the user to provide a more meaningful title than that provided by the Project Name.

4.1.2 LAS File Directory

LogCheck requires all downhole geophysical logs to be in LAS V1.2 or LAS V2.0 format. The LAS format was developed by the Canadian Well Logging Society. More information regarding the LAS format can be found on its website at www.cwls.org/las_info.php.

LogCheck enforces a strict discipline on the location and naming of data files. The only exception to this is the LAS data which may reside anywhere on the user's computer or their network. As LAS data tends to occupy large amounts of disk space and may be accessed by a number of applications, the user is able to specify a separate location for it so as to reduce the need for multiple copies of the data, copying the data and/or holding it permanently on their hard drive.

When *LogCheck* is looking for LAS data it will search the directory specified in the Project Details. It will also search all lower directories off this directory. If this field is blank, *LogCheck* will instead search the LAS directory under the project folder and again all lower directories off this. The only restriction is that the chain of lower directories and the filename must not contain more than 36 characters. Be aware though, that the directories should not contain more than one set of readings for any particular geophysical variable at a particular reading interval, over the same depth interval of a particular hole.

4.1.3 Geodetic Datum

The display of coordinate data in *LogCheck* can be based on either:

- Australian Geodetic Datum (AGD84), or
- Geocentric Datum of Australia (GDA94)

The Australian Map Grid 1984 (AMG84) uses the AGD84 datum for its geographical coordinates, whereas Map Grid of Australia (MGA) used the GDA94 datum for its geographical coordinates.

As coordinate data is entered and saved in *LogCheck*, it is stored in both formats. These options determine in which datum coordinates are displayed. *LogCheck* uses GCalc software from the Queensland Department of Natural Resources and Mines, to convert between datums.

4.1.4 Format for Survey Coordinates

The format for the display of survey coordinates in *LogCheck* is specified with one of the following options:

- Grid,
- Longitude/Latitude as decimal degrees, or
- Longitude/Latitude as degrees/minutes/seconds.

Historically, most coal exploration data in Australia was recorded in AMG's and most petroleum exploration data in Longitude/Latitude with decimal degrees. At the start of 2005, the New South Wales Department of Mineral Resources insisted that coordinate data needed to be referenced to the new MGA. Queensland, as of the start of 2013, still has not enforced a changeover.

The Survey Coordinates Format option changes what system is used when the coordinates are entered, displayed, printed and exported. For example, often in coal bed methane work some of the historical data will come from coal exploration and some from petroleum exploration. When entering old petroleum data in Longitude/Latitude with decimal degrees change the option to Longitude/Latitude (decimal degrees). All the current data in the system for the project will then be displayed in Longitude/Latitude though it will still be stored in AMG's/MGA's.

The latitude and longitude of a survey point will change depending on which geodetic datum was used for calculating it. Therefore when entering latitudes and longitudes, firstly determine which geodetic datum was used and that the appropriate one is selected in the Project Details.

When changing coordinate systems, *LogCheck* does not recalculate the actual stored data, just what is displayed on the screen and in reports, as there is a small rounding error each time the coordinates are recalculated. If the recalculated coordinates overwrote the previous coordinates, then after changing coordinate systems a number of times then the rounding errors could accumulate and finally become significant. It is suggested that when working outside Australia, that AMG's are used. The actual grid is only relevant if the coordinates need to be transformed to another system. If this is necessary outside Australia contact the *LogCheck* distributors so that the software can be appropriately modified.

4.1.5 Depth Units

Depth Units specifies the unit of measurement that is used for editing hole data. Often historical data will be in feet and inches or decimal feet. By selecting the appropriate Depth Units option the format used for entering the data can be modified. Upon entering, the data is stored in metres and all reporting, plotting and exporting of the data is in metres. This option can be changed at any time so that the Hole Data stored on the machine can be edited/displayed in the required format.

4.1.6 Project Limits

Project Limits are a rectangular set of limits, and a minimum and maximum elevation for hole collars. The horizontal limits are set by specifying a minimum and maximum Easting/Northing coordinate pair. Survey coordinates are validated against the project limits. This is performed whenever coordinates are entered at the keyboard or imported from file. If the AGD84 datum is selected, then AMG Easting/Northing coordinates are used for the project limits. If the GDA94 datum is selected, then MGA Easting/Northing coordinates are used for the project limits.

Where the user's Header format does not contain a field for recording the Zone then the maximum Zone is automatically set to the same as the minimum zone. This zone will be applied to all coordinates when transforming the coordinates to Longitude/Latitude.

4.1.7 UCS Calculation Parameters

UCS (Uniaxial Compressive Strength) can be estimated from Sonic Transit Time or Velocity data. It is common practice within the Australian coal industry to determine a relationship between the UCS and sonic data for each project based on lab results of UCS and Sonic values for a number of samples from preliminary holes.

Once a relationship has been established it can be used to generate UCS values for hole zones where no laboratory UCS tests have been performed but downhole sonic values have been recorded. More information about this procedure can be found in "Geotechnical applications and interpretations of downhole geophysical logs" by G.H. McNally published by Australian Coal Industry Research Laboratories, Sydney. If required, *LogCheck* will calculate these UCS values when opening LAS data containing sonic data.

Chapter 5
Hole and Interval Selection

By the end of this chapter you will be able to:

- Open holes for editing.
- Create and edit a group of holes known as a hole set.
- Create and edit a set of hole data intervals.

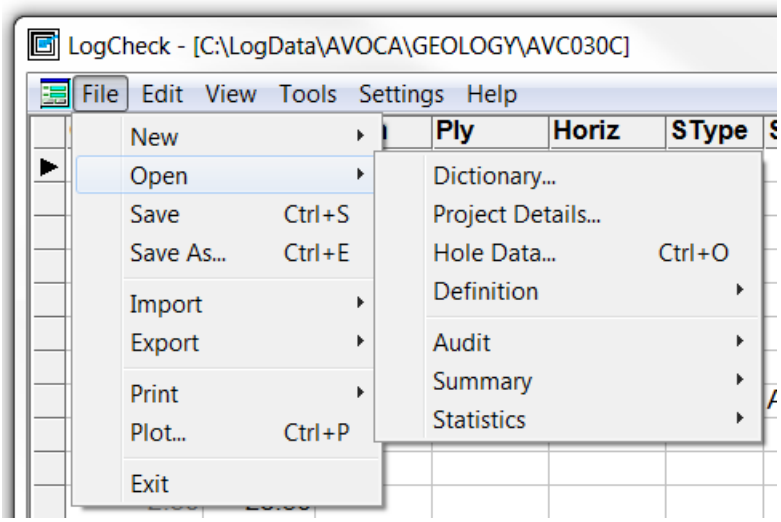
5.1 Introduction

This chapter describes how to select drill holes. Once open, the drill holes can be viewed, edited, revalidated, plotted, exported and/or reports generated. You can select a single hole, all holes, or a group of holes, known as a hole set. For the selected hole or holes, you can also select a predefined interval, known as an interval definition. This is usually used for plotting just part of a drill hole, for example, from the roof of a specified seam to the floor of a specified seam.

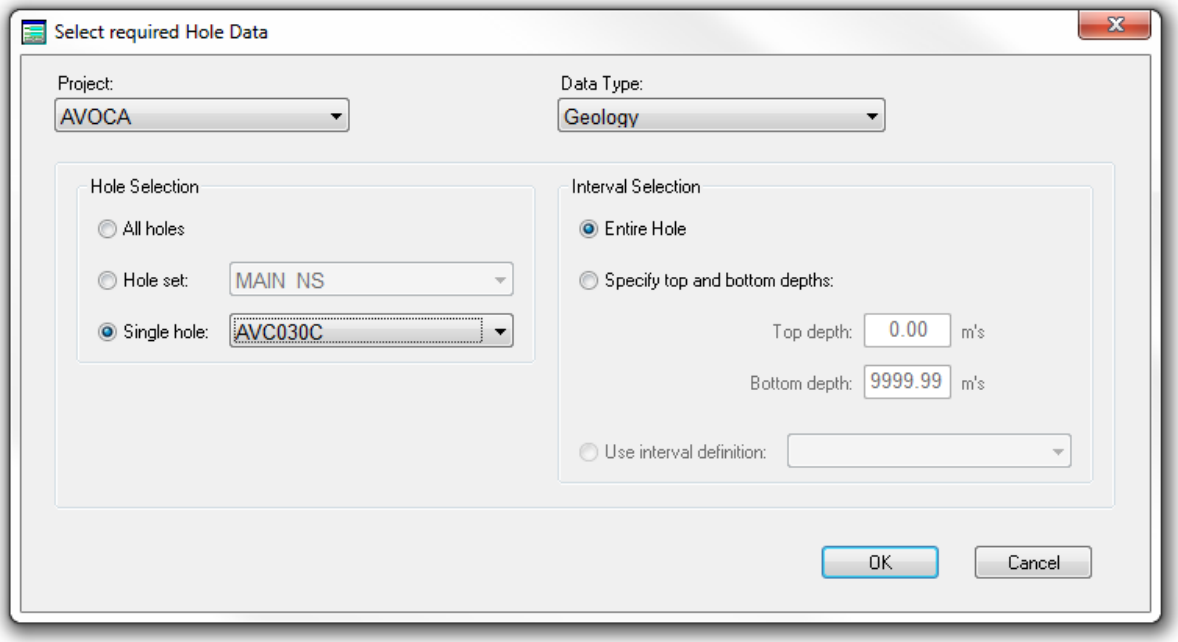
Holes in a hole set can be selected from a list, or by specifying a section, such as north-south or oblique section, or by creating a query or by importing a list from a text file.

5.2 Opening Hole Data

To open the data for a drill hole, go to the File menu, select Open, then select Hole Data (as shown on the right). Alternatively, the hot key is Ctrl+O. This only applies to existing holes; to create a new hole use File > New > Hole Data (see Chapter 2).



This brings up the following dialog:



The options on this screen are:

- Project,
- Data Type,
- Hole Selection,
- Interval Selection.

Note that the interval selection is not available for header data as all its data applies to the entire hole. If you select only part of the hole, you can view, but not modify it. These options are described in the following sections. Click the OK button when you are done.

5.2.1 Project

Selecting from this drop-down list allows you to choose the project whose holes you are opening. The list will only contain projects that have existing hole data.

5.2.2 Data Type

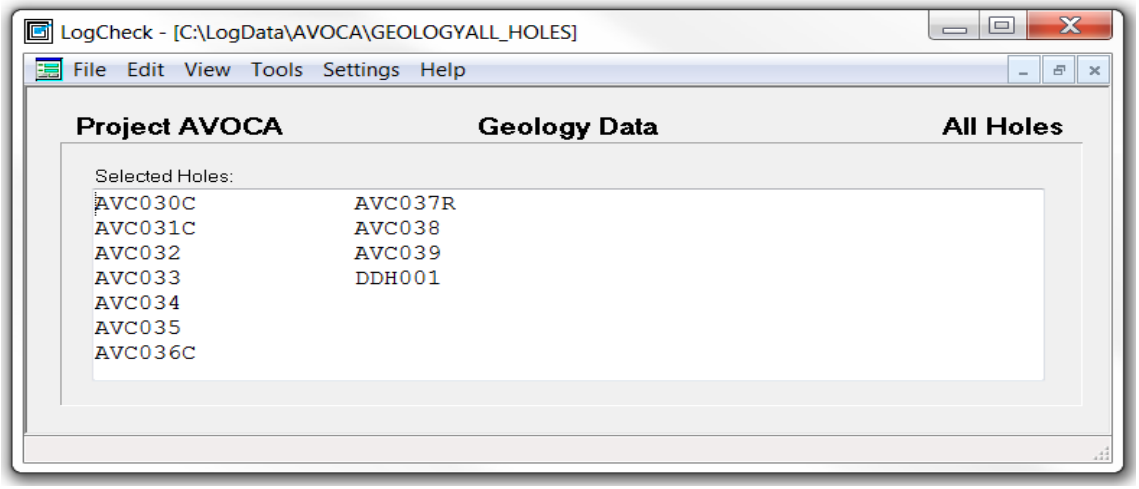
Selecting from this drop-down list allows you to choose the data type of the holes that you are opening. This list only contains the data type for which there is hole data in the currently selected project.

5.2.3 Hole Selection

There are three options when selecting holes:

- All holes: All holes for the project are selected.
- Hole Set: Only those holes in a specified *hole set* are available (see following section).
- Single Hole: Only the hole specified is selected. Choose the required hole from the drop-down list. This list only contains the holes within the current project that have the currently selected data type.

To edit data for a hole, the Single Hole option must be selected. If multiple holes are opened, using the All Holes or Hole Set options, you can export, print and/or plot data, however editing is limited to the Find or Find and Replace functions. After selecting multiple holes, the screen will show the project, data type and a list of the holes that are currently open, as shown below:



5.2.4 Interval Selection

The interval selection option allows you to specify which part of the hole(s) you will be working with. The available options are:

- Entire hole: Entire hole available for editing.
- Specify top and bottom depths: Specify a top and bottom depth in metres.
- Use interval definition: Select an interval – see the Section 5.4 in this chapter for instructions on how to create an interval definition.

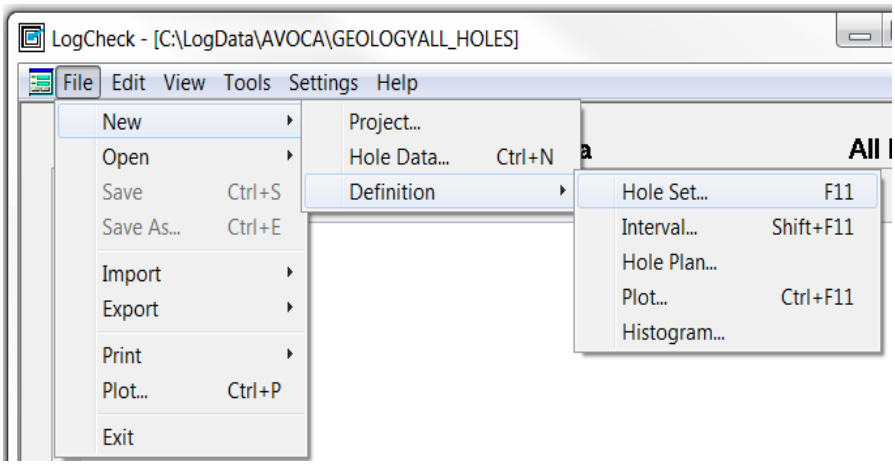
Note that if selecting less than the entire hole then the data opens in read-only mode. Generally, opening less than the entire hole is used for plotting or reporting.

5.3 Creating/Editing a Hole Set Definition

A Hole Set Definition is a group of holes that can be operated on simultaneously, for example:

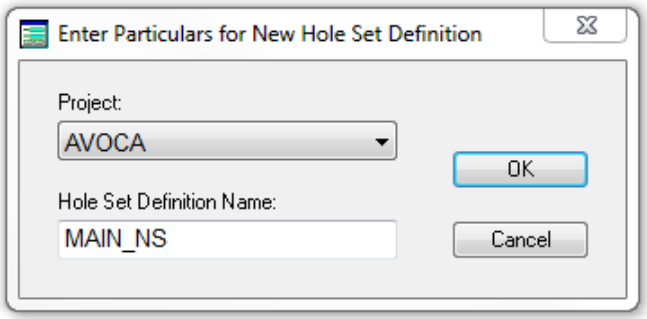
- Validating a group of holes,
- Plotting a group of holes,
- Reporting for a group of holes, or
- Exporting data for a group of holes to other systems.

To create a new Hole Set Definition, go to File > New > Definition, then select Hole Set:



In addition, a Hole Set Definition can also be created by importing a list of holes in a text file.

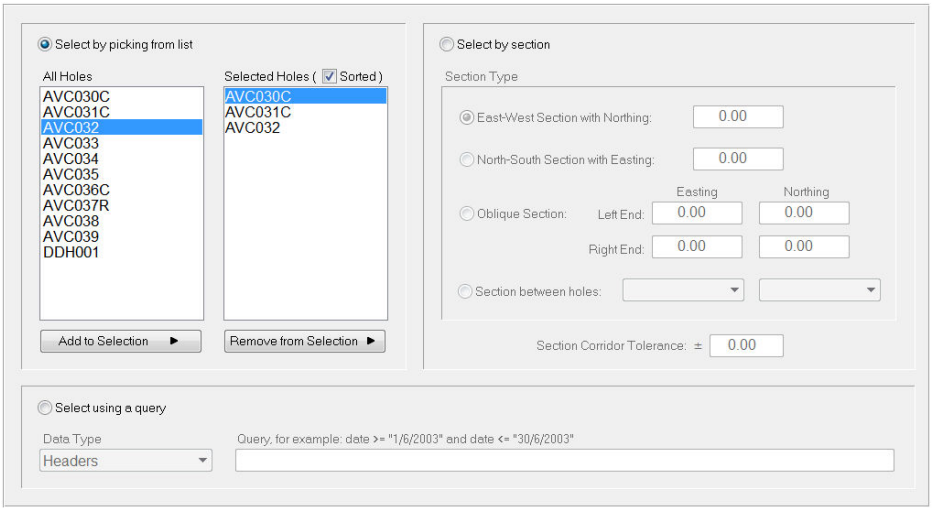
This displays the dialog to enter the name for the Hole Set Definition, as shown on the right:



Enter a relevant name (in this example, MAIN_NS), then click OK.

To open an existing Hole Set Definition, go to File > Open > Hole Set definition, and select the required Hole Set.

The Hole Set Definition dialog is then displayed, as shown on the right. This dialog allows you to select holes for a hole set definition by one of three ways:



- Select by picking from list;
- Select by section;
- Select using a query.

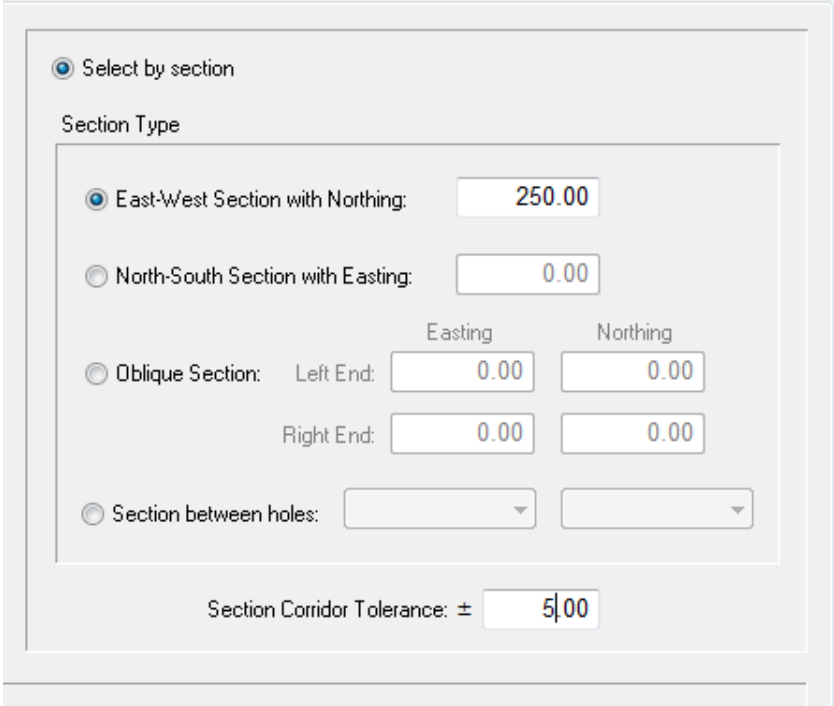
5.3.1 Select by Picking from List

In the previous diagram, the list on the left displays all holes in the project for which data exists for at least one data type. Select from the list on the left, then click the Add to Selection button. Multiple selections can be made by using the Ctrl or Shift keys with the mouse. The example on the previous page shows that holes AVC030C, AVC031C and AVC032 have so far been included in the hole set definition set MAIN_NS. To remove holes from the list, select them and then click the Remove From Selection button.

5.3.2 Select by Section

The figure on the right is part of the Hole Set Definition form that allows you to create a hole set by selecting drill holes that are located along a section. Select by section type:

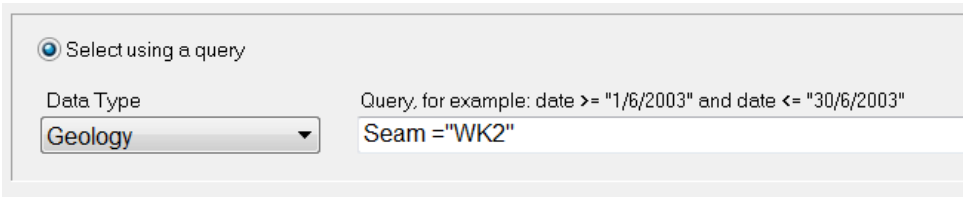
- East-West,
- North-South,
- Oblique or
- Section between specified holes.



The Section Corridor Tolerance allows you to set the width of the corridor for including holes. Clearly, Select by Section can only select holes whose coordinates have been entered in the header data.

5.3.3 Select using a Query

The figure below is part of the Hole Set Definition form that allows you to create a hole set by using a query. The query is in DBL, which is the dBase query language (see Appendix A).

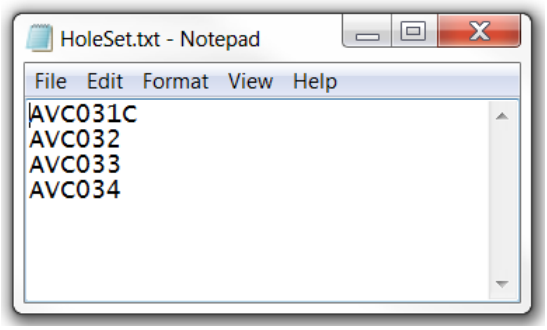


In this example, *Seam* is the variable name at the heading of the Seam/horizon column when editing Geology data. This query will include all holes where seam "WK2" has been logged. Note that the "WK2" requires the double quotes.

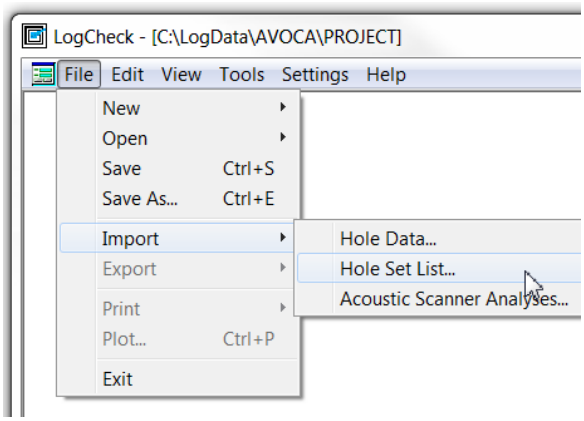
When you have finished creating your hole set definition, go to the File menu, then select Save. Note: as the actual hole set definition is the current *LogCheck* "data", closing it by selecting the X button in the top right corner closes *LogCheck* not just the "data".

5.3.4 Importing a Hole Set

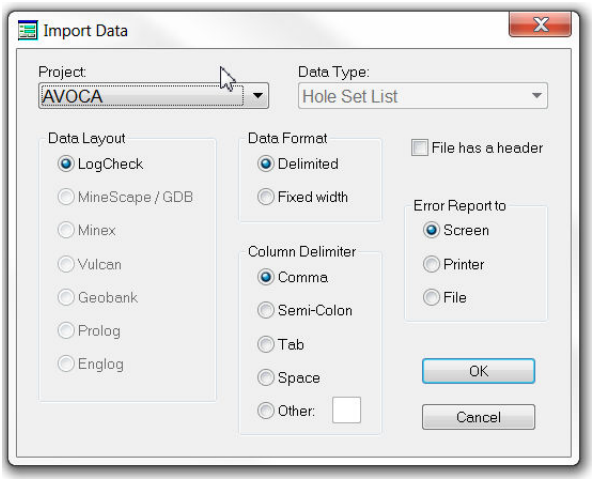
A Hole Set Definition can also be created by importing a list of holes contained in a text file. For example, Notepad can be used to create a list of hole names, as shown on the right:



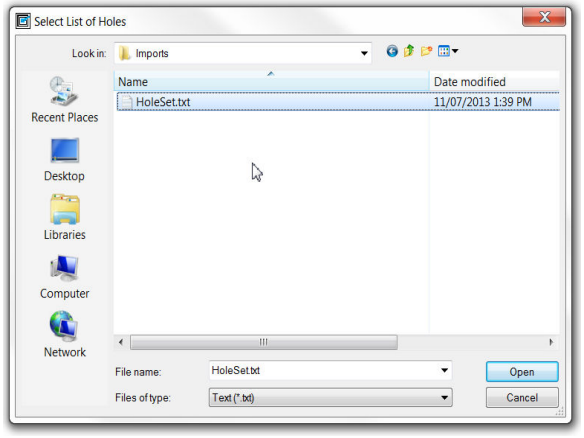
(a) In *LogCheck*, go to the File > Import > Hole Set List menu:



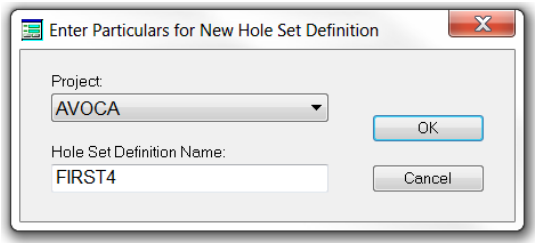
(b) Next, accept the defaults from the Import Data dialog:



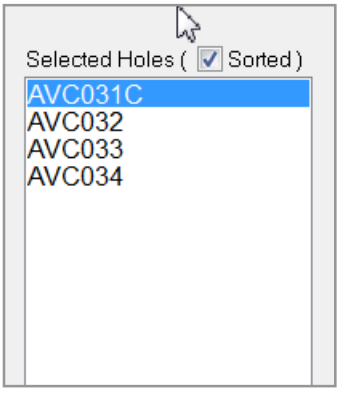
(c) Select the file containing the list of holes:



(d) Next, provide a name:



The resulting holes are displayed in *LogCheck*, as shown by the fragment from the Hole Definition screen on the right:



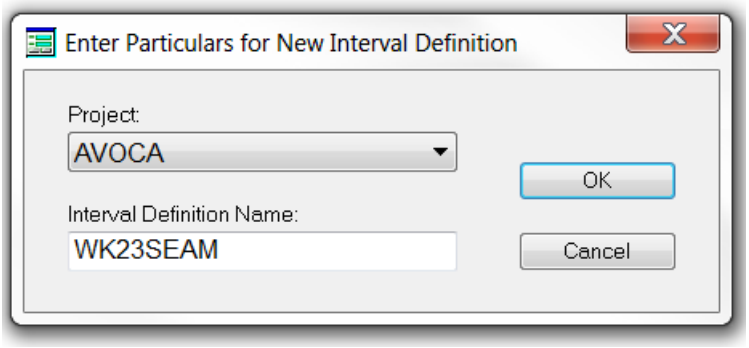
5.4 Creating/Editing Interval Definitions

An Interval Definition allows you to maintain downhole intervals, based on specific criteria for the top and bottom of the interval. This can be used in the Open Hole dialog to specify which part of a hole or holes to open for viewing, revalidating, plotting, exporting and/or reporting.

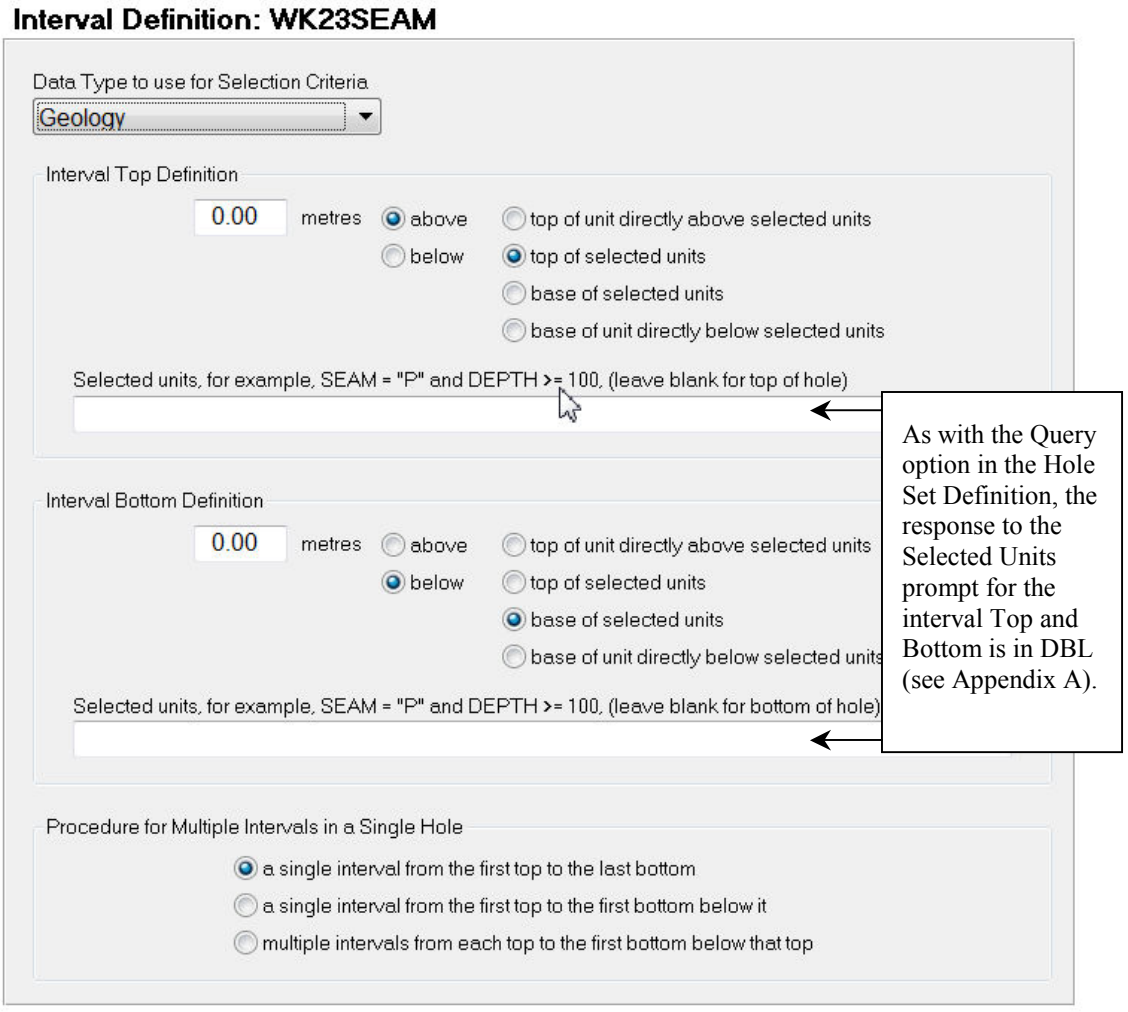
5.4.1 Creating a New Interval Definition

To create a new Interval Definition, go to File > New > Definition, then select Interval Definition.

This displays the dialog to enter the name for the Interval Definition:



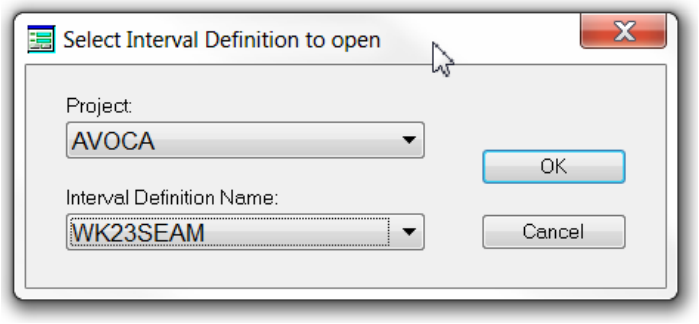
Enter a relevant name (in this example, WK23SEAM), then click OK. Next, the Interval Definition dialog is displayed:



As with the Query option in the Hole Set Definition, the response to the Selected Units prompt for the interval Top and Bottom is in DBL (see Appendix A).

5.4.2 Open an Existing Interval Definition

To open an existing Interval Definition, go to File > Open > Definition, then select Interval Definition. This brings up the dialog as shown on the right:

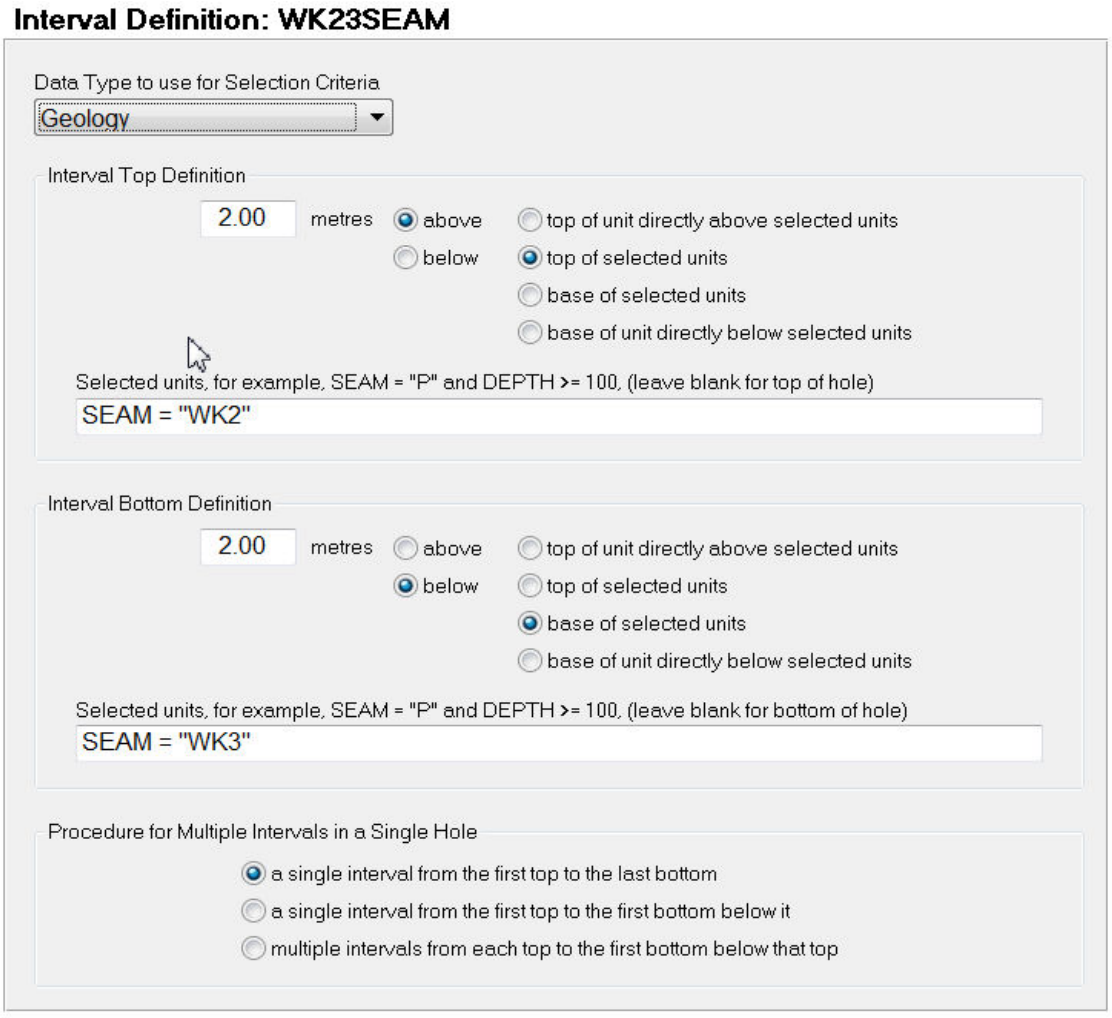


Click the OK button to display the Interval Definition form (shown below).

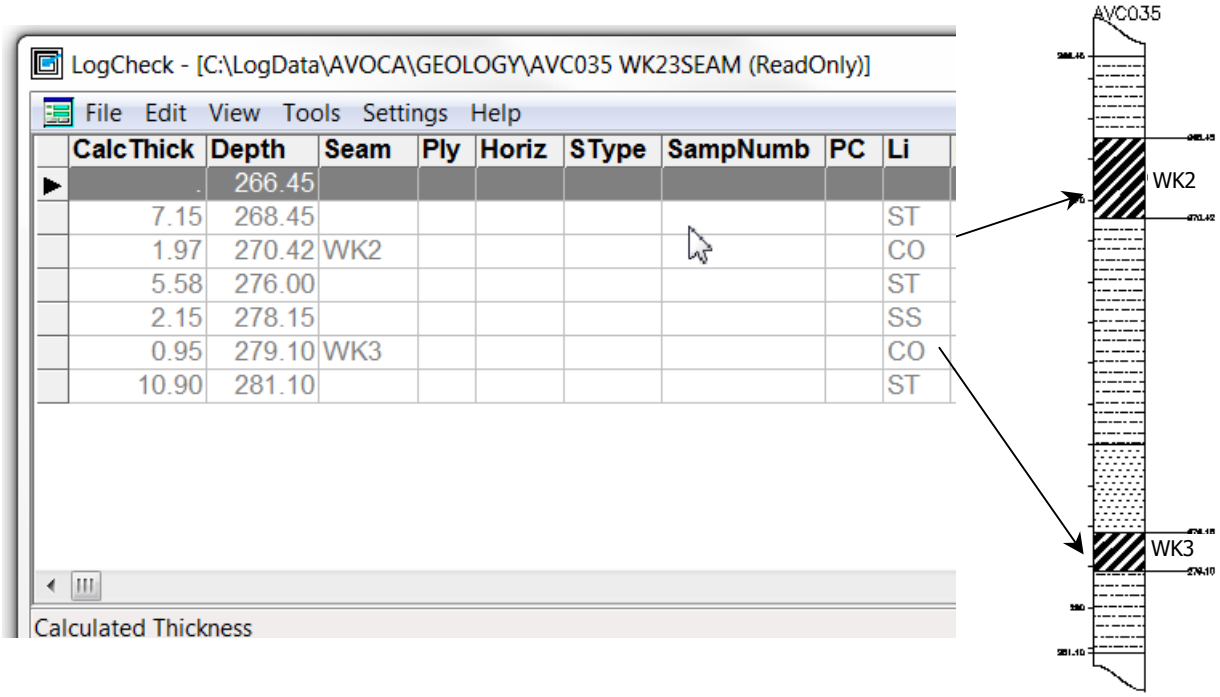
Interval definitions can be specified that display as a single interval, or as multiple intervals that do not display all the intervening intervals between the units in the *LogCheck* editor. Examples of these are discussed in the following sections.

5.4.2.1 Example 1: Single Interval for One or More Units

An interval definition based on the geology data that runs from 2.0m above the top of the WK2 seam to 2.0m below the base of the WK3 seam that will display as a single interval in the *LogCheck* editor is shown below:



The result of opening up hole AVC035 with the WK23SEAM interval definition in the *LogCheck* hole editor is shown below on the left. If the hole is then plotted (File > Plot), the results are shown on the right. This example also illustrates the effect of selecting the "*Single interval from the first top to the last bottom*" option from the Multiple Interval choices in the interval definition.



The range selected by this interval definition is displayed as a single interval in the *LogCheck* editor even though the intervening interval between the WK2 and WK3 seams is longer than the 2.0m above the WK2 seam and below the WK3 seam.

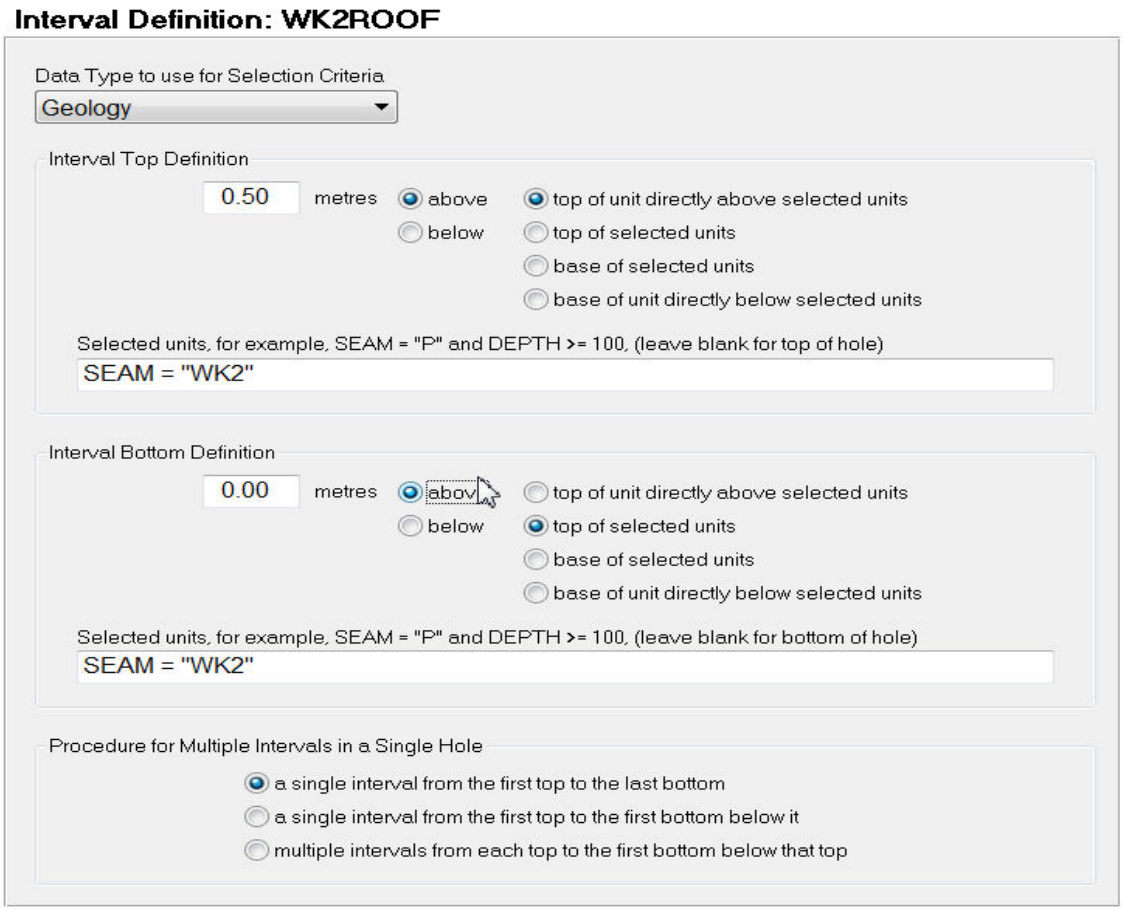
Note that a blank row coloured dark grey is used to indicate that only part of the hole has been opened. Although the total logged depth of the hole is 314.0m, the editor only displays down to the 2.0 m below the base of the WK3 seam that was specified in the interval definition.

The data type used for the selection criteria does not have to be the same as the data type that is being opened. For example, the above interval definition could be used to open the LAS data for all depths from 2.0m above the top of the WK2 seam to 2.0m below the base of the WK3 seam. As a variation on this example, if "WK2" and "WK3" is replaced with "WK", this would define an interval running from 2.0m above the first seam starting with "WK" to 2.0m below the last seam starting with a "WK".

Because the selection criteria are applied with the dBASE DBL query language, specifying "WK ", where there is a blank after the "K", then it would select from 2.0m above the first seam named precisely "WK" to 2.0m below the seam named precisely "WK". In this case, the trailing blank enforces a strict match with the characters, rather than matching any seam that started with "WK".

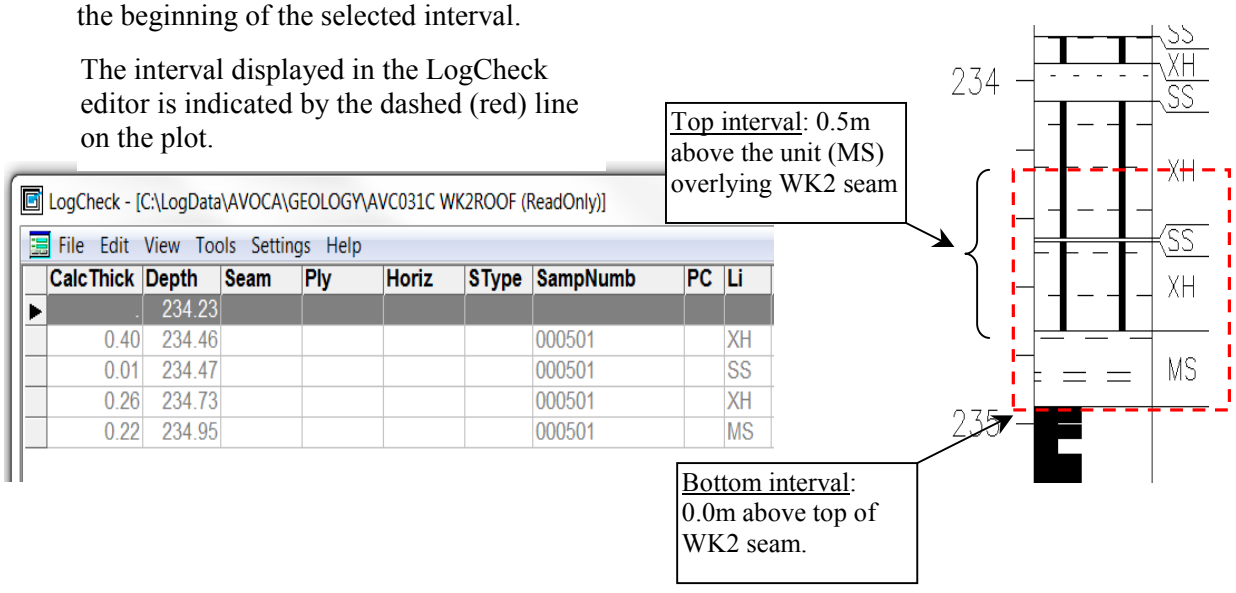
5.4.2.2 Example 2: Seam Roof Plus Adjacent Bolting Horizon Definition

If a bolting horizon is required to be included in the interval, for example 0.5m of the unit that is directly above the unit that constitutes the roof of the seam, select the "*top of unit directly above selected units"* option for the top interval. In this example, the Interval Top Definition is set at 0.5 m above the top of the unit that overlies the WK2 seam, and the Interval Bottom Definition is set at 0.0 m above the top of the WK2 seam – that is, the top of the WK2 seam.



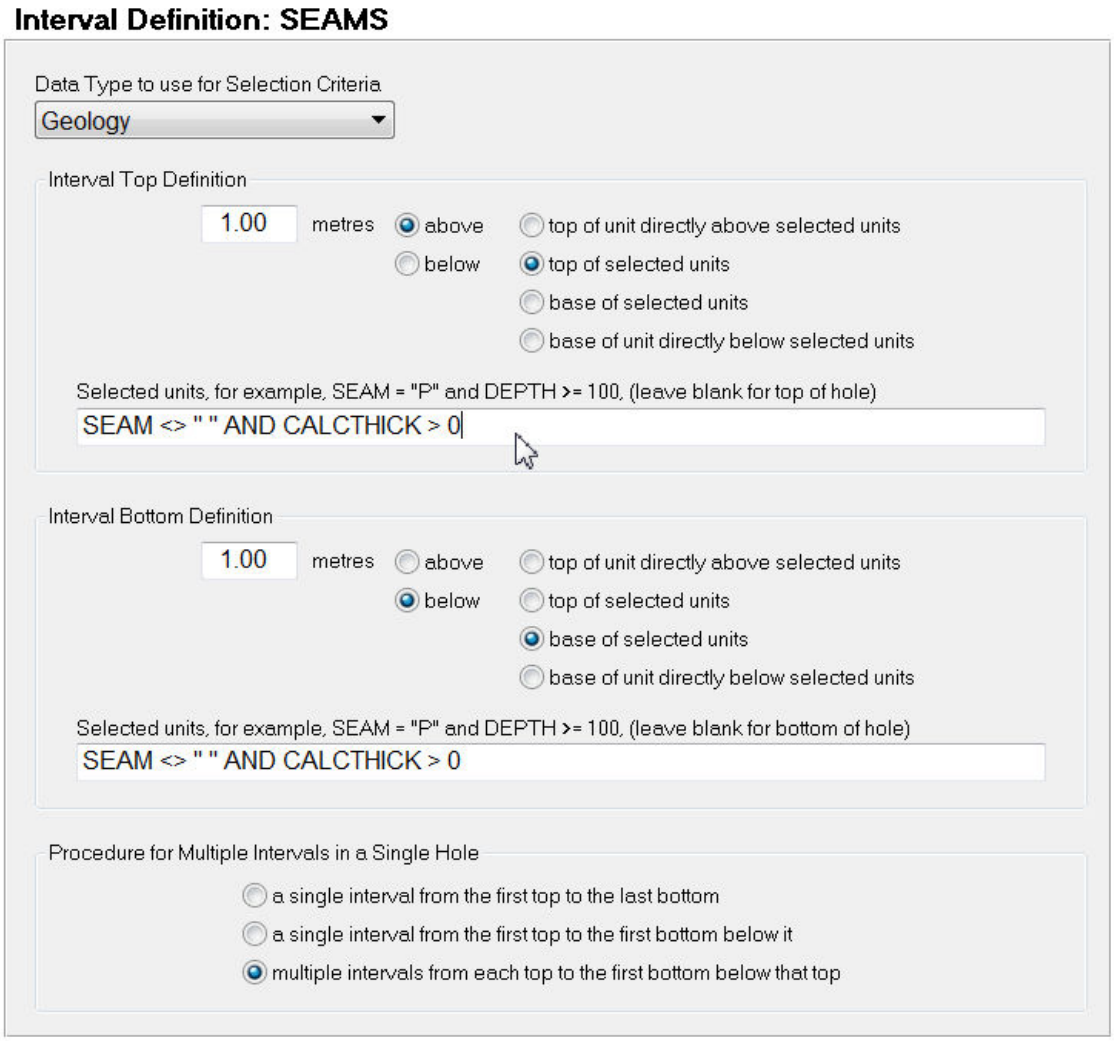
The result of opening up hole AVC031C with the WK2ROOF interval definition in the *LogCheck* hole editor is shown below. Note that a blank row coloured dark grey is used to mark the beginning of the selected interval.

The interval displayed in the LogCheck editor is indicated by the dashed (red) line on the plot.



5.4.2.3 Example 3: selecting multiple intervals in a single hole

This example illustrates the effect of selecting the "*multiple intervals from each top to the first bottom below that top*" option from the Multiple Interval choices in the interval definition. The effect is to select potentially non-contiguous sequences and display them at the same time.

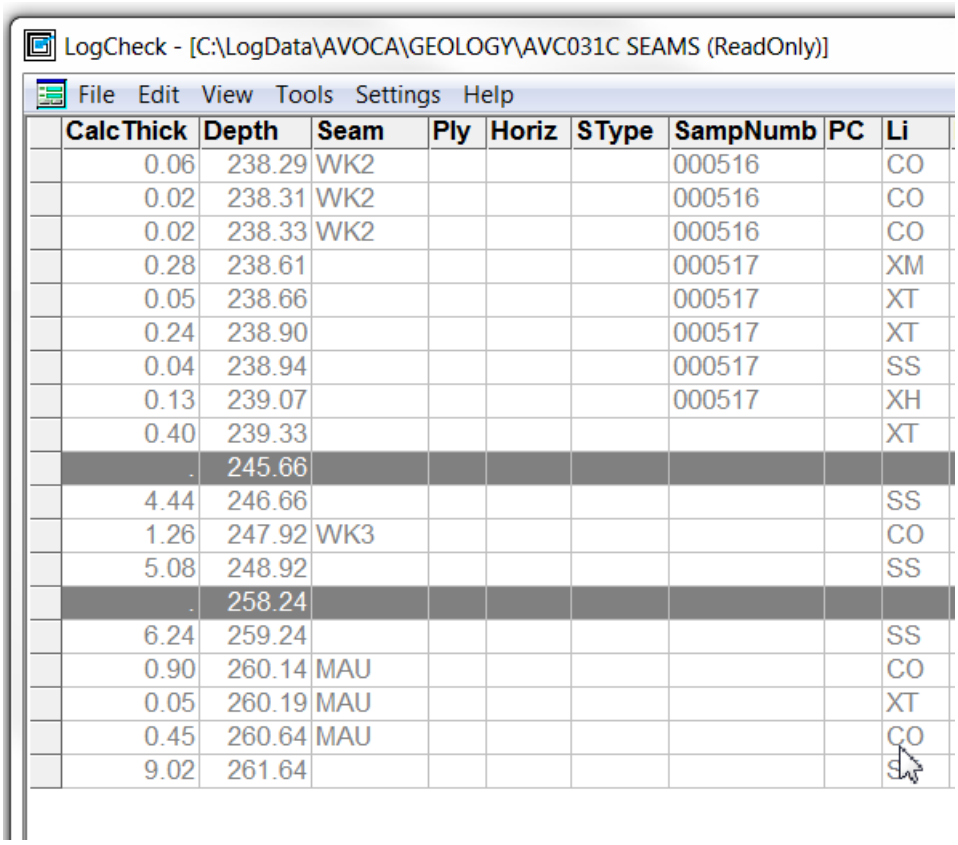


In this example, the Interval Top Definition is set to 1.0 m above each seam that occurs in the hole. The Interval Bottom Definition is set to 1.0 m below each seam that occurs in the hole. The end result is to select all seams that occur in the hole, but only the seam itself and 1.0 m of the roof and 1.0 m below the floor.

The restriction: SEAM <> " " gives every single seam and adding CALCTHICK > 0 excludes horizons. Note that there is a single blank between the quotes for the seam.

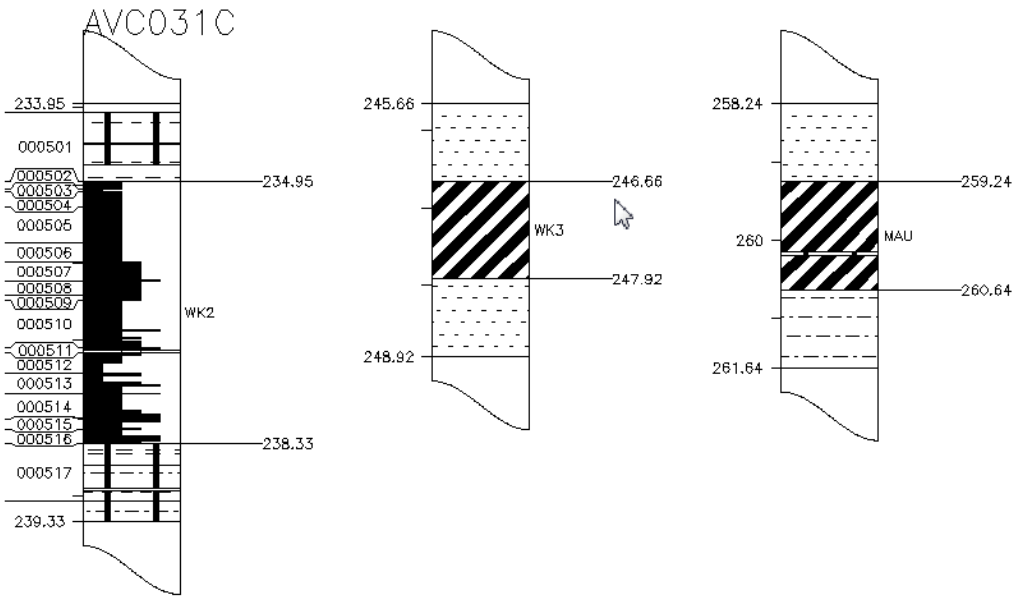
The "multiple intervals" option has been selected – the effect of this is shown in a sample plot on the following page.

The result of opening up hole AVC031C with the SEAM interval definition in the *LogCheck* hole editor is shown below. Note that a blank row coloured dark grey is used to separate the selected intervals – in this case each seam and 1.0 m above it and 1.0 m below it.



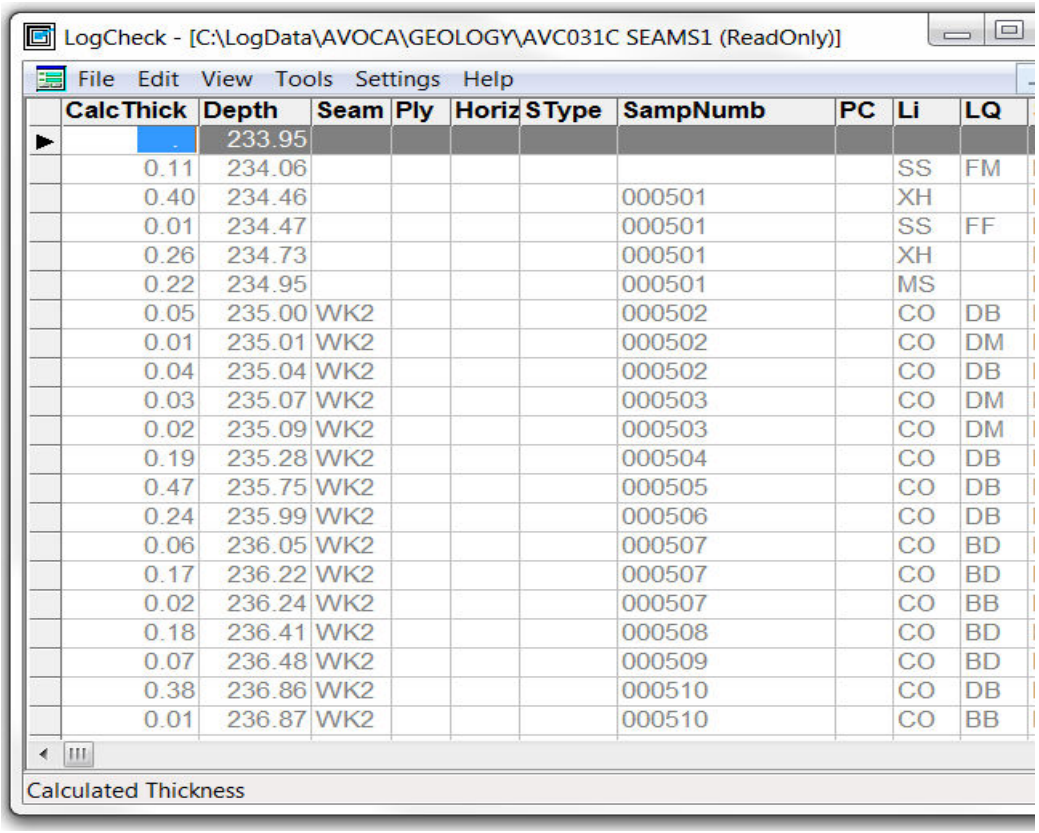
CalcThick	Depth	Seam	Ply	Horiz	SType	SampNumb	PC	Li
0.06	238.29	WK2				000516		CO
0.02	238.31	WK2				000516		CO
0.02	238.33	WK2				000516		CO
0.28	238.61					000517		XM
0.05	238.66					000517		XT
0.24	238.90					000517		XT
0.04	238.94					000517		SS
0.13	239.07					000517		XH
0.40	239.33							XT
.	245.66							
4.44	246.66							SS
1.26	247.92	WK3						CO
5.08	248.92							SS
.	258.24							
6.24	259.24							SS
0.90	260.14	MAU						CO
0.05	260.19	MAU						XT
0.45	260.64	MAU						CO
9.02	261.64							SS

The results of plotting this data are shown below. Note the effect of selecting "multiple intervals" – exactly 1.0m above and below each seam, and the seam itself is selected.



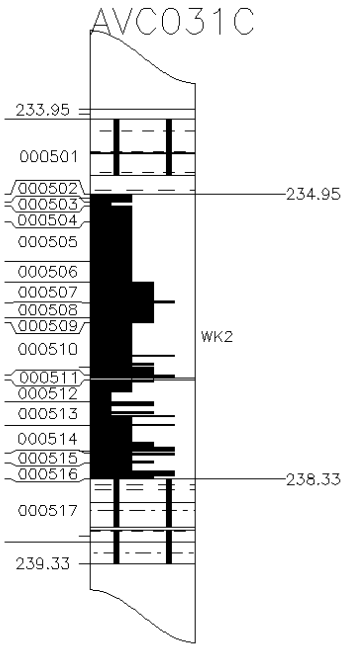
5.4.2.4 Example 4: a single interval from the first top to the first bottom below it

This example illustrates the effect of selecting the "*a single interval from the first top to the first bottom below it*" option from the Multiple Interval choices in the interval definition.



CalcThick	Depth	Seam	Ply	Horiz	SType	SampNumb	PC	Li	LQ
	233.95								
0.11	234.06							SS	FM
0.40	234.46					000501		XH	
0.01	234.47					000501		SS	FF
0.26	234.73					000501		XH	
0.22	234.95					000501		MS	
0.05	235.00	WK2				000502		CO	DB
0.01	235.01	WK2				000502		CO	DM
0.04	235.04	WK2				000502		CO	DB
0.03	235.07	WK2				000503		CO	DM
0.02	235.09	WK2				000503		CO	DM
0.19	235.28	WK2				000504		CO	DB
0.47	235.75	WK2				000505		CO	DB
0.24	235.99	WK2				000506		CO	DB
0.06	236.05	WK2				000507		CO	BD
0.17	236.22	WK2				000507		CO	BD
0.02	236.24	WK2				000507		CO	BB
0.18	236.41	WK2				000508		CO	BD
0.07	236.48	WK2				000509		CO	BD
0.38	236.86	WK2				000510		CO	DB
0.01	236.87	WK2				000510		CO	BB

The resulting plot is displayed below.



Chapter 6
Data Formats

By the end of this chapter you will be able to:

- Understand the types of *LogCheck* data formats.
- Understand the format of hole header data.
- Understand the format of geologists, casing and cementing data.
- Understand the format of drilling data.
- Understand the format of geology data.
- Understand the format of defect data.
- Understand the format of LAS data.
- Understand the format of point load test data.
- .

6.1 Introduction

The purpose of this chapter is to describe how to open holes for editing, methods of selecting holes and the data format for each of the types of hole data that is available in *LogCheck*. Most of the formats in this chapter conform to the CoalLog 4 format – however the data formats for a given project may vary from what is described here. Data formats include:

- Headers,
- Geologists,
- Casing,
- Cementing,
- Drilling,
- Geology,
- Water Flows,
- LAS,
- Defects,
- Point Loads,
- Basic Coal Quality,
- UCS Laboratory Measurements.

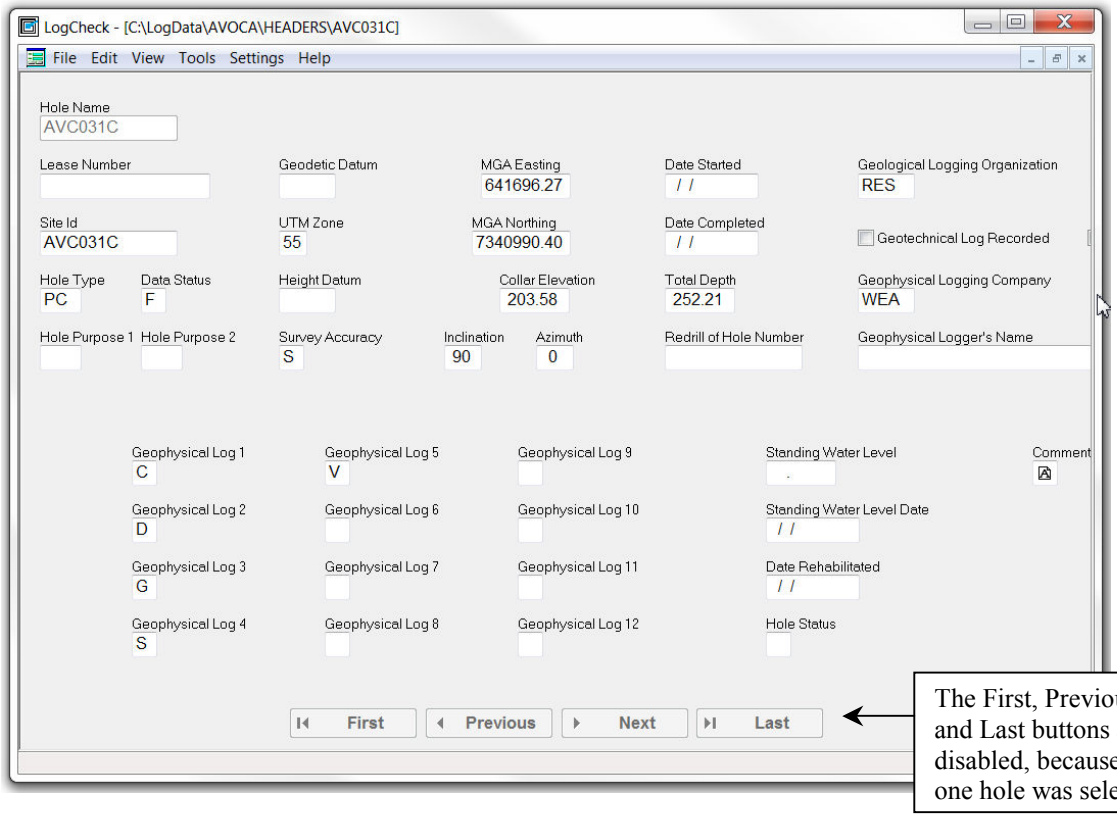
Viewing *LogCheck* data can be done in two modes:

- Grid layout, or
- Form layout.

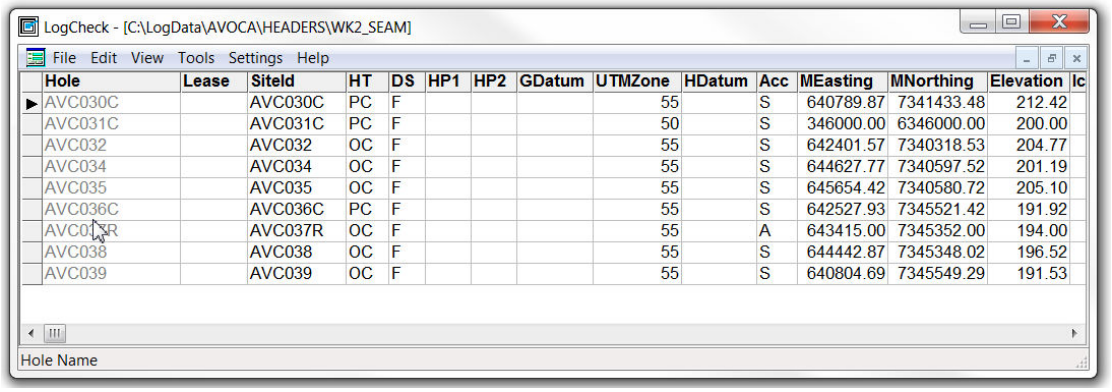
To switch between the two, go to the View menu and select the required layout.

6.2 Header Data

Header data consists of data for which there is usually a single value for the entire hole. For example, data that is recorded for a hole includes the hole name, survey data (easting, northing and elevation), total depth. An example in form view is shown below:



When opening header data if more than one hole is selected, the data is displayed by default in Grid layout as shown below:



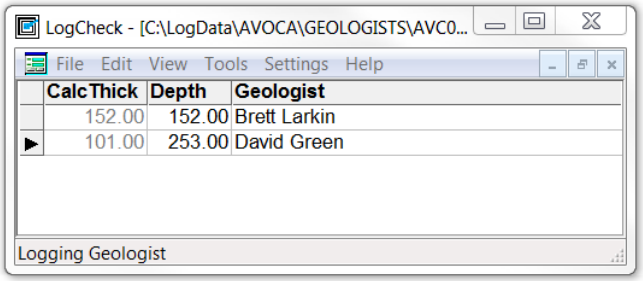
Hole	Lease	SiteId	HT	DS	HP1	HP2	GDatum	UTMZone	HDatum	Acc	MEasting	MNorthing	Elevation	Ic
AVC030C		AVC030C	PC	F				55		S	640789.87	7341433.48	212.42	
AVC031C		AVC031C	PC	F				50		S	346000.00	6346000.00	200.00	
AVC032		AVC032	OC	F				55		S	642401.57	7340318.53	204.77	
AVC034		AVC034	OC	F				55		S	644627.77	7340597.52	201.19	
AVC035		AVC035	OC	F				55		S	645654.42	7340580.72	205.10	
AVC036C		AVC036C	PC	F				55		S	642527.93	7345521.42	191.92	
AVC037R		AVC037R	OC	F				55		A	643415.00	7345352.00	194.00	
AVC038		AVC038	OC	F				55		S	644442.87	7345348.02	196.52	
AVC039		AVC039	OC	F				55		S	640804.69	7345549.29	191.53	

You can switch to Form layout from the View menu, in which case, the First, Previous, Next and Last buttons are available to navigate between the holes. The variables will differ for different versions of *LogCheck*, but will usually contain the following:

- SiteId: The site identification code.
- HT: Hole type – fully cored or open, etc.
- DS: Data Status – raw, final, etc.
- UTMZone: Map Zone.
- Easting: The easting coordinate.
- Northing: The northing coordinate.
- Elevation: The elevation of the hole collar.
- GeoOrg: Geological logging organisation
- TotDep: Total depth of the hole.
- Inc: Hole inclination
- Azi: Azimuth of the hole.
- HS: Hole Status.
- GphLog: Geophysical logging company.
- L1 – L10: Flags to indicate which geophysical logs were recorded on the hole.

6.3 Geologist Data

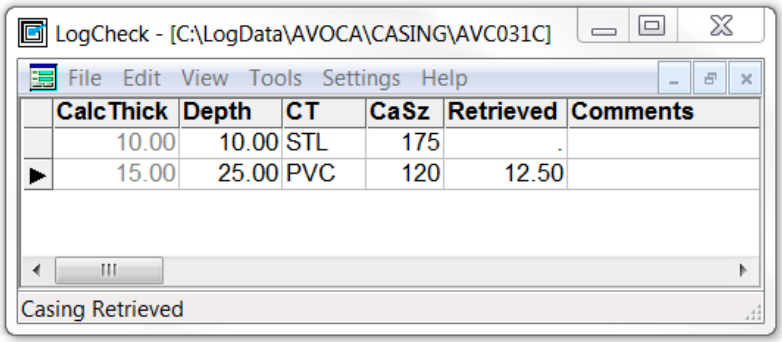
For each hole, the geologist data can be recorded. The fields are Base Depth and Logging Geologist. An example of the Geologist data for a hole in grid format is shown below:



CalcThick	Depth	Geologist
152.00	152.00	Brett Larkin
101.00	253.00	David Green

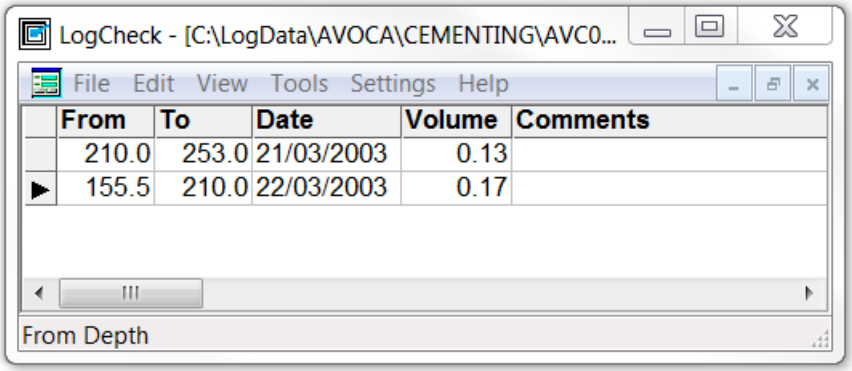
6.4 Casing Data

For each hole, the casing data can be recorded. The fields are Base Depth, Casing Type, Casing Size, Casing Retrieved and Comments. An example of the Casing data for a hole in grid format is shown below:



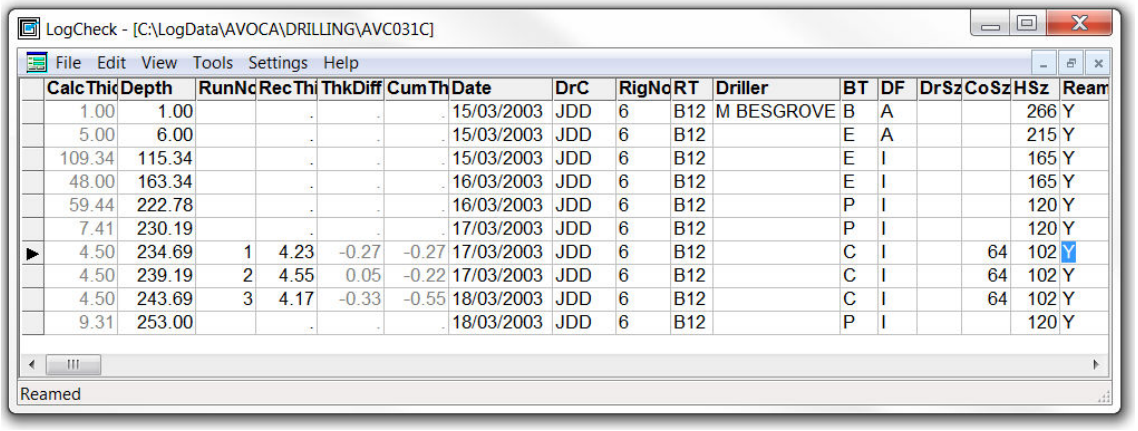
6.5 Cementing Data

For each hole, the cementing data can be recorded. The compulsory fields are From Depth, To Depth, Date and Actual Volume (m^3). An example of the drilling data for a hole in grid format is shown below:



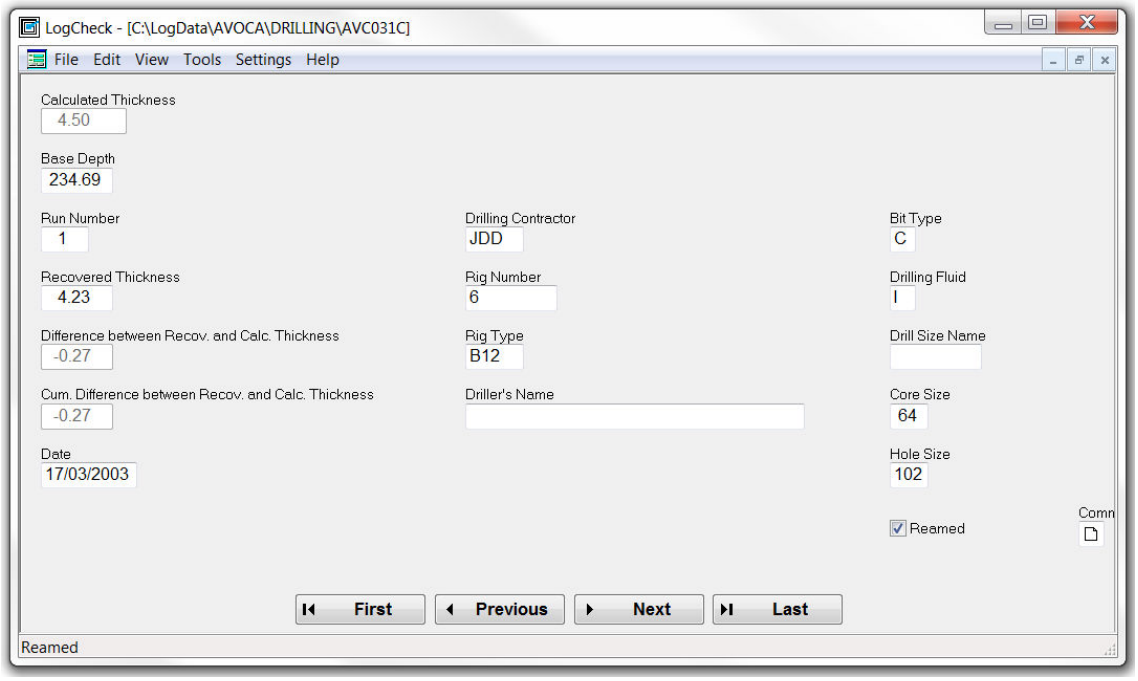
6.6 Drilling Data

For each hole, the drilling data can be recorded. The compulsory fields are Base Depth, Bit Type and where Bit Type includes cored data, the Core Size. An example of the drilling data for a hole in grid format is shown below:



CalcThic	Depth	RunNo	RecThi	ThkDiff	CumTh	Date	DrC	RigNo	RT	Driller	BT	DF	DrSz	CoSz	HSz	Ream
1.00	1.00		.	.	.	15/03/2003	JDD	6	B12	M BESGROVE	B	A			266	Y
5.00	6.00		.	.	.	15/03/2003	JDD	6	B12		E	A			215	Y
109.34	115.34		.	.	.	15/03/2003	JDD	6	B12		E	I			165	Y
48.00	163.34		.	.	.	16/03/2003	JDD	6	B12		E	I			165	Y
59.44	222.78		.	.	.	16/03/2003	JDD	6	B12		P	I			120	Y
7.41	230.19		.	.	.	17/03/2003	JDD	6	B12		P	I			120	Y
4.50	234.69	1	4.23	-0.27	-0.27	17/03/2003	JDD	6	B12		C	I		64	102	Y
4.50	239.19	2	4.55	0.05	-0.22	17/03/2003	JDD	6	B12		C	I		64	102	Y
4.50	243.69	3	4.17	-0.33	-0.55	18/03/2003	JDD	6	B12		C	I		64	102	Y
9.31	253.00		.	.	.	18/03/2003	JDD	6	B12		P	I			120	Y

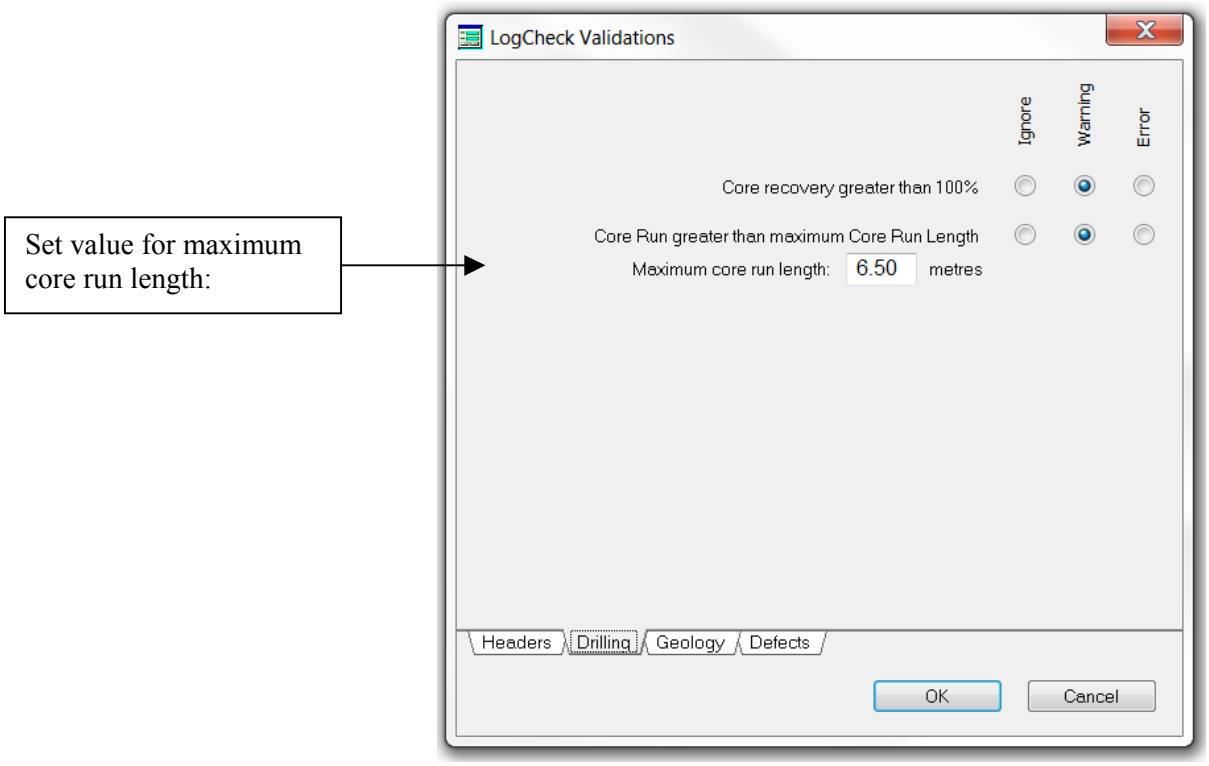
On switching to form layout, the drilling data appears as shown below:



The entries for drilling data include:

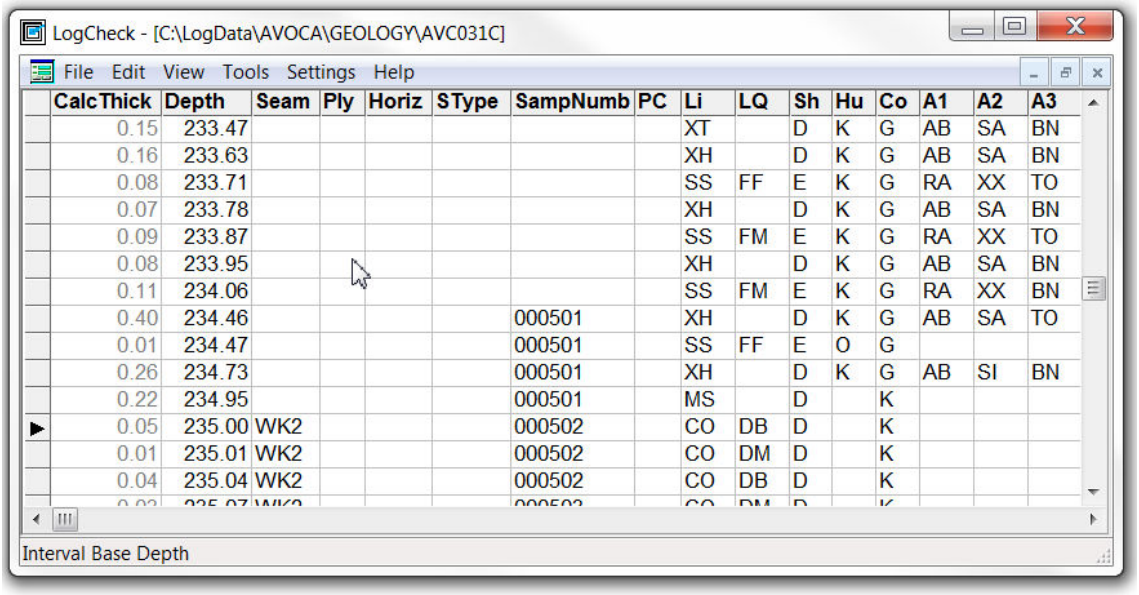
- Depth: The depth to the base of the core. The top of an interval is assumed to be the base depth of the previous interval.
- RunNo: Run number.
- RecThk: Recovered thickness.
- ThkDiff: The recovered thickness.
- CumThk: The cumulative recovered thickness.
- Date: The date of the drilling.
- DrC: The drilling contractor.
- RigNo: The rig number.
- RT: The rig type.
- Driller: The name of the driller.
- BT: The bit type.
- DF: Drilling fluid used.
- DrSz: Drill size name.
- CoSz: Core size.
- HSz: Hole size.
- Reamed: Whether or not the hole has been reamed.

For cored intervals, the difference between the base depth and the top depth must be less than the maximum core run length, which is set in the Settings > Validations menu, which only appears if you are in Manager Mode, as shown below:



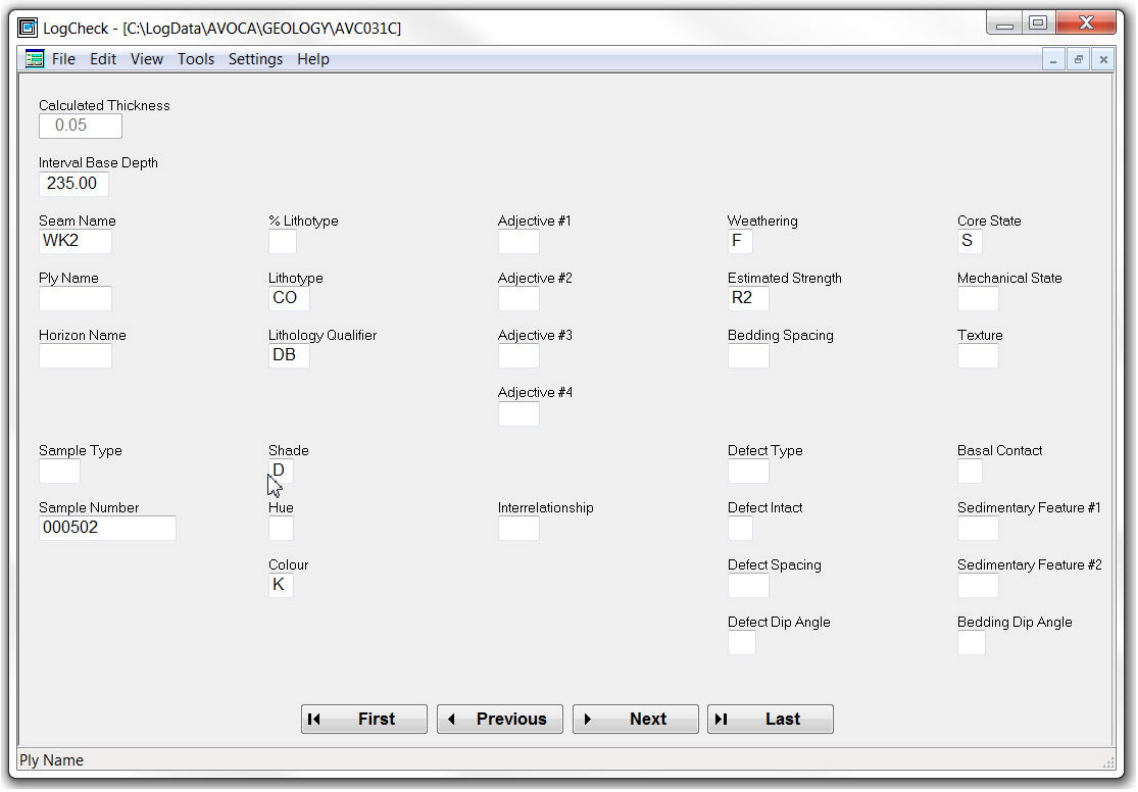
6.7 Geology Data

An example of Geology data in grid format is shown below:



CalcThick	Depth	Seam	Ply	Horiz	SType	SampNumb	PC	Li	LQ	Sh	Hu	Co	A1	A2	A3
0.15	233.47							XT		D	K	G	AB	SA	BN
0.16	233.63							XH		D	K	G	AB	SA	BN
0.08	233.71							SS	FF	E	K	G	RA	XX	TO
0.07	233.78							XH		D	K	G	AB	SA	BN
0.09	233.87							SS	FM	E	K	G	RA	XX	TO
0.08	233.95							XH		D	K	G	AB	SA	BN
0.11	234.06							SS	FM	E	K	G	RA	XX	BN
0.40	234.46					000501		XH		D	K	G	AB	SA	TO
0.01	234.47					000501		SS	FF	E	O	G			
0.26	234.73					000501		XH		D	K	G	AB	SI	BN
0.22	234.95					000501		MS		D		K			
0.05	235.00	WK2				000502		CO	DB	D		K			
0.01	235.01	WK2				000502		CO	DM	D		K			
0.04	235.04	WK2				000502		CO	DB	D		K			

The same hole in form view is shown below:



Fields that will be in the Geology data for every user include:

- Calculated Thickness: The interval base depth minus the base depth of the previous interval. This is a readonly field calculated on the fly by the program as the user enters interval base depth values.
- Interval Base Depth: The depth of the base of the lithological unit. The interval top is assumed to be the base depth of the previous unit. Interval base depth must be greater than or equal to the base depth of the previous unit. If the base depth is equal to that of the previous unit it is assumed that the unit is an horizon, in which case, it must have a horizon entered in the Seam/Strat column and if the user is using Vulcan a lithology, usually NL for Not Logged, in the Lithotype/Rock Type column. It cannot have values in any of the other columns apart from the Comments column. A Seam/Strat code is denoted as being an Horizon by having a value of HORIZ in the its Group column in the dictionary.
- Sample Number: This should appear on at least the first record within each lithological unit that is part of a sample. Despite its name it can contain both numbers and letters.
- Horizon/Seam Name: This should appear on at least the first record within each lithological unit which the unit wishes to denote as a Stratigraphic unit or Seam.
- % Lithotype: Where a lithological unit consists of more than one lithotype/rock type the user must specify what percentage of the lithological unit consists of this lithotype/rock type.
- Lithotype/Rock Type: The Lithotype/Rock Type of a portion of a lithological unit
- Comments: The comment field appears on the far right hand side of the table. It only shows the first line of the comment. If the user wants to see the subsequent lines and/or edit the comment they need to hit the spanner button that appears on the right-hand side of the field when they click on it. There is no limit on the size of the comment for each record, however, be aware that on exporting the data to other systems most have a limit on the size of their comments.

Each lithological unit can include multiple lines including multiple lithologies. It must contain an interval base depth on the first line in the unit and then subsequent lines must have the interval base depth as blank. Each new lithology within the unit is included by a code in the Lithotype/Rock Type column. The user can extend the description of each rock type over a number of lines but must leave the rock type blank on these subsequent lines.

Note that *LogCheck* only checks that:

- depths increase down the hole,
- lithotype percentages add up to 100% and
- that horizon lines only contain horizons and no other data

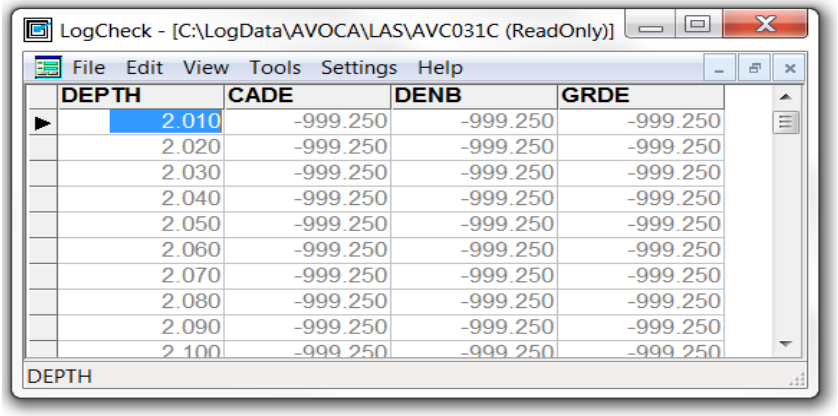
when the user attempts to save their data as these restrictions may not be temporarily satisfied while the user is editing their data.

6.8 LAS Data

The LAS file records geophysical data obtained from logging a hole, such as gamma, density and calliper recordings. The format of a LAS file is available from the Canadian Well Logging Society and can be found on its website at:

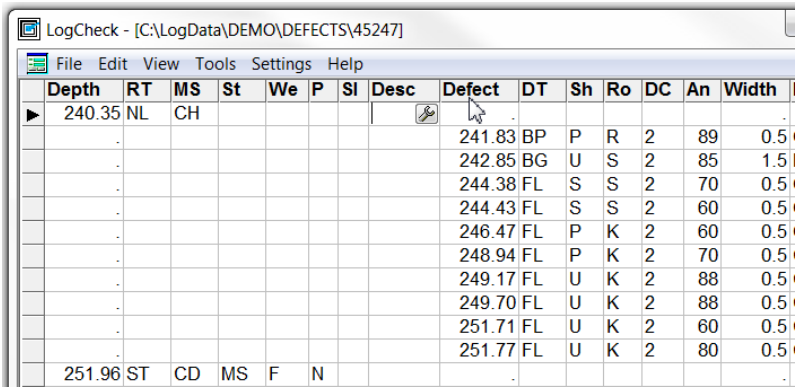
www.cwls.org/las_info.php

LAS data is stored in an ASCII file (it can be opened in Notepad). LAS data can also be opened in *LogCheck* – go to File > Open > Hole Data, then select "LAS" from the Data Type list. When opened in *LogCheck*, LAS data is read-only. An example of LAS data is shown below:



6.9 Defect Data

In *LogCheck*, there are two parts to defect data – on the left hand side, from the Depth – Desc columns, are rock mass unit (RMU) details. A single RMU has uniform geotechnical characteristics. On the right hand side is a description of each of the defects. For example, in the following hole, from 40.35 – 51.96 is a RMU, with a defect logged at 41.83 – BP (Bedding Planes). It is important to note that the Depth value is the *top* of the RMU. The entries for defect data include:



- Depth: The depth to the top of the RMU.
- RT: Rock mass unit type, for example, SS – sandstone.
- ST: Estimated strength, for example, MS – moderate strength rock.
- We: Weathering, for example, F – fresh.
- P: Plasticity, for example, P – puggy.
- Sl: Slaking potential, for example, 4 – moderate slaking.
- Desc: Description of the RMU.
- Defect: The base depth of the defect.
- DT: A defect type within the RMU, for example, BP – bedding planes.
- Sh: Surface shape, for example, P – planar.
- Ro: Surface roughness, for example, K – slickensided.
- DC: Defect continuity, for example, 1 – one end terminates.
- An: Average angle to core, in degrees.
- Width: Defect aperture width (in mm).

6.10 Point Load Test Data

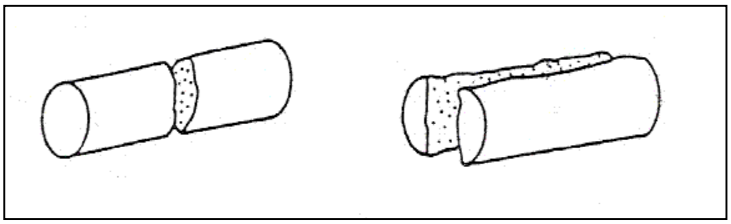
In a point load test, a stick of core is subject to compressive forces in both axial and diametral directions, until the core fails. The force measured is the force in kN at which the core fails. Results are standardized to a 50 mm diameter core size. An established testing procedure involves:

(a) An initial diametral test, where pressure is applied along the diameter of the core, until it breaks into two sticks of core.

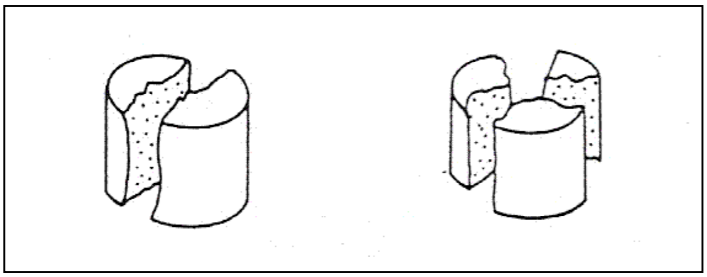
(b) A diametral test is applied to each of the two sticks derived from (a).

(c) This usually results in four pieces of core on which axial tests are done. In an axial test, pressure is applied along the longitudinal axis of the core

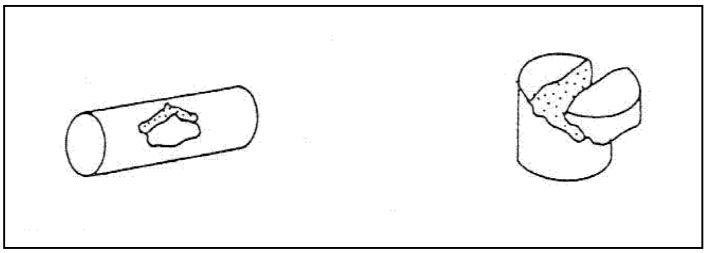
Examples of valid diametral failures are as shown below:



Examples of valid axial failures are as shown below:



Examples of invalid failures are shown below (diametral on the left, and axial on the right):



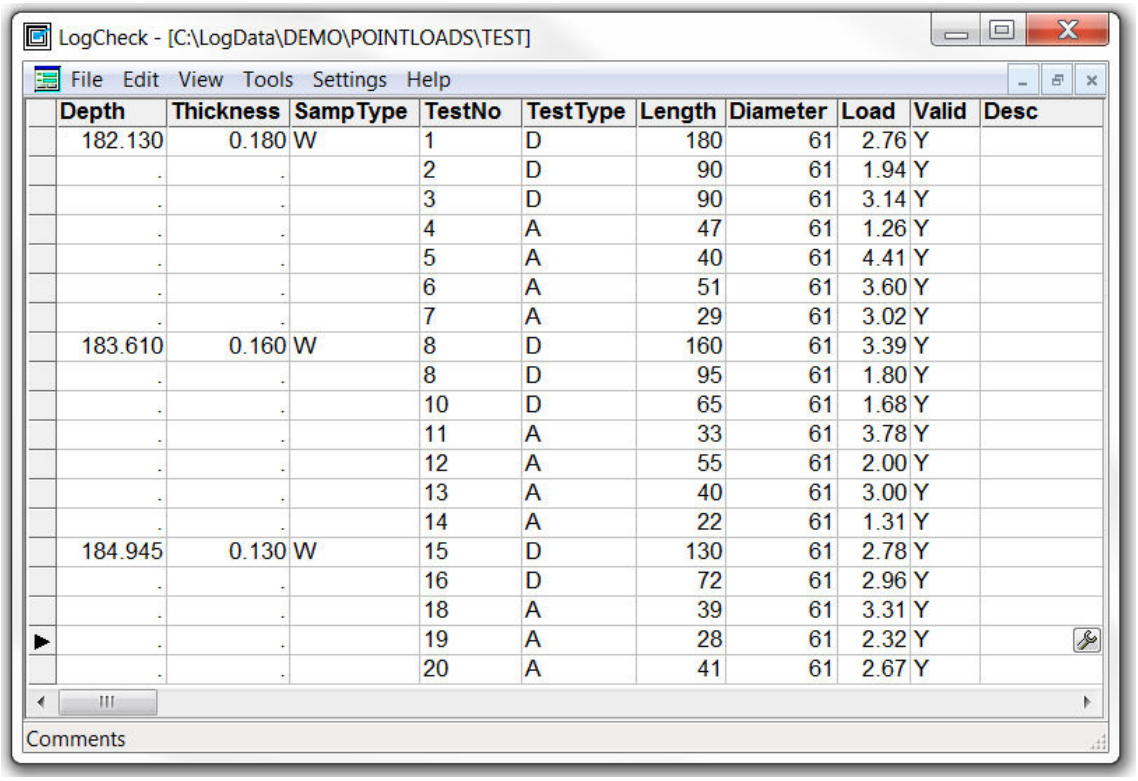
For Point Load test results to be included in the calculation of Point Load Indices, they must be:

(a) A valid test,

(b) If it is a diametral test, the core length must be greater than the diameter, or

(c) If it is an axial test, the core length must be less than or equal to the diameter and greater than 0.3 times the diameter.

In *LogCheck*, an example of point load test data is shown below:



Depth	Thickness	SampType	TestNo	TestType	Length	Diameter	Load	Valid	Desc
182.130	0.180	W	1	D	180	61	2.76	Y	
.	.		2	D	90	61	1.94	Y	
.	.		3	D	90	61	3.14	Y	
.	.		4	A	47	61	1.26	Y	
.	.		5	A	40	61	4.41	Y	
.	.		6	A	51	61	3.60	Y	
.	.		7	A	29	61	3.02	Y	
183.610	0.160	W	8	D	160	61	3.39	Y	
.	.		8	D	95	61	1.80	Y	
.	.		10	D	65	61	1.68	Y	
.	.		11	A	33	61	3.78	Y	
.	.		12	A	55	61	2.00	Y	
.	.		13	A	40	61	3.00	Y	
.	.		14	A	22	61	1.31	Y	
184.945	0.130	W	15	D	130	61	2.78	Y	
.	.		16	D	72	61	2.96	Y	
.	.		18	A	39	61	3.31	Y	
.	.		19	A	28	61	2.32	Y	
.	.		20	A	41	61	2.67	Y	

For example, in the figure above, for the depth of 182.13, Test No. 1 is the initial diametral test, Test Nos. 2 and 3 are the tests on the two sticks of core derived from Test No. 1, and Test Nos. 4, 5, 6 and 7 are the results of the axial tests on the each of the two sticks of core derived from Test Nos. 2 and 3.

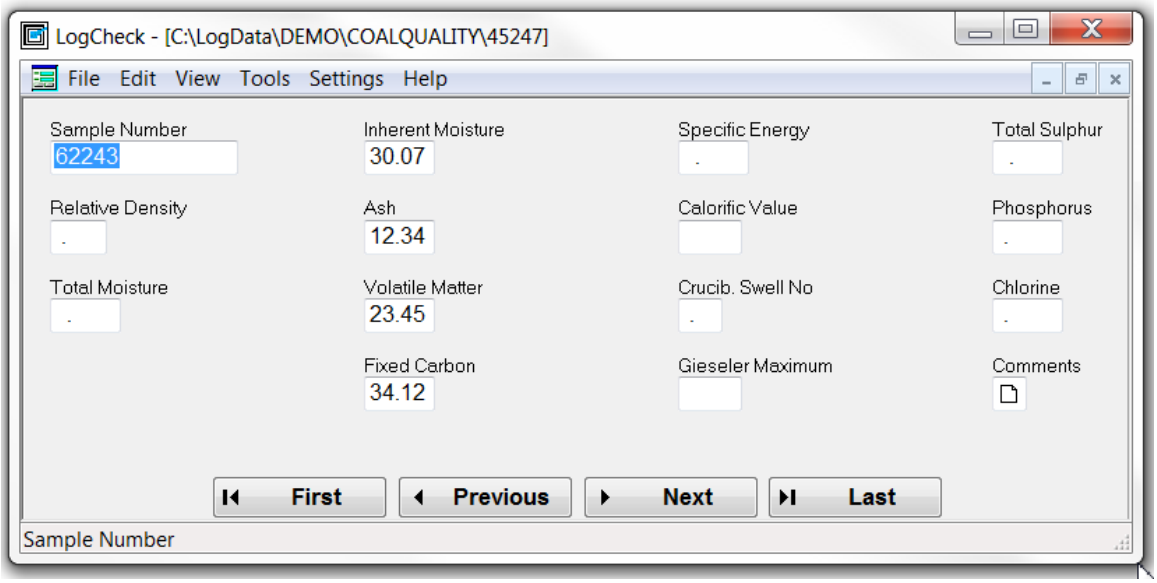
In this diagram, the columns are:

- Depth: The depth to the base of the sample.
- Thickness: The original length of the sample.
- SampType: This can be either wet (W) or dry (D).
- TestNo: This is a unique number within a sample to uniquely identify a particular test within LogCheck.
- TestType: Refers to the direction that the pressure was applied in; this can be either diametral (D) or axial (A).
- Length: Always the length down the core, regardless of the TestType.
- Diameter: The diameter of the core.
- Load: The force in kN at which the core failed.
- Valid: Refers to whether the failure was a valid one or not (see above diagram for examples of invalid failures.

6.11 Basic Coal Quality Data

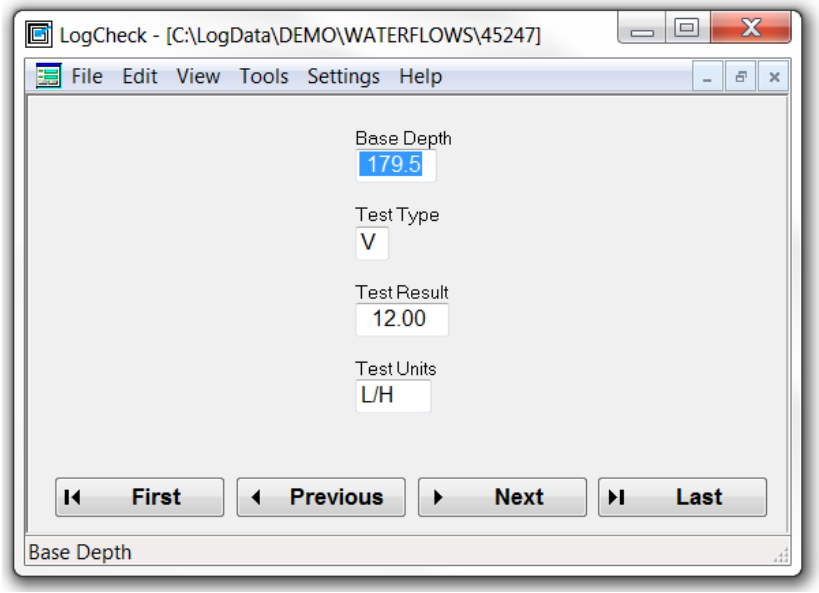
Normally coal quality data is entered via importing a CSV file supplied by the laboratory. If the CSV file does not contain fixed carbon values, the import routine calculates the fixed carbon by subtracting the inherent moisture, ash and volatile matter percentages from 100%.

If only one of specific energy or calorific values is supplied, the import routine calculates the other from the supplied value. You can't enter coal quality sample numbers unless those sample numbers also exist within the geology data for that hole.



6.12 Water Flow Data

Water flow is flow out of the hole from particular depths – you can use the dictionary to specify the measurements.



Chapter 7
The *LogCheck* Editor

By the end of this chapter you will be able to:

- Navigate the *LogCheck* editor form.
- Modify hole data in the hole edit form.
- Append, copy and delete rows in the hole edit form
- Find and replace logging codes.
- Modify options in the Settings menu
- Validate drill hole data against a dictionary.
- Import hole data.

7.1 Introduction

The *LogCheck* editor is used for viewing and modifying dictionaries and hole data, and for viewing summaries and audits. Dictionaries can only be viewed; if you need to update a dictionary, you need to set Manager status (see Chapter 3). Hole data can generally be modified, however if the file properties are set to read-only, it can only be viewed (see following section for setting the read-only property).

Summaries and audits are all read-only. If the data being viewed is read-only, it is shown in grey rather than black. In addition, even when you can modify data, there may be calculated fields such as calculated thickness that cannot be modified, which are shown in grey.

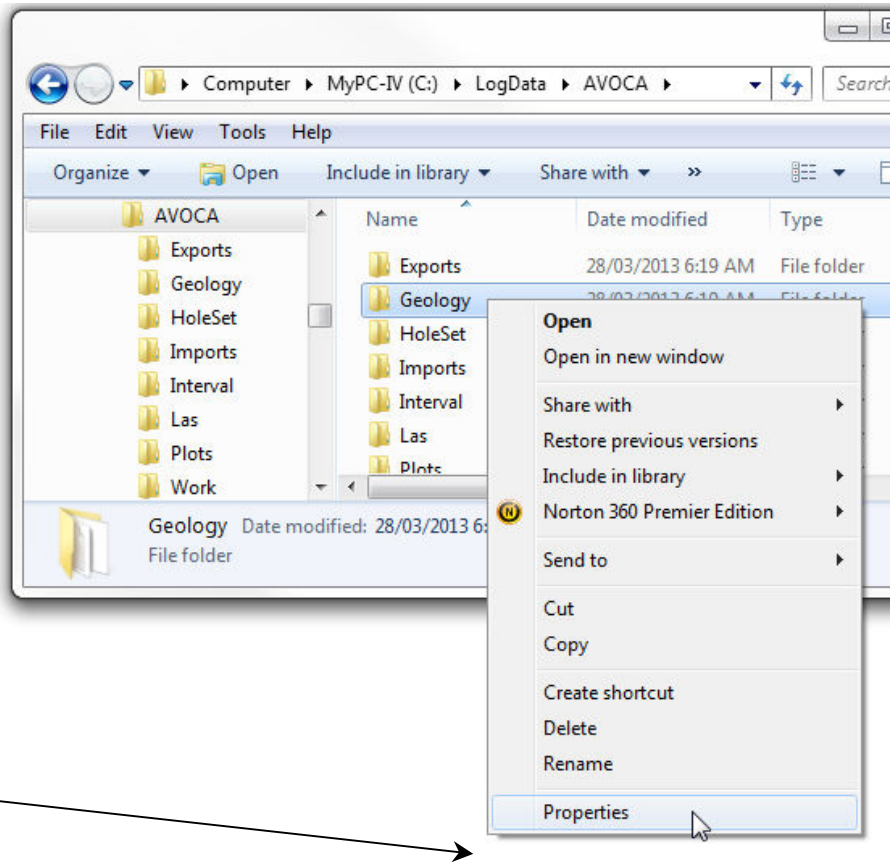
7.1.1 Setting the Read-Only Property

Setting the read-only property can be done for a folder, and all of its contents or applied to a single file.

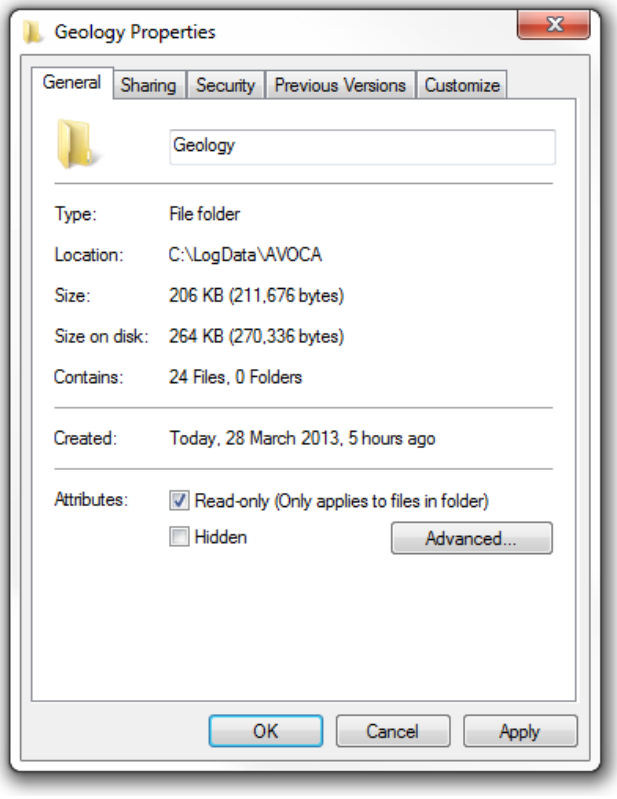
To set or unset the read-only property, requires the following steps:

1. Open up My Computer or Windows Explorer, and navigate to the folder where the project data is stored.

2. Right-click the required folder and select the Properties item from the menu, as shown on the right:



3. The Properties dialog is shown in the figure below:



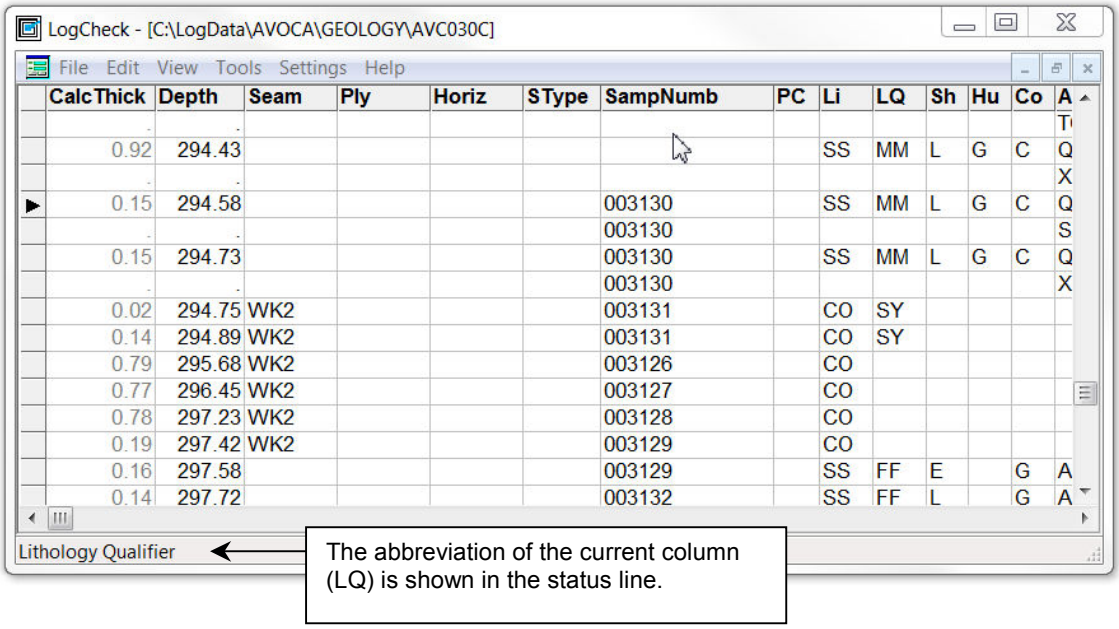
4. To set the read-only property, click the Read-only checkbox so that it is checked and click the OK button.

5. To unset the read-only property, clear the check from the box, and click the OK button.

7.2 The Editor Form

After selecting the data (for example, hole data or a dictionary) to be edited, the data is displayed in *LogCheck*'s data editor, which can display the data in either Grid Layout, or Form Layout. The respective items in the View menu allow you to switch between them, or the Shift+F8 function key combination will also toggle between the two views.

Opening hole data is described in Chapter 5; opening a dictionary is described in Chapter 4. An example of Grid Layout is shown below:



CalcThick	Depth	Seam	Ply	Horiz	SType	SampNumb	PC	Li	LQ	Sh	Hu	Co	A
													T
0.92	294.43							SS	MM	L	G	C	Q
													X
0.15	294.58					003130		SS	MM	L	G	C	Q
						003130							S
0.15	294.73					003130		SS	MM	L	G	C	Q
						003130							X
0.02	294.75	WK2				003131		CO	SY				
0.14	294.89	WK2				003131		CO	SY				
0.79	295.68	WK2				003126		CO					
0.77	296.45	WK2				003127		CO					
0.78	297.23	WK2				003128		CO					
0.19	297.42	WK2				003129		CO					
0.16	297.58					003129		SS	FF	E		G	A
0.14	297.72					003132		SS	FF	L		G	A

This form can be scrolled horizontally and vertically. Each row represents a logged drill-hole entry and each column represents a variable. The menus that are available along the top of the form are: Edit, View, Tools, Settings and Help. The View menu allows you to choose Grid View (as shown above) or Form View (as described later in this chapter).

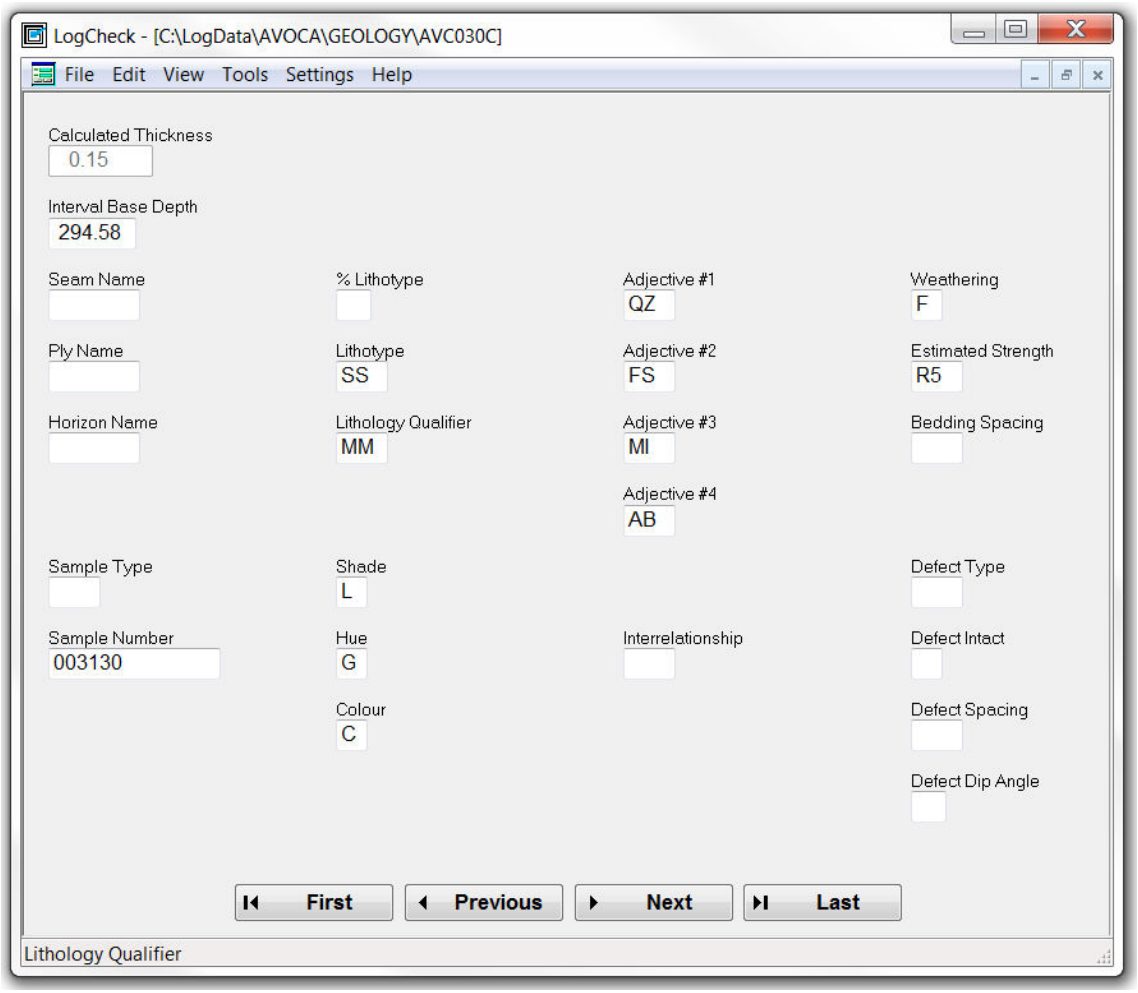
7.2.1 Navigating the Edit Window

For existing hole data you can move around the Edit Window by using the following keys:

- Tab key: Moves to the next column on the current row;
- Shift Tab key Moves to the previous column;
- PgDn key Moves down a page at a time;
- PgUp key: Moves up a page at a time;
- Ctrl+PgUp: Moves to top of form;
- Ctrl+PgDn: Moves to bottom of form;
- Mouse wheel: Scrolls up or down the log;
- Scroll bars: Drag the vertical or horizontal scrollbars with the mouse;
- Arrow keys: The Left, Right, Up and Down arrow keys move one item in the selected direction.
- F2: Enables editing of current field;
- End: Move to end of current field;
- Home: Move to beginning of current field.

Note that there is no explicit "Close hole" command – opening another hole automatically closes the previously open hole.

An example of the geology data for a hole in Form Layout is shown below:



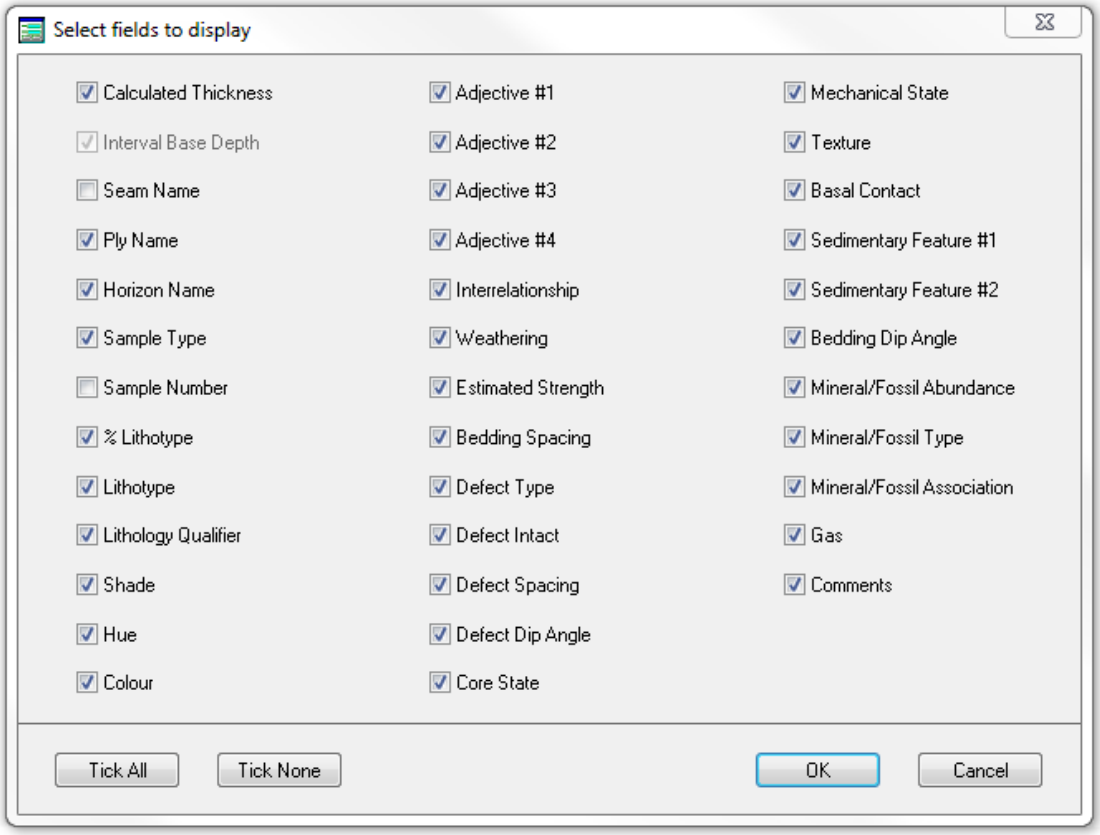
In Form Layout (above), all the data for a single row is shown, with a full description of each dictionary category.

Clicking the Next button moves to the next record in the log. Similarly with the Previous, First and Last buttons. To enter Remarks, double-click the field to bring up a full-screen editor – when entry of Remarks is complete, click the lower Close button. The advantages of this layout are that:

1. You don't need to tab across to fields on the right, as in Grid View;
2. The full descriptions of fields are shown alongside the values.

7.2.2 Display/Hide Fields

The Display/Hide Fields option of the View menu allows you to select the columns to be displayed in the Editor. Tick a column to display it, or untick it to hide it. The Tick All button selects all columns for display; the Tick None button de-selects all columns.



Since the SampleNumb, Seam and Ply are usually only filled in for coal seams, you can turn these off when not in a coal seam, so more of the fields on the right are visible.

7.2.3 The Restore Previous Field Display

The Restore Previous Fields option of the View menu allows you to restore the previously selected columns. You can press Shift+F3 to turn these on and off. For example, as you log in and out of coal seams.

This is useful when moving between coal and non-coal lithologies. This will be greyed out if you haven't made any changes in the field display.

7.2.4 Modifying Data in the *LogCheck* Editor

When entering data into cells in the *LogCheck* editor, you can either:

- Type the data in using the keyboard.
- Use the dictionary/keypad that is displayed on the side of the screen. This is useful when using tablets which only have a keyboard that pops up on the screen

When the dictionary is displayed, it changes according to the type of data in the current cell. To display the dictionary, go to the View menu, then select the Display Keypad/dictionary option.

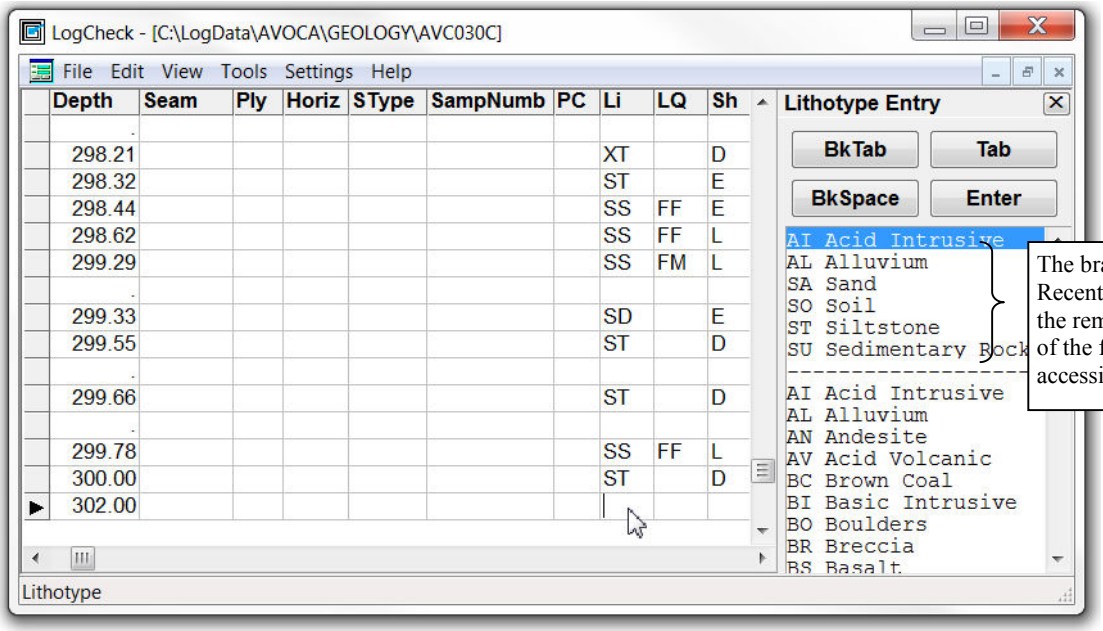
When entering depths, if you enter a value less than 1.0, then *LogCheck* retrieves the units value from the previous line; this makes it faster to enter data by reducing the amount of typing. For example, for a depth of 170.80, if the previous depth was 170.25, then you only need type in .80 – *LogCheck* carries the 170 down from above. For numeric fields, such as depth, even though a numeric keypad may be displayed, it is often easier to use the keyboard. Also, when you are familiar with the codes in the dictionary, these can be typed into a cell directly.

7.2.5 Display Keypad/Dictionary Menu

For alphanumeric fields that are dictionary lookup fields, the possible dictionary values for the field are displayed. If all the dictionary values for the field do not fit on the screen (for example, Lithology), the most recently used values are shown at the top of the list; the remaining values can be accessed by scrolling further down the list.

The Recently Used list is only displayed if the whole list runs on to another page. Only the items you have entered will appear on your computer – it will not include those entries used if the hole was edited on another computer (the Recently Used list is kept in the project dictionary).

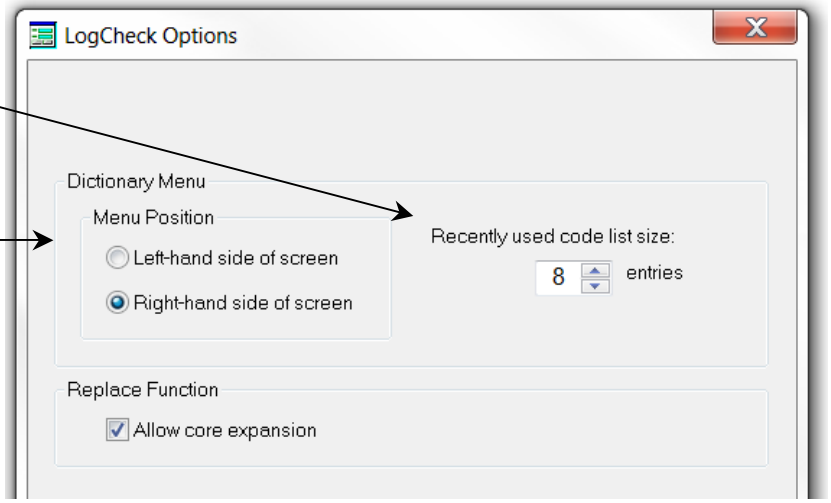
An example of a the Geology dictionary keypad and its Recently Used list is shown below:



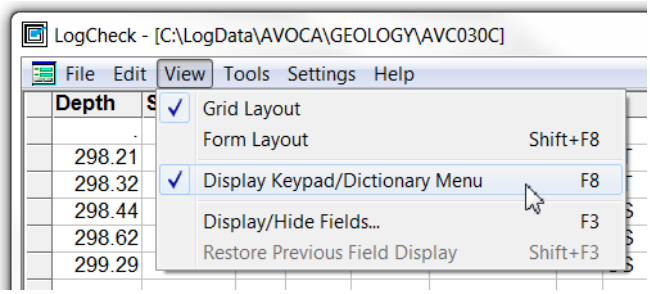
The size of the recently used list can be set in the Options by selecting Settings > Options and the Editing tab, as shown:

You can specify which side of the screen the dictionary is displayed, as shown on the right:

If using a tablet, left-handed users prefer the menu on the left, and right-handed users on the right, so that their arm does not cover the data.



The display of the keypad/dictionary in the hole editor can be toggled on or off from the View menu and clicking the Display Keypad/Dictionary menu item, or pressing the F8 shortcut key, as shown on the right:

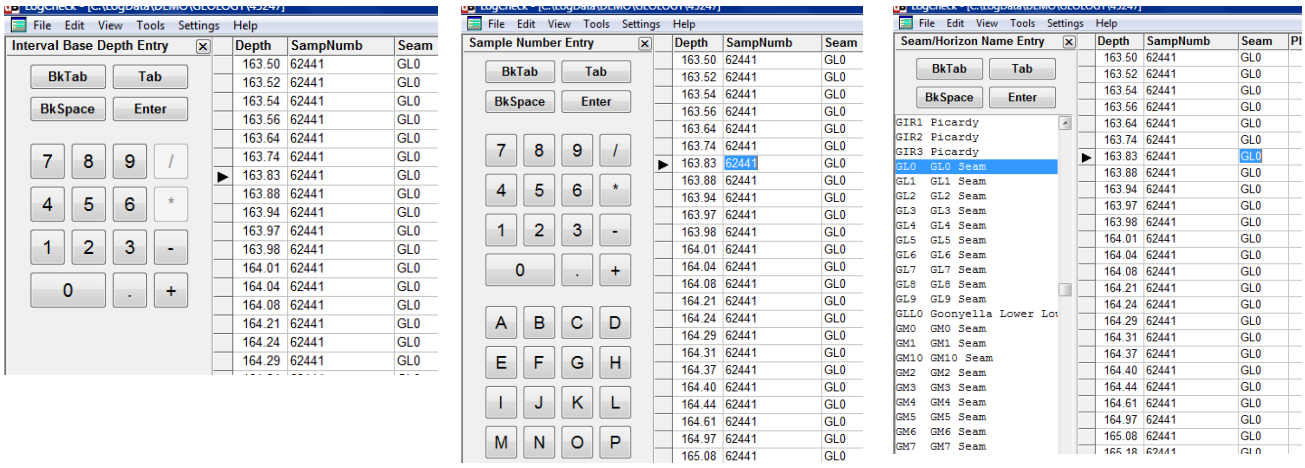


The dictionary contains all the valid entries for a column. The *LogCheck* Editor with the dictionary/keypad displayed is shown below:

1. The current cell is in the Depth column – the numeric keypad is active, as this is the only valid form of input. Clicking the Tab button moves to the next field (SampNumb).

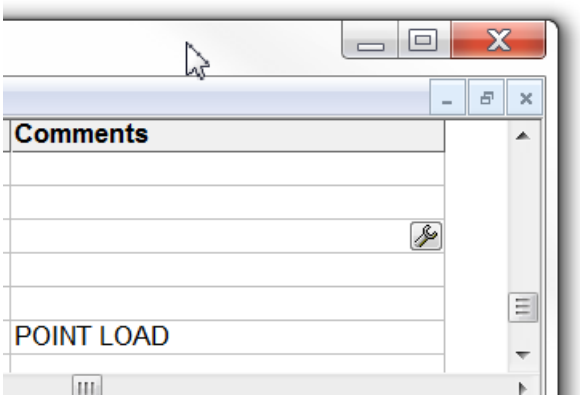
2. The current cell is in the SampNumb column – the numeric and alpha keypads are active, to allow for alphanumeric input.

3. The current cell is in the Seam column – now the dictionary is displayed, with the current entry highlighted.



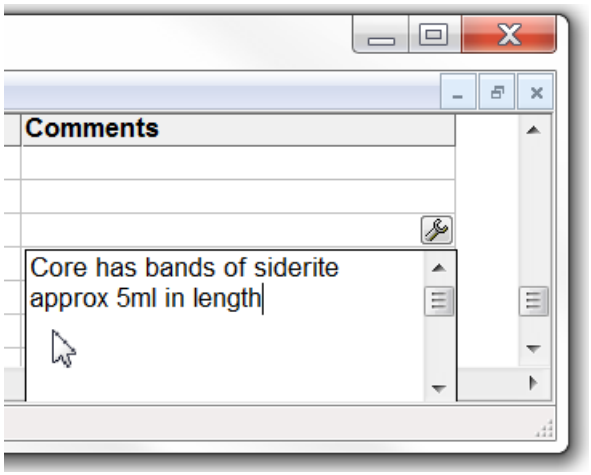
7.2.6 Multi-Line Comments

The Comments field on the far right of the Hole Edit form allows you to add multi-line comments for a unit. When you first enter the field, it shows a spanner in the right-hand side, as shown on the right.

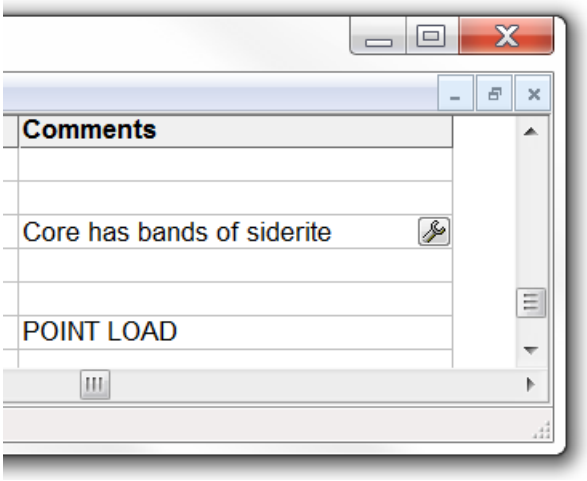


You can either type a single-line comment, or click the spanner icon, and a multi-line edit box appears.

In the multi-line edit box, you can add further comments, as shown on the right.



To terminate the input, click the spanner again, and the first line of the comment is displayed, as shown below:

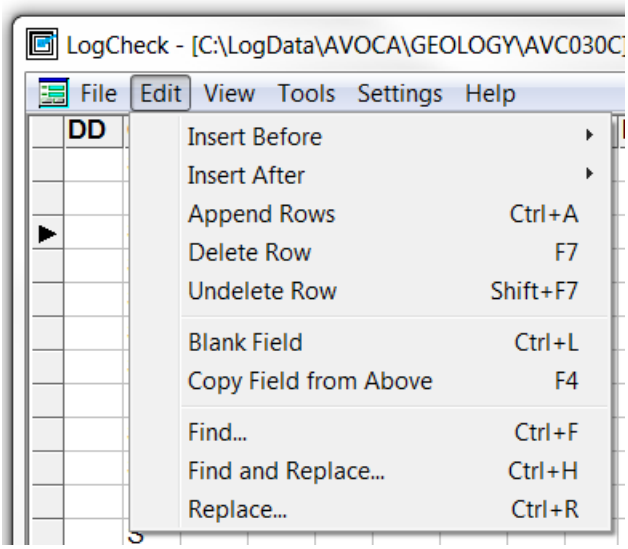


You can force a blank line by putting a space in the first line, then your comments will start on the second line. Note that if you just type the Enter key without first putting in a space, dBase will remove the blank line. This allows the Comments field to appear in a new line in the reports.

7.3 The Edit Menu

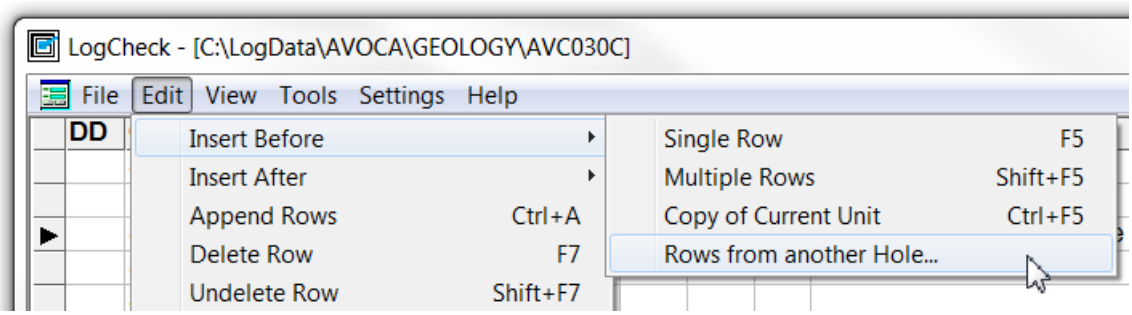
The Edit menu allows you to insert, append, copy, delete and undelete rows. It also has options to clear or copy a field, and find/replace items.

The Edit menu appears as shown on the right:



7.3.1 Inserting Rows Before the Current Row

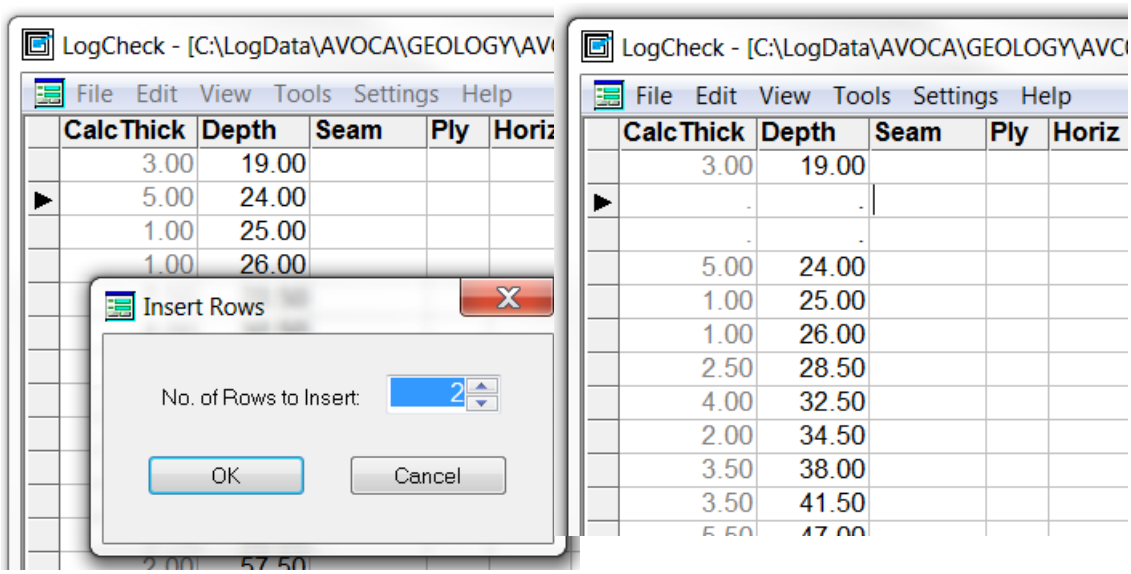
To insert new row(s) before the current row in a log, select Edit > Insert Before; the options are as shown below:



When a new row is inserted, it copies data from the columns above. The user can control which columns are copied by going to the Settings menu, then selecting Carry Fields (see following section). The options are:

- Single Row: Inserts a single row, with no further dialog.
- Multiple Rows: Inserts multiple rows.
- Copy of Current Unit: Inserts an identical copy of the current unit, including the depth.
- Rows from another hole: Inserts the specified rows from another hole

The figure below on the left shows the Multiple Rows dialog, which requests the number of new rows to insert. The figure on the right shows the insert operation after it has completed. The new rows are inserted above the current row, and the specified fields are copied from the row above.

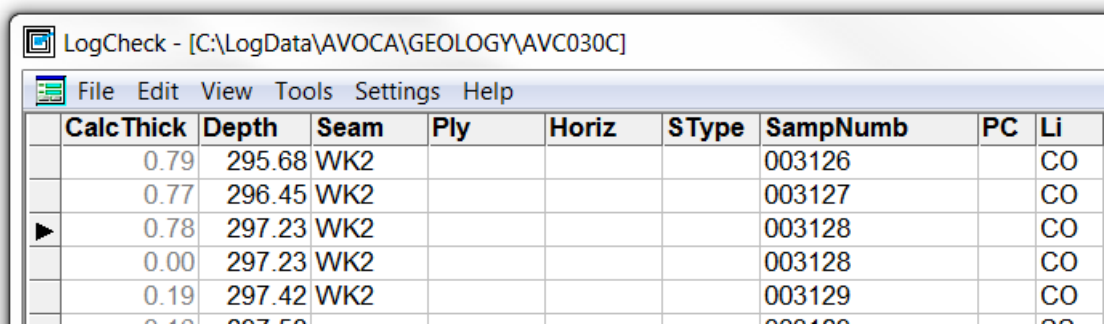


The Copy of Current Unit menu option of the Edit menu makes an identical copy of the row above. Beware that this does not create a new row – probably what you want to do is create a new row first, otherwise it will overwrite an existing row. You can use the F4 function key to copy from the line above, but it ignores blanks.

This menu option allows you to split a unit in two. For example, you may want to:

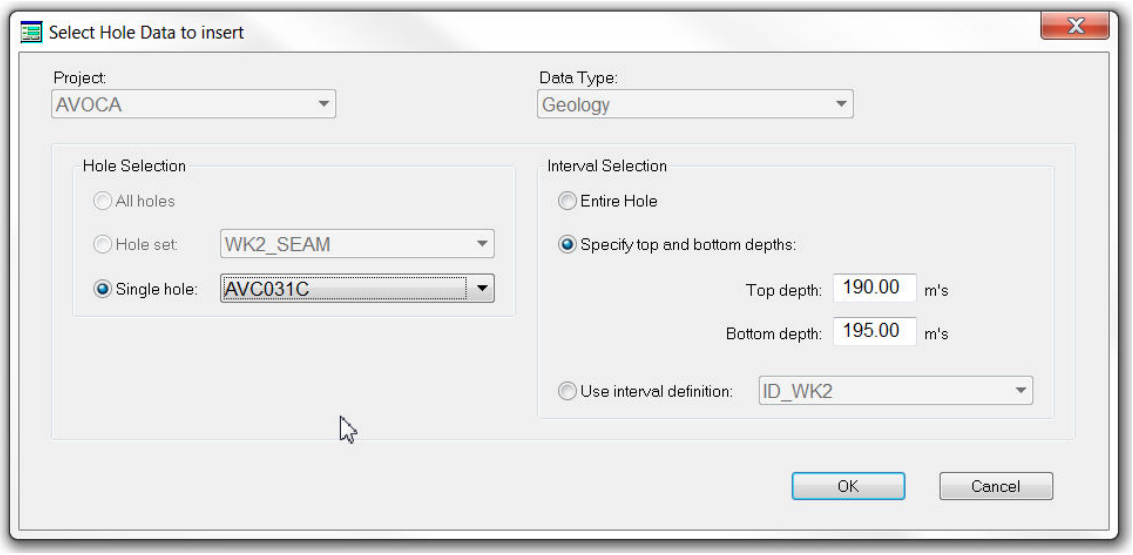
- take a sample in one half, but not the other half of a unit;
- change the sample number for the same unit;
- log different weathering characteristics, but all other aspects are the same.

The Copy of Current Unit menu item also adjusts the thickness of the current row to 0.0, as shown below:



The Carry Fields option of the Settings Menu allows you to choose which fields are copied from the previous row, when adding or inserting rows (see following section). In the above example, it can be seen that the SampNumb, and Seam are copied from the fields above.

You can also insert rows from another hole (or Shift+F6). This is similar to the copy and paste options that are available in a word processor. The Insert Rows from another Hole option displays the dialog below.



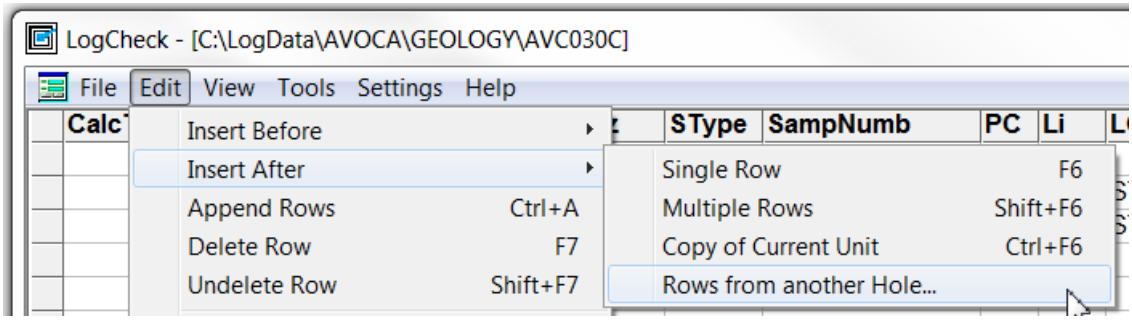
It allows you to specify:

- the hole from which the data is to be copied,
- the interval that is to be inserted.

The new rows are inserted above the current row. In the example above, intervals from 190.00 to 195.00 from hole AVC031C will be inserted in the log for hole AVC030. One of the reasons for inserting rows from another hole is that the second log of the same hole may have been completed in more detail after gas bomb testing.

7.3.2 Insert Rows After

The Insert Rows After menu option provides the same options as Insert Rows Above, except that new rows are inserted after the current row.

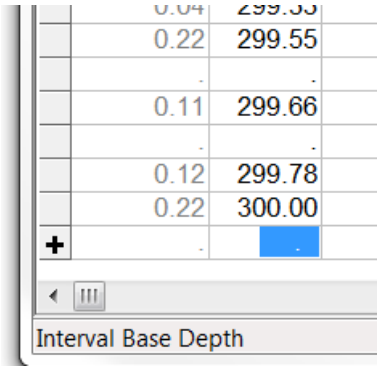


7.3.3 Append Rows

The Append Rows option of the Edit menu enables the user to add a new record to the end of the currently selected hole. The Append Rows option, as with the Insert Rows option, copies down fields from columns above the new row. The user can control which columns are copied by going to the Settings menu, then selecting Carry Fields (see following section).

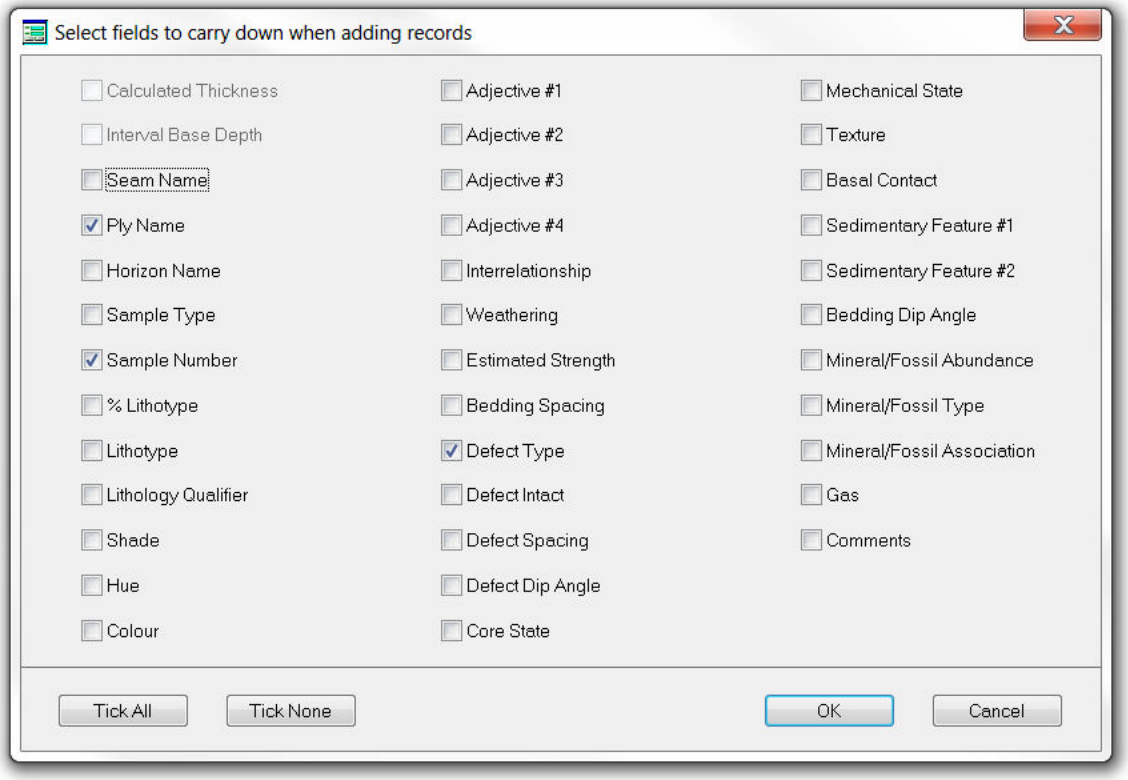
An alternative way to add a new record to the end of the hole is to page down to the last row, then press the Down Arrow key.

The figure on the right displays the editor after appending a row. In the first column of the last row, a large ✚ sign is displayed to indicate the new row.



7.3.4 The Carry Fields Option

The Carry Fields option of the Settings Menu allows you to choose which fields are copied from the previous row, when adding or inserting rows.



7.3.5 Deleting Row(s)

The Delete Row option of the Edit menu will delete the selected rows in the grid. Note that confirmation of deleting is not requested. If you have accidentally deleted a number of rows, you can either choose the Undelete Rows option or if you have not completed a Save during the current session, exiting *LogCheck* without saving, then re-opening the hole will restore the previous version of the data.

7.3.6 Undeleting Row(s)

The Undelete Row option of the Edit menu will undelete a row that was previously deleted. Confirmation of undeleting is not requested. You can keep selecting Undelete Row to undelete one further deleted row back to the start of the editing session.

7.3.7 Making Fields Blank

Pressing the Delete key in a numeric field turns the number into 0.0. Blank data in the depth field indicates line continuation. If you want to convert a numeric value, including 0.0 into a blank, highlight the field and select the Blank Field option from the Edit menu.

7.3.8 Copy Field from Above

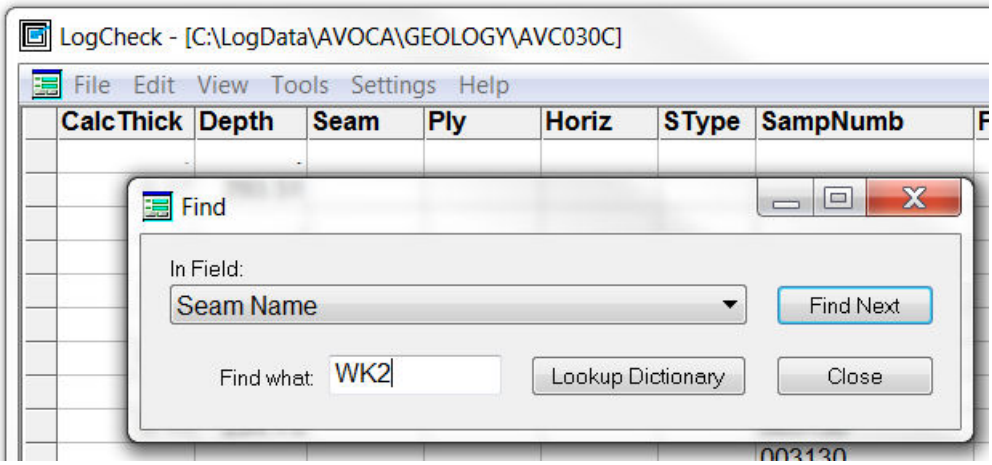
The Copy Field from Above option searches up the currently selected column to find the first non-blank entry, and then copies it to the current row. You can use the F4 function key to copy from the column above, but it ignores blanks.

This option is often useful when adding seams or sample numbers into already entered data.

7.3.9 The Find Option

The Find option of the Edit menu (or Ctrl+F) allows you to find values in a specified column. The dialog below allows you to specify values to find and the field (column) to find it in.

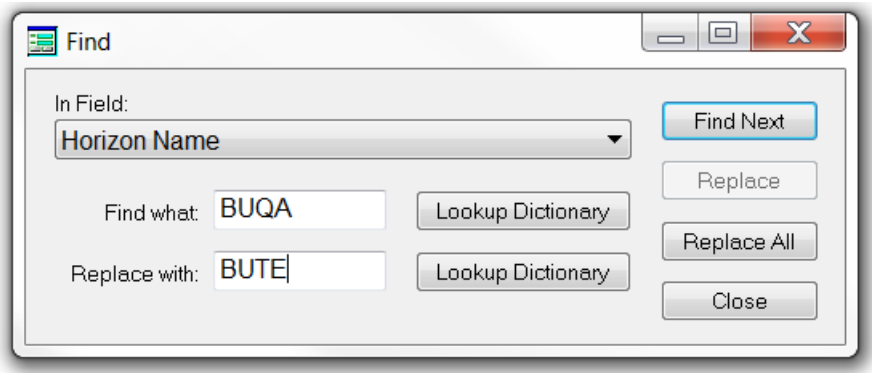
In the example shown, repeatedly clicking the Find Next button in the Seam column will search for the next occurrence of "WK2".



7.3.10 The Find and Replace Option

The Find and Replace option of the Edit menu (or Ctrl+H) allows you to search for specific values and replace them with something different.

The dialog requests the Field in which to search, the value to be replaced, and the value to replace it with. Clicking the Lookup Dictionary button allows you to select a valid replacement entry.



The Replace button replaces the next entry found. The Replace All button searches for, and replaces all values. In the example shown, all occurrences of Horizon "BUQA" will be replaced with "BUTE.

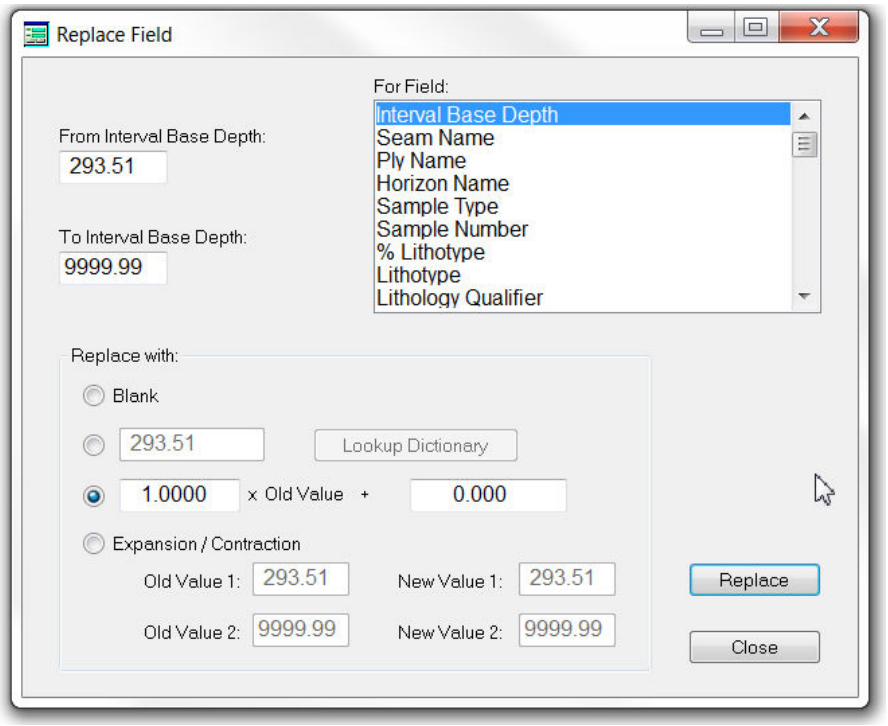
The Find and Replace, and the Replace options in the Edit menu are the only ones that operate when you have multiple holes open. You could use this, for example, if you decide to change your seam nomenclature so that all instances of "BUQA" are changed to "BUTE".

All of the changes you make are made to temporary copies of the hole data – the changes are not made permanently until you save the data.

7.3.11 The Replace Field Option

The Replace Field option of the Edit menu allows you replace all entries for a single hole between two depths. The replacement value can be either:

- A blank
- A value selected from the dictionary
- Manipulating numerical values
- Expansion/Contraction.

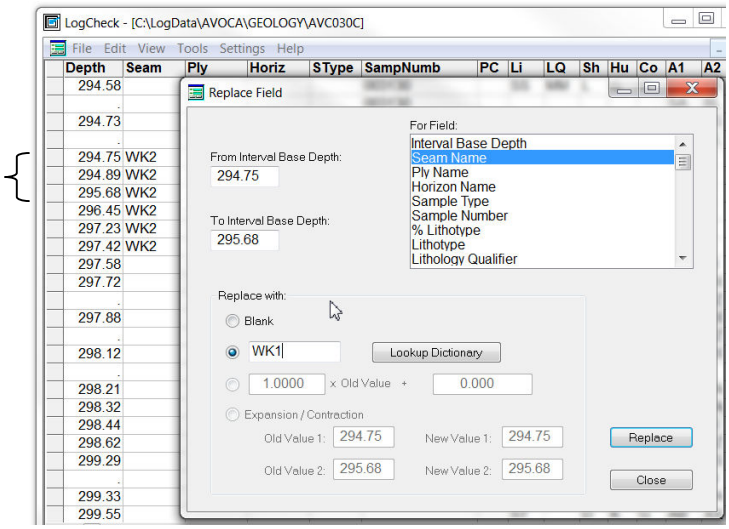


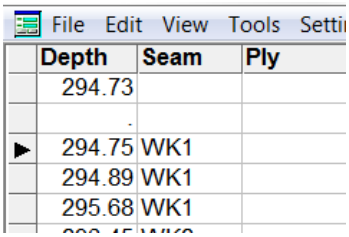
7.3.11.1 Replacing with a Blank

As an example of replacing with a blank, consider the common case of a hole that starts out as weathered, then goes to slightly weathered, then fresh, that repeats for the rest of the hole. This clutters the reporting – as all subsequent intervals will generally be fresh, so the solution is to replace the remainder of core logged as fresh, with a blank.

7.3.12 Replacing with a Value from the Dictionary

This option allows all values between the specified depths to be replaced with another value from the dictionary. In the Replace Field dialog (below left) the From depth is specified as 294.75, the To depth 295.68, and all values for the current column (Seam) are to be replaced with WK1.



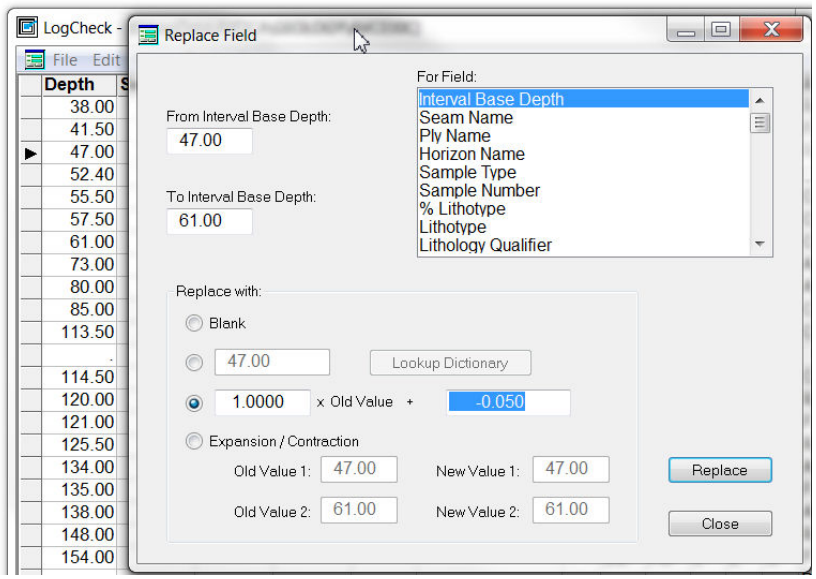


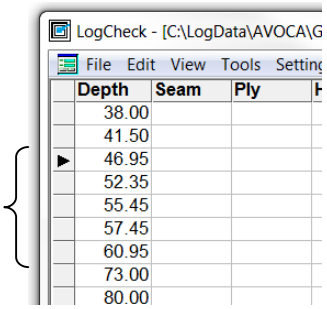
This shows the result of replacing seam WK2 with WK1 between 294.75 and 295.68. After the Replace button is clicked, *LogCheck* will update the log and inform you of the number of rows that were replaced. Click the Close button when finished.

7.3.12.1 Manipulating Numerical Values

The Replace Field option is useful for manipulating numerical values. Coal geologists spend a lot of time matching depths in the geology file to depths recorded in geophysical logging of the hole. For example, if you wanted to raise the depth of all intervals between depths 47.00 and 61.00 by 5 cm you would select third option from the "Replace with" list and enter 1.000 in the first box(this subtracts 0.05m from each depth over the specified interval), as shown below.

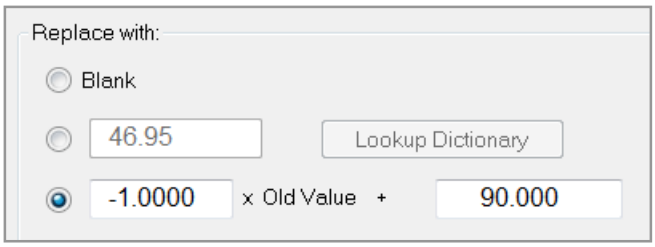
The figures shown below are an example of log data before (on the left) and after the Replace example shown above:





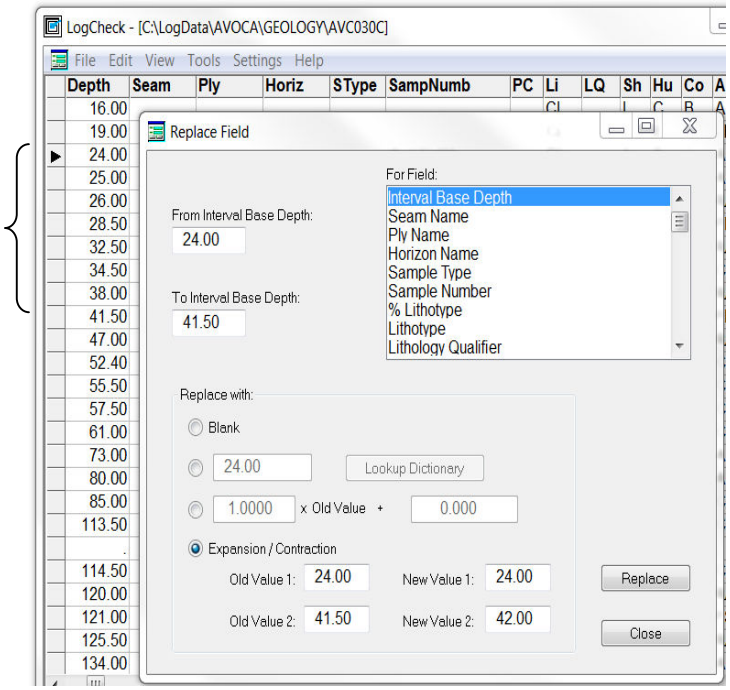
The figure on the right shows the results of the Replace operation. The braces indicate the same interval, with the before values on the left. Depths on either side of the interval are unchanged.

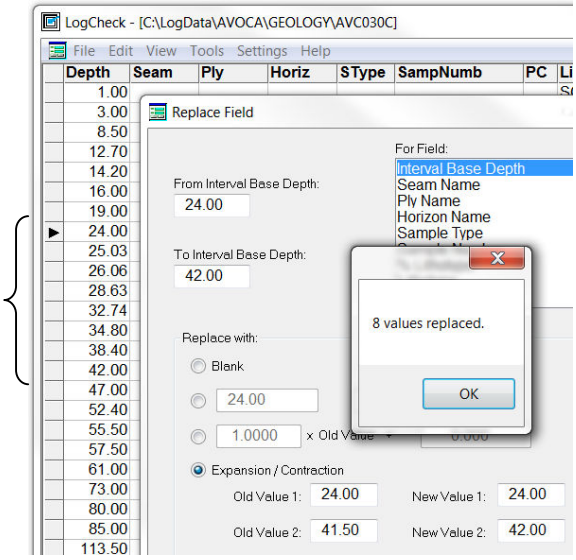
A second application of this would be where it has been decided to measure dips with respect to the horizontal but you had historic data where the dips have been measured with respect to the core axis (vertical). In this case, the values can be corrected by typing –1.00 for the Old Value, and using 90 for the + value, as shown below:



7.3.12.2 Expansion/Contraction

When matching the geology to the geophysics, it may be necessary to add in a core loss. You should try to identify where the core loss occurred, and enter a new row indicating "core loss" (KL) for the lithology column. Where the drill core is broken up, it may be impossible to identify where the core loss occurred, so you can try to spread the loss over the interval. For example, for a depth from 19.00 – 41.50, use the Expand/Contract option.





The figure on the left shows the depths *before* the Replace operation. The braces indicate the *old* interval, 19.00 – 41.50, before expansion.

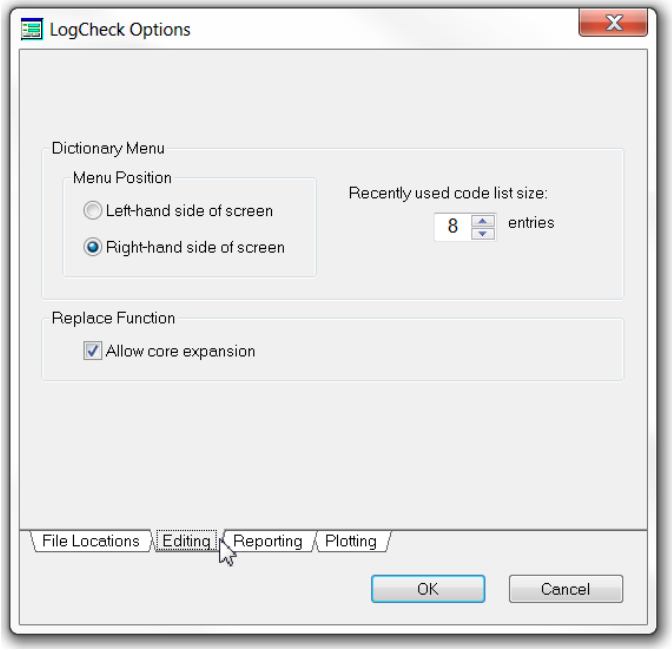
The figure on the right shows the results of the Replace operation. The braces indicate the same interval, with the after values. Depths on either side of the interval are unchanged.

The effect of the example shown below is to stretch out the data between 19.00 – 41.50 so that it is between 19.00 – 42.00. It stretches the depth values and puts the core loss proportionately throughout the zone.

After core has been brought to the surface, expansion may occur; in this case, you could make New Value 2 less than Old Value 2, in order to counteract the expansion.

7.3.13 Expansion Option

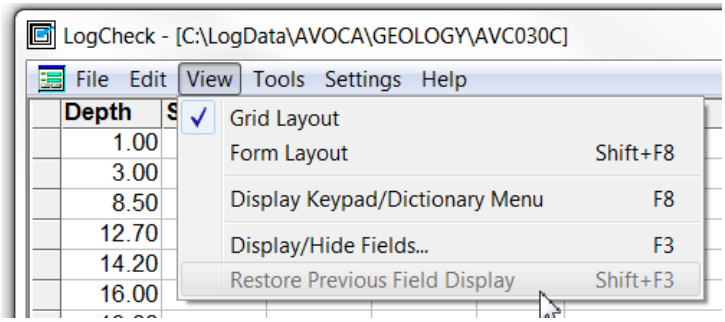
There is an option in *LogCheck* that allows or disallows core expansion in the Replace Field dialog. This can be set from Settings > Options, then selecting the Editing tab, as shown on the right:



If the Allow Core Expansion option is checked, *LogCheck* will permit both core expansion and contraction, otherwise it will only allow contraction. The manager may wish to turn this off.

7.4 The View Menu

The View menu allows you to configure the way the *LogCheck* Edi tor Window is displayed.

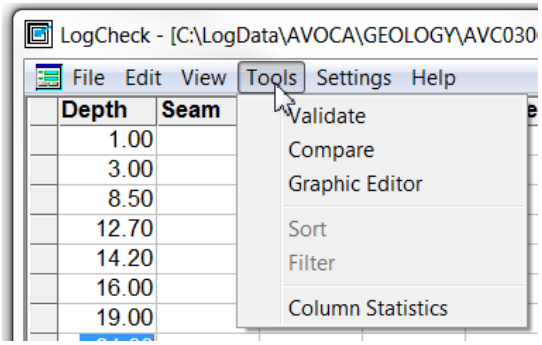


It contains the following items:

- Grid Layout – displays the data for multiple records in a scrollable grid;
- Form Layout – displays the data for a single record in a form;
- Display Keypad/Dictionary Menu – toggles this on or off;
- Display/Hide fields – allows you to choose which fields are to be displayed in Form layout.
- Restore Previous Field Display – allows you to restore previously selected columns.

7.5 The Tools Menu

The items in the Tools menu are shown in the figure on the right:



The Validate and Compare items in the Tools menu are used for hole data, whereas the Sort and Filter items are used for audits and summaries.

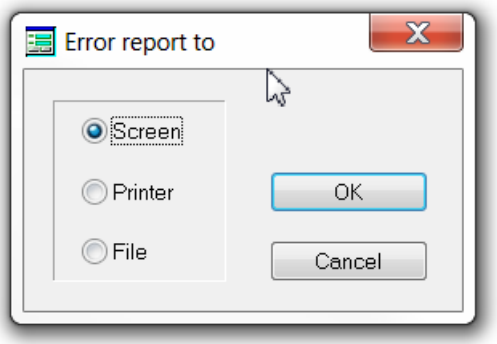
7.5.1 Validate

The Validate tool checks all data that is currently open and it will re-check all codes against those that occur in the dictionary. Validate can operate on a single hole or across multiple holes. Validate can be used to re-validate your old data, as newer validation checks may be added in later versions of the software.

Coded values (for example, those for the Lithology column) are only checked against the dictionary when you actually enter them. So if you have picked up somebody else's data by copying *LogCheck* files from one machine to another, then the dictionary that was used when the copied data was entered, may be different to the current dictionary, and the copied data may therefore have codes that are not in your dictionary.

As LogCheck does not re-check the codes when saving data, you can save data you have modified that contains codes that are not in the dictionary, and then open up your dictionary and add them in.

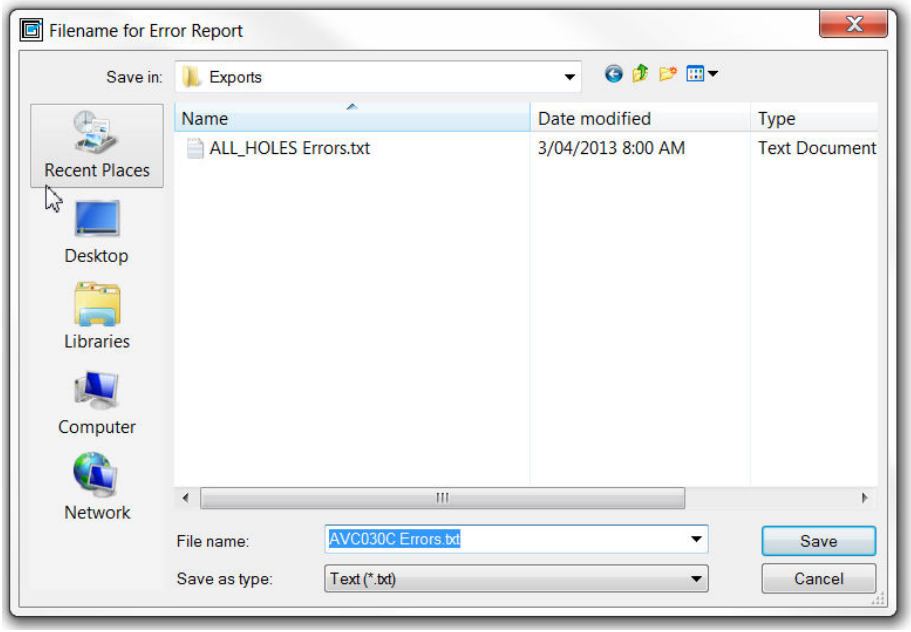
When you select the Validate item, the dialog shown on the right requests where the error report is to be sent:



When printing the report to a file, the dialog below requests a file name – the default is the hole name. The file is saved to the Exports folder for the project. In this example, the file can be found at:

C:*LogCheck*\AVOCA\exports\AVC030C Errors.txt

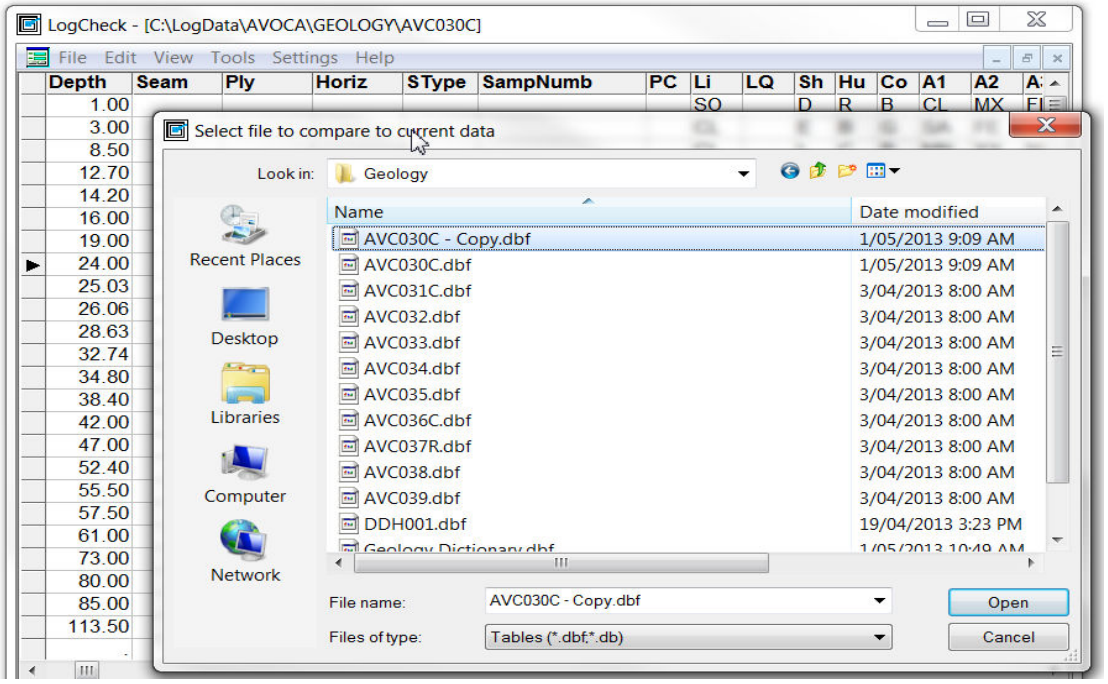
It is prudent to open all holes and validate before producing reports or exporting them to another system, such as a modelling package.



7.5.2 Tools – Compare

The Compare tool can be used to compare two copies of the same data – it allows you to see the differences between the two copies. You can compare individual files, dictionaries or all files in two specified directories. As with Validate, the output can be sent to Screen, Printer or File.

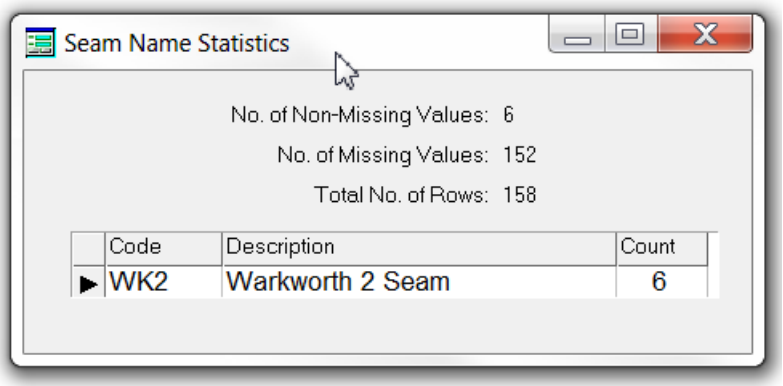
In the following example, hole AVC030C has been opened in the *LogCheck* editor. Another copy of hole AVC030C also exists, and it is desired to find out what, if any differences exist between the two files. To compare the two files, go to Tools > Compare, and you will be asked to select the file that is to be compared with the current file in the editor, as shown below:



You will then be presented with the dialog that requests where the output is to be sent.

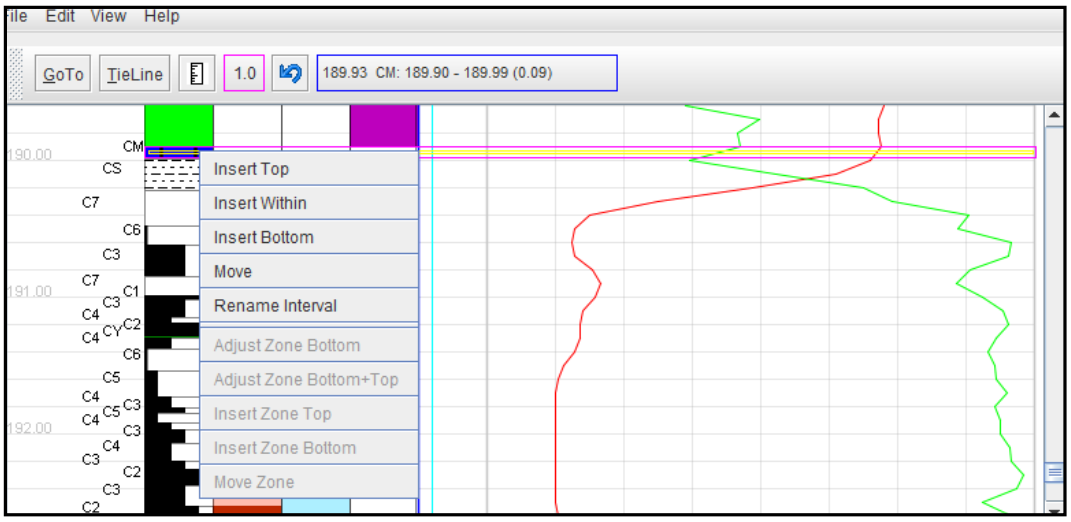
7.5.3 Tools – Column Statistics

For the currently selected column (the one the cursor is currently in), selecting the Column Statistics item of the Tools menu displays a summary of the data in the column. An example is shown on the right for the Seam column:



7.5.4 Tools – Graphical Editor

The Graphical Editor is an optional component that allows graphical editing of the data. It allows the depths, lithology units, seams, plies and sample numbers to be edited. It is available from GeoCheck Pty Ltd.



7.6 Setting Editing Options

The Options menu of the Settings menu allows you to set options for *LogCheck*. The Editing tab of the Options menu allows you to select:

- The number of recently used entries in the dictionary – which is displayed on the left side of the screen when editing,
- Whether core expansion is allowed – otherwise it will only allow contraction. The manager may wish to turn this off.
- The maximum core length run allowed in drilling data.
- The Check rock mass unit depths against geology depths option. If this is ticked, the program will check that the depth of every rock mass unit (RMU) matches the depth of a lithological unit. If the geological log has been corrected to the geophysical log, this option enables the user to check that the RMU depths have also been corrected.
- The Check Point load depths option – if this is ticked, it checks that any point load sample lies entirely within a RMU sample.

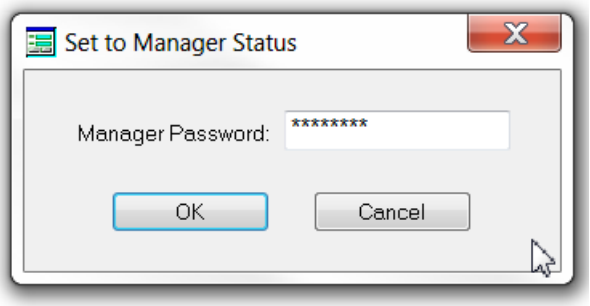
7.7 Editing a Dictionary

A dictionary can be opened in two modes:

- User mode: Dictionary entries can only be viewed .
- Manager mode: Entries can be altered and new entries made.

7.7.1 Manager Mode for Dictionaries

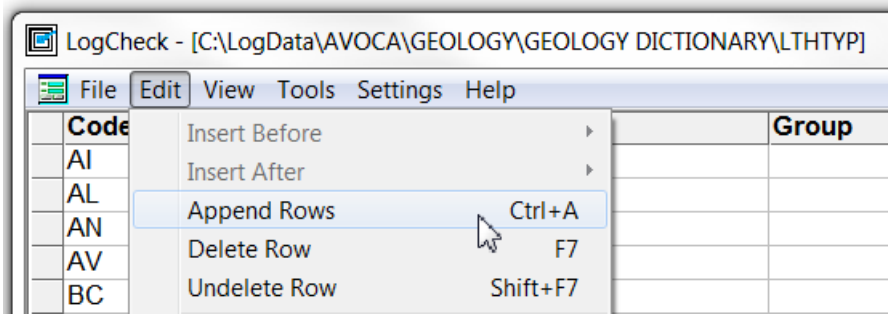
Each time *LogCheck* is started it operates in User mode. To change to Manager, select Settings > Manager from the *LogCheck* menu. A prompt for the manager password will then appear:



The default manager password is "*LogCheck*" and is not case sensitive. Modifying a dictionary is described in Chapter 4.

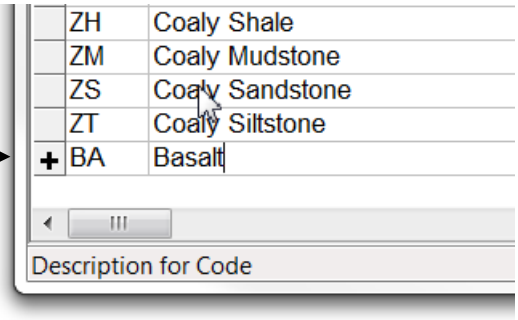
7.7.2 Adding New Entries

To add a new entry, open the required dictionary and select the option for a specific category. Then click the Edit menu item and select Append Rows. In the example below, the Lithotype category has been selected:



Then the editor creates a new row at the bottom of the grid, as shown below:

A + sign indicates the new row; a new entry, BA (Basalt) has been added



These methods of adding new entries and editing existing entries apply to the remaining *LogCheck* dictionaries. Most dictionary categories are stored in alphabetical order, however, some systems, some categories, such as *weathering*, or *estimated strength* may be entered in a more appropriate order such as *degree of weathering* or *strength.*

For categories in alphabetical order, there is no insert option. To insert items, just add them to the bottom of the list, and *LogCheck* will automatically move each entry to the appropriate place once it has been entered.

Chapter 8
Audits, Summaries and Total Statistics

By the end of this chapter you will be able to:

- Audit *LogCheck* data.
- Summarise *LogCheck* data.
- View total statistics.
- Sort and filter data.

8.1 Introduction

Audits of drill holes are performed to verify the consistency and accuracy of the data, as opposed to the Summary data, which is usually information that you want to use somewhere else. Sorting and filtering data are also described. The audits, summaries and total statistics available in *LogCheck* are:

Audits

- Projects
- Dictionaries
- Codes
- Total Depths
- Uncorrelated coals
- Unsampled coals
- Unsampled seams
- Horizons
- Strats
- Seams
- Plies
- LAS files

Summaries

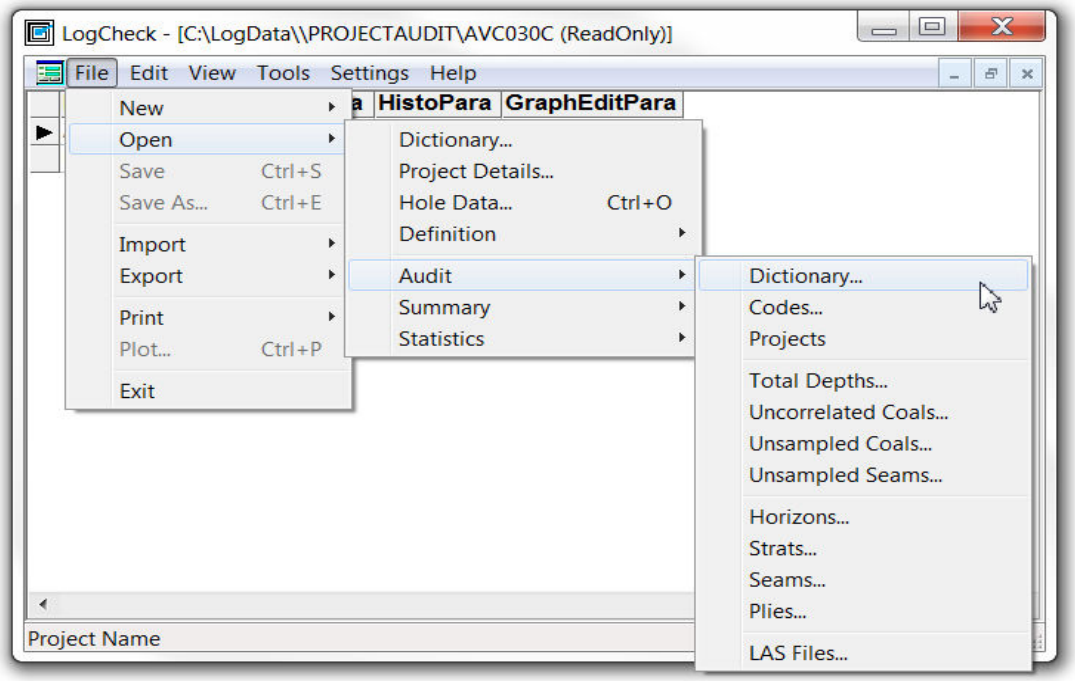
- Hole completion
- Drilling
- Seam/Horizon Picks
- Seams
- Plies
- Samples
- Defect spacing
- Fracture frequency
- Point load indices

Total Statistics

- Coded data totals
- Total thickness by value
- LAS variables

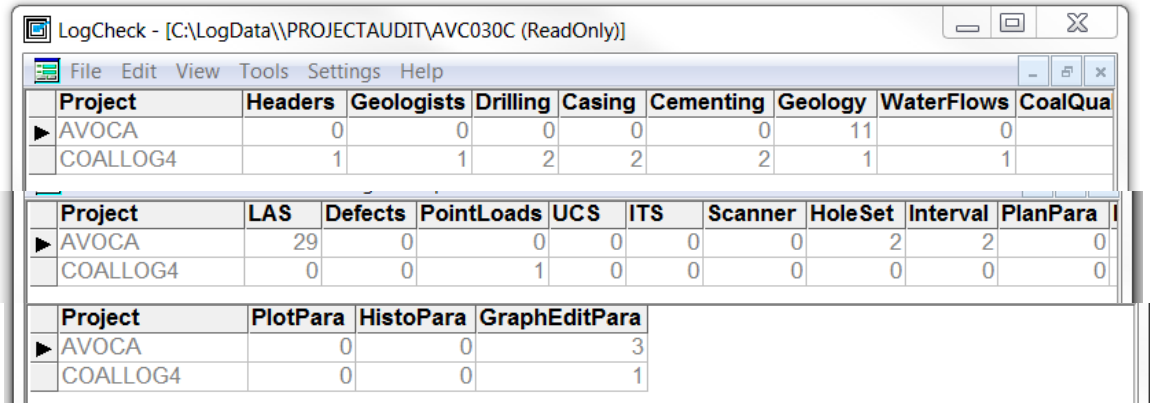
8.2 Audits

To access the Audit menu select the File menu, then Open, to display the following:



8.3 Project Audits

A Project audit will display a list of all projects on your computer. If you have a number of copies of *LogCheck* on your computer for handling different data formats, it only displays the projects for the version that you are currently using. This is useful to see quickly if you have the same number of holes for each data type and that these match the number of holes that were drilled.



Project	Headers	Geologists	Drilling	Casing	Cementing	Geology	WaterFlows	CoalQua
AVOCA	0	0	0	0	0	11	0	
COALLOG4	1	1	2	2	2	1	1	

Project	LAS	Defects	PointLoads	UCS	ITS	Scanner	HoleSet	Interval	PlanPara
AVOCA	29	0	0	0	0	0	2	2	0
COALLOG4	0	0	1	0	0	0	0	0	0

Project	PlotPara	HistoPara	GraphEditPara
AVOCA	0	0	3
COALLOG4	0	0	1

In the above screen shot, the column headings show each of the different data types and the number of holes for that data type, up to the Scanner column.

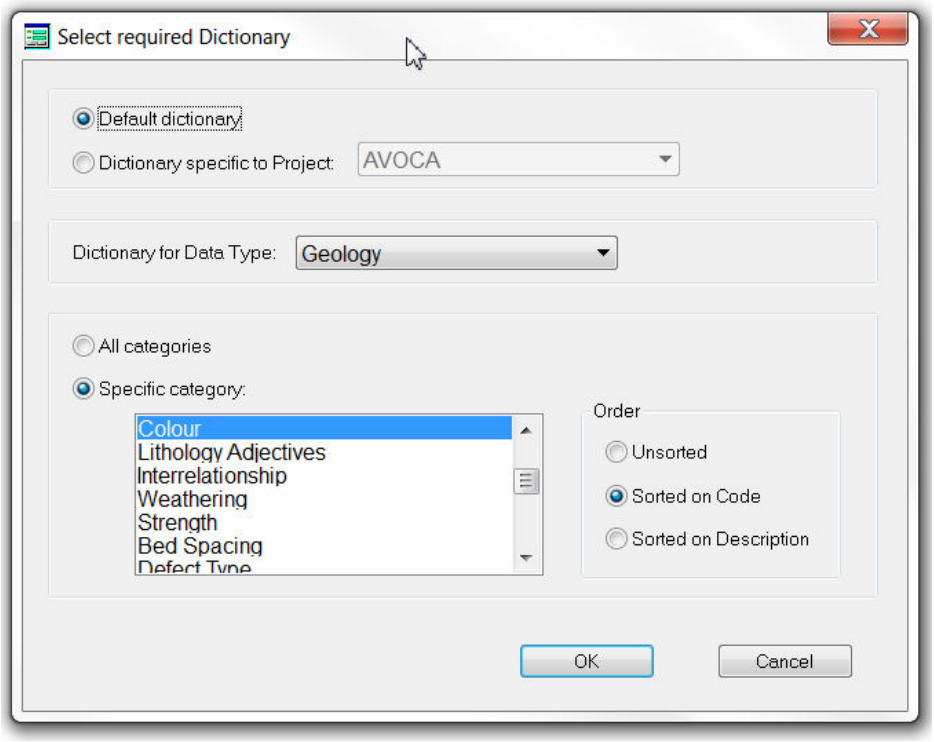
The last five columns (Hole Set, Interval, PlanPara and PlotPara and GraphEditPara) display the number of definitions of each type that have been stored in the project. For example, for the Demo project, there are two hole sets and three interval definitions.

8.4 Dictionary Audits

A Dictionary audit analyses the selected dictionary and find out how many times a code has been used in a dataset in the current project. The steps required are:

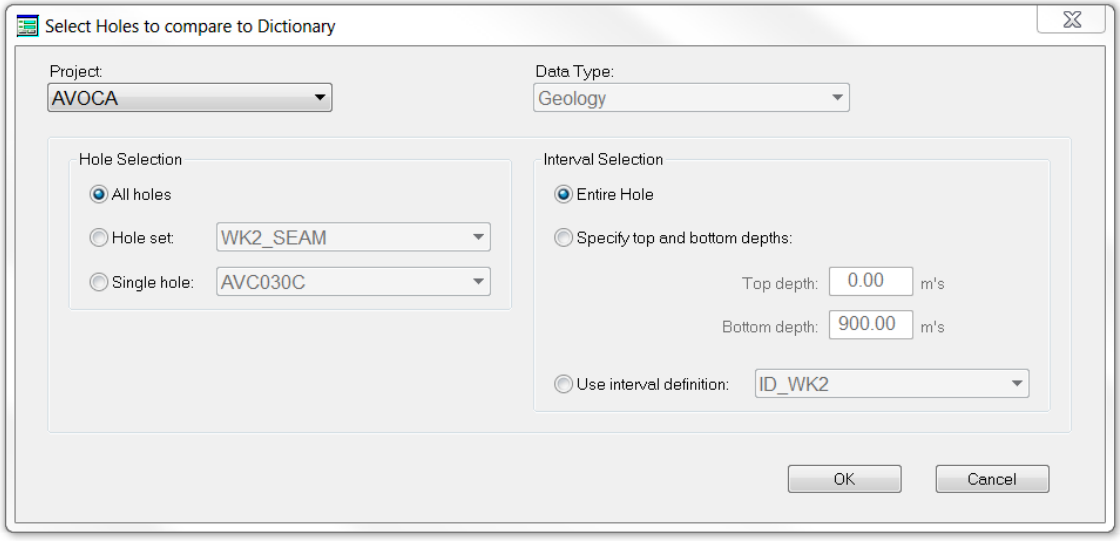
1. Select the required dictionary.
2. Select the holes to compare to the dictionary.

From the Audit menu, select the Dictionary item. The Select required Dictionary dialog is then displayed. This allows you to select the Project, the Data Type, and options to select All categories or a specific category.

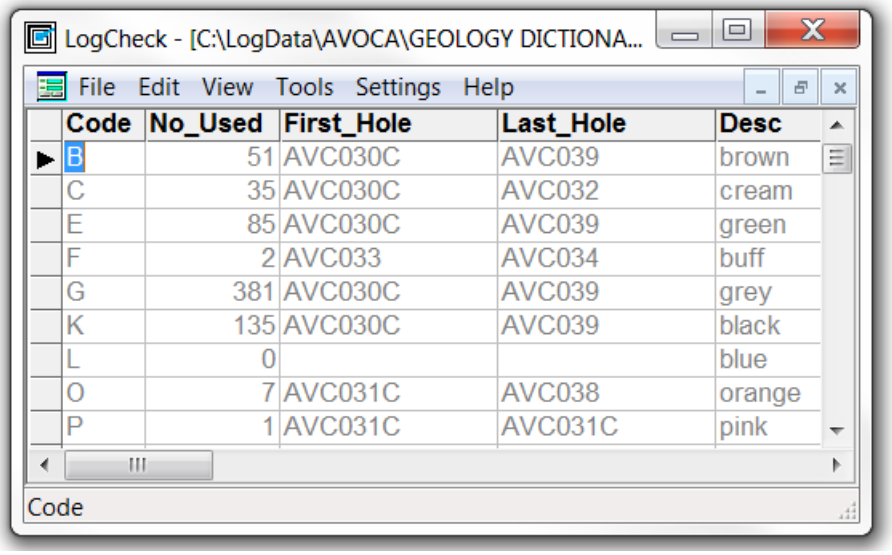


In this example, the Colour category has been selected for the Geology dictionary, sorted by code.

The Select Holes dialog is then displayed:



The audit of the colour dictionary for all holes in the Demo project is then displayed:



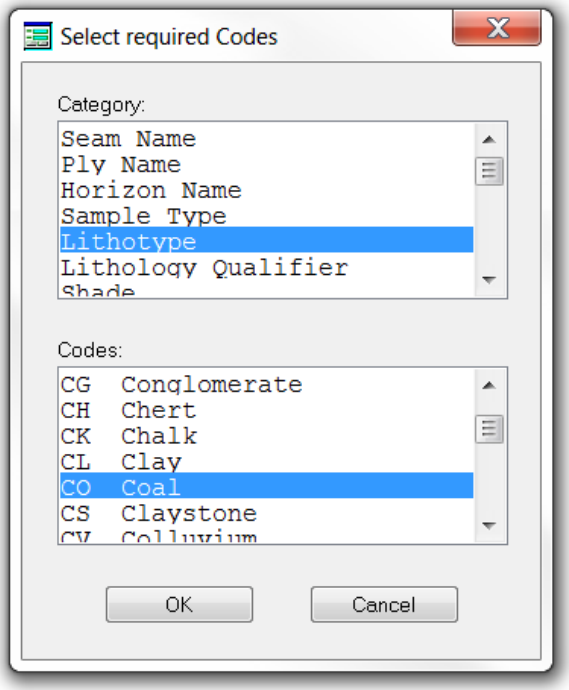
A dictionary audit is useful when cleaning up dictionaries so that you can see if a code has been used at all, before deleting it or combining it with another code.

You can delete a code from a dictionary, even though it may be in use – the system will allow this. Then when an audit is run for that code, it says "MISSING FROM DICTIONARY".

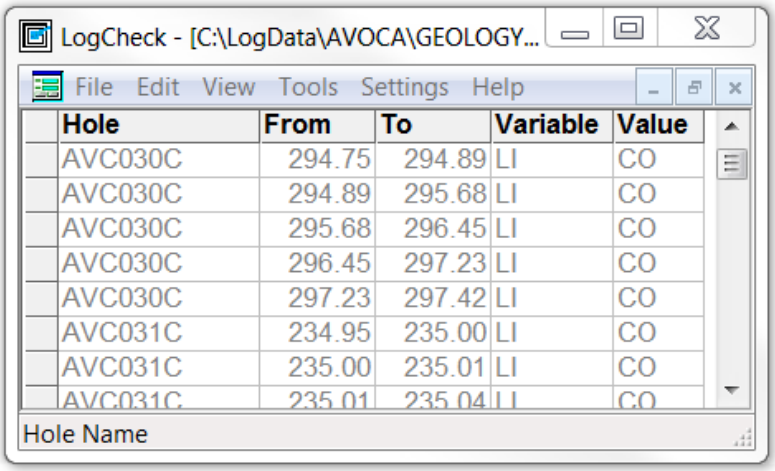
8.5 Code Audits

A Code audit shows where a particular dictionary code has been used in a selected group of holes.

From the Audit menu, select the Codes menu item. This displays the standard Hole Selection dialog, then the dialog on the right that requests the category of code, and within that category, you can select one or more of the available codes:



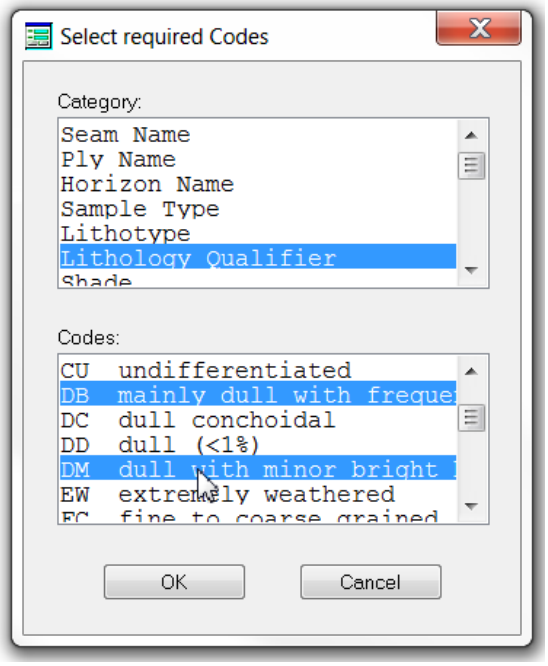
For the above example, with category of Lithotype and code CO, the following audit is displayed:



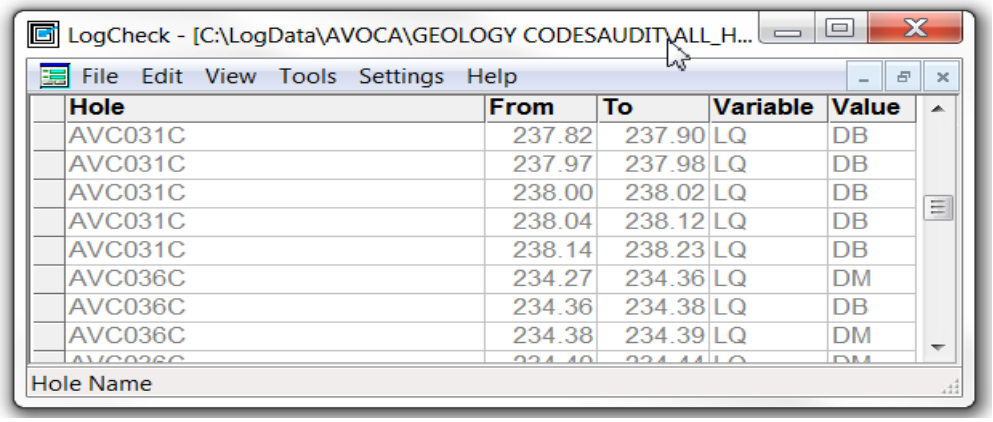
You can also select more than one code to analyse, using standard Windows selection mechanisms:

- To select adjoining codes, firstly hold the Shift key down, click the first code, and then click the last one in the selection.
- To select codes that are not adjacent, firstly hold the Control key down, then click each code that is required.

In the example on the right, for the Lithological Qualifier category, two codes are being audited (DB and DM).

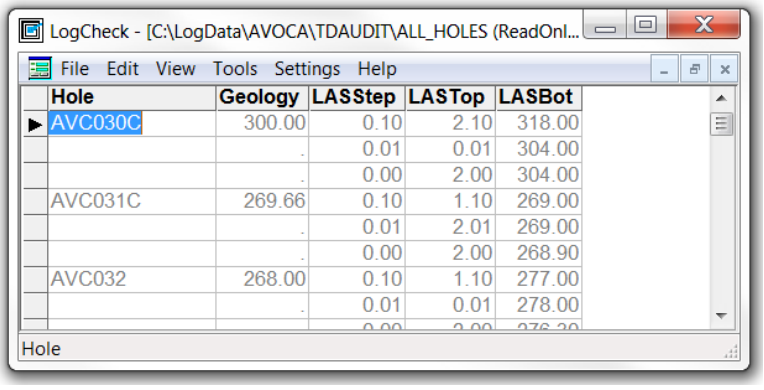


The resulting audit shows that the same code has been logged in each of the three qualifiers:



8.6 Total Depth Audits

A Total Depth audit shows the total depth in each data type of the selected drill holes. A Total Depth audit will enable you to spot where data may have not been entered. For example, the top part of a hole may have been entered, but the lower part, which may have been recorded on a different day or by a different geologist, may accidentally not have been entered. Selecting Total Depths from the Audit menu then displays the standard hole selection dialog. The results of the audit areshown on the right:



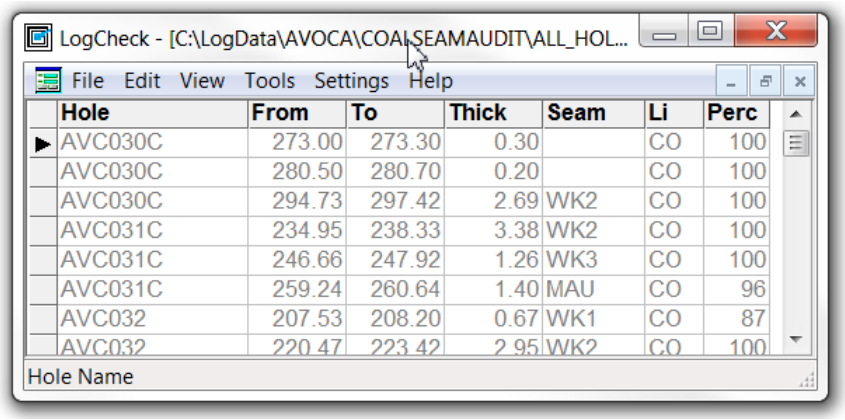
As an example, if the Drill Hole data ends at 179.80m and the Geology at 202.06 m, it suggests that there may be missing Drill Hole data. If there is no data, it shows up as a blank field. A 0.0 in the Header data means that the Header data is there, but the total depth field has not been filled in.

It is important to check that the Geophysics log is the same as the Geology – this may not be the case, due to hole cave in. The LAS Step column can have multiple values for the same hole, for example one at 0.05 cm and one at 0.01 cm intervals. The LASTTOP and LASTBOT columns are the top and bottom depths that the LAS data was logged.

8.7 Uncorrelated Coals

The Uncorrelated Coals audit analyses each hole and shows the top and bottom depth of each seam. It then shows any instances of coal that occur between the seams. It also shows the thickness of the seam, so that you can determine how significant it is. If the unit consists of only one coal lithology it shows it, otherwise it just shows CO.

The Perc column is the Percentage column and shows the percentage of the unit that was coal (if a lithology is coal from the Group column in the dictionary).



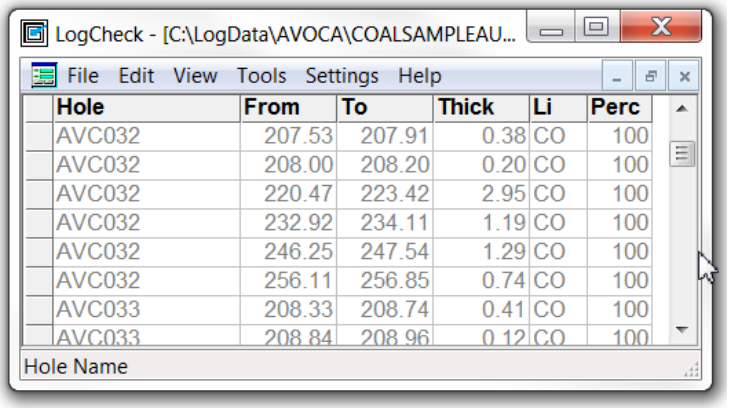
Hole	From	To	Thick	Seam	Li	Perc
AVC030C	273.00	273.30	0.30		CO	100
AVC030C	280.50	280.70	0.20		CO	100
AVC030C	294.73	297.42	2.69	WK2	CO	100
AVC031C	234.95	238.33	3.38	WK2	CO	100
AVC031C	246.66	247.92	1.26	WK3	CO	100
AVC031C	259.24	260.64	1.40	MAU	CO	96
AVC032	207.53	208.20	0.67	WK1	CO	87
AVC032	220.47	223.42	2.95	WK2	CO	100

The Uncorrelated Coals audit initially allows you to select the required holes from the standard Hole Selection dialog, then a form similar to the following is displayed:

8.8 Unsampled Coals

The Unsampled Coals audit analyses each of the selected holes and shows the intervals where coal has been logged as a lithology, but for which no sample number exists. Again, it determines that a lithology is coal from the Group column in the dictionary.

The Unsampled Coals audit initially allows you to select the required holes from the standard Hole Selection dialog, then a form similar to the following displays the details of coals that have not yet been sampled:



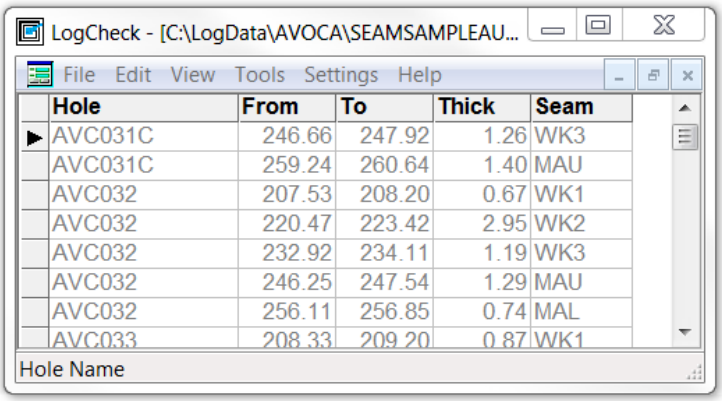
Hole	From	To	Thick	Li	Perc
AVC032	207.53	207.91	0.38	CO	100
AVC032	208.00	208.20	0.20	CO	100
AVC032	220.47	223.42	2.95	CO	100
AVC032	232.92	234.11	1.19	CO	100
AVC032	246.25	247.54	1.29	CO	100
AVC032	256.11	256.85	0.74	CO	100
AVC033	208.33	208.74	0.41	CO	100
AVC033	208.84	208.96	0.12	CO	100

If there is only one type of lithology in the uncorrelated coal, it shows it, otherwise it just shows CO. It determines if a lithology is coal from the Group column in the dictionary.

8.9 Unsampled Seams

The Unsampled Seams audit analyses each of the selected holes and shows seams for which no sample number exists.

The Unsampled Seams audit initially allows you to select the required holes from the standard Hole Selection dialog, then a form similar to the following displays the details of seams that have not yet been sampled:



8.10 Horizons, Strats, Seams and Plies

In some *LogCheck* formats, Horizons, such as Base of Tertiary, are stored in the seam column of the geological data; on a unit with the same base depth as the preceding unit and blanks in all the remaining columns. Other *LogCheck* formats, such as CoalLog have separate Seam, Ply and Horizon columns.

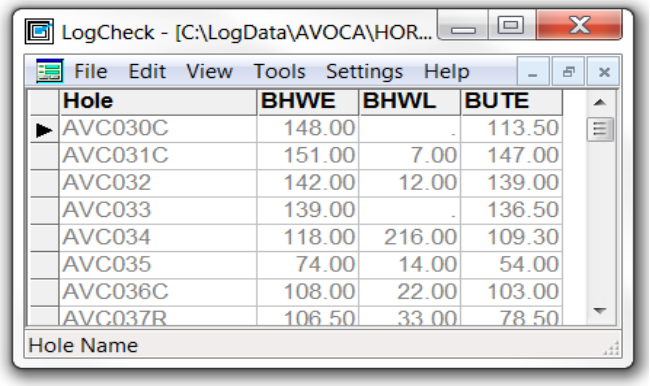
Horizon, strat and seam audits are all similar in the output format. The Seam column can also include Strats – a strat is a unit that is to be used for correlation purposes, as opposed to a seam, which only refers to a coal. Seam/Horizon/Strats are specified in a project-specific Seam/Horizon dictionary. For the Seam audit, it shows the thickness of the seam, as opposed to the *depth* for a horizon.

In each of these three, each row is a hole and each column is a horizon/seam or strat from the dictionary, but it only shows those that occur in at least one of the holes you have requested. This can be used to identify missing horizons, for example, if there is no Base of Tertiary in a particular hole this could be because the geologist forgot to identify it, or this hole may have been in rock the whole way.

The audit can show up where a seam is missing from a hole and it can also show up where a seam is atypically thicker or thinner than other instances of that seam.

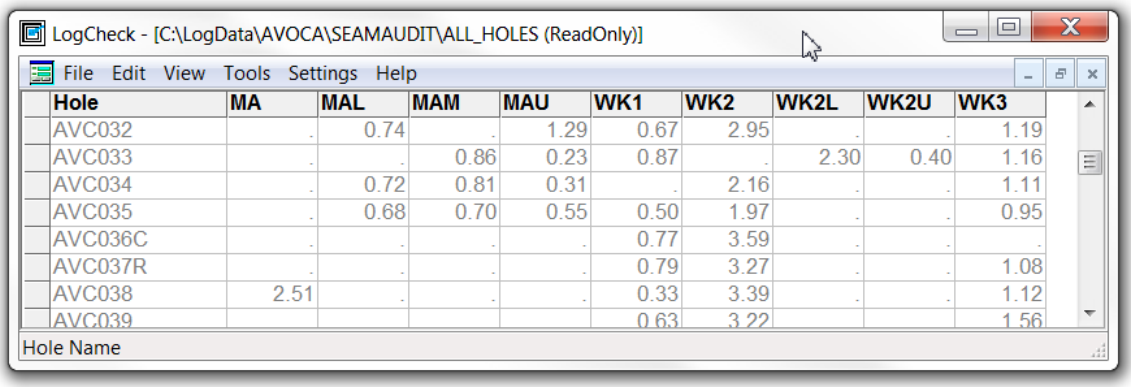
8.10.1 Horizon Audit

From the Audit menu, select the Horizons menu item. This initially displays the standard Hole Selection dialog. An example of a Horizon audit is shown on the right. Each horizon has its own column – in this case, there are three: BHWE, BHWL and BUTE



8.10.2 Seam Audit

From the Audit menu, select the Seam menu item. This initially displays the standard Hole Selection dialog. An example of a Seam audit is shown on the right:



Hole	MA	MAL	MAM	MAU	WK1	WK2	WK2L	WK2U	WK3
AVC032		0.74		1.29	0.67	2.95			1.19
AVC033			0.86	0.23	0.87		2.30	0.40	1.16
AVC034		0.72	0.81	0.31		2.16			1.11
AVC035		0.68	0.70	0.55	0.50	1.97			0.95
AVC036C					0.77	3.59			
AVC037R					0.79	3.27			1.08
AVC038	2.51				0.33	3.39			1.12
AVC039					0.63	3.22			1.56

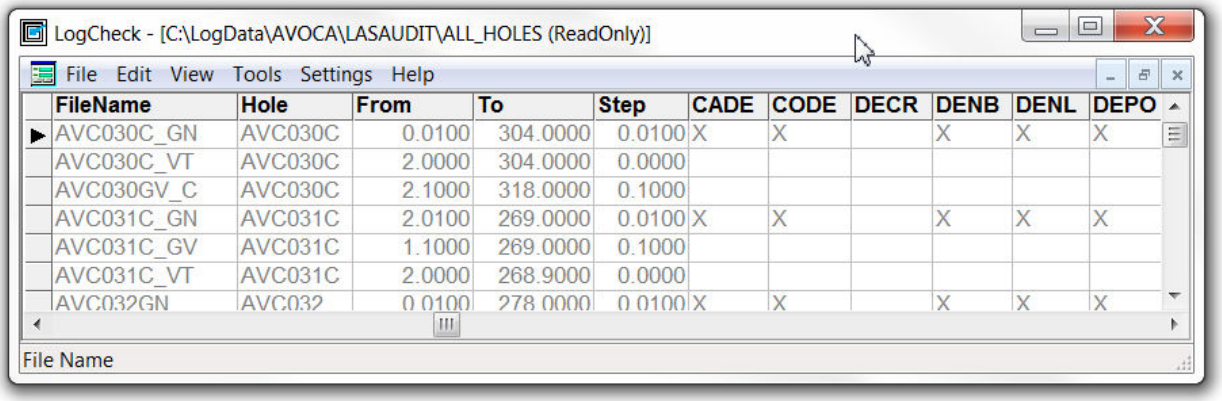
8.11 LAS Files Audit

The LAS file audit goes through all selected holes and specifies for each LAS file, the hole, from and to depths, step, and service company (SRVC).

Often, there will be a multitude of LAS files; there may be numerous LAS files even for a single hole, as there may be separate LAS files for different reading intervals, geophysical tools and/or sections of the hole. It is often difficult for the logger to incorporate the hole name, reading interval, tool and section of the hole all into the file name.

When you need the LAS data for a specified variable, hole and depth *LogCheck* determines the required file from the LAS Audit table. In order to do this though, the Well line in the LAS file should contain the hole name as is being used in *LogCheck*

From the Audit menu, select the LAS Files menu item. This initially displays the standard Hole Selection dialog. An example of a LAS Files audit is shown below:



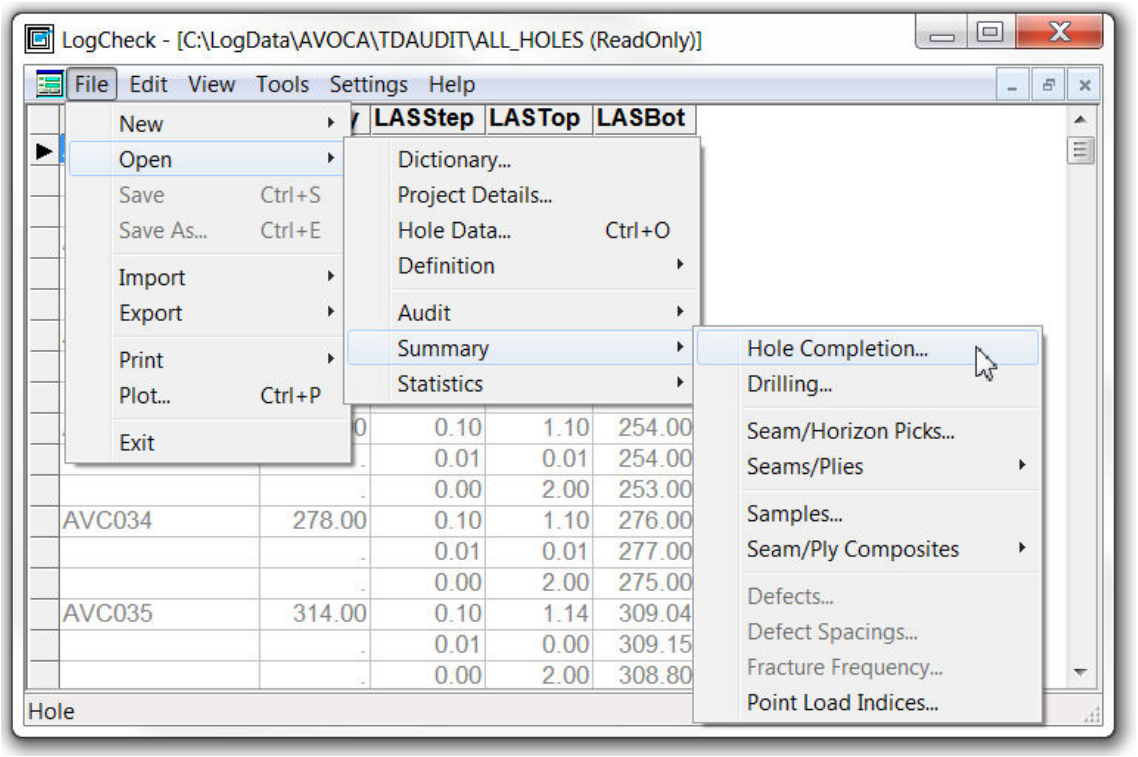
FileName	Hole	From	To	Step	CADE	CODE	DECR	DENB	DENL	DEPO
AVC030C_GN	AVC030C	0.0100	304.0000	0.0100	X	X		X	X	X
AVC030C_VT	AVC030C	2.0000	304.0000	0.0000						
AVC030GV_C	AVC030C	2.1000	318.0000	0.1000						
AVC031C_GN	AVC031C	2.0100	269.0000	0.0100	X	X		X	X	X
AVC031C_GV	AVC031C	1.1000	269.0000	0.1000						
AVC031C_VT	AVC031C	2.0000	268.9000	0.0000						
AVC032GN	AVC032	0.0100	278.0000	0.0100	X	X		X	X	X

8.12 The Summary Menu

Summaries can be conducted for:

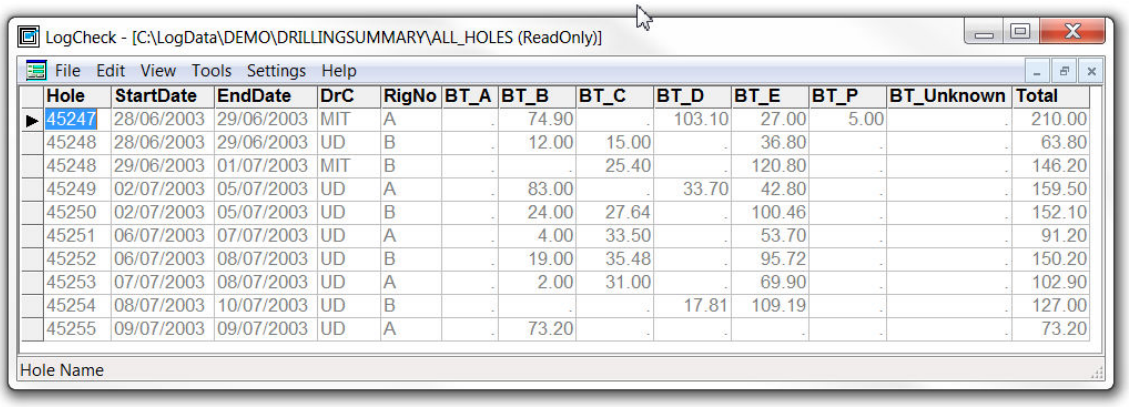
- Hole Completion,
- Drilling,
- Seam/horizon Picks,
- Seams,
- Plies,
- Samples,
- Defects,
- Defect Spacings,
- Fracture Frequency,
- Point Load Indices.

To access the Summary menu select the File menu, then Open, to display the following:



8.13 Drilling Summary

The Drilling Summary displays the type of drilling that was done for each hole. This initially displays the standard Hole Selection dialog. An example of a Drilling Summary for all holes is shown below:



Hole	StartDate	EndDate	DrC	RigNo	BT_A	BT_B	BT_C	BT_D	BT_E	BT_P	BT_Unknown	Total
45247	28/06/2003	29/06/2003	MIT	A		74.90		103.10	27.00	5.00		210.00
45248	28/06/2003	29/06/2003	UD	B		12.00	15.00		36.80			63.80
45248	29/06/2003	01/07/2003	MIT	B			25.40		120.80			146.20
45249	02/07/2003	05/07/2003	UD	A		83.00		33.70	42.80			159.50
45250	02/07/2003	05/07/2003	UD	B		24.00	27.64		100.46			152.10
45251	06/07/2003	07/07/2003	UD	A		4.00	33.50		53.70			91.20
45252	06/07/2003	08/07/2003	UD	B		19.00	35.48		95.72			150.20
45253	07/07/2003	08/07/2003	UD	A		2.00	31.00		69.90			102.90
45254	08/07/2003	10/07/2003	UD	B				17.81	109.19			127.00
45255	09/07/2003	09/07/2003	UD	A		73.20						73.20

The columns for this summary are:

- Hole: Hole number,
- Start date: Start date of drilling,
- End date: End date of drilling,
- DrC: Drilling company,
- RNo: Rig number,
- BT_A: Roller bit drilling,
- BT_B: Blade bit drilling,
- BT_C: Tungsten coring bit drilling,
- BT_D: Diamond coring bit drilling,
- BT_E: Hammer bit drilling,
- BT_P: Polycrystalline diamond bit drilling,
- BT_Unknown: Unspecified bit drilling,
- Total: Total depth of drilling.

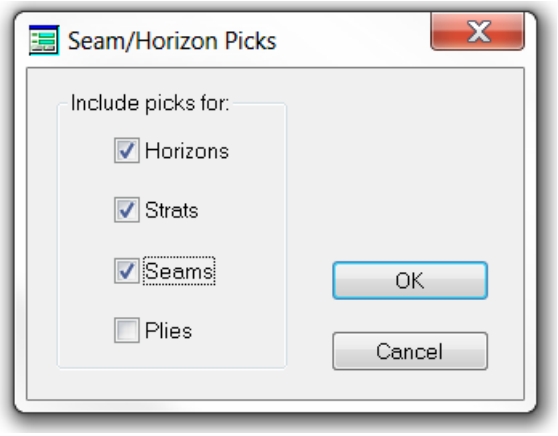
These depend on the entries that are in the Drilling dictionary.

Note: where a hole has had more than one drilling company or rig operating in the hole a separate line is shown for each drilling company/rig combination. To calculate total meterage for different bit types over a set of holes, open a drilling summary for these holes, export it to Microsoft® Excel as a comma delimited file (.csv) and then sum the columns in Excel.

8.14 Seam/Horizon Picks

The Seam/Horizon Picks summary allows you to choose combinations of the following:

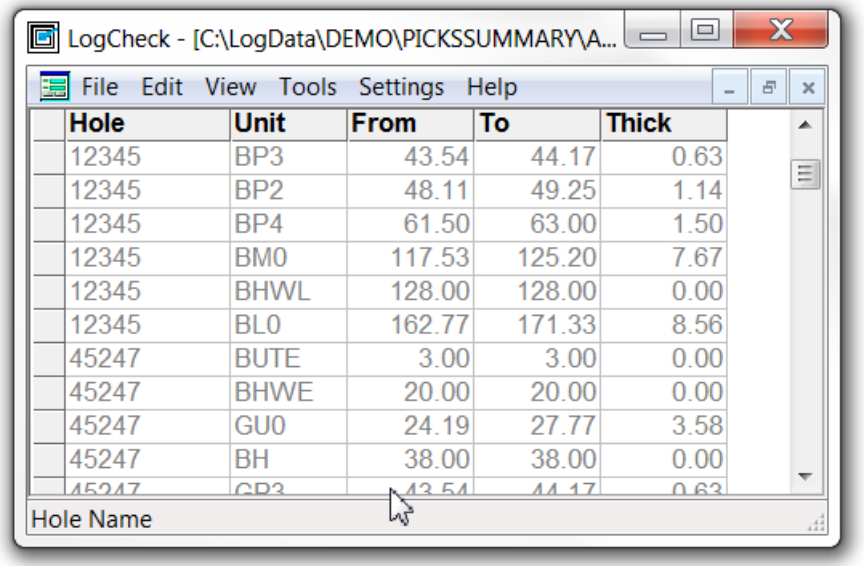
- Horizons,
- Strats,
- Seams,
- Plies



Navigating the menu to the File > Open > Summaries > Seam/Horizon Picks menu item initially displays the standard Hole Selection dialog. This is followed by the Seam/Horizon Picks dialog, shown on the right:

Note that the Plies option only appears if you have a Ply column in your data format.

An example of a Seam/Horizon Picks summary is displayed on the right:



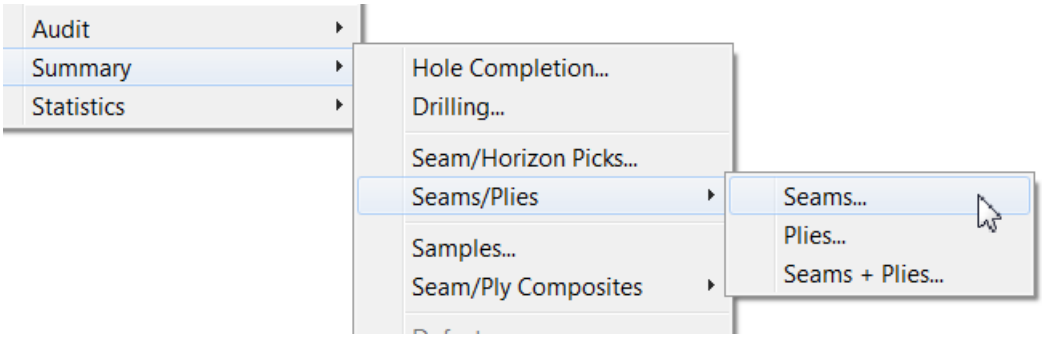
Hole	Unit	From	To	Thick
12345	BP3	43.54	44.17	0.63
12345	BP2	48.11	49.25	1.14
12345	BP4	61.50	63.00	1.50
12345	BM0	117.53	125.20	7.67
12345	BHWL	128.00	128.00	0.00
12345	BL0	162.77	171.33	8.56
45247	BUTE	3.00	3.00	0.00
45247	BHWE	20.00	20.00	0.00
45247	GU0	24.19	27.77	3.58
45247	BH	38.00	38.00	0.00

The columns for this summary are:

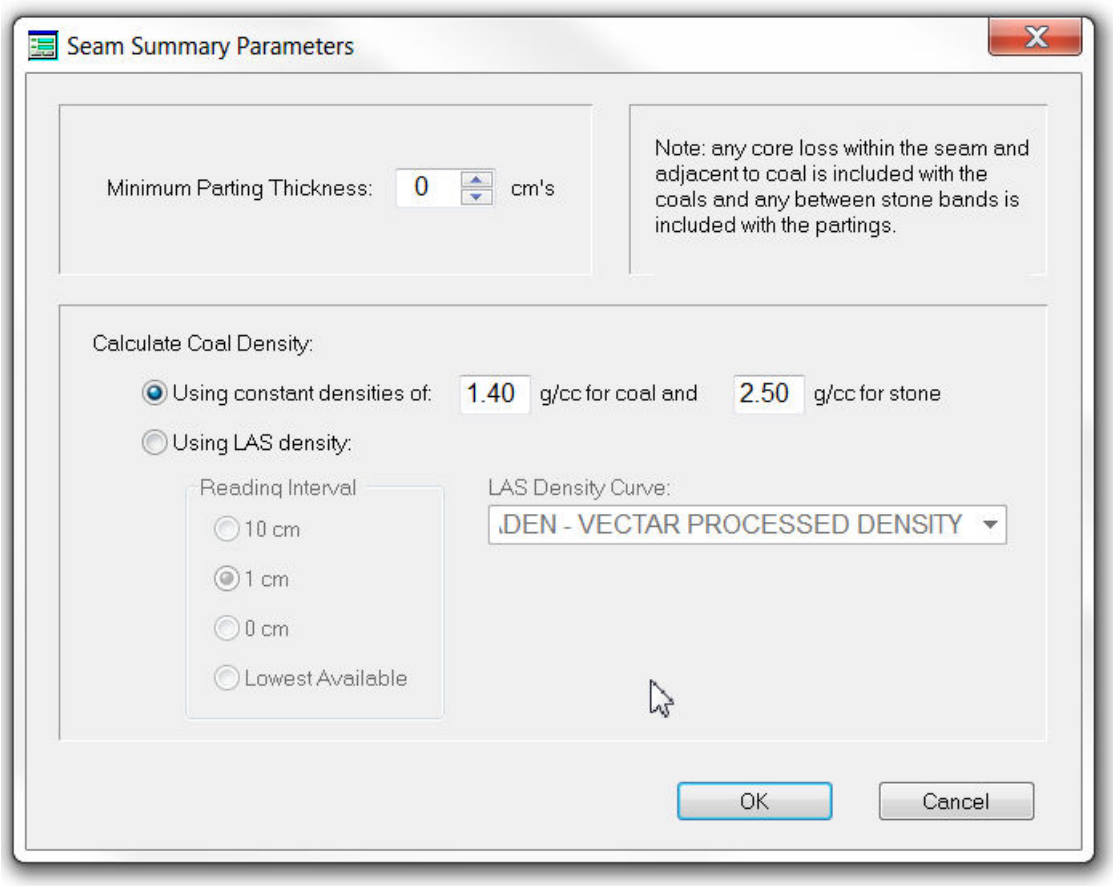
- Hole: Hole number,
- Unit: The Horizon/Strat/Seam/Ply name,
- From: From depth of unit,
- To: To depth of unit,
- Thick: Thickness of the unit.

8.15 Seam/Plies Summary

The Seam Summary displays a summary of the seams occurring in each hole. For this summary, navigate to the File > Open > Summaries > Seams/Plies > Seams menu item (if Plies is chosen, it works on the Ply column, not the Seam column), as shown below:



Initially, the standard Hole Selection dialog is displayed. This is followed by the Seam Summary Parameters dialog as shown below:

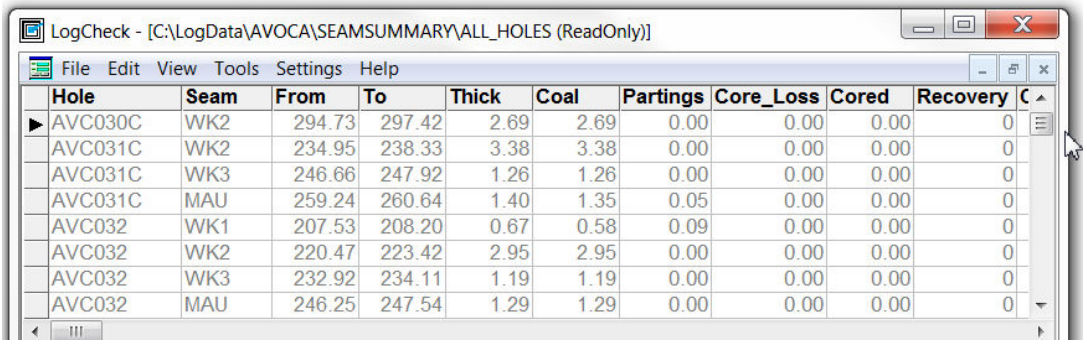


When deciding whether a unit is coal or partings, you can specify a minimum parting thickness in this dialog. This is significant, because when mining coal, anything less than this thickness that is not coal, can't be separated from the actual coal, and is included with the coal.

The coal density is required, in order to calculate the strip ratio, although this is irrelevant for underground mining. In *LogCheck*, there are two ways to specify the density:

1. Using an estimated density for all coal and one for all stone.
2. Using LAS density. In the example above, there ino LAS data is available, so this option is greyed out.

The Seam Summary for all holes is shown below (left-hand section):



Hole	Seam	From	To	Thick	Coal	Partings	Core_Loss	Cored	Recovery	C
AVC030C	WK2	294.73	297.42	2.69	2.69	0.00	0.00	0.00	0	
AVC031C	WK2	234.95	238.33	3.38	3.38	0.00	0.00	0.00	0	
AVC031C	WK3	246.66	247.92	1.26	1.26	0.00	0.00	0.00	0	
AVC031C	MAU	259.24	260.64	1.40	1.35	0.05	0.00	0.00	0	
AVC032	WK1	207.53	208.20	0.67	0.58	0.09	0.00	0.00	0	
AVC032	WK2	220.47	223.42	2.95	2.95	0.00	0.00	0.00	0	
AVC032	WK3	232.92	234.11	1.19	1.19	0.00	0.00	0.00	0	
AVC032	MAU	246.25	247.54	1.29	1.29	0.00	0.00	0.00	0	

The columns for the left-hand section of the Seam Summary are:

- Hole: Hole number,
- Seam: Seam name,
- From: From depth of seam,
- To: To depth of seam,
- Thick: The seam thickness – the difference between the From and To depths (includes partings and core loss),
- Coal: Metres of thickness of coal; it determines which lithologies are coal by those lithologies that have COAL in the Group column of the dictionary (may include core loss – see following section),
- Partings: Thickness of anything that is not coal (may include core loss – see following section,
- Core Loss: Any part of the lithology that has CORELOSS in the Group column in the lithology,
- Cored: That part of the seam thickness that has a bit type in the drilling data with its GROUP set to CORED in the Bit Type dictionary,
- Recovery: Is the percentage recovery – it is the percentage of the parts of the seam that are cored and do not have core loss recorded in the geology.

8.15.1.1 Determining Whether a Core Loss is Coal or Non-Coal

When deciding whether a core loss is to be regarded as coal or non-coal, three situations can be distinguished, based on whether the core loss is overlain/underlain by coal/non coal:

Coal
Core Loss
Coal

1. Core loss is regarded as coal

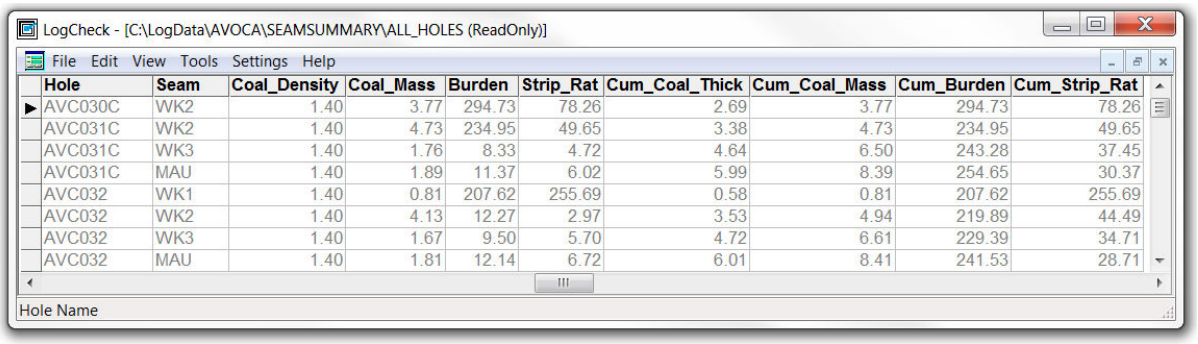
Non-coal
Core Loss
Coal

2. Core loss is regarded as coal

Non-coal
Core Loss
Non-Coal

3. Core loss is regarded as parting

The right-hand section of the Seam Summary is shown below:



Hole	Seam	Coal_Density	Coal_Mass	Burden	Strip_Rat	Cum_Coal_Thick	Cum_Coal_Mass	Cum_Burden	Cum_Strip_Rat
AVC030C	WK2	1.40	3.77	294.73	78.26	2.69	3.77	294.73	78.26
AVC031C	WK2	1.40	4.73	234.95	49.65	3.38	4.73	234.95	49.65
AVC031C	WK3	1.40	1.76	8.33	4.72	4.64	6.50	243.28	37.45
AVC031C	MAU	1.40	1.89	11.37	6.02	5.99	8.39	254.65	30.37
AVC032	WK1	1.40	0.81	207.62	255.69	0.58	0.81	207.62	255.69
AVC032	WK2	1.40	4.13	12.27	2.97	3.53	4.94	219.89	44.49
AVC032	WK3	1.40	1.67	9.50	5.70	4.72	6.61	229.39	34.71
AVC032	MAU	1.40	1.81	12.14	6.72	6.01	8.41	241.53	28.71

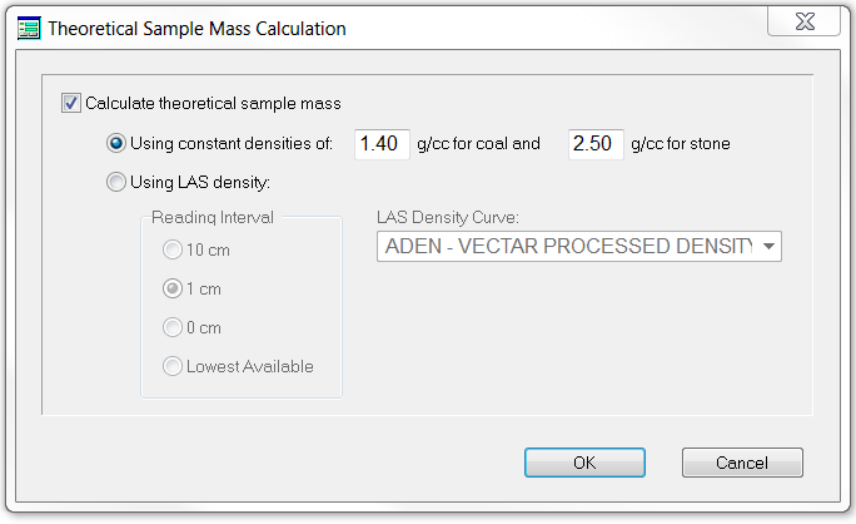
The columns are as follows:

The cumulative values include the combination of all the overlying values

- Coal_Density: Coal density,
- Coal_Mass: Coal mass per square metre,
- Burden: Thickness of over/interburden and partings,
- Strip_Rat: Burden thickness/coal mass (strip ratio),
- Cum_Coal_Mass: Cumulative coal mass per square metre,
- Cum_Burden: Cumulative thickness of over/interburden and partings,
- Cum_Strip_Rat: Cumulative strip ratio (cumulative burden / cumulative coal mass),

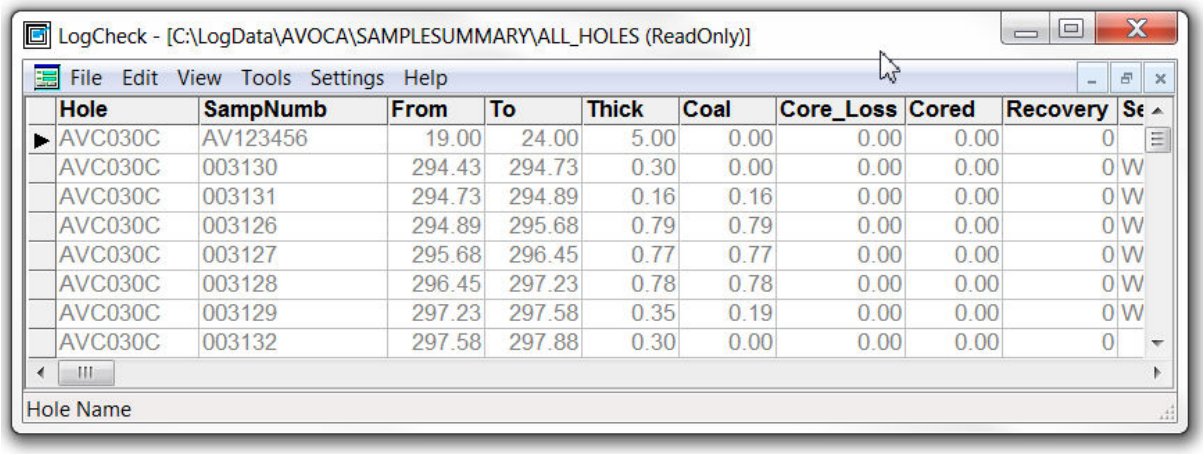
8.16 Samples Summary

The Samples Summary displays a summary of the samples taken for each hole. Navigate the menu to the File > Open > Summaries > Samples menu item. Initially, the standard Hole Selection dialog is displayed. This is followed by the Theoretical Sample Mass Calculation dialog, where densities for coal and stone can be entered, as shown below:



If the "Calculate …" box is checked, a theoretical sample mass is calculated for each sample by multiplying the sample length by drill hole cross-sectional area (derived from the core size in the drilling data) by a density which can either be derived by using a specified density for each of coal and stone or from a density from the LAS data. The sample mass as measured by the laboratory can be compared to this to determine a recovery for the sample.

Clicking the OK button then displays the Sample Summary, as shown below, for all holes (left-hand section):

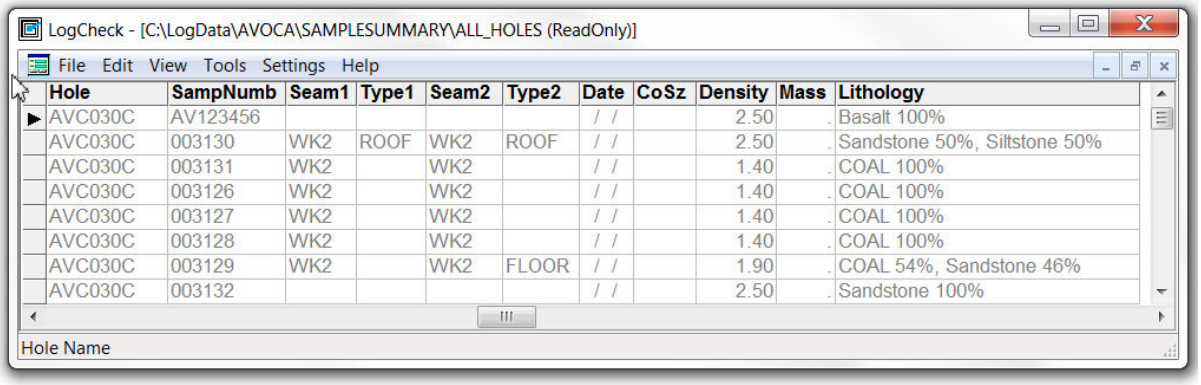


Hole	SampNumb	From	To	Thick	Coal	Core_Loss	Cored	Recovery	Se
AVC030C	AV123456	19.00	24.00	5.00	0.00	0.00	0.00	0	
AVC030C	003130	294.43	294.73	0.30	0.00	0.00	0.00	0	W
AVC030C	003131	294.73	294.89	0.16	0.16	0.00	0.00	0	W
AVC030C	003126	294.89	295.68	0.79	0.79	0.00	0.00	0	W
AVC030C	003127	295.68	296.45	0.77	0.77	0.00	0.00	0	W
AVC030C	003128	296.45	297.23	0.78	0.78	0.00	0.00	0	W
AVC030C	003129	297.23	297.58	0.35	0.19	0.00	0.00	0	W
AVC030C	003132	297.58	297.88	0.30	0.00	0.00	0.00	0	

The columns for the left-hand section of this summary are:

- Hole: Hole number,
- SampNumb: Sample number,
- From: From depth of sample,
- To: To depth of sample,
- Thick: Difference between the From and To depths,
- Coal: Coal thickness, as determined from the lithologies of the sample and which lithologies have their Group set to coal.
- Core Loss: Core loss thickness – same as above, except that the Group is now CORE LOSS,
- Cored: Cored thickness – the sample has a bit type in the drilling data with its GROUP set to CORED in the Bit Type dictionary,
- Recovery: The percentage recovery – it is the percentage of the parts of the sample that are cored and do not have core loss recorded in the geology.

An example of the right-hand section of the Sample Summary is shown below:



Hole	SampNumb	Seam1	Type1	Seam2	Type2	Date	CoSz	Density	Mass	Lithology
AVC030C	AV123456					/ /		2.50		Basalt 100%
AVC030C	003130	WK2	ROOF	WK2	ROOF	/ /		2.50		Sandstone 50%, Siltstone 50%
AVC030C	003131	WK2		WK2		/ /		1.40		COAL 100%
AVC030C	003126	WK2		WK2		/ /		1.40		COAL 100%
AVC030C	003127	WK2		WK2		/ /		1.40		COAL 100%
AVC030C	003128	WK2		WK2		/ /		1.40		COAL 100%
AVC030C	003129	WK2		WK2	FLOOR	/ /		1.90		COAL 54%, Sandstone 46%
AVC030C	003132					/ /		2.50		Sandstone 100%

The columns for the right-hand section of this summary are:

- Seam1: Top seam in the sample,
- Type1: Top type (roof or floor),
- Seam2: Bottom seam in the sample,
- Type2: Bottom type (roof or floor),
- Date: Date of drilling, as derived from drilling data,

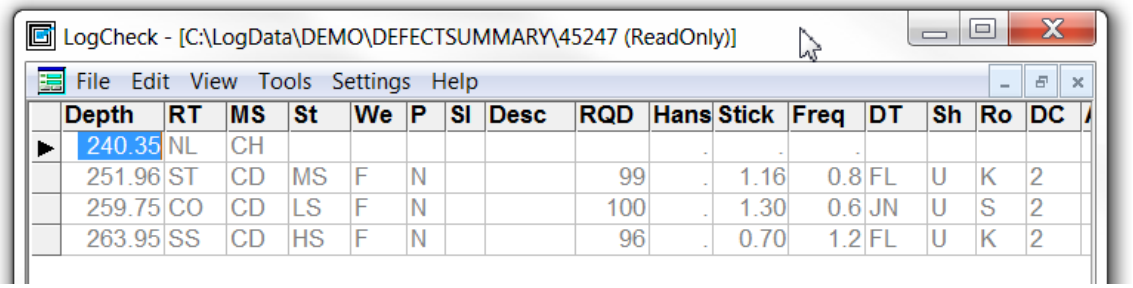
- CoSz: Core size, as derived from drilling data,
- Density: The estimated density of the sample,
- Mass: Theoretical sample mass – assuming 100% core recovery.
- Lithology: Summary of lithology based on the group in the dictionary.

Notes:

1. For the Type1 and Type2 columns, if the sample starts above the seam, ROOF is entered in the column; if the sample ends below the seam, FLOOR is entered in the column.
2. To calculate the density, it uses the Group codes in the lithology in the geology dictionary. For example, in the second row of the above example, the density is estimated using the pro rata density of 1.40 for the 79% coal, and 2.50 for the remaining 21% stone (see previous page).

8.17 Defect Summary

The Defect Summary displays a summary of the defects occurring in rock mass units. Navigate the menu to the File > Open > Summaries > Defect menu item. This summary presents the standard Hole Selection dialog. If the All holes option is selected, *LogCheck* then displays a list of all holes that have defect data recorded.



Depth	RT	MS	St	We	P	Sl	Desc	RQD	Hans	Stick	Freq	DT	Sh	Ro	DC
240.35	NL	CH							.	.	.				
251.96	ST	CD	MS	F	N			99	.	1.16	0.8	FL	U	K	2
259.75	CO	CD	LS	F	N			100	.	1.30	0.6	JN	U	S	2
263.95	SS	CD	HS	F	N			96	.	0.70	1.2	FL	U	K	2

If the Single hole option is selected, a summary of the defects for that hole is displayed. An example is shown below:

The entries for the defect summary data include:

- Depth: The depth to the top of the RMU.
- RT: Rock mass unit type, for example, SS – sandstone.
- ST: Estimated strength, for example, MS – moderate strength rock.
- We: Weathering, for example, F – fresh.
- P: Plasticity, for example, P – puggy.
- Sl: Slaking potential, for example, 4 – moderate slaking.
- Desc: Description of the RMU.
- RQD: Rock quality designator.
- Hans: Hansagi's C factor.
- Stick: Average stick length.
- DT: A defect type within the RMU, for example, BP – bedding planes.
- Sh: Surface shape, for example, P – planar.
- Ro: Surface roughness, for example, K – slickensided.
- DC: Defect continuity, for example, 1 – one end terminates.

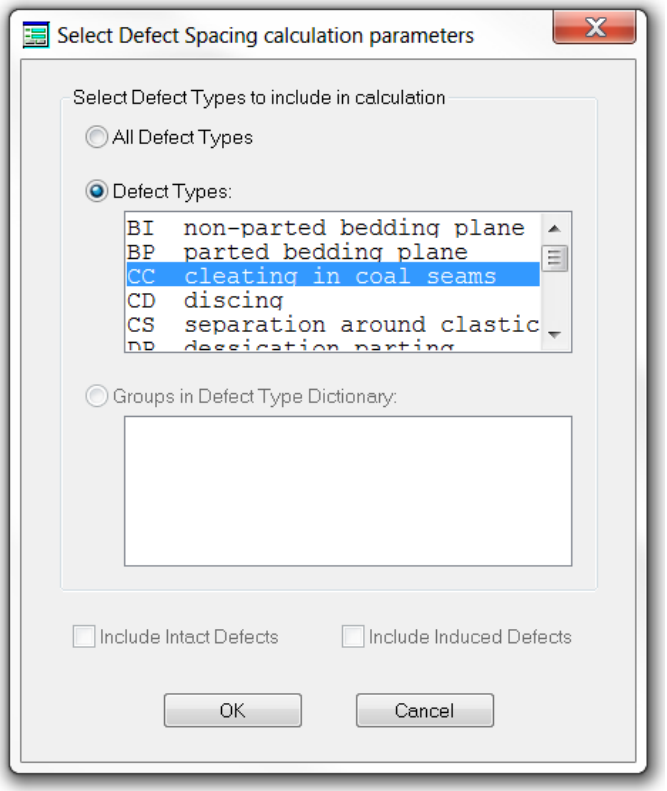
8.18 Defect Spacing Summary

The Defect Spacing Summary displays a summary of the seams occurring in each hole.

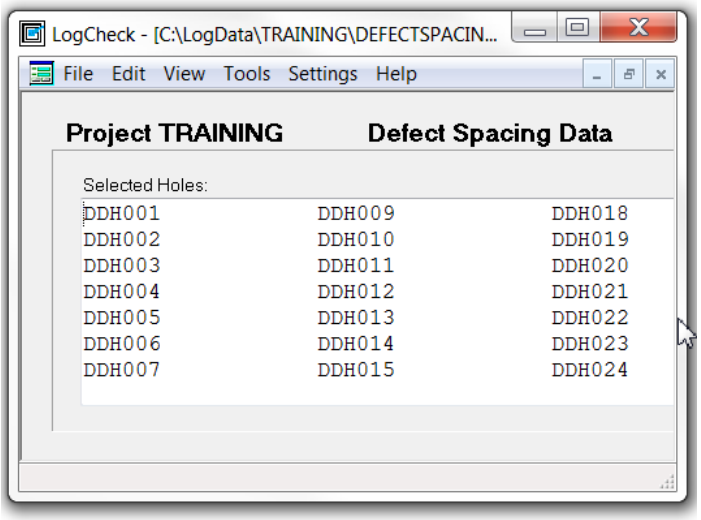
Navigate the menu to the File > Open > Summaries > Defect Spacing menu item. This summary presents the standard Hole Selection dialog, which gives you a choice of listing all holes, or data for a specified hole.

The dialog on the right allows you to select:

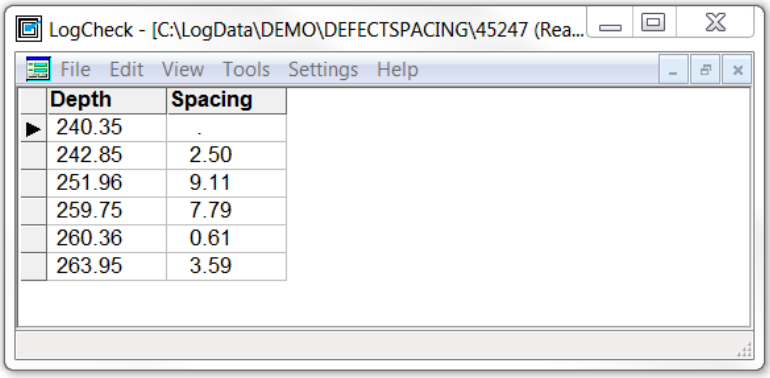
- Either all defects, a specific defect type or groups in the Defect dictionary.
- An option to include intact defects.
- An option to include induced defects.



If all holes was selected, a list of holes containing that defect is displayed, as shown on the right:



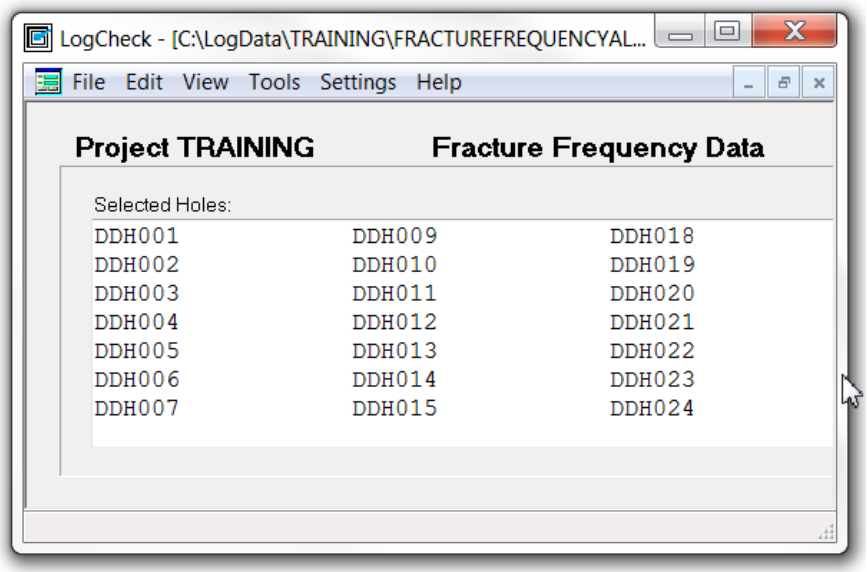
If a single hole was selected, the depth and defec t spacing are displayed, for example:



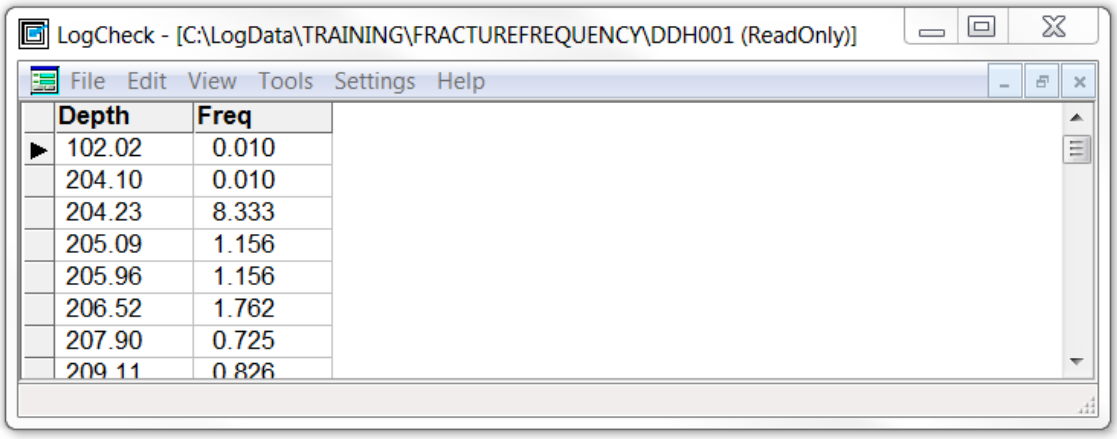
8.19 Fracture Frequency Summary

The Fracture Frequency Summary displays a list of all holes with defect data. Navigate the menu to the File > Open > Summaries > Fracture Frequency menu item.

Initially, the standard Hole Selection dialog is displayed. If the All Holes option is selected, it lists all holes where fracture frequencies have been recorded. An example is shown on the right:



Selecting an individual hole, displays the fracture frequency in fractures per metre. The hole is divided into intervals between points half-way between defects. An example of a Fracture Frequency Summary for a hole is displayed below:



Depth	Freq
102.02	0.010
204.10	0.010
204.23	8.333
205.09	1.156
205.96	1.156
206.52	1.762
207.90	0.725
209.11	0.826

8.20 Point Load Indices Summary

The Point Load Index that is calculated in *LogCheck*, is a size-corrected value that is the equivalent Point Load Index for a sample that would have been measured by a diametral test with a diameter of 50 mm.

The uncorrected point load index[1] is calculated as follows:

$$I = P / D^2$$

Where:

I: Uncorrected point load strength;
P: The load at failure;
D: The equivalent core diameter.

The equivalent core diameter depends on whether the test was:

(a) *Diametral*, where D is the core diameter.

For a diametral test, if the sample length is less than the diameter, a value for the point load index is not recorded

(b) *Axial*, where D is given by the following formula:

$$D = 4 * A / PI$$

For an axial test, if the sample length is greater than the diameter or the length is less than 0.3 of the diameter, a value for the point load index is not recorded

Where A is the minimum cross-sectional area of a plane through the platen contact points:

A = Core length * Width (perpendicular to the loading direction)

The size-corrected Point Load Strength Index of a sample uses the following Size Correction Factor, F:

$$F = (D / 50)^{0.45}$$

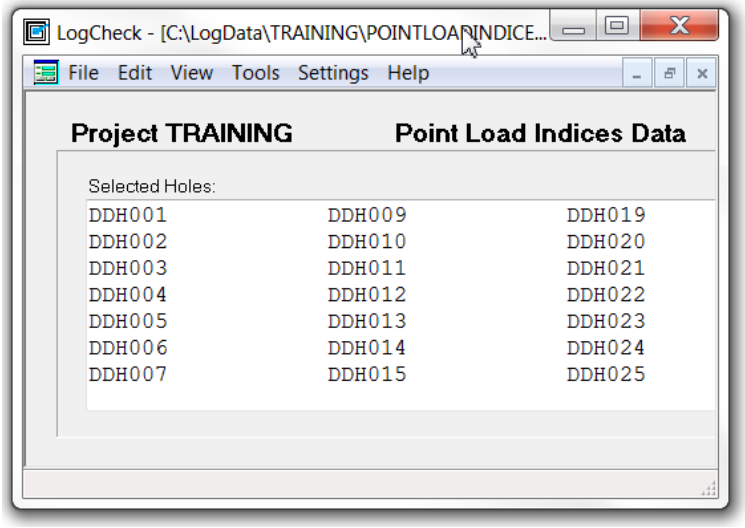
The size-corrected Point Load Index used by LogCheck is given by the following formula:

$$I_{s(50)} = F * 1000 * (P / D^2)$$

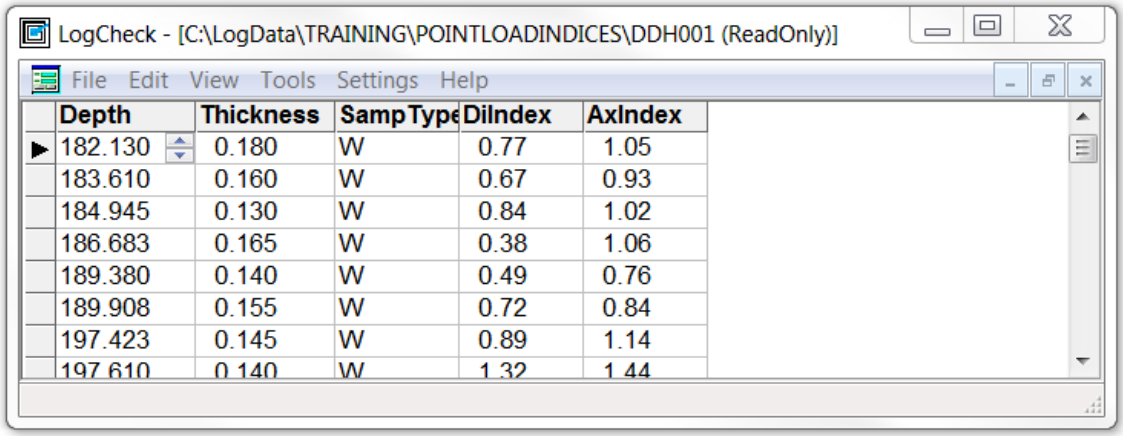
[1] Journal of Geomechanics, Vol. 22, No.2, pp51-60, 1985. "Suggested method for Determining Point Load Strength"

The Point Load Indices Summary displays a list of all holes with point load data. Navigate the menu to the File > Open > Summaries > Point Load Indices menu item.

Initially, the standard Hole Selection dialog is displayed. If the All Holes option is selected, it lists all holes where point load data is available. An example is shown on the right:



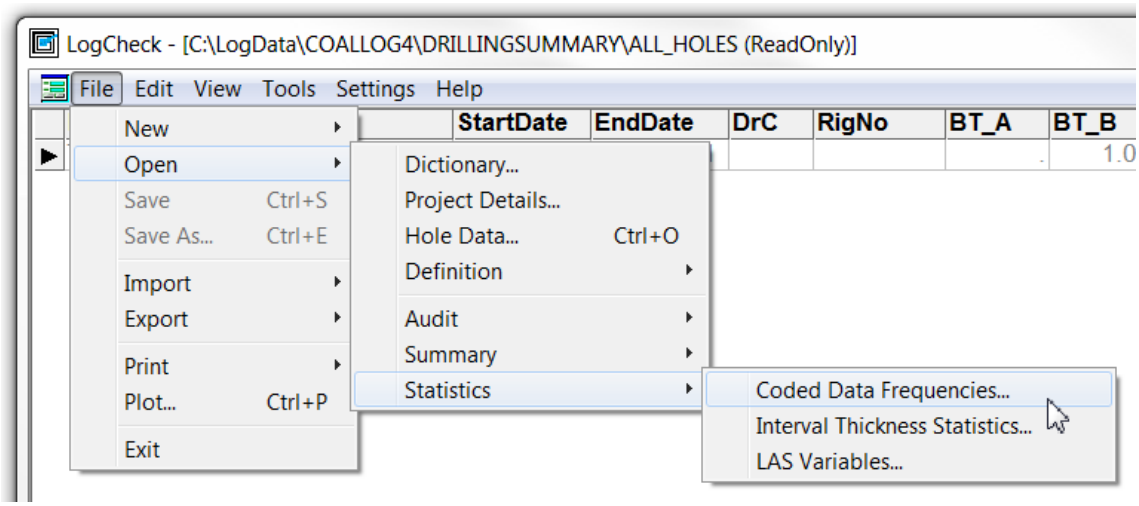
Selecting an individual hole will display the point load indices for the hole, for example:



Depth	Thickness	SampType	DiIndex	AxIndex
182.130	0.180	W	0.77	1.05
183.610	0.160	W	0.67	0.93
184.945	0.130	W	0.84	1.02
186.683	0.165	W	0.38	1.06
189.380	0.140	W	0.49	0.76
189.908	0.155	W	0.72	0.84
197.423	0.145	W	0.89	1.14
197.610	0.140	W	1.32	1.44

8.21 Statistics

The Statistics menu is opened by selecting File > Open > Statistics. The Statistics menu is as shown below:

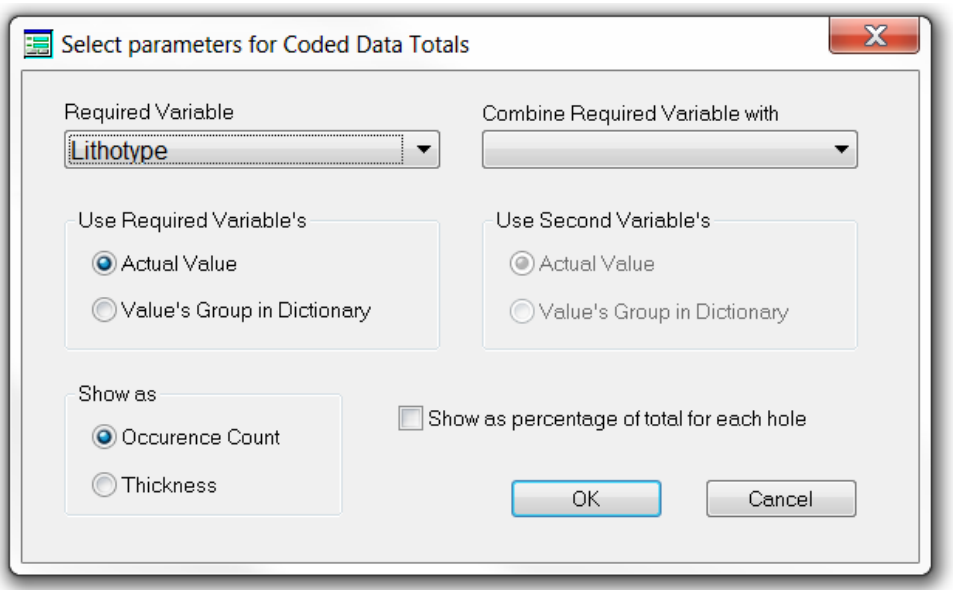


There are three items on the Statistics menu:

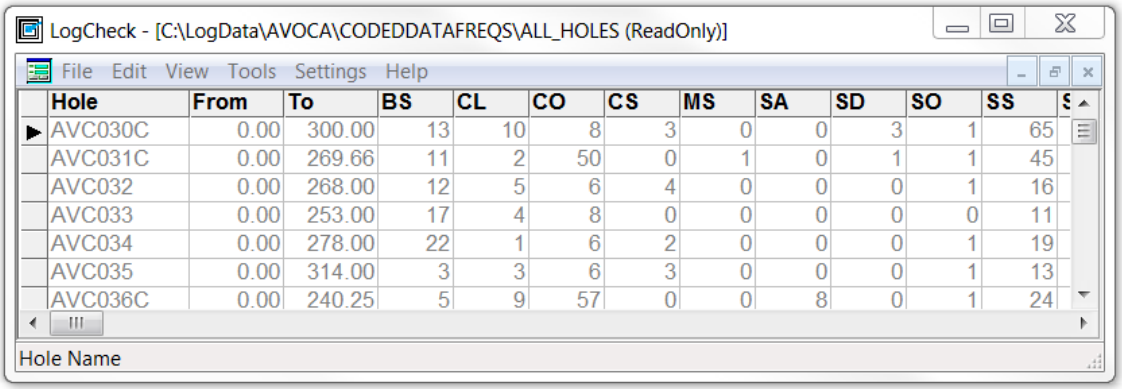
- Coded Data Frequencies,
- Interval Thickness Statistics for a Specified Value,
- LAS Variables.

For the Coded Data Frequencies summary, the standard hole selection dialog is displayed, then the Select parameters dialog:

A second variable can optionally be selected. The statistics can be produced either on the actual value of the variable, or its value in the Group column in the Dictionary.



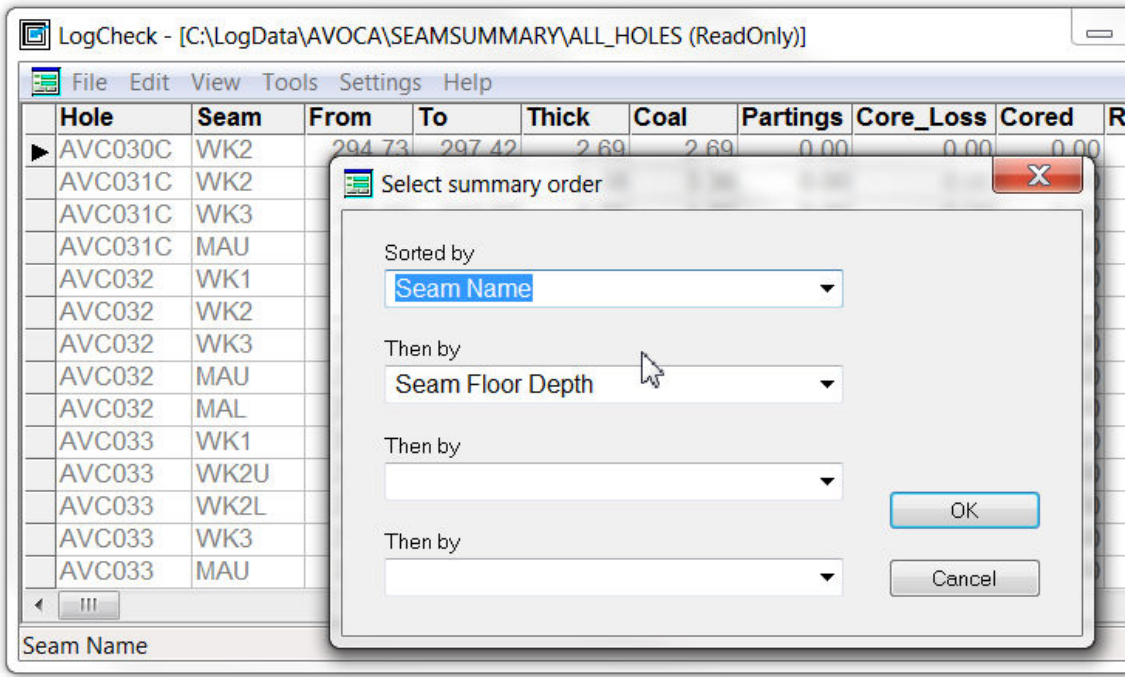
The following is an example of the Coded Data Frequency summary. It lists the frequency of occurrence of each of the lithotype codes for each hole that was selected:



Hole	From	To	BS	CL	CO	CS	MS	SA	SD	SO	SS
AVC030C	0.00	300.00	13	10	8	3	0	0	3	1	65
AVC031C	0.00	269.66	11	2	50	0	1	0	1	1	45
AVC032	0.00	268.00	12	5	6	4	0	0	0	1	16
AVC033	0.00	253.00	17	4	8	0	0	0	0	0	11
AVC034	0.00	278.00	22	1	6	2	0	0	0	1	19
AVC035	0.00	314.00	3	3	6	3	0	0	0	1	13
AVC036C	0.00	240.25	5	9	57	0	0	8	0	1	24

8.22 Tools – Sort

The Sort item of the Tools menu is only enabled when you are opening an audit, summary or statistics. These can be sorted by up to four variables. In the following Seam Summary example, from the main menu, select Tools > Sort, and the following dialog is displayed:

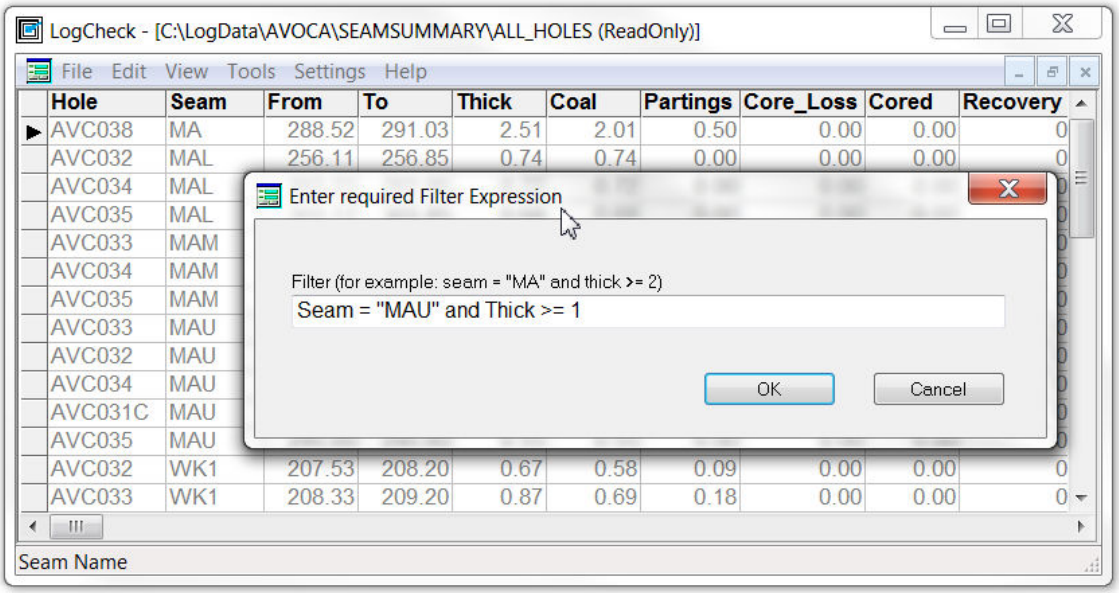


Hole	Seam	From	To	Thick	Coal	Partings	Core_Loss	Cored
AVC030C	WK2	294.73	297.42	2.69	2.69	0.00	0.00	0.00
AVC031C	WK2							
AVC031C	WK3							
AVC031C	MAU							
AVC032	WK1							
AVC032	WK2							
AVC032	WK3							
AVC032	MAU							
AVC032	MAL							
AVC033	WK1							
AVC033	WK2U							
AVC033	WK2L							
AVC033	WK3							
AVC033	MAU							

In the drop-down list, select the required sort fields, as shown below, then click the OK button:

8.23 Tools – Filter

The Filter item of the Tools menu is only enabled when you are opening an audit, summary or statistics. These can be filtered by an expression. In the following Seam Summary example, from the main menu, select Tools > Filter, and the following dialog is displayed:



In the above example, the results are filtered so that only those records where the seam name is “MAU” and the thickness is greater than, or equal to, 1 metre, are displayed.

Chapter 9
Printing and Exporting

By the end of this chapter you will be able to:

- Set *LogCheck* reporting options.
- Print a data report.
- Print a descriptive report.
- Export data to other file formats.

9.1 Introduction

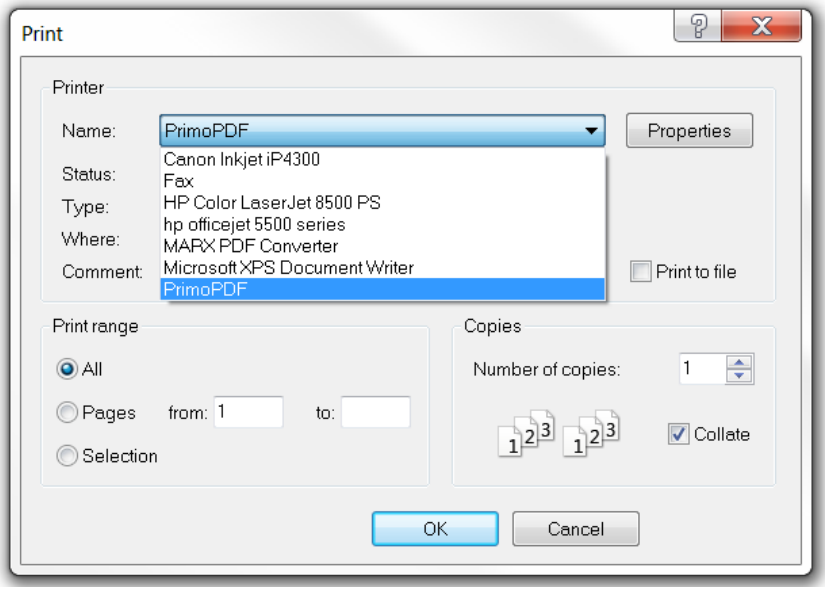
LogCheck reports are available on all data entered into the system. The reporting options allow you to print a report on the data that is currently displayed in the *LogCheck* editor. For example, if hole geology is displayed, selecting the File > Print > Report option will print that data or if a summary is displayed, then it will be printed.

9.2 Printing

LogCheck When a report menu option is chosen, a printer selection dialog is displayed, for example:

In addition to hard copy of a report, it is also useful to install a PDF (Portable Document File) printer so that reports can be emailed. In the this dialog, PrimoPDF has been selected as the printer. PrimoPDF is a free software utility that prints the selected data to a PDF file. It can be downloaded from:

www.primopdf.com

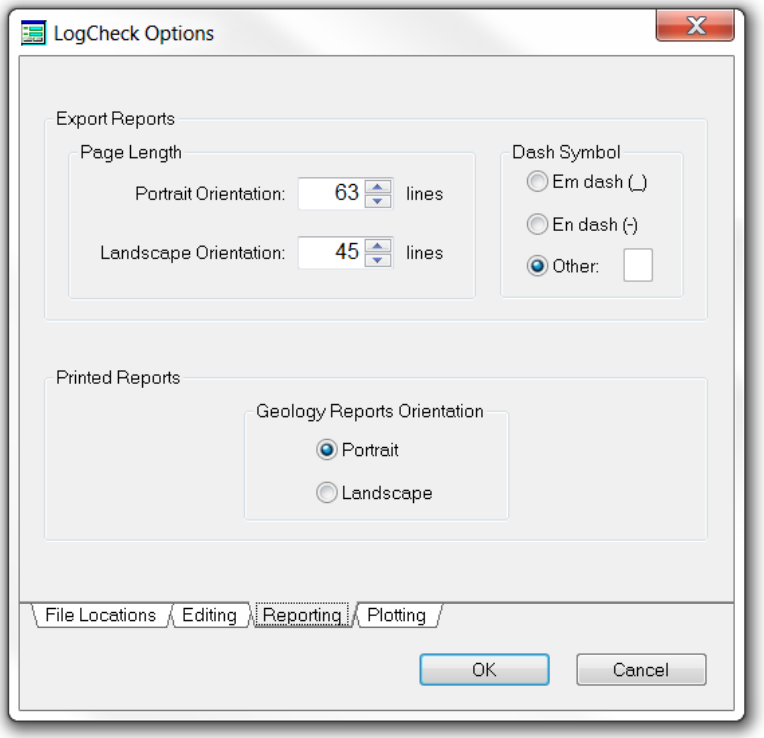


9.3 Reporting Options

From the Options menu, the Reporting tab allows you to specify the number of lines in a page – for both portrait and landscape orientation.

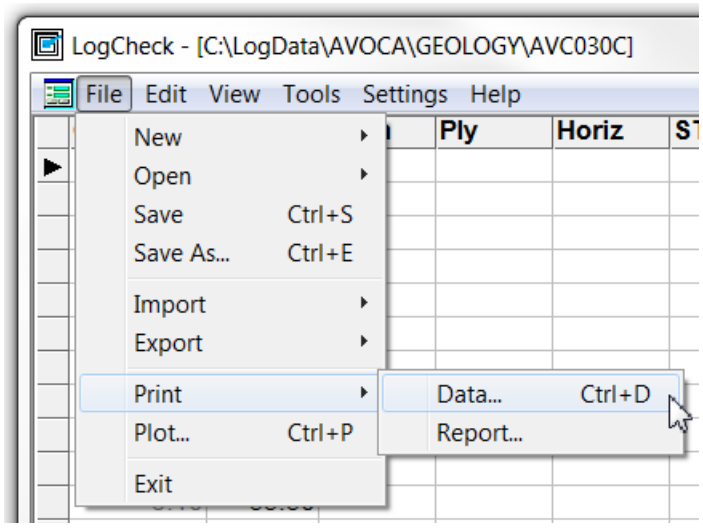
For exported reports, the page length can be specified, and the dash symbol, can be one of:

- the Em dash (the long dash –),
- the En dash (the short dash -) or
- some other symbol.



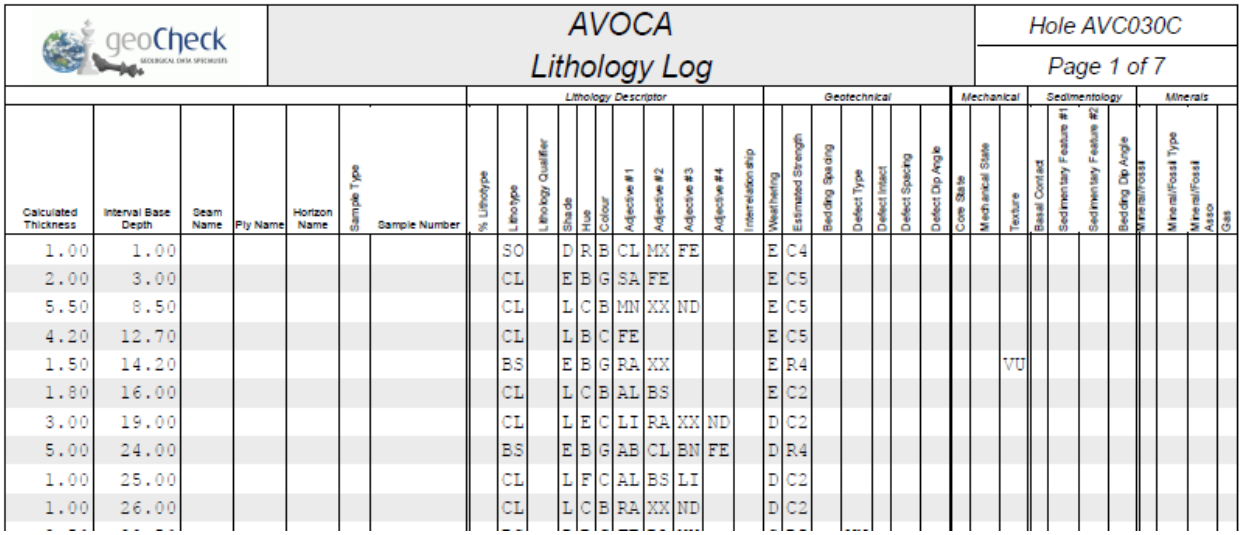
9.4 The Reports Menu

To access the Reports menu select the File menu, then Print, to select either the Data or Report option:



9.4.1 Data Report

If the Data option is selected, a report is generated that displays the data in columns. For coded data fields, the actual code values are displayed. An example is:



geoCheck

AVOCA
Lithology Log

Hole AVC030C
Page 1 of 7

							Lithology Descriptor											Geotechnical						Mechanical			Sedimentology				Minerals			
Calculated Thickness	Interval Base Depth	Seam Name	Ply Name	Horizon Name	Sample Type	Sample Number	% Lithotype	Lithotype	Lithology Qualifier	Shade	Hue	Colour	Adjective #1	Adjective #2	Adjective #3	Adjective #4	Interrelationship	Weathering	Estimated Strength	Bedding Spacing	Defect Type	Defect Intact	Defect Spacing	Defect Dip Angle	Core State	Mechanical State	Texture	Basal Contact	Sedimentary Feature #1	Sedimentary Feature #2	Bedding Dip Angle	Mineral/Fossil	Mineral/Fossil Type	Mineral/Fossil Asso	Gas
1.00	1.00							SO		D	R	B	CL	MX	FE			E	C4															
2.00	3.00							CL		E	B	G	SA	FE				E	C5															
5.50	8.50							CL		L	C	B	MN	XX	ND			E	C5															
4.20	12.70							CL		L	B	C	FE					E	C5															
1.50	14.20							BS		E	B	G	RA	XX				E	R4								VU							
1.80	16.00							CL		L	C	B	AL	BS				E	C2															
3.00	19.00							CL		L	E	C	LI	RA	XX	ND		D	C2															
5.00	24.00							BS		E	B	G	AB	CL	BN	FE		D	R4															
1.00	25.00							CL		L	F	C	AL	BS	LI			D	C2															
1.00	26.00							CL		L	C	B	RA	XX	ND			D	C2															

9.4.2 Descriptive Reports

If the Report option is selected, a report is generated that displays the data in columns. For coded data fields, the actual code values and their descriptions are displayed. An example is:

geoCheck

AVOCA
Lithology Log

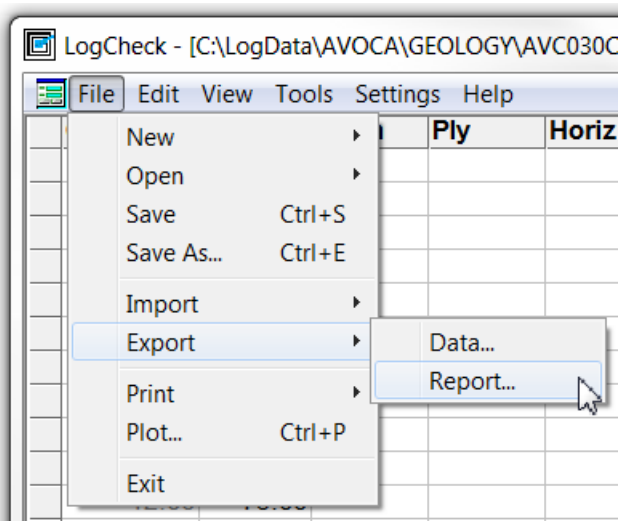
Hole AVC030C
Page 7 of 8

Depth	Thickness	Sample Number	Lithology
293.34	0.66		**SANDSTONE, fine to medium grained**: light greyish cream, quartzose feldspathic micaceous abundant silty sideritic nodules bands throughout, fresh, high strength rock, solid core.
293.51	0.17		**SANDSTONE, fine to medium grained**: light greyish cream, quartzose feldspathic micaceous abundant silty sideritic nodules bands throughout, fresh, high strength rock, solid core.
294.43	0.92		**SANDSTONE, medium grained**: light greyish cream, quartzose feldspathic micaceous abundant carbonaceous blebs, fresh, high strength rock, solid core.
294.58	0.15	003130	**SANDSTONE, medium grained**: light greyish cream, quartzose feldspathic micaceous abundant sandy blebs, fresh, high strength rock, solid core, POINT LOAD.
294.73	0.15	003130	**SILTSTONE**: light greyish cream, quartzose feldspathic micaceous abundant carbonaceous blebs, fresh, high strength rock, solid core, POINT LOAD.

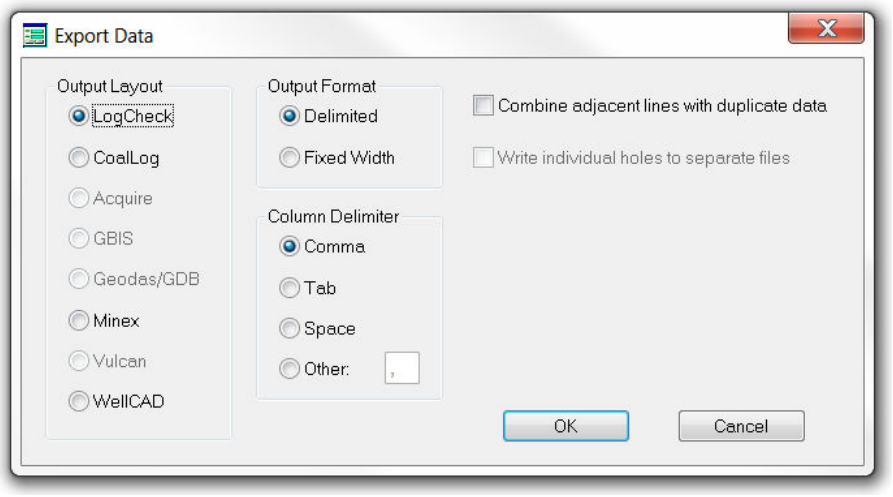
Top of Warkworth 2 Seam

9.5 Exporting Data

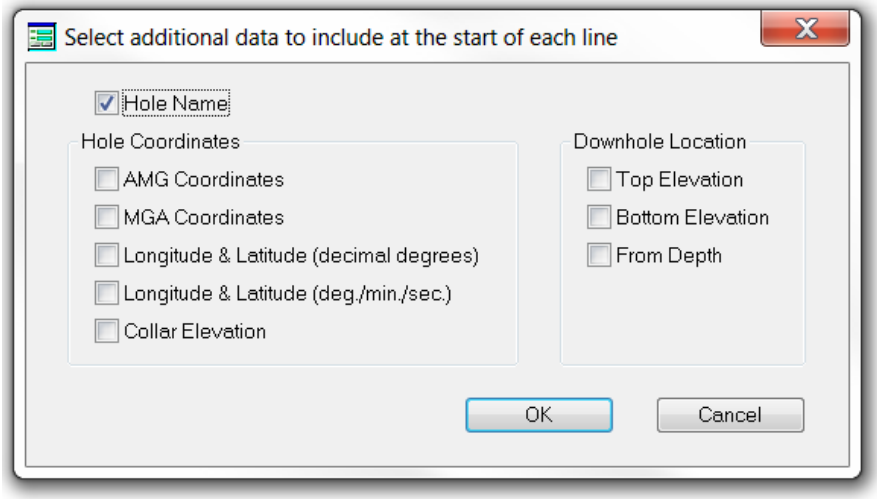
The exporting menu is as follows:



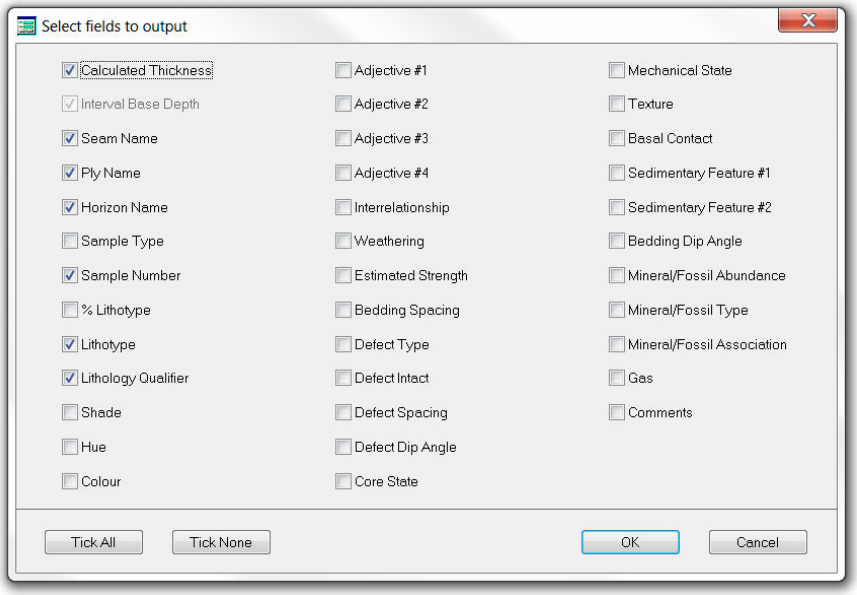
The Export Data dialog is then displayed:



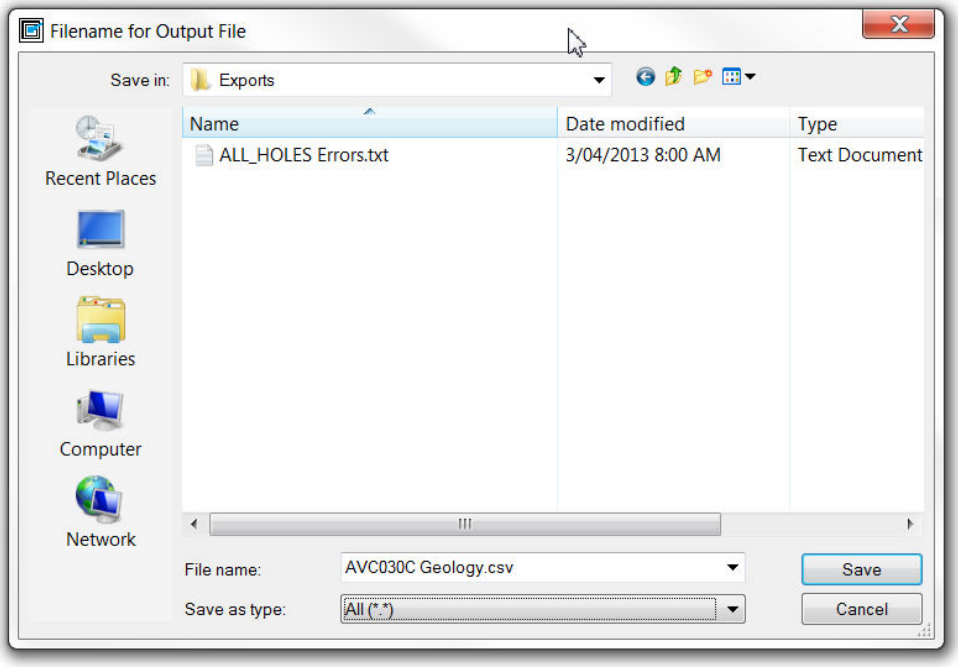
Next, a dialog for selecting additional data for inclusion in the report is displayed:



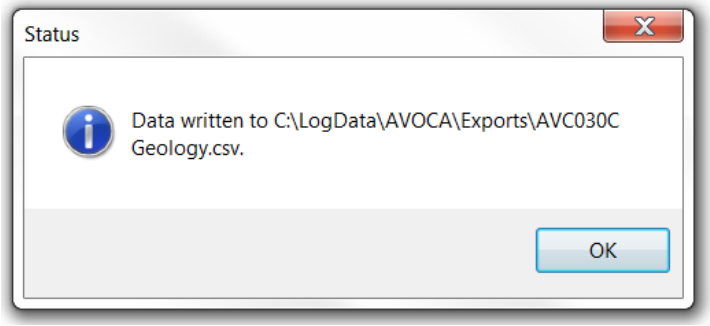
Next, a dialog for selecting fields to include in the exported file is displayed:



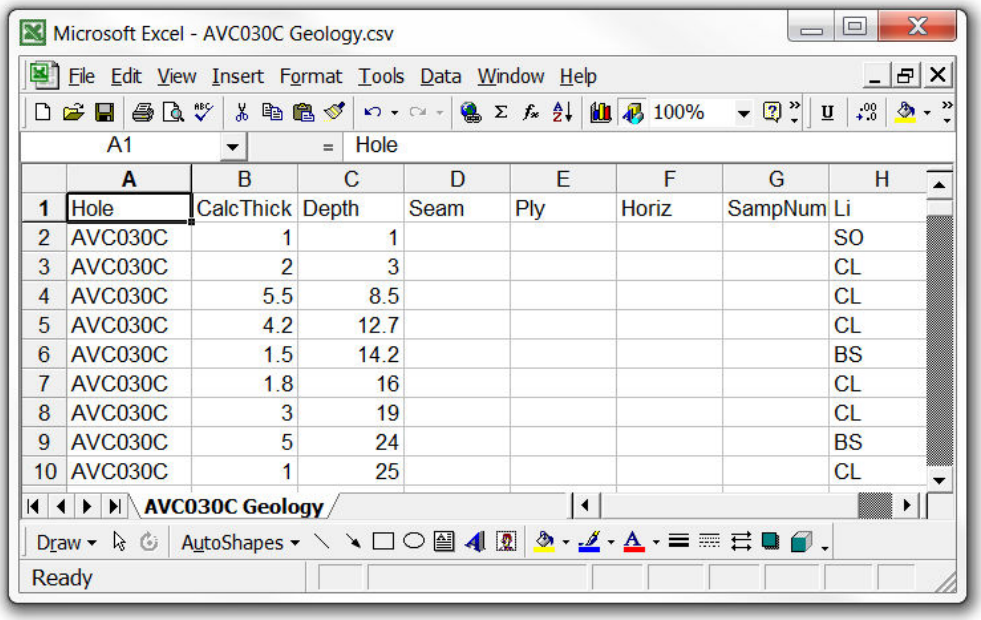
Next, a dialog that requests the location and name of the exported file is displayed. The default location is the Exports folder of the current project:



Finally, confirmation of the data export is displayed:



The exported file can then be opened in other applications, such as Microsoft Excel:



	A	B	C	D	E	F	G	H
1	Hole	CalcThick	Depth	Seam	Ply	Horiz	SampNum	Li
2	AVC030C	1	1					SO
3	AVC030C	2	3					CL
4	AVC030C	5.5	8.5					CL
5	AVC030C	4.2	12.7					CL
6	AVC030C	1.5	14.2					BS
7	AVC030C	1.8	16					CL
8	AVC030C	3	19					CL
9	AVC030C	5	24					BS
10	AVC030C	1	25					CL

Chapter 10
Plotting

By the end of this chapter you will be able to:

- Open, create and save a plot definition file.
- Set parameters for sections and title blocks.
- Add, insert, and delete tracks for a plot.
- Plot a hole or a section.
- Plot the LAS data by appending to an existing plot file.

10.1 Introduction

LogCheck provides a wide variety of options for plotting hole logging data. There are many variations and parameters that define the appearance of the plot. Not all of them are covered here – you may need to experiment in order to obtain the output that you require.

All plots are generated as AutoCad release 12 DXF files (note that Release 12 has no facilities for bitmaps or JPEG files). Many freeware packages and most CAD packages can display and plot these files. We recommend AutoCad's TrueView to display the plot file. TrueView is available free and can be downloaded from (at the time of printing):

http://usa.autodesk.com/adsk/servlet/pc/index?id=6703438

The plot layouts are defined by the user in *LogCheck* files known as plot definitions. These include such things as the vertical scale, the width, location and contents of columns known as tracks) on the plot, the horizontal scale, and items to be shown in the title block. When the user plots their currently open data, they are prompted for the name of the plot definition to be used to plot their data.

LogCheck comes with a standard list of plot files. These are described in Appendix B and include:

- A *seams only* plot at 1:20
- Entire hole with Geophysics (Density Gamma and Calliper)
- 1:20 plot of individual holes in A4 and A3.
- 1:100 plot of individual holes in A4 andA3.
- 1:200 plot of individual holes in A4 and A3.
- A4 and A3 section plots without horizontal scale (ie sit 10 mm apart for a fence diagram) at 1:100 and 1:200.

10.1.1 Plot Definition Files

The plot parameters are stored in a plot definition file. When *LogCheck* looks for plot definition files, it searches the following folders in this order:

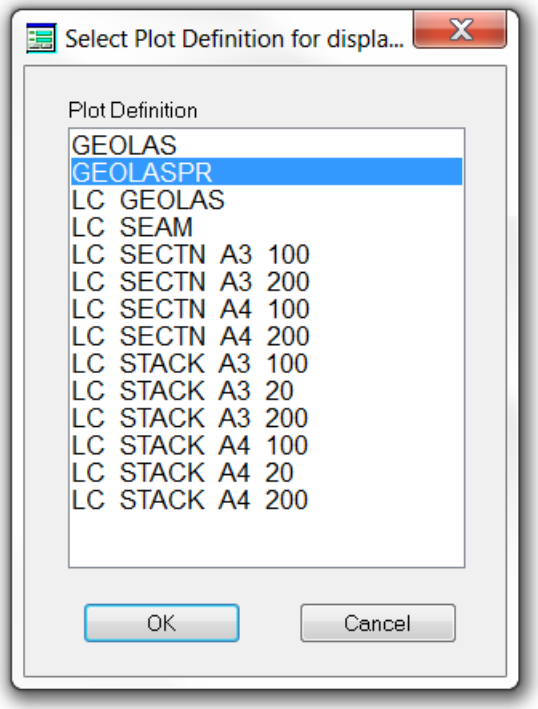
1. PlotPara in the current project folder.
2. PlotPara under \LogData.
3. PlotPara under \Program Files\LogCheck – this is distributed with the software.

Any modifications are saved in folders (1) or (2). A plot definition consists of three files with extensions .BBF, .DBF, and .MEM. For example, the GEOLASPR plot definition in the above selection is made up of these three files: GEOLASPR.BBF, GEOLASPR.DBF and GEOLASPR.MEM. These three files can be renamed, deleted or copied to another location.

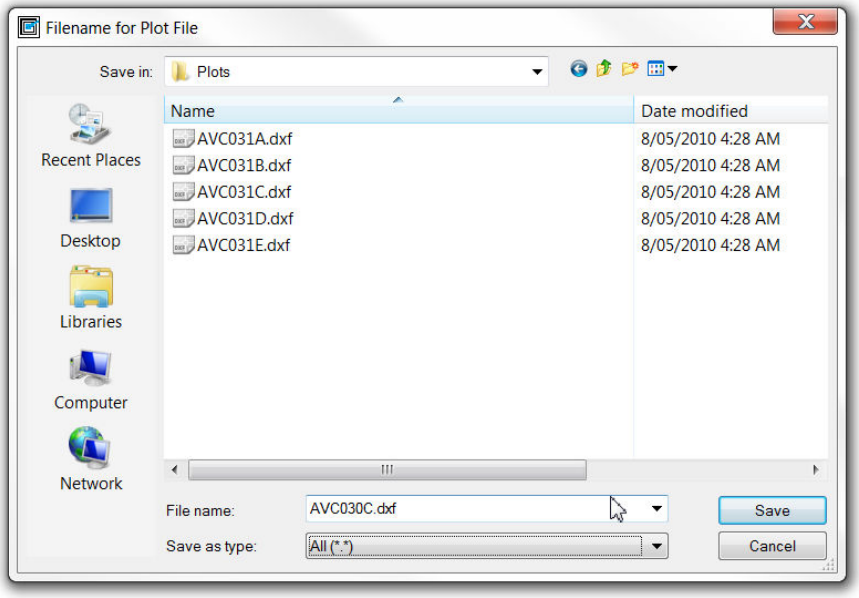
10.2 Plotting a Hole

When plotting a hole in *LogCheck*, the steps generally are:

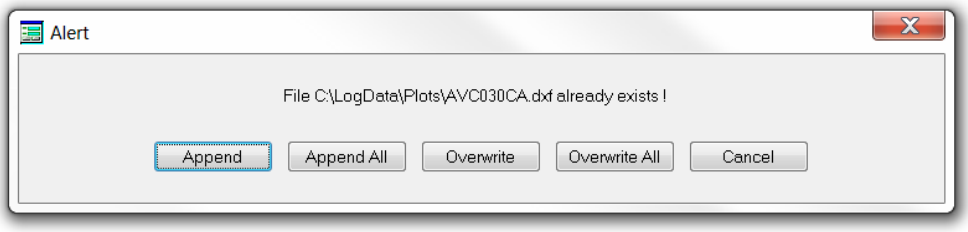
- Select the hole to be plotted. When selecting the hole, the user can select the entire hole, a depth interval or seam.
- Go to the File > Plot menu. The user will then be asked to select a plot, as shown on the right: This lists every plot definition file available to *LogCheck*. These include the standard LogCheck plots that start with LC, those that are available in C:\LogData\PlotPara, and those stored with the project.



- Save the plot file. *LogCheck* asks the user for a file name.



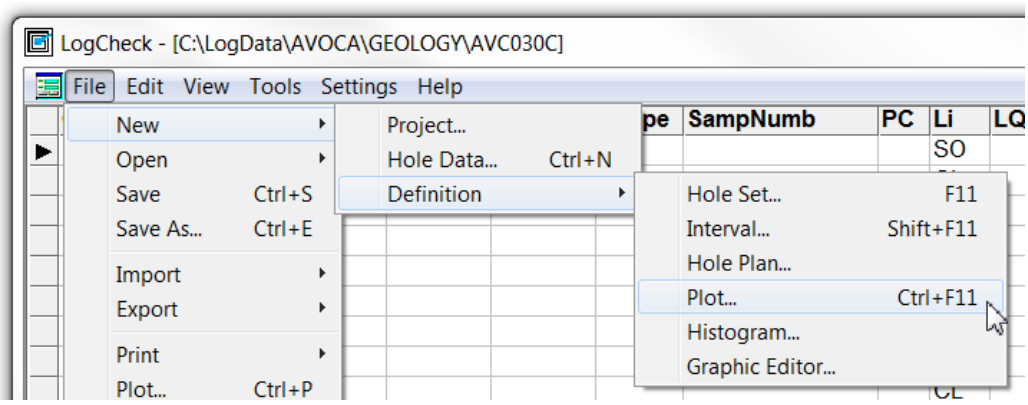
- If a plot file of that name already exists, *LogCheck* ask whether to overwrite the file, or append the current hole to data that is already in the file.



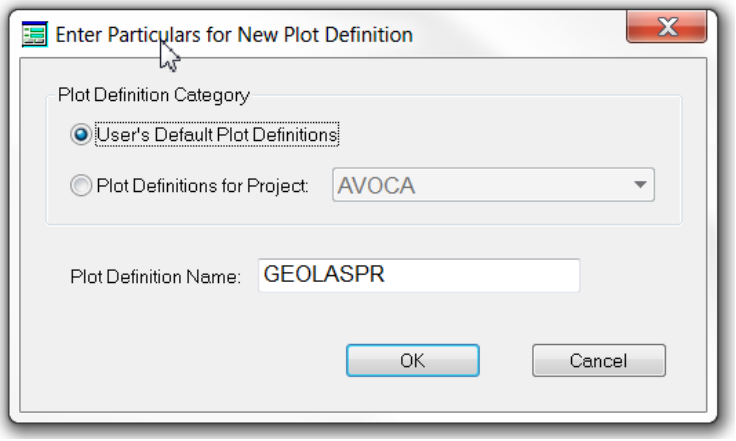
If one of the Append options is chosen, the data is added to the existing plot; if one of the Overwrite options is chosen, the data in the file is deleted and a new plot is created. We can also select a seam for a hole and plot it, in which case the plot file is named as HOLENAME_SEAMS.dxf.

10.3 Creating a Plot Definition File

A new plot definition can be created by going to File > New > Plot Definition (or pressing the Ctrl+F11 keys), as shown below on the left. In the figure below, a new plot definition will be created specific to the AVOCA project, and its name will be GEOLASPR.



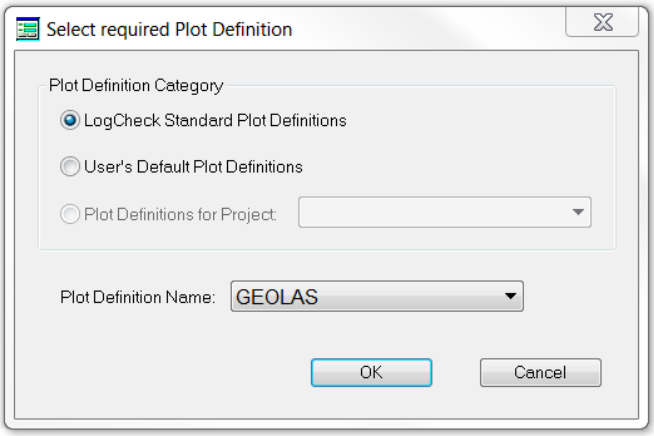
In the figure on the right, a new plot definition will be created specific to the TRAINING project, and its name will be GEOLASPR.



10.4 Opening Plot Definition Files

A plot definition file can be opened by going to File > Open > Plot Definition. This initially displays the following dialog that allows the selection of the plot definition file:

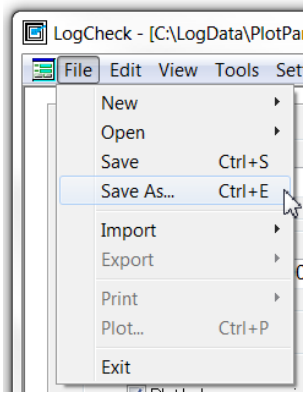
This form allows you to choose either a default plot definition, or one that is specific to the project. Choose the required plot definition, then click the OK button (hidden in the above diagram).

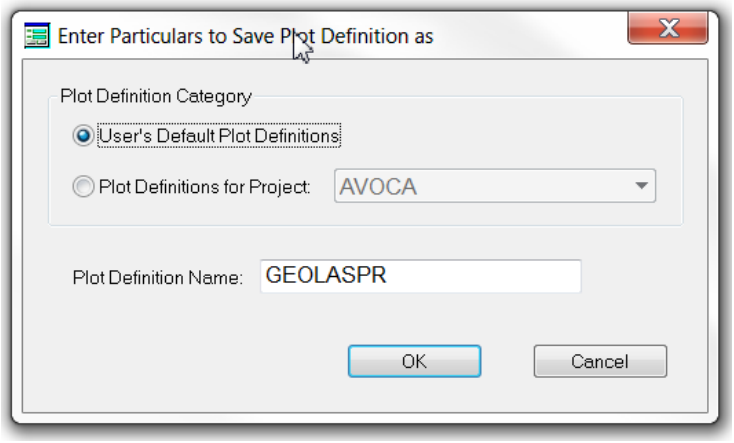


10.5 Copying a Plot Definition File

An existing plot file can be copied to another plot file – and presumably this will then have some modification that wasn't present in the original definition. To copy a plot file:

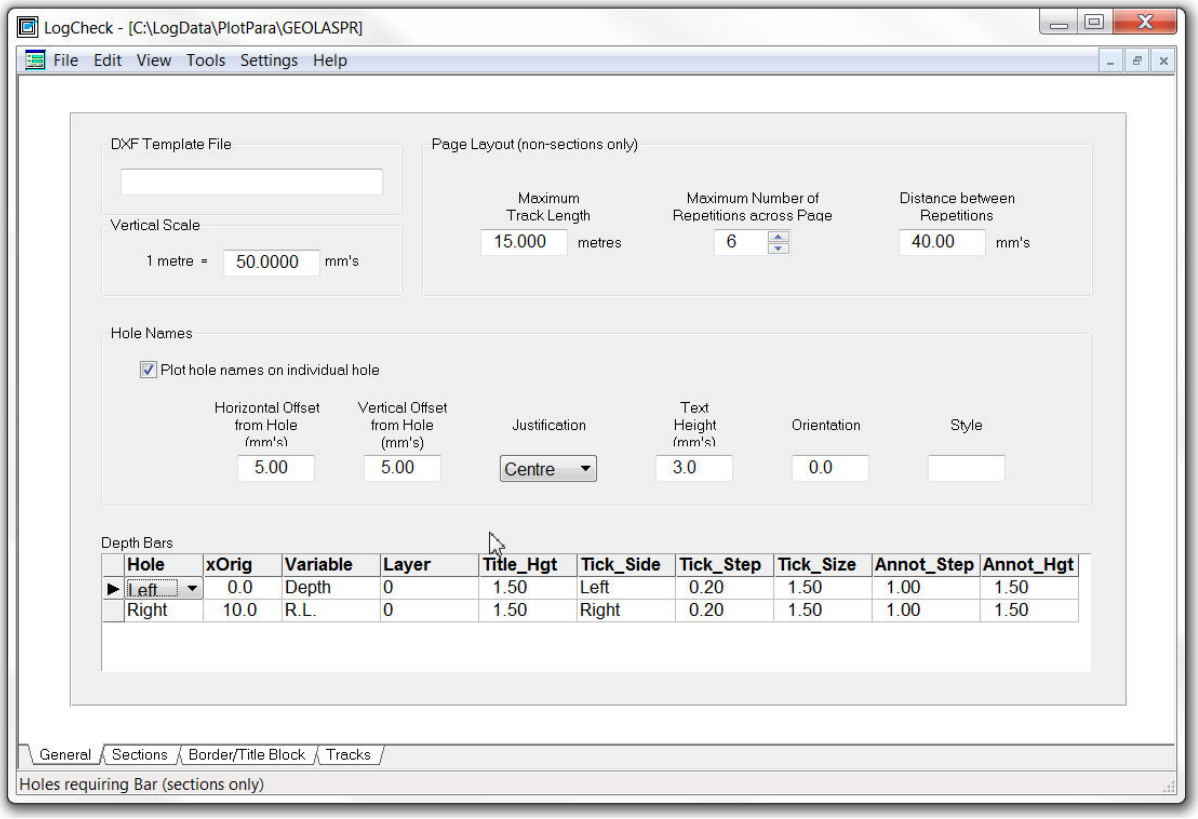
1. Open an existing plot file.
2. From the File menu, select Save As (as shown on the left).
3. Enter a new name for the plot (as shown on the right).





10.6 The Plot Definition Form

An example of the Plot Definition form is shown below:



The tabs in this form and their purpose are:

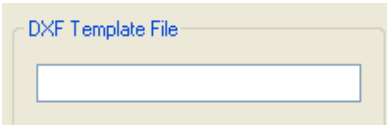
- General: Set options for the DXF template file, how to draw the hole name and depth bars, page layout and vertical bars.
- Sections: Set options for drawing sections.
- Border/Title Block: Set options for drawing the border and title block.
- Tracks: Set options for the location and content of the various tracks that are to be drawn on the plot.

10.7 General Tab

The parameters that can be set in the General tab (which is shown on the previous page) include:

- The DXF template file,
- The vertical scale,
- Page layout – such as maximum track length and number of repetitions,
- Options on how and where to position the name of the hole on the plot,
- Depth bar formatting.

10.7.1 DXF Template File



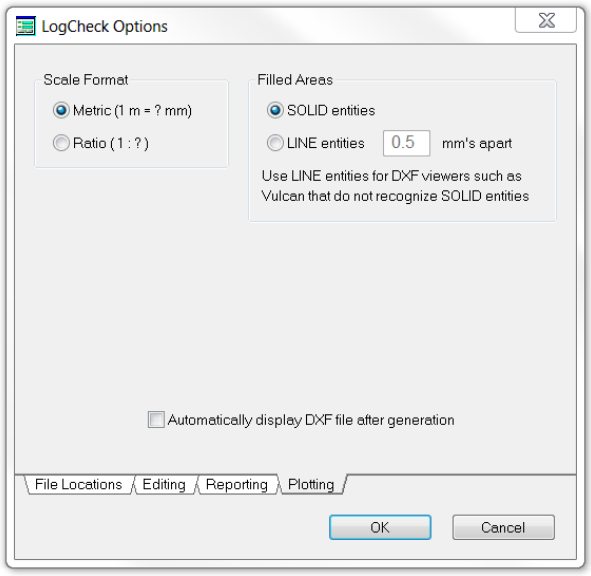
When *LogCheck* creates a DXF file, it builds on another DXF file – that is, the DXF template. If this field is left blank, *LogCheck* uses its own default template, called *LogCheck*.dxf. However, the user can specify another template in this field. DXF template files are stored in the folder \Program Files*LogCheck*\PlotPara. The search path for DXF template files is the same as for the plot definition files

The file *LogCheck*.dxf. is an empty DXF file that contains setup data only and does not contain any graphics commands. The user can set up their own DXF file template. This allows you to set up your own default legends and title block for plots. *LogCheck* can now produce a simple title block.

10.7.2 Vertical Scale

Vertical scale is the vertical scale used to plot the log data. The vertical scale is specified in the General tab In order to get the scales that you have set up in *LogCheck* to work as they are meant to in TrueView/AutoCad, in TrueView printer setup, you must have the plot scale set up so that 1 mm = 1 unit, as the drawing unit in *LogCheck* is always millimetres.

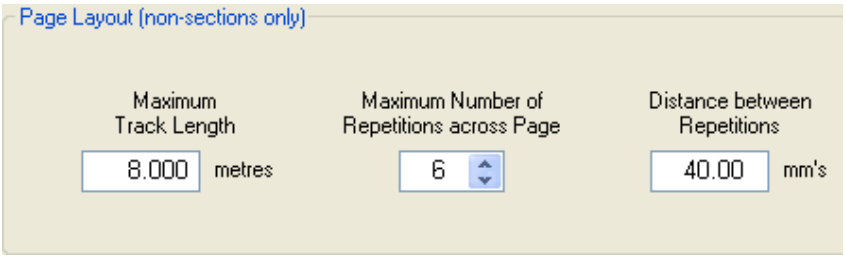
In *LogCheck* > Options > Plotting tab, the scale format can be set as either metric or ratio, as shown on the right. For example, if metric 1 metre (on ground) = 20mm on paper, the ratio for this is 1:50.



10.7.3 Page Layout Panel

The Page Layout panel of the General tab has parameters that control the maximum track length and distance between repetitions. These parameters only apply when a single hole is being plotted (they do not apply if a section is being plotted – in this case, these values are set in the Sections tab).

The page layout parameters are displayed on the right:



10.7.3.1 Maximum Track Length

The maximum track length is the maximum amount of hole that will be displayed going down the page.

10.7.3.2 Maximum Number of Repetitions

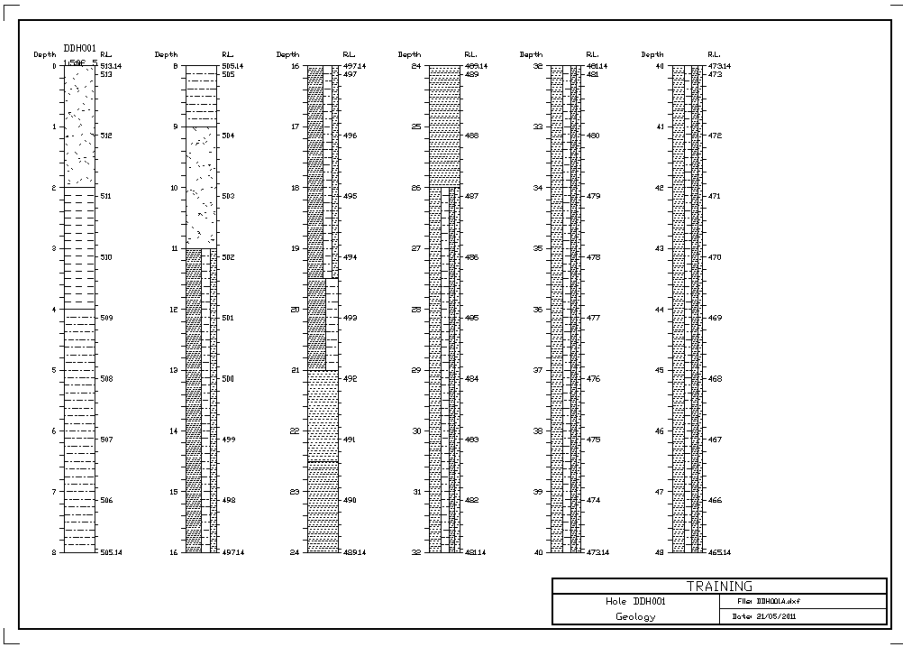
The maximum number of repetitions is the maximum number of times that a track is repeated across the page.

If there is a part of the hole left over, *LogCheck* writes the plot data into separate DXF files, identified by the hole name and a letter. For example if the hole name is D1234, and there are multiple plot files, the default names of the plot files are D1234A.dxf, D1234B.dxf, D1234C.dxf. If there are more than 26 files, the 27th would become D1234AA.dxf.

10.7.3.3 Distance between Repetitions

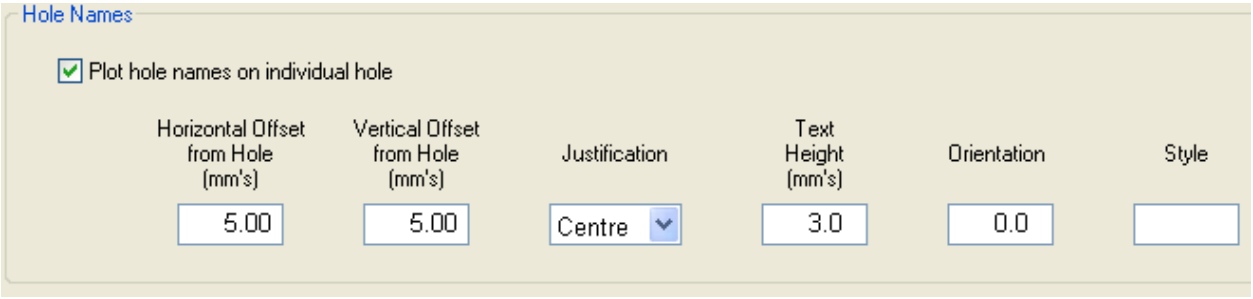
Where there are repetitions of the track across the page, this specifies the distance between them in millimetres.

The page layout example above would plot 6 logs across the page separated by 40mm. The first log is from 0-8m, the second from 8-16, etc.



10.7.4 Positioning of Hole Names

The hole name positioning parameters determine how the hole name for each hole is placed on the plot. This panel is located in the General tab, and is shown below:

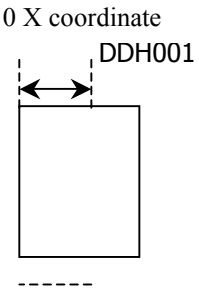


10.7.4.1 Plot Hole Names

If this checkbox is checked, the hole number is printed on the plot, otherwise it is not.

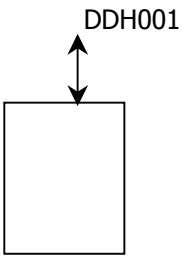
10.7.4.2 Horizontal Offset from Hole

The horizontal offset is the offset from the 0 X coordinate where the hole name will be printed. In the example on the right, the width of the log is 10mm, the ho, the 0 X coordinate is the left hand edge of the log. Where the Justification is set to Centre, it references the bottom of the hole text.



10.7.4.3 Vertical Offset from Hole

The vertical offset is the offset from the 0 Y coordinate where the hole name will be printed, as shown on the right.



10.7.4.4 Justification

Justification relates to placement of text relative to the horizontal offset; it can be either Left, Right or Centre.

10.7.4.5 Text Height

Text height is the vertical size of the text in millimetres.

10.7.4.6 Orientation

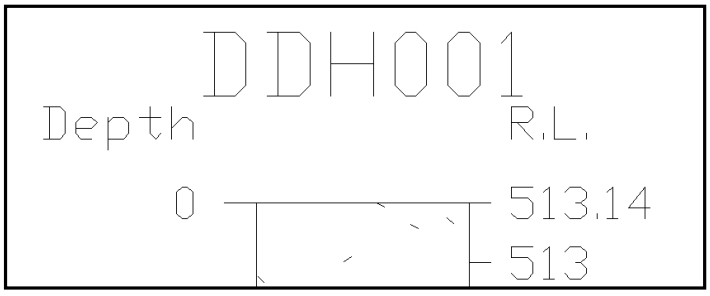
The orientation is the angle from the horizontal that the text will be printed. For example, a value of 0 will display the hole name horizontally, and a value of 90 will display the text vertically.

10.7.4.7 Style

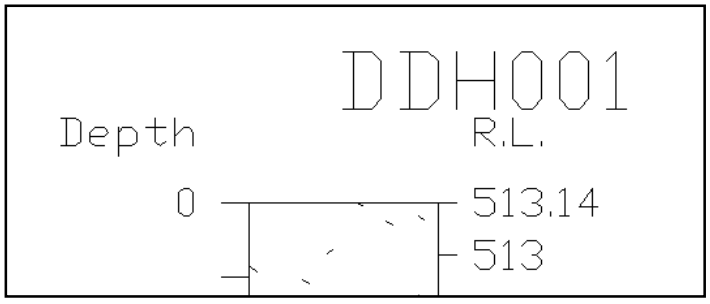
The Style parameter is not currently used.

Examples of changing the position of hole names are shown below:

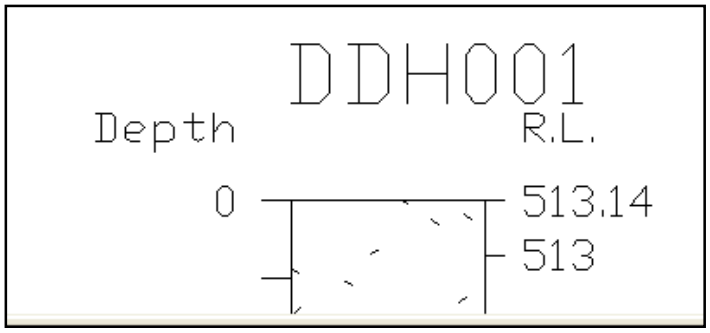
- Justification set to Centre,
  Horizontal offset set to 5 mm:



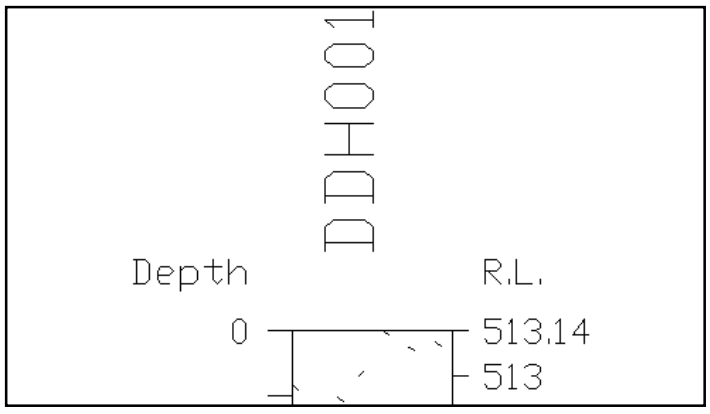
- Justification set to Left
  Horizontal offset set to 5 mm:



- Justification set to Left
  Horizontal offset set to 0 mm:

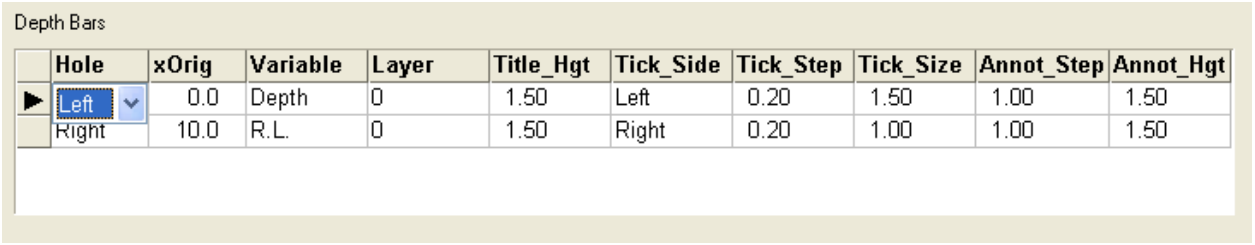


- Orientation set to 90,
  justification set to Left
  Horizontal offset set to 5 mm:



10.7.5 Depth Bars

Depth bars determine how the depth and RL ticks are formatted on the plot. The Depth Bars panel is located in the General tab. Depth bars can be added to the end of the existing depth bar rows, or deleted by accessing the Edit menu. To append a track, go to Edit > Append Rows, and a new track is added to the grid. When a Depth Bar is appended, it copies the values from the previous row down to the new row.


Depth Bars

Hole	xOrig	Variable	Layer	Title_Hgt	Tick_Side	Tick_Step	Tick_Size	Annot_Step	Annot_Hgt
Left	0.0	Depth	0	1.50	Left	0.20	1.50	1.00	1.50
Right	10.0	R.L.	0	1.50	Right	0.20	1.00	1.00	1.50

10.7.5.1 Hole

The options are Left, Right or All. This specifies whether the depth bar goes on the left or right side of the hole plot. Adding extra rows adds an additional depth bar to the plot.

10.7.5.2 xOrig

The xOrig column specifies the position of the depth bar. A value of 0 means that the depth bar will be plotted down the left hand edge of the lithology pattern, and extending to the left. If the lithology pattern is 10 mm wide, the second line in the above example means that the RL (reduced level).will be plotted down the right side of the pattern, with the bars going to the right.

10.7.5.3 Variable

The variable that is plotted can be either the depth down the hole, or the RL

10.7.5.4 Title_Hgt

The Title_Hgt column specifies the height of the title (either “Depth” or “RL”) that appear on the depth bar.

10.7.5.5 Tick_Side

The Tick_Side column specifies whether the ticks are drawn to the left or right hand side.

10.7.5.6 Tick_Step

The Tick_Step column specifies how much of the log is represented by the distance between two ticks. For example, a value of .2 means that a tick will be placed every .2 m.

10.7.5.7 Tick_Size

The Tick_Size column specifies the length of a tick in millimetres..

10.7.5.8 Annot_Step

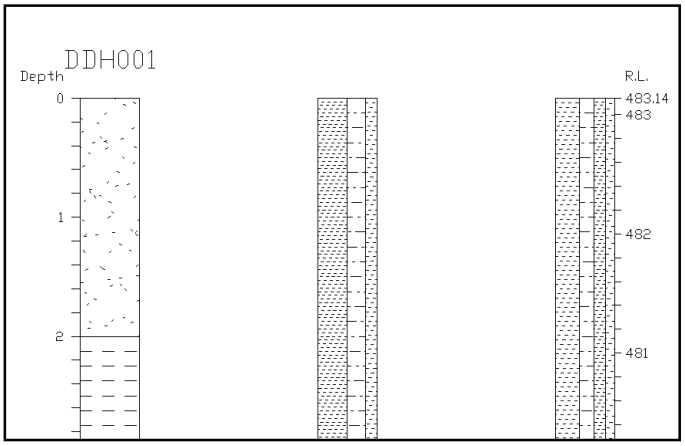
The Annot_Step column specifies where the numbers are printed – as not every tick has a number.

10.7.5.9 Annot_Hgt

The Annot_Hgt column specifies the height of the numbers that appear on the depth bar.

10.7.6 Examples of Settings in the General Tab

For the previous plot definition (GEOLASPR), the resulting plot looks like:



Note the "Depth" on the left of the plot, and "R.L." on the right side of the plot. The tick step is 0.2, giving 5 to the metre, and the Annot_Step is 1.0 metres.

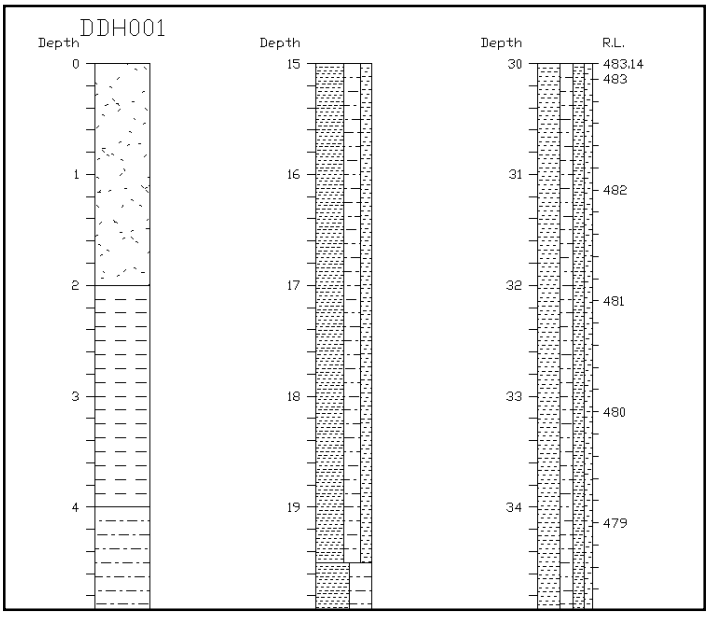
There are three repetitions across the page.

By altering the previous plot definition so that the for the Depth variable, the Hole parameter is changed to All,

Depth Bars

	Hole	xOrig	Variable	Layer	Title_Hgt	Tick_Side	Tick_Step	Tick_Size	Annot_Ste
▶	All	0.0	Depth	0	1.50	Left	0.20	1.50	1.00
	Right	10.0	R.L.	0	1.50	Right	0.20	1.00	1.00

The following plot results. Notice that now all repeat sections have the depth bars on them:

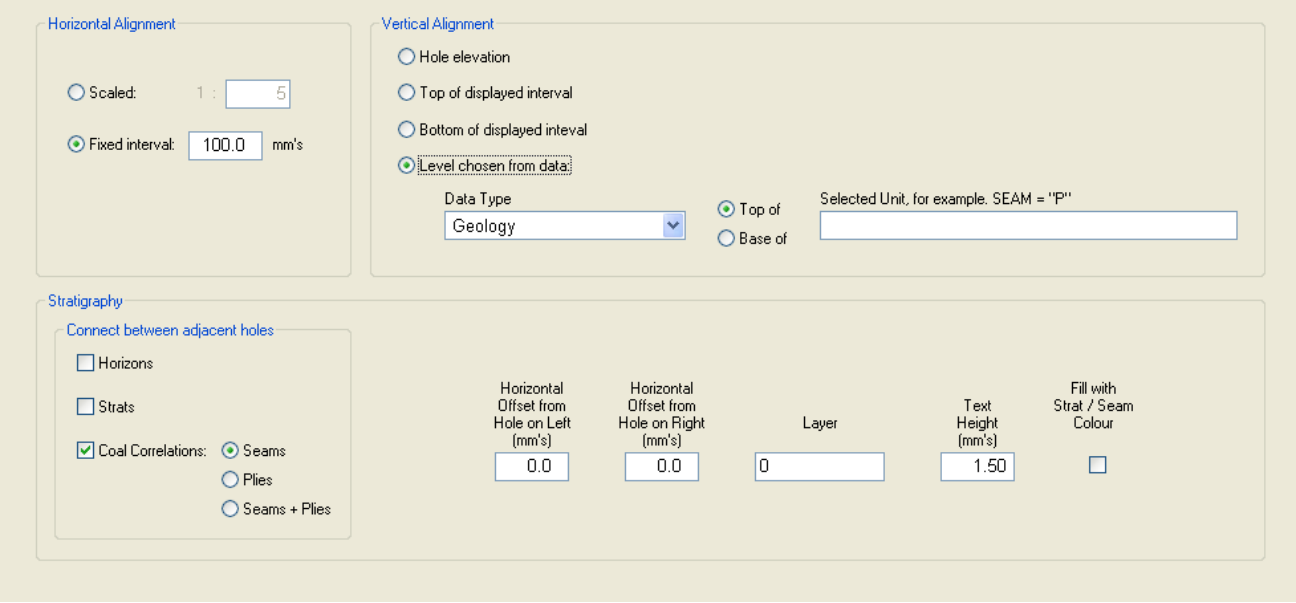


Note: the above plot requires that in the Sections tab (described in the following section), the Vertical Alignment needs to be set to Top of displayed interval.

10.8 The Sections Tab

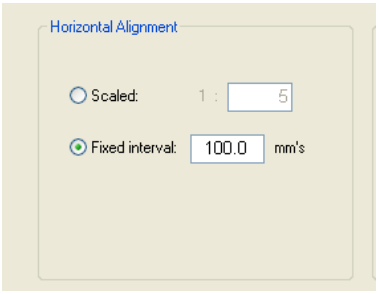
The Sections Tab sets parameters to be used when plotting sections. The three panels in this tab are:

- Vertical alignment.
- Horizontal alignment.
- Stratigraphy – for connecting between adjacent holes.



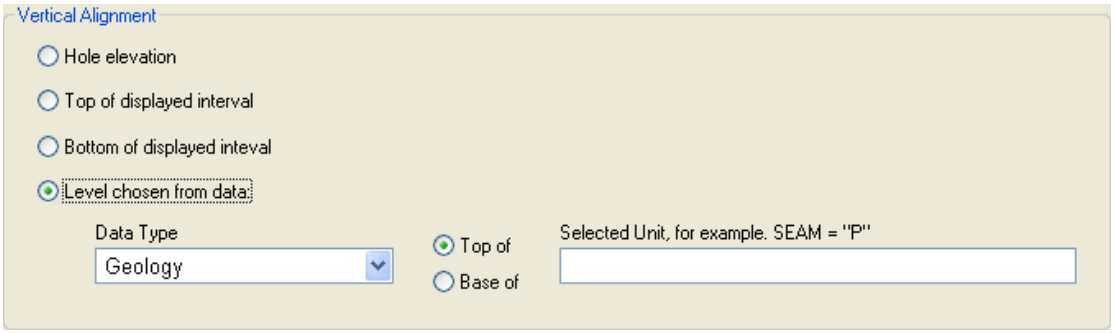
10.8.1 The Horizontal Alignment Panel

The Horizontal Alignment panel of the Sections Panel allows either a scale ratio or a fixed interval to be chosen for the plot.



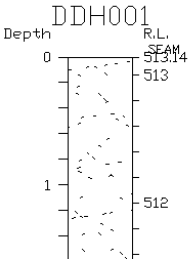
10.8.2 The Vertical Alignment Panel

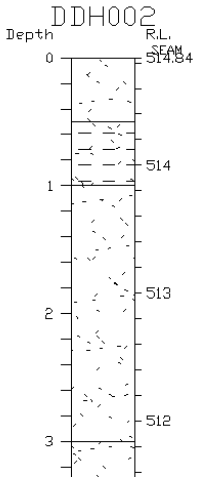
The Vertical Alignment panel allows the holes to be aligned by: Hole Elevation, Top of displayed interval, Bottom of displayed interval, or a level chosen from the data, as shown below:



10.8.2.1 Alignment by Hole Elevation

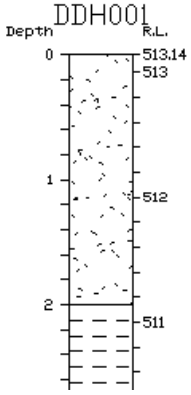
An example of vertical alignment by hole elevation is shown below:

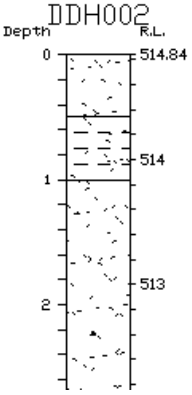




10.8.2.2 Alignment by Top of Displayed Interval

An example of vertical alignment by top of displayed interval is shown below:



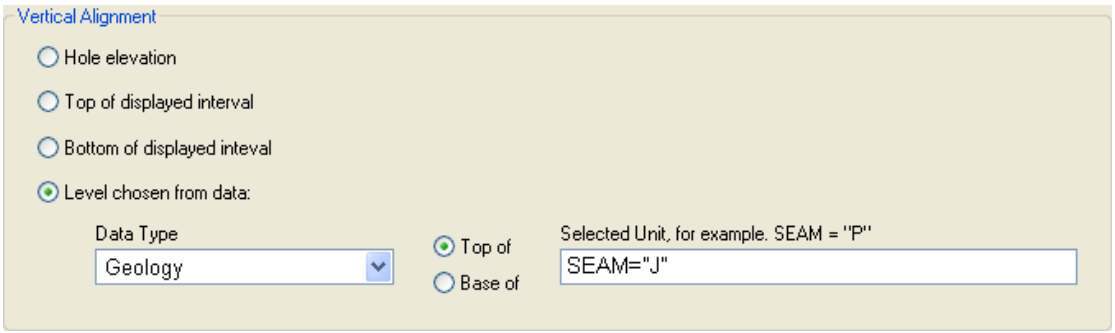


10.8.2.3 Alignment by Bottom of Displayed Interval

An example of vertical alignment by bottom of displayed interval is shown below:

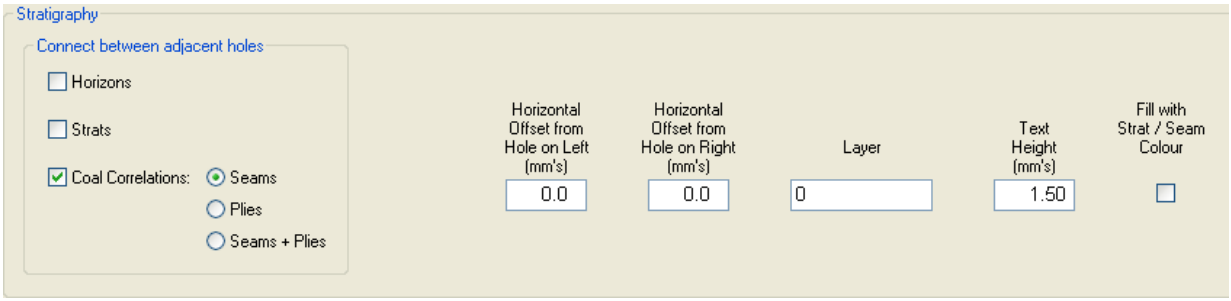
10.8.2.4 Alignment by Level Chosen From Data

Vertical alignment can also be specified by a level chosen from the data. By specifying "SEAM="J", the connections are aligned to the top of this seam:



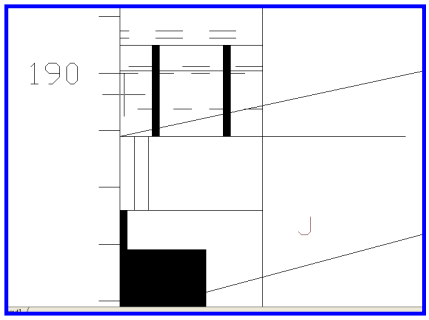
10.8.3 The Stratigraphy Panel

The Stratigraphy panel of the Sections tab allows the stratigraphic units to be chosen for connection between the holes on the section. Connections between holes can be made on the basis of Horizon, Strats or/and Coal Correlations (Seams, Plies or Seams+Plies):

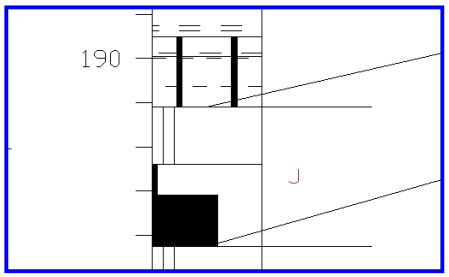


Horizontal offsets can be specified for holes on the left and right hand side of a connection.

If connections are drawn between holes (eg the Seams box is ticked), the Horizontal offset alters the position where the connecting lines are drawn on the lithology column. The effect of this value can be seen in these two examples.

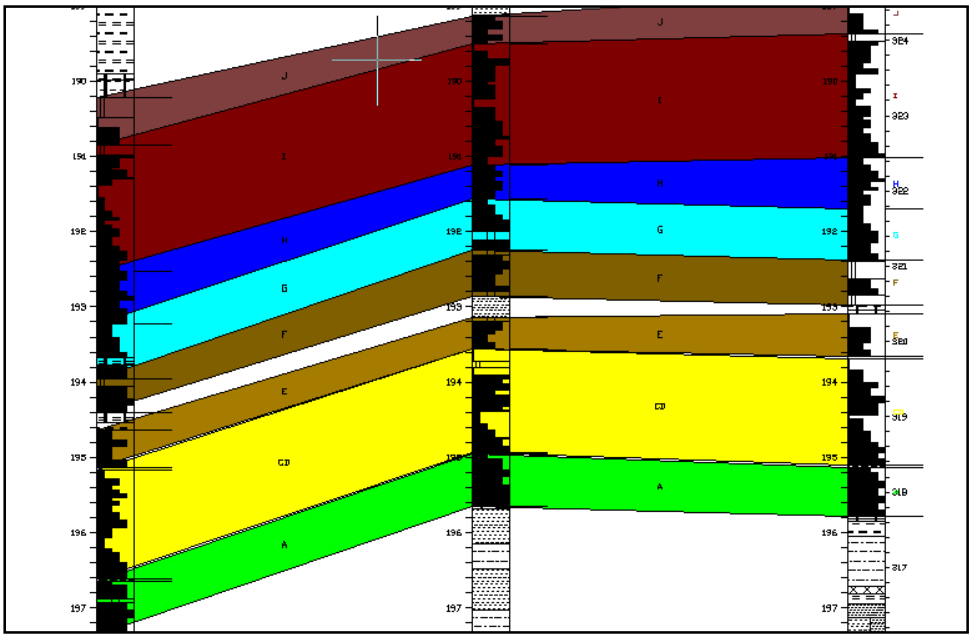


(a) Horizontal offset set to 0 mm – the connecting lines start at the left edge of the lithology column.

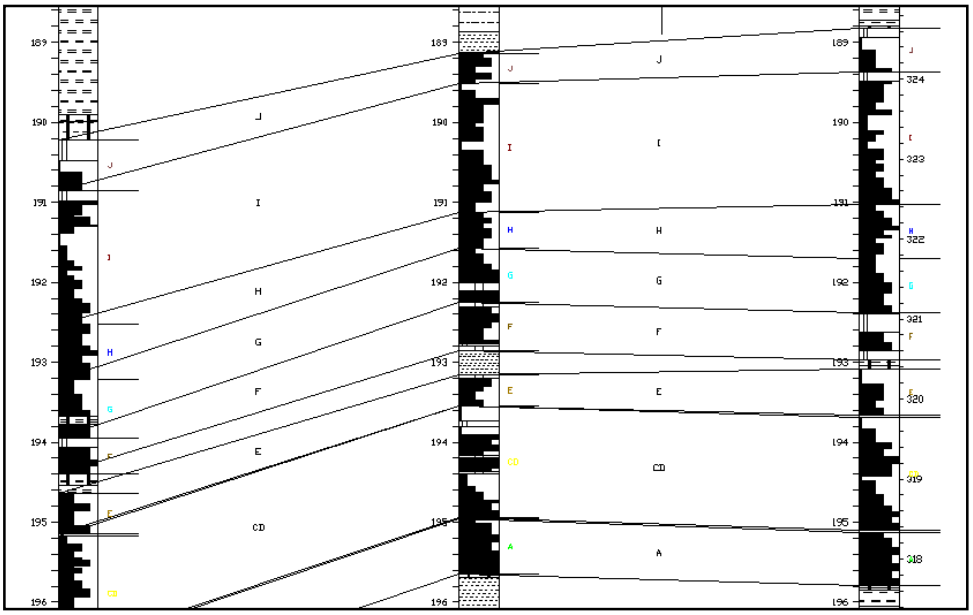


(b) Horizontal offset set to 5mm – the connecting
lines start 5 mm from the left edge of the lithology column.

The following example shows the seams connected, and with the Colour box ticked:



The following example is the same as the previous plot, except that the Colour box was not checked:

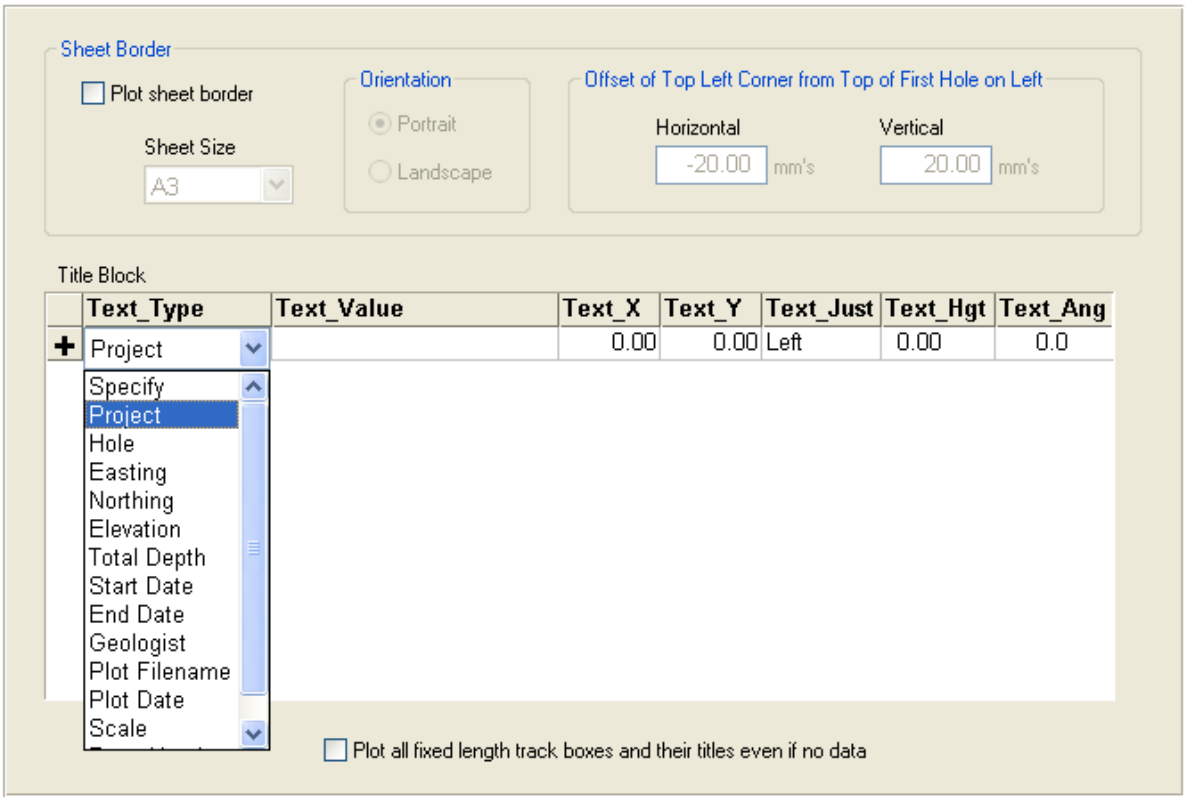


To plot a section:

- Define the holes that will be plotted on the section. (File > New > Hole Set Definition), if it doesn't already exist.
- Then open the hole data for that section (File > Open > Hole Data).
- Generate the plot file (File > Plot).

10.9 The Border/Title Block Tab

The Border /Title Block tab allow the user to draw a border around the plot, and specify the position of the title block and its entries. For a new plot definition, this tab is shown below:



If the Plot Sheet Border box is checked, the remaining fields in the Sheet Border panel are enabled. The orientation of the plot and position of the border relative to the top left hole can be specified.

10.9.1 Specifying Title Block Text Entries

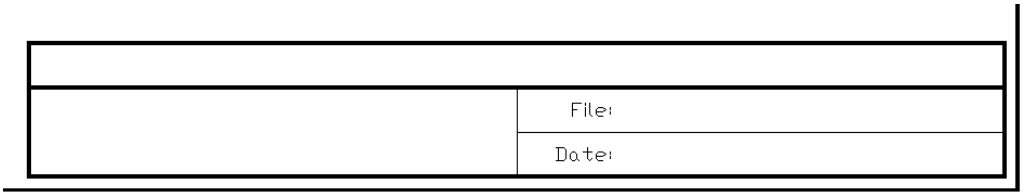
The title block of a plot is made up of a number of fixed panels where you can place text relevant to the plot. Text entries can be added to the title block by specifying the text type and its location, inserted between existing tracks or deleted by accessing the Edit menu. To insert a text entry, select Edit > Insert Rows Above/Below or Append Rows, and a new track is added to the grid. Alternatively, when on the last row, press the down arrow key to add a new blank row.

Each row has the following values:

- **Text_Type**: The text type of the entry. This column displays a drop down box with the available *LogCheck* variables that can be displayed in the title block.
- **Text_Value**: For the Text_Type "Specify", you can enter some arbitrary text in this column.
- **Text_X**: The X coordinate of the text relative to the plot.
- **Text_Y**: The Y coordinate of the text relative to the plot.
- **Text_Just**: The text justification (left, right or centre).
- **Text_Hgt**: The height of the text in mm.

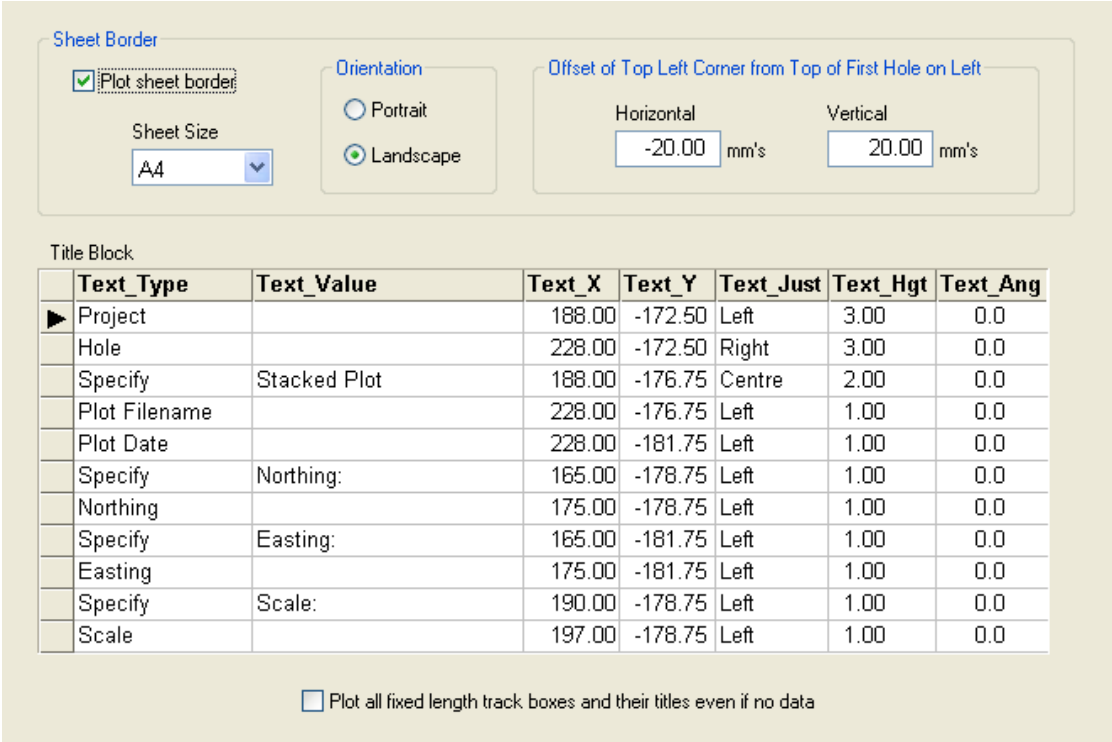
- **Text_Ang**: The angular rotation of the text.

The panels in the default title block are fixed, and it appears as follows:



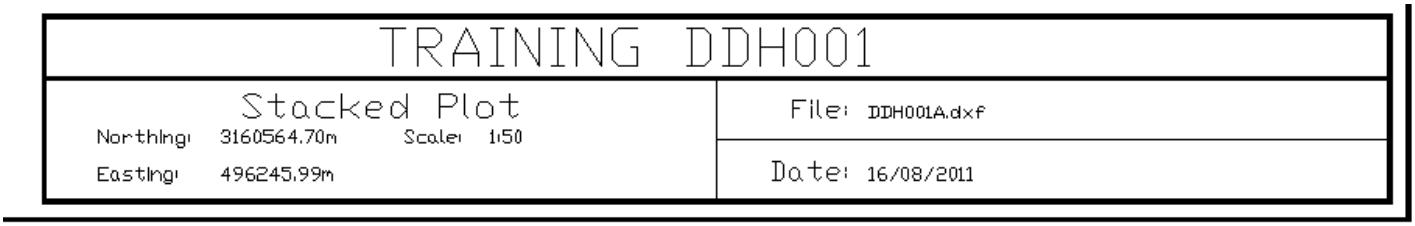
Note that if the Sheet Size is changed, for example, from A4 to A3, *LogCheck* re-calibrates the coordinates of each text entry to fit the new plot size.

For the following title block parameters:



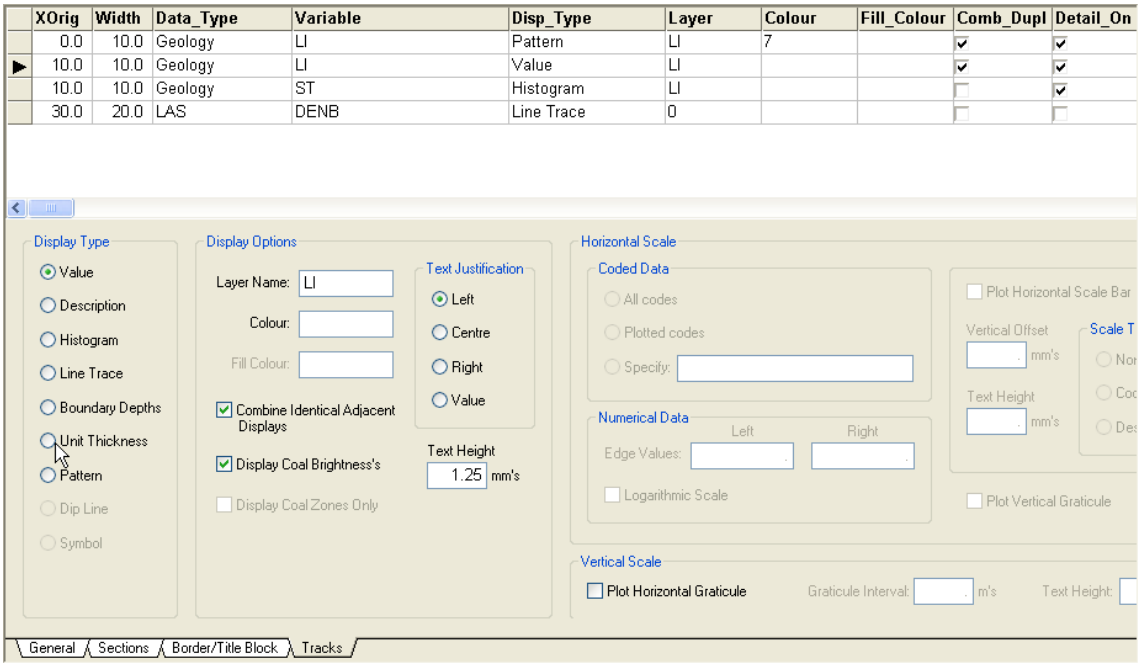
Text_Type	Text_Value	Text_X	Text_Y	Text_Just	Text_Hgt	Text_Ang
Project		188.00	-172.50	Left	3.00	0.0
Hole		228.00	-172.50	Right	3.00	0.0
Specify	Stacked Plot	188.00	-176.75	Centre	2.00	0.0
Plot Filename		228.00	-176.75	Left	1.00	0.0
Plot Date		228.00	-181.75	Left	1.00	0.0
Specify	Northing:	165.00	-178.75	Left	1.00	0.0
Northing		175.00	-178.75	Left	1.00	0.0
Specify	Easting:	165.00	-181.75	Left	1.00	0.0
Easting		175.00	-181.75	Left	1.00	0.0
Specify	Scale:	190.00	-178.75	Left	1.00	0.0
Scale		197.00	-178.75	Left	1.00	0.0

An example of the title block produced by these settings is shown below:



10.10 The Tracks Tab

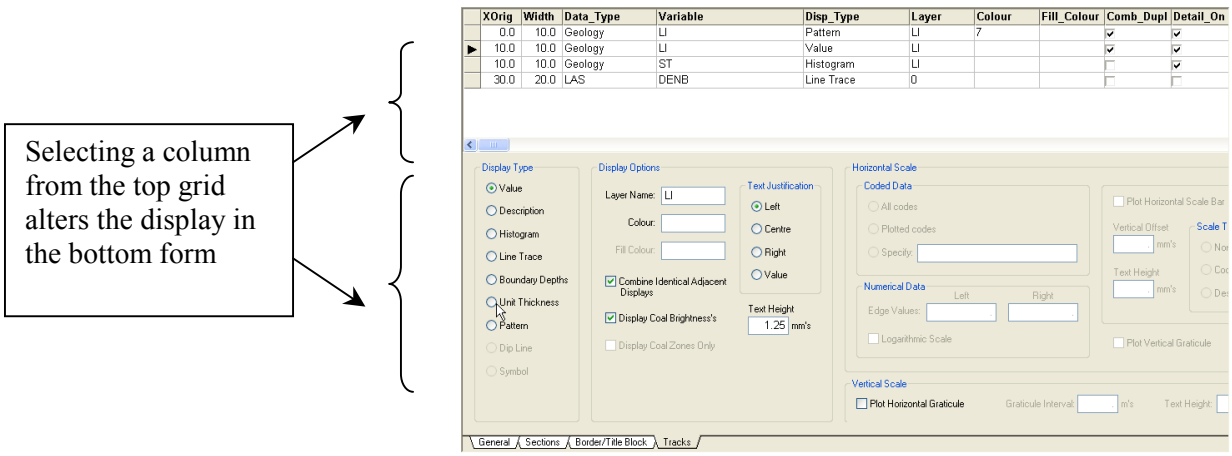
The Tracks tab determines the columns and the appearance of the columns that will be displayed on a plot. Tracks can be inserted between existing tracks, added to the end of the existing tracks, or deleted. An example of the Tracks tab is shown below:



In this example, there are two tracks: both with a data type of Geology; the first track plots the lithology as a pattern and the second track plots the Seam variable as a Value type. The second track will be plotted 10mm from the start of the Lithology.

10.10.1 How This Form Works

The top grid panel has columns for all the parameters that can be set for plotting a track. The bottom panel changes depending on which column in the top grid is currently selected.



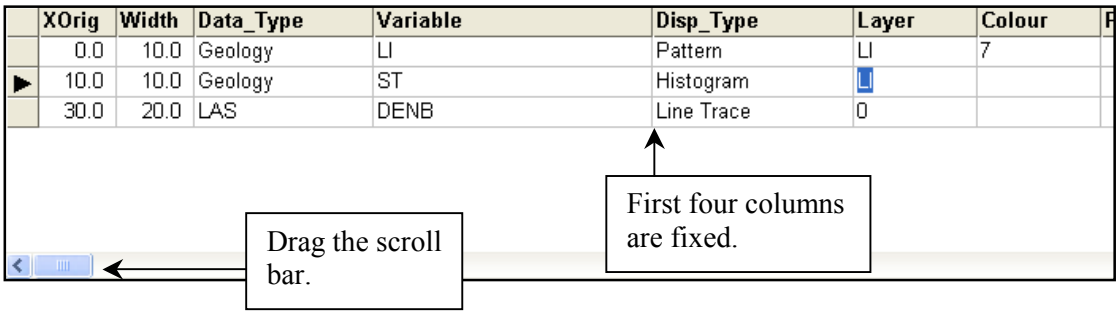
Setting values in the top grid updates the corresponding values in fields in the panel, and setting values in the panel fields updates the grid. The bottom section of the Tracks tab has the following panels that control settings in the top grid:

- Display Type panel,
- Display Options panel,
- Horizontal Scale panel,
- Vertical Scale panel and
- Track Title panel.

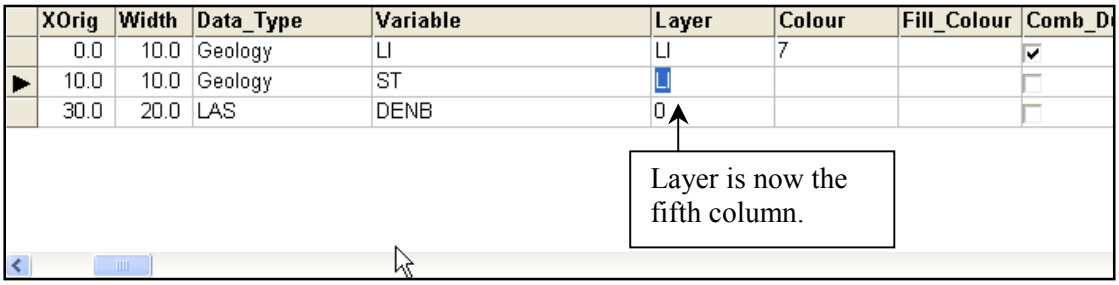
These panels are described in following sections.

10.10.1.1 Scrolling the Grid Panel

To view the remaining columns in the grid panel, drag the knob in the scroll bar.



As this panel is scrolled, the first four columns are frozen (Xorig, Width, Data Type, Variable); the remaining columns are moved left. Scrolling one column to the left, the panel now looks like:



Notice that the Disp_Type column has “disappeared”, and the remaining columns to the right are moved to the left.

10.10.2 Setting Track Position and Width

The position and width of a track can be set with the XOrig and Width columns. These values can be typed directly in the grid.

10.10.2.1 XOrig

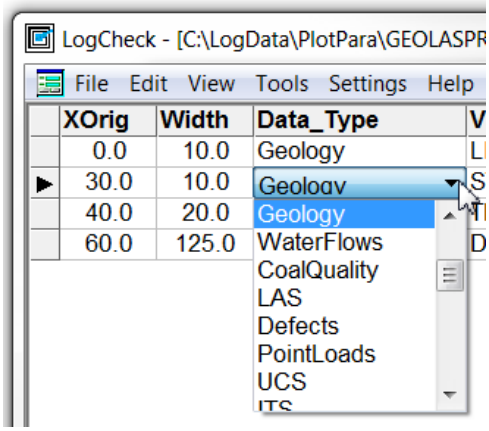
The horizontal offset from the hole on the left edge on the plot.

10.10.2.2 Width

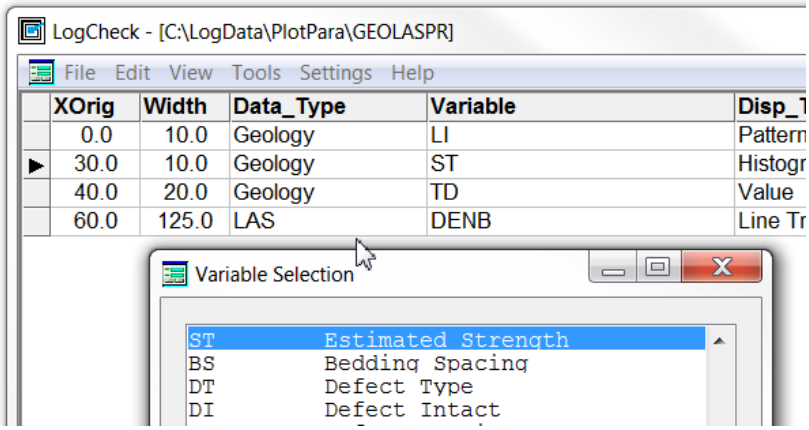
The width in mm of the track – this can be typed directly in the top grid.

10.10.3 Selecting the Data Type and Variable

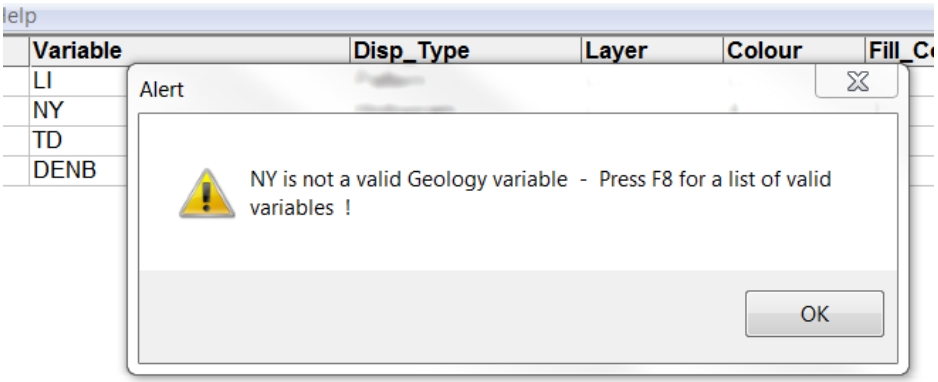
The Data Type of the track is selected from a drop-down box as shown on the right:



The variable is specified by typing its name in the Variable column of the grid. A list of the valid variables can be obtained by pressing the F8 function key.

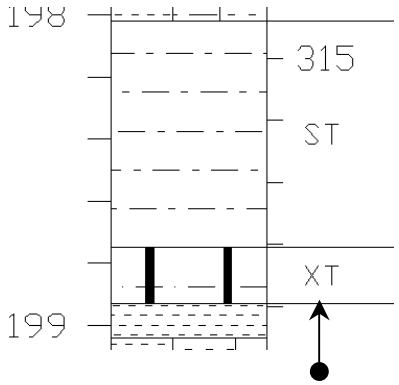
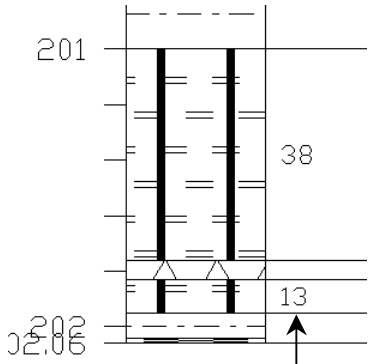
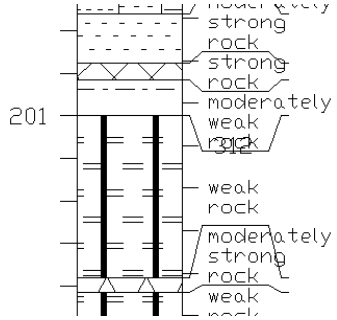
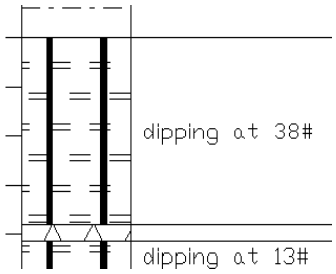
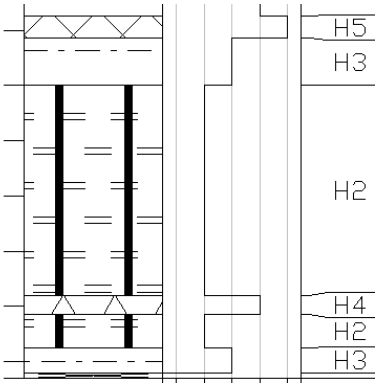
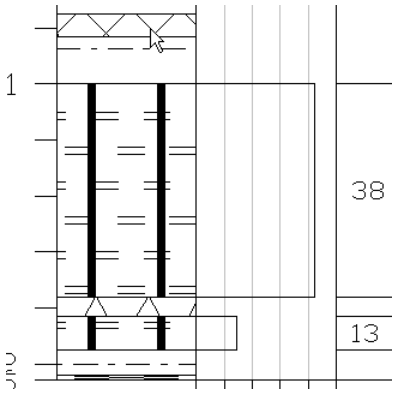


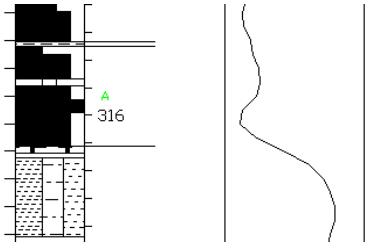
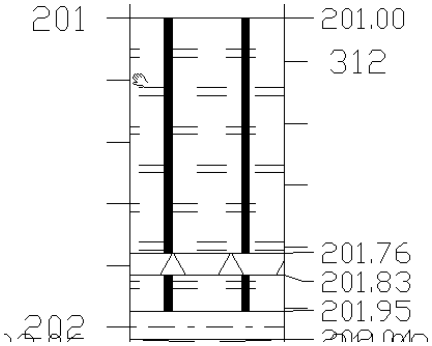
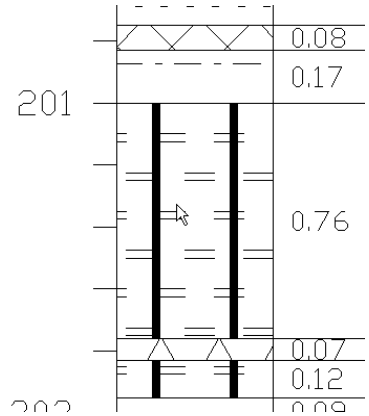
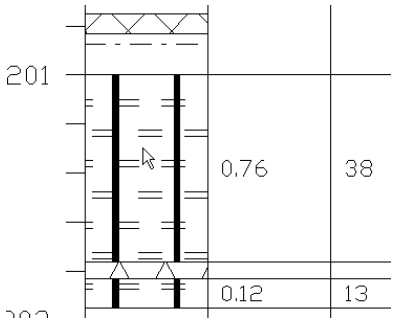
If a non-existent variable is entered, the following message is displayed:



10.10.4 Selecting the Display Type of a Track

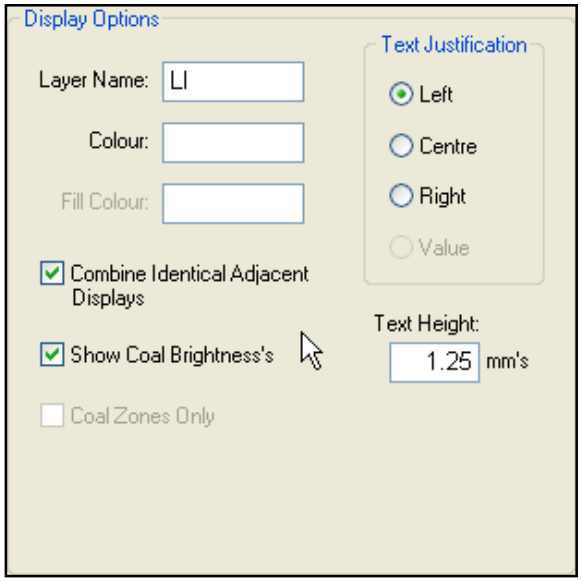
The display of a track is determined by the Disp_Type column. The values available in the drop-down box are: Value, Description, Histogram, Line Trace, Boundary Depths, Unit Thickness, and Pattern. The display of data is determined by whether the data type of the variable is coded (for example, Lithology – LI) or numeric (for example LAS data – DENB).

Display Type	Coded Data - Strength	Numeric Data
Value and Pattern	 Variable: Lithology (LI)	 Variable: Tectonic Dip (TD)
Description	 Variable: Strength (ST)	 Variable: Tectonic Dip (TD)
Histogram	 Variable: Strength (ST)	 Variable: Tectonic Dip (TD)

Line Trace	-	 Variable: DENB.
Boundary Depth	 Variable: Lithology (LI)	-
Unit Thickness	 Variable: Lithology (LI)	 Variable: Tectonic Dip (TD)

10.10.5 The Display Options Panel

The Display Options panel of the Tracks tab has sections that determine the way data is displayed in the plot.



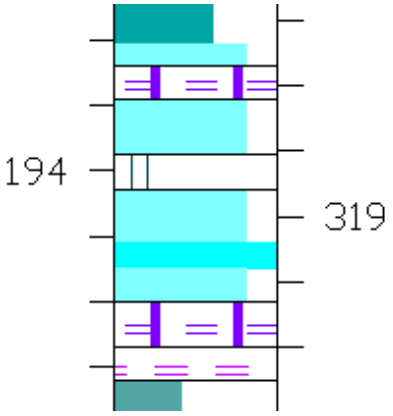
In the Display Options panel, the variables are:

- Layer Name (Layer): The plot layer for the track. This is a user-defined layer name. In AutoCad's TrueView, layers can be turned on or off. If a layer is not specified, it goes on Layer 0.
- Colour (Colour): the colour that the track will be drawn in. It can be either an Autocad colour number or, the colours specified in the *LogCheck* dictionary (eg, LI).
- Fill Colour (Fill_Colour): The Autocad colour number for the histogram.
- Combine Identical Adjacent Displays (Comb_Dupl): combine the identical adjacent displays. This is only available for coded data – it is disabled for numeric data.
- Show Coal Brightness: display coal brightness.

If the track variable is a text data type, the Text Justification options and Text Height field are enabled.

For the Lithology variable, the example on the right shows:

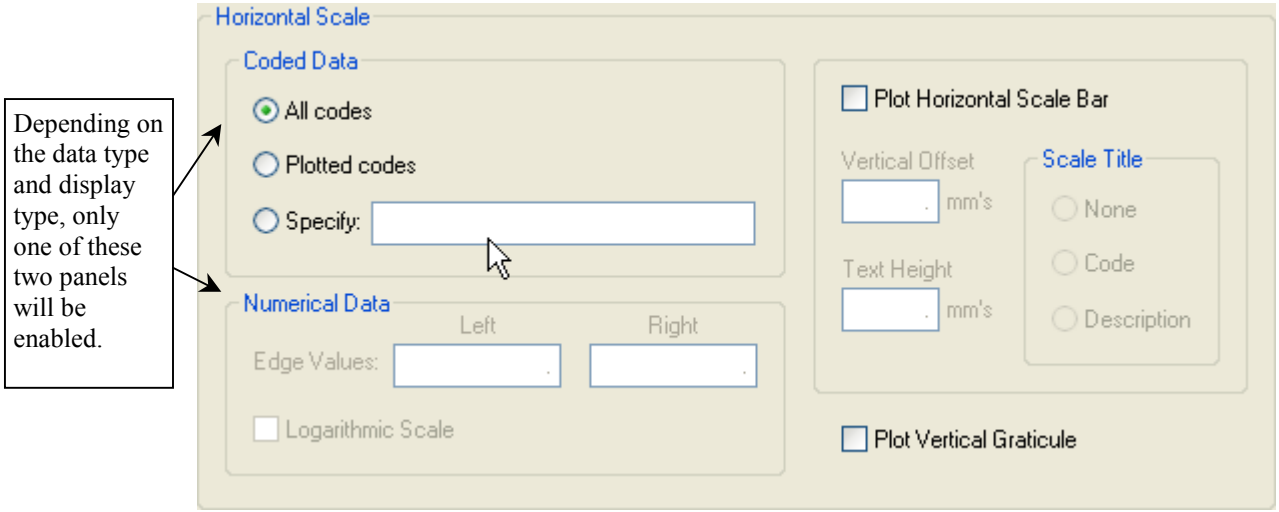
- The lithology displayed as a pattern,
- Specifying the colour of a track using the colours in the Lithology dictionary – by setting the Colour field to LI,
- Displaying the coal brightness.



10.10.6 The Horizontal Scale Panel

The Horizontal Scale panel of the Tracks tab has sections that control the formatting of the horizontal scale for a track. The sections that are enabled vary depending on the data type and display type being plotted:

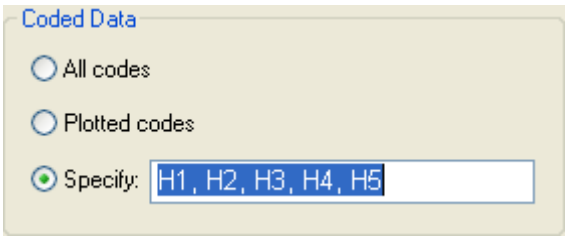
- If the track is a coded value, the Coded Data panel is enabled.
- If the track is numeric data, the Numeric Data panel is enabled.
- If the track display is set to Pattern, the horizontal scale is not relevant, and the entire panel is disabled.

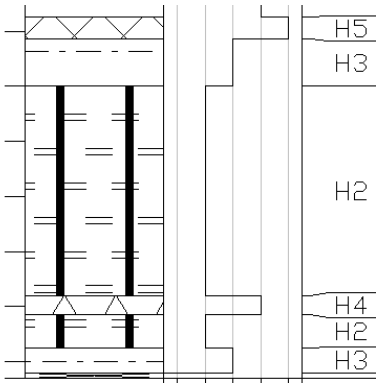


10.10.7 The Coded Data Panel

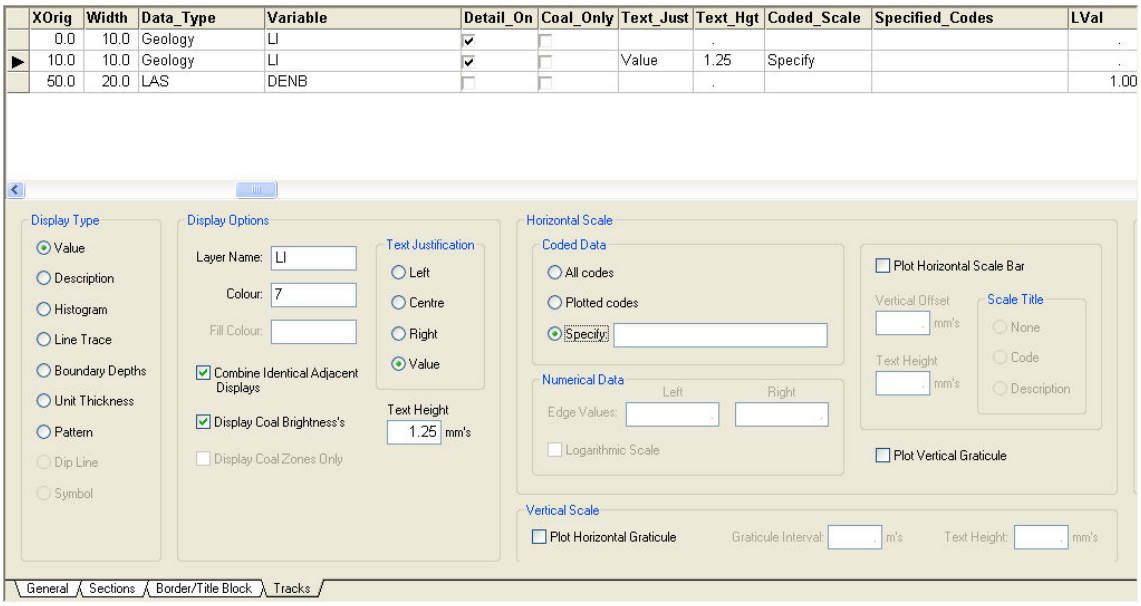
The Coded Data panel of the Tracks tab is only valid if the Disp_Type is set to Histogram or Value. In these cases, the options available are:

- **All Codes**: All codes from the dictionary will be used.
- **Plotted Codes**: Only those codes used in the plot will be used.
- **Specify**: Only those codes that are specified will be used to construct the histogram. In the example below, if the track variable is Strength (ST), and the Disp_Type is Histogram, the relative axis of the histogram can be specified with a comma separated list of values, in this case the order determines the height of a bar:

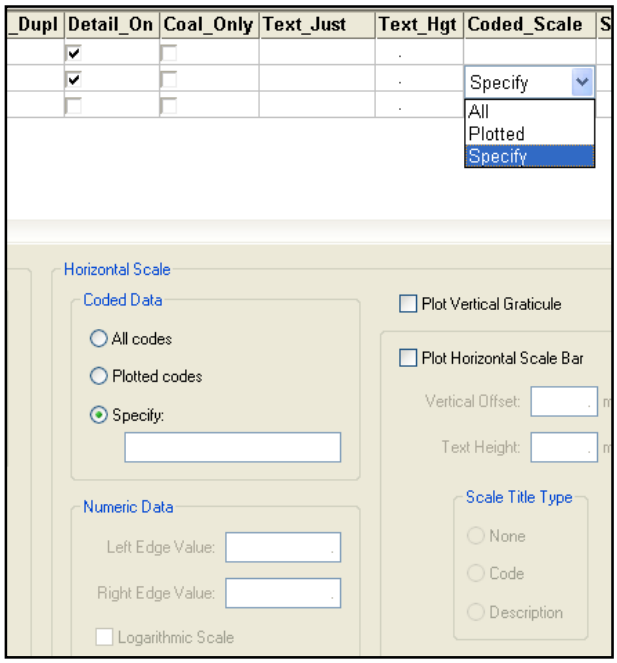




The example below shows that for Variable LI, where Disp_Type is Value, and Text Justification set to Value, the Coded Data panel is enabled:



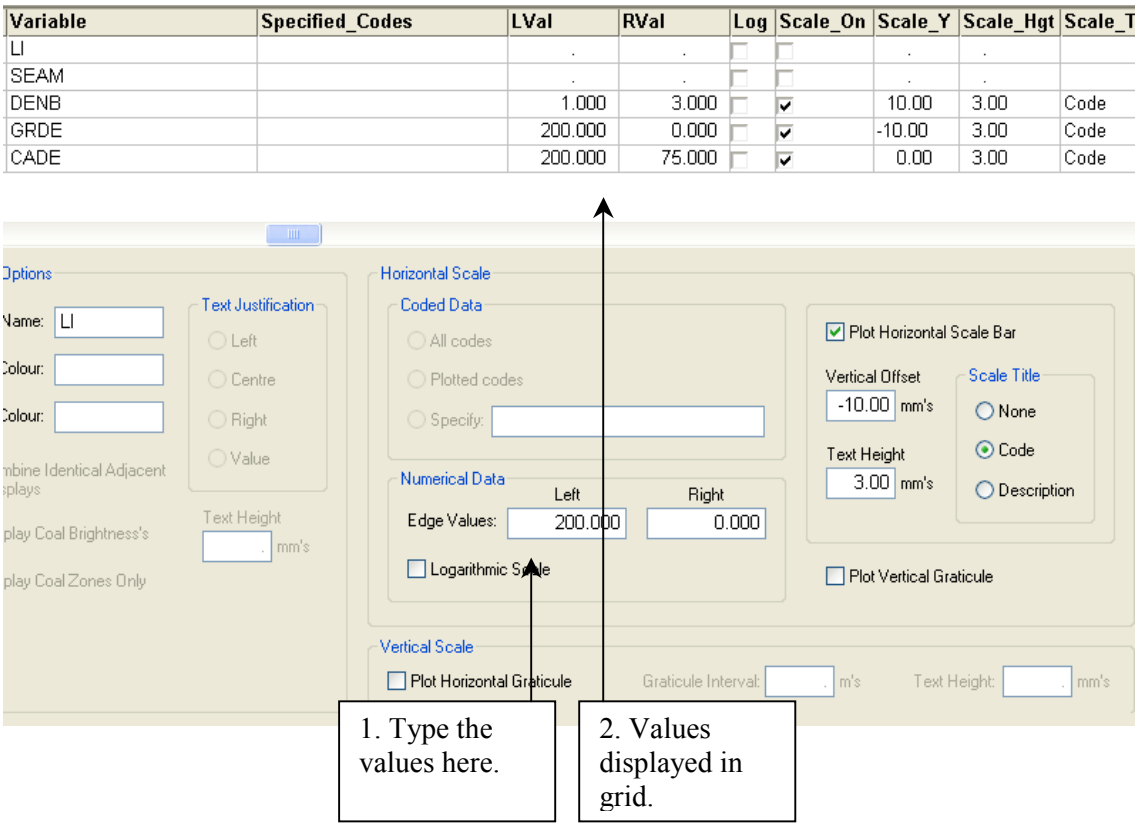
The Coded Data options can also be set in the grid, by selecting one of the items in the drop-down box, as shown on the right:



10.10.8 The Numeric Data Panel

The Numeric data panel of the Tracks tab forms part of the Horizontal Scale panel, and allows the left and right values of the horizontal axis to be specified for tracks with numeric data. For a Line Trace, it is necessary to specify the minimum and maximum values of the axis. These can be specified in the LVal and RVal columns. LVal specifies the variable value at the left end of the track, RVal specifies the variable value at the right end of the track.

The LVal and RVal values must be specified – the axis is only displayed if the Plot Horizontal Scale box is checked. This is described on the following page.



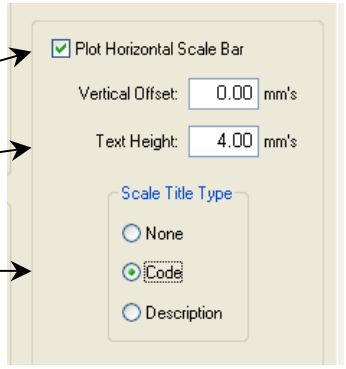
Setting the LVal and RVal fields in the panel will update the display in the grid.

10.10.9 Specifying the Horizontal Scale

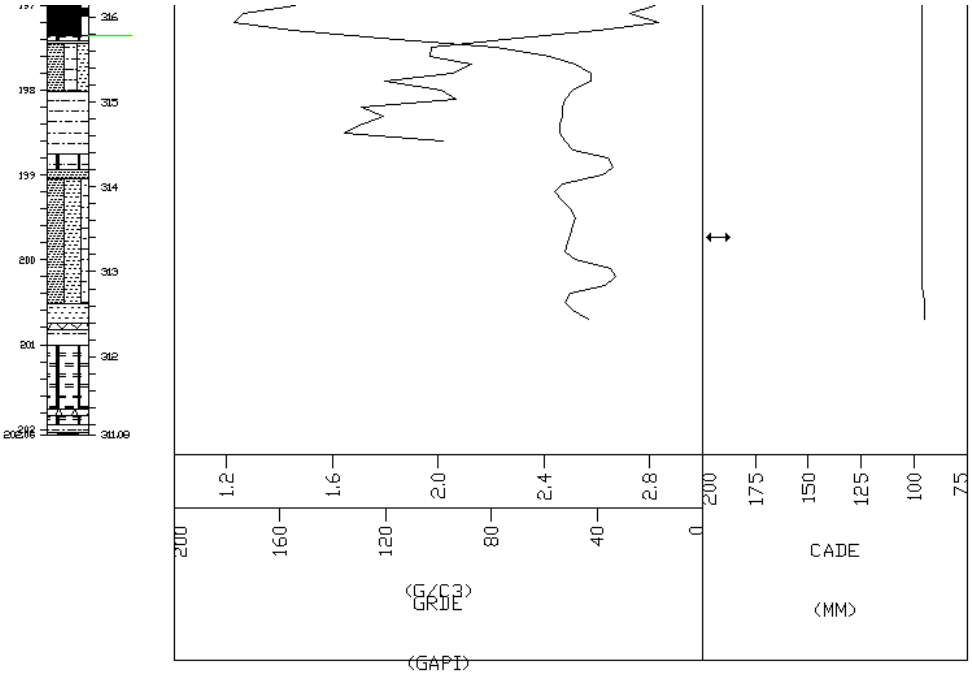
The horizontal scale bar can be displayed at the end of a plot. If the Plot Horizontal Scale Bar option is checked, the remaining fields in this panel are enabled

To display the scale:

- Check the Plot Hor. Scale box,
- Alter the Text Height (eg 4 mm) and
- Click the Code option. The values will then be displayed in the grid.

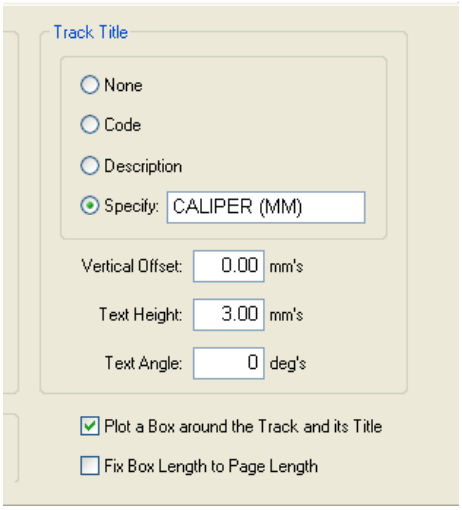


Where one track is overlaid on top of another, the Vertical Offset can be used to move the scale of one of the variables further down the plot so that they don't overwrite each other. In the example below, the Vertical Offset for the GRDE LAS variable was set to –12.5 mm:



10.10.10 The Track Title Panel

The title of a track can be displayed on the plot in the Track Title panel, which is in the Tracks tab. The options are to not have a track Title, to use the Code or Description of the variable (as found in the dictionary), or to specify a title, as shown on the right. The parameters that can be set from this panel are:



- Vertical Offset: the distance down the plot that the title will be printed.
- Text Height: the height of the title in mm.
- Text Angle: the angle at which the title will be drawn.

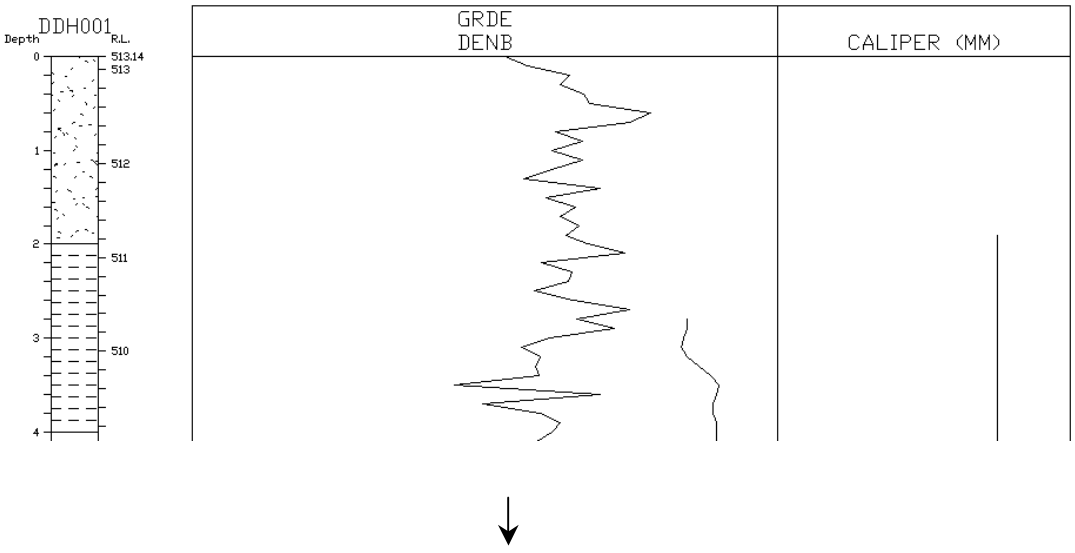
A box can optionally be drawn around the plot, and its length optionally fixed to the page length.

In the GEOLASPR plot parameter file, three LAS variables are plotted; in the example shown below of the Tracks tab, DENB and GRDE both use the Code as the Track Title, whereas the CADE variable is specified as CALIPER (MM). Note that for GRDE, the Title is offset by 5mm down the page, so it is not overwritten which is plotted in the same space as the DENB variable,

	XOrig	Width	Data_Type	Variable	Title	Title_Text	Title_Y	Title_Hgt	Title_Ang	Box	Box_Fixed
	0.0	10.0	Geology	LI	None		.	.		☑	☐
	10.0	10.0	Geology	SEAM	None		.	.		☐	☐
	30.0	125.0	LAS	DENB	Code		0.00	3.00	0	☑	☐
	30.0	125.0	LAS	GRDE	Code		5.00	3.00	0	☑	☐
▶	155.0	62.5	LAS	CADE	Specify	CALIPER (MM)	0.00	3.00	0	☑	☐

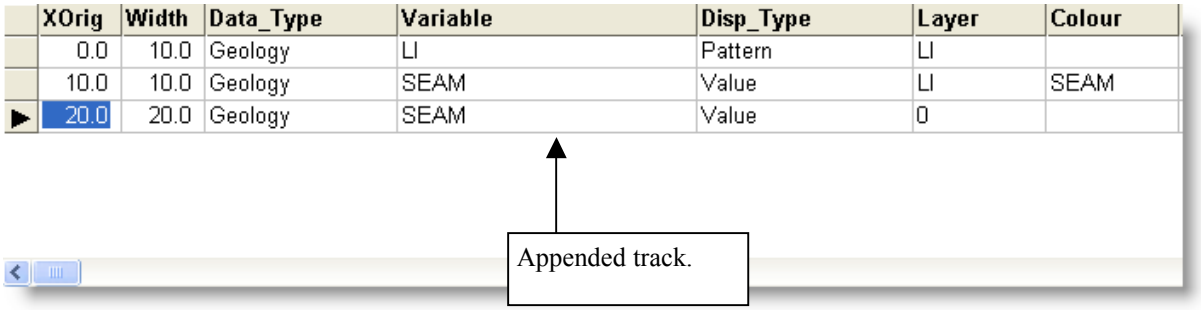
Note that specifying the same values for XOrig and Width results in the tracks being overlaid on each other, as shown with the DENB and GRDE variables.

This results in the following plot:

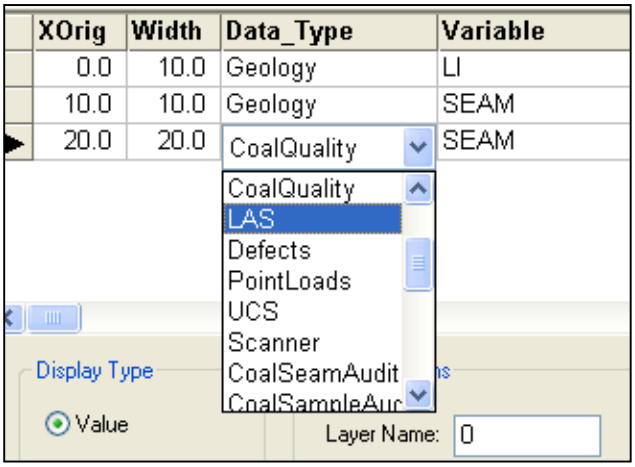


10.11 Adding, Inserting and Deleting Tracks

Tracks can be added to the end of the existing tracks, inserted between existing tracks or deleted by accessing the Edit menu. To insert a track, select the Tracks tab and go to Edit > Append Rows, and a new track is added to the grid, as shown below:



When a track is appended, it copies the values from the previous row down to the new row. However, for this track the LAS data is to be plotted. Click on the Data_Type column, and select LAS from the drop-down box, as shown below:



10.12 Summary of Tracks Parameters

The parameters that can be set in the Tracks tab are:

- Box: Draw a box around the track and its title.
- Box_Fixed: Fix box length to page length.
- Coal_Only: Display only coal zones.
- Coded_Scale: Horizontal scale type (All, Plotted or Specify).
- Colour: The Autocad colour number for the track.
- Comb_Dupl: Combine the identical adjacent displays.
- Data_Type: The data type of the track. This column displays a drop down box with the available data types.
- Detail_On: Display coal brightness.
- Fill_Colour: The Autocad colour number for the histogram and line trace fill the track.
- HGrat_Hgt: Horizontal graticule annotation height (mm).
- HGrat_On: Option to plot the horizontal graticule.
- HGrat_Step: Horizontal graticule interval (mm).
- Layer: The plot layer for the track.
- Log: Use a logarithmic scale for the horizontal scale.
- LVal, RVal: Left and right hand limits of the horizontal scale.
- Scale_Hgt: Horizontal scale height of text (mm).
- Scale_On: Show the horizontal scale.
- Scale_Title: Optional title for the horizontal scale.
- Scale_Y: The vertical offset of the horizontal scale.
- Specified_Codes: If Coded_Scale is set to Specify, the list of codes for the histogram.
- VGrat_On: Option to plot the vertical graticule.
- Title: Title for a track (none, code, description or specify)
- Title_Y: Vertical offset of Title (mm).
- Title_Hgt: Track title height (mm).
- Title_Ang: Track title orientation (degrees).
- Variable: The variable being plotted.
- Width: The width in mm of the track.
- XOrig: The horizontal offset from the hole on the left edge on the plot.

10.13 Plotting the LAS Data

To plot the LAS data:

1. Set up the track data for each LAS variable. For example,

   (a) In the Tracks tab, append a new track and set the Xorig and Width values. Here, the Xorig is moved to 30 mm from the origin, the width is changed to 125 mm.

   (b) Select LAS data as the Data_Type, then the Variable can be changed to one of the LAS variables – in the following example, the DENB variable is typed in, the Disp_Type is set to Line Trace:

	XOrig	Width	Data_Type	Variable	Disp_Type	Layer	Colour
	0.0	10.0	Geology	LI	Pattern	LI	
	10.0	10.0	Geology	SEAM	Value	LI	SEAM
▶	30.0	125.0	LAS	DENB	Line Trace	LI	

2. Open the LAS data (File > Open > Hole Data and select LAS data from the Data Type drop down box), then go to File > Plot, and append the data to the existing plot.

3. Activate TrueView and open the DXF plot file to view the plot.

Chapter 11
File Structure

By the end of this chapter you will be able to:

- Understand the purpose and locations of *LogCheck* files.
- Understand how *LogCheck* selects dictionaries, plot definitions, and graphic editor definitions.

11.1 Introduction

This chapter describes the directory (ie. *folder*) structure that is used by *LogCheck*. It describes the location of the runtime files, the *LogCheck* program and the location and purpose of the different subdirectories that are used by *LogCheck* to store data. The terms *Directory* and *folder* are interchangeable.

11.2 *LogCheck* Directories

The *LogCheck* program uses directories for storing the:

- dBASE Runtime program,
- *LogCheck* program and documentation,
- *LogCheck* working and temporary files,
- The *LogCheck* user data.

If any of these directories do not exist, the *LogCheck* program automatically creates them.

11.2.1 RunTime Program Directory

LogCheck uses a cut- down version of dBASE Plus. This is called the dBASE RunTime Engine. This must be installed from its installation file before *LogCheck* can be installed. The user is able to specify the directory where RunTime is stored but generally they select the default of:

c:\Program Files\dBase\PLUS\Runtime (for Windows 32-bit System).

or

c:\Program Files (x86) \dBase\PLUS\Runtime *(*for Windows 64-bit systems)

Do **not** delete or alter any of the files in this directory. When receiving upgrades of *LogCheck*, the Runtime remains the same and generally does not need to be upgraded. In rare cases, a *LogCheck* upgrade will include a Runtime upgrade. In these cases the user will need to download a new version of the Runtime installation file and run it before *LogCheck* can be upgraded.

11.2.2 *LogCheck* Program Directory

The user is able to specify the directory where the *LogCheck* program is stored but generally they select the default of c:\Program Files\LogCheck\Bin. Do **not** delete or alter any of the files in this directory.

11.2.3 *LogCheck* Work Directory

LogCheck creates two working directories to store working and temporary files. These may vary from computer to computer, but on Windows 7, examples of these are:

C:\Users*username*\AppData\Local\LogCheck\Work
C:\Users*username* \AppData\Local\LogCheck\Temp

where *username* is the name under which the current user is logged onto the computer. Temporary files are those that will be deleted once *LogCheck* terminates. Working files are those that persist between *LogCheck* sessions. The user must have write access to these directories. Note that on computers running Microsoft Windows XP or older versions of Windows, these directories may reside in other locations.

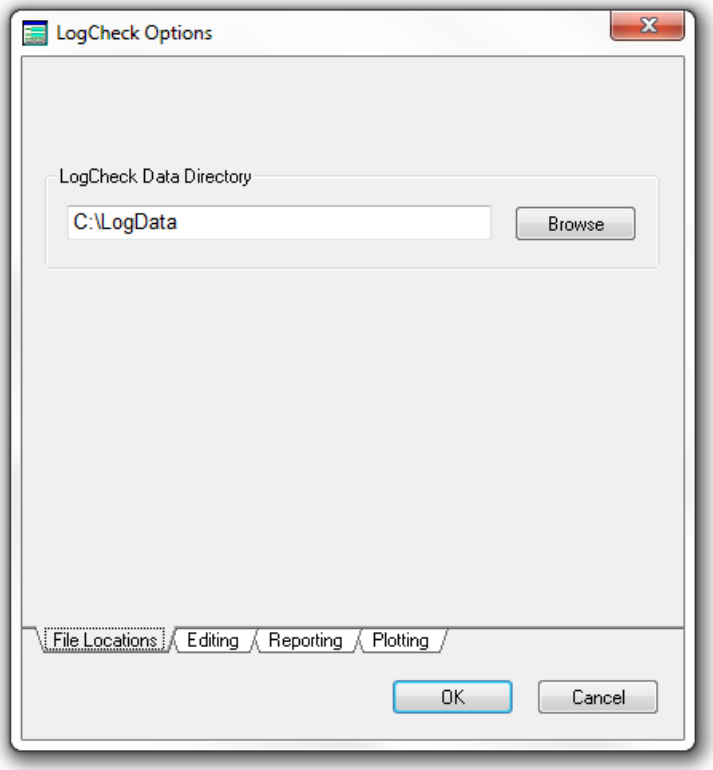
With Release 6.000 and onwards of *LogCheck*, the Work and Temp directories are stored in a different directory for each user logged on with a different user name. This enables each user to have a different set of default values saved from their previous sessions.

11.2.4 *LogCheck* Data Directory

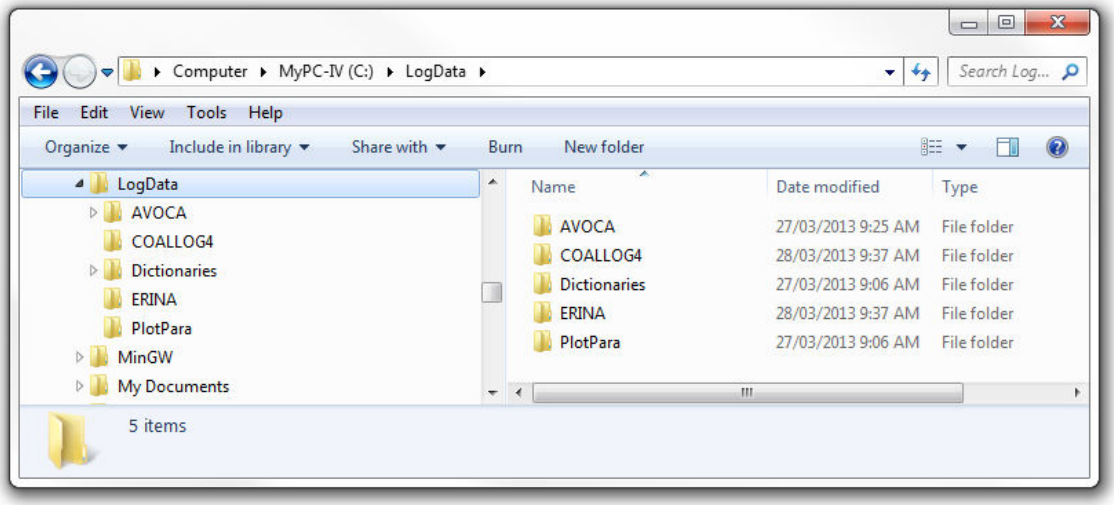
On running *LogCheck* for the first time, the user is prompted for the name of directory where the data will be stored. This can be a directory on your hard drive or anywhere on your connected network. The default is c:\LogData. If the specified directory does not exist the program creates it.

The user can later change the directory from where *LogCheck* accesses its data by selecting Settings > Options from the *LogCheck* menu and then entering another directory name. This dialog is shown in the figure on the right. You can either type the name of the directory, or select the Browse button to choose from a list.

For example, you can use this feature to locate working data on the local hard drive, and finalised data on a server.



The user can even have a number of *LogCheck* data directories but the program will only access data in the one that is current. The figure below shows a typical *LogCheck* data directory structure:



The diagram above shows three project folders (AVOCA, COALLOG4 and ERINA) and two folders (Dictionaries and PlotPara) that are provided for storing default values used by *LogCheck*. If the graphical editor is installed, there will be a third folder, GraphEditPara. The purpose of these folders is as follows:

- The Dictionaries folder stores the default dictionaries for *LogCheck*,
- The GraphEditPara folder stores the details of the LAS variables that are to be plotted in the graphical editor and
- The PlotPara folder stores the default plot definitions required for *LogCheck*.

These defaults are used if *LogCheck* does not find the required dictionaries and/or plot definitions in the current project.

11.2.5 Dictionaries Subdirectory

Each dictionary consists of two files with names of the form:

- *Data Type* Dictionary.dbf and
- *Data Type* Dictionary.mdx.

For example, the dictionary for the geology data consists of two files named Geology Dictionary.dbf and Geology Dictionary.mdx. The .dbf file contains the actual dictionary and the .mdx file an index to speed lookups in the dictionary. These files can be copied or deleted, but not renamed. Note that if you copy, delete or overwrite these files, you must do it for both of them.

When *LogCheck* is searching for a dictionary for a particular data type it first looks in the directory of the particular data type within the current project. If there is no dictionary there, it searches the directory called Dictionaries sitting in the *LogCheck* data directory. For example when looking for the geology dictionary for the project AVOCA it would look for:

c:\LogData\AVOCA\Geology\Geology Dictionary.dbf

and if this file does not exist it would look for:

c:\LogData\Dictionaries\Geology Dictionary.dbf.

Users working for a single mining company with a number of projects will generally have a single dictionary for all their projects sitting in the Dictionaries folder whereas a consultant will often have different dictionaries for different clients and these will be stored in the client's projects. Coal Quality Cementing, Geologists and UCS do not have dictionaries as they do not have coded data.

For Geology data, there is also the provision to store seams and horizons in a separate Seams dictionary. This enables the user to have one Geology dictionary for all their projects stored in that folder and an individual Seams dictionary for each project stored in the Geology folder of each project.

11.2.6 PlotPara Subdirectory

One of the *LogCheck* data types is the Plot Definition data type. Once the user has entered a Plot Definition it can be used by the program for plotting the user's Hole Data. Plot Definitions may be deleted, copied or renamed by deleting, copying or renaming these files. Plot Definitions sitting in the PlotPara subdirectory of the main *LogCheck* data directory can be used by all projects in the *LogCheck* data directory. For a particular Plot Definition there are four files:

PlotDefinitionName.MEM	The scale, sheet size and section information for *PlotDefinitionName;*
*PlotDefinitionName*_Bars.DBF	The depth and RL bar definitions for *PlotDefinitionName;*
*PlotDefinitionName*_Titles.DBF	The data for the title block for *PlotDefinitionName;*
*PlotDefinitionName*_Tracks.DBF	The definition of each of the vertical tracks, including the names of the variables to be plotted and how they are to be plotted, for *PlotDefinitionName.*

11.2.7 GraphEditPara Subdirectory

If the Graphical Editor is installed, default GraphEditPara Definitions can be set up in the C:\LogData\GraphEditPara folder. Each one consists of a single file with a .dbf extension. Once the user has entered a GraphEditPara Definition it can be used by Graphical Editor. A GraphEditPara Definition can be deleted, copied or renamed by deleting, copying or renaming one of these files.

11.3 Project Subdirectories

Each *LogCheck* project has its own subdirectory in the *LogCheck* data directory. The subdirectory has the name that was specified for the project when it was created. A project can be deleted, copied or renamed by deleting, copying or renaming this directory. Currently, project names can only be a maximum of eight characters and must not contain blanks.

Each project subdirectory contains a file named:

project.mem	Project Details for the project. Do **not** delete or rename this file. If this file is present, *LogCheck* recognizes this as one of its project folders. If it is deleted, it will no longer be recognized as a *LogCheck* folder. You can create other folders in the *LogCheck* data directory, however, *LogCheck* will ignore them without this file.

If project.mem is deleted, it can be restored by creating a new project, copying across the data, deleting the old project and renaming the new project. After a new project is created, *LogCheck* creates the following subdirectories:

Exports	Text files and reports produced by *LogCheck,*
Imports	Dictionaries or data from other systems to be imported into *LogCheck,*
LAS	For downhole geophysical data,
Plots	Plots created by *LogCheck*,
Work	Working files created by *LogCheck.*

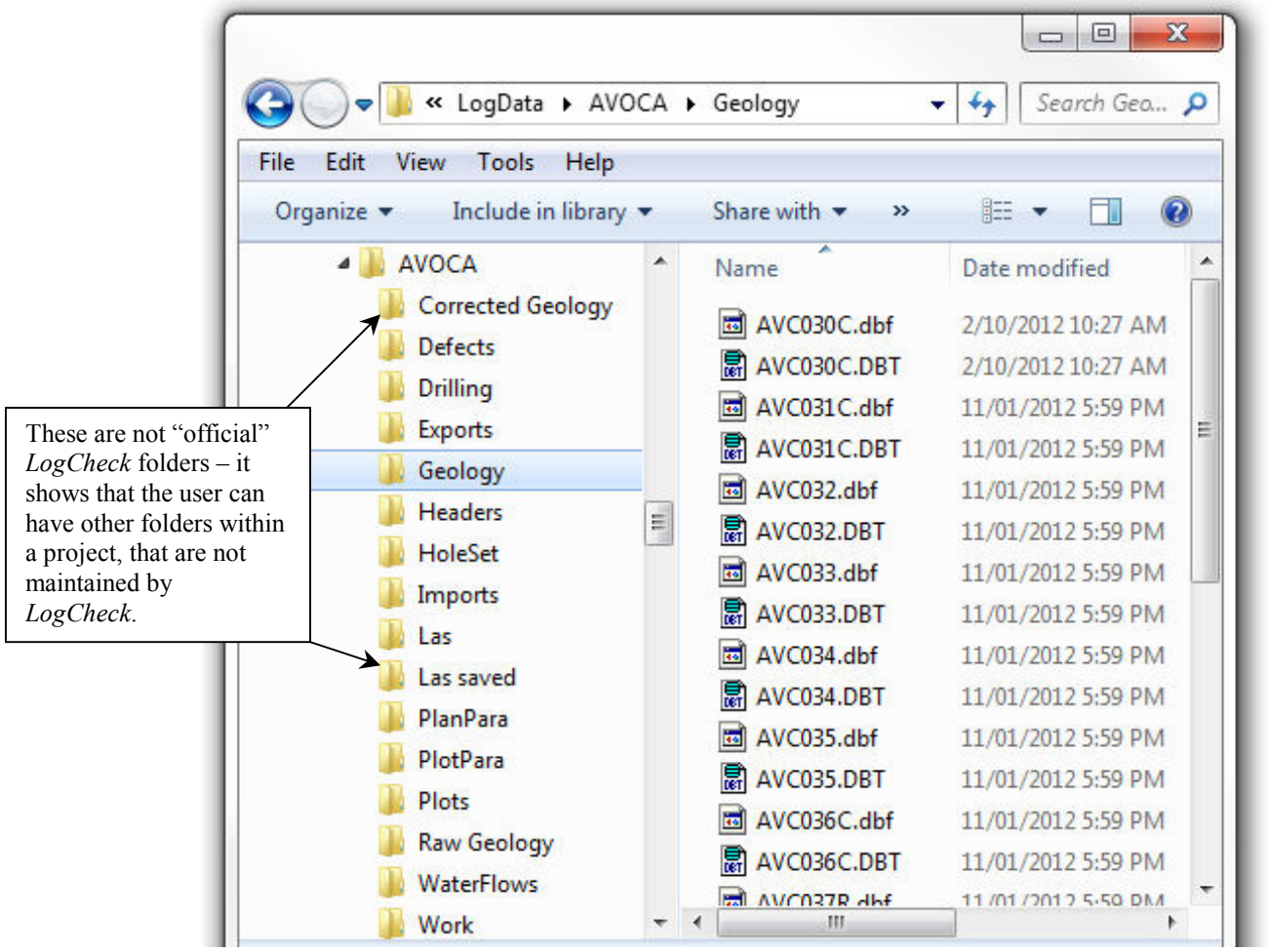
Depending on what data is present for the project it may also contain the following subdirectories for hole data:

Coal Quality	Raw prox coal quality data,
Casing	Hole casing data,
Cementing	Details of any cementing,
Defects	Rock Mass Unit (RMU) and individual defect data,
Drilling	Drilling data such as drilling company and core size,
Geologists	Details of intervals logged by geologists,
Geology	Geological data such as lithology, colour, seam name,
Headers	Header data such as survey coordinates,
PointLoads	Point load data,
Scanner	Acoustic scanner analyses data,
UCS	Laboratory UCS measurements,
WaterFlows	Water flow data.

Depending on what data is present for the project it may also contain the following subdirectories which have program control data for use by *LogCheck* when accessing Hole Data:

GraphEditPara	Graphical editor definitions containing names of the LAS traces, their horizontal scale and colour for the Graphical Editor;
HoleSet	Hole Set Definitions such as hole lists, section lists or lists based on a query;
Interval	Interval Definitions based on a query, such as cored interval or the interval within a certain number metres of the roof of a specified seam.
PlotPara	Plot Definitions such as plot scale and variables to be plotted;

An example of the folders in a project subdirectory is shown below in the left pane and the contents of the Geology folder in the right pane:



11.3.1 Hole Data Subdirectories

The hole data subdirectories are: Headers, Drilling, Casing, Cementing, Geologists, Geology, WaterFlows, Defects, PointLoads and Scanner. The hole data subdirectories contain files for each drill hole named:

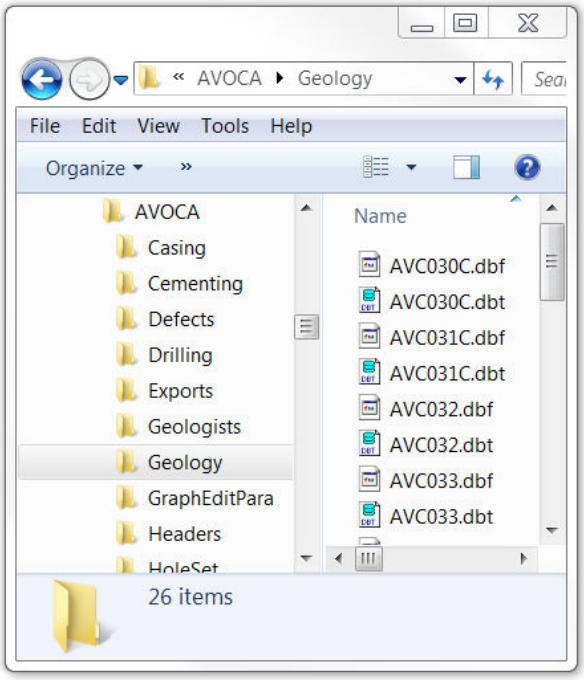
holename.DBF	the coded data for the hole named *holename*;
holename.DBT	the comments for the hole named *holename* (unless the particular data format does not have any comments fields).

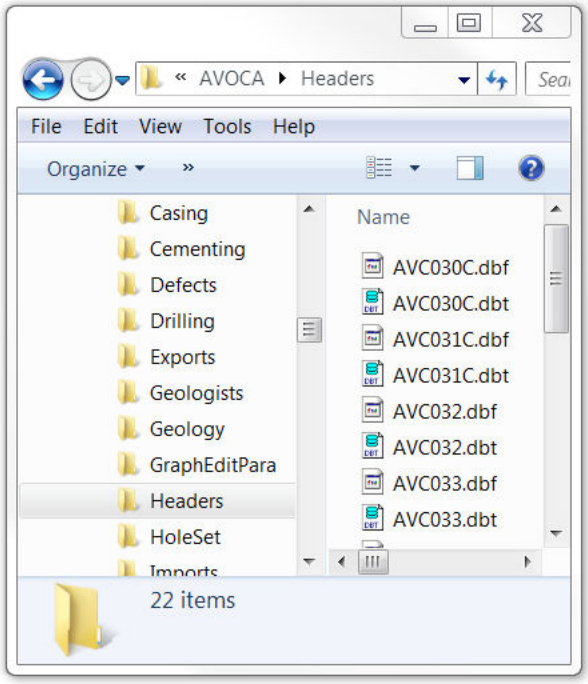
Each hole data subdirectory may also contain the appropriate lookup dictionary files.

Hole data can be deleted, copied between projects or machines or its hole name changed by renaming these files. Depending on the internal data format that *LogCheck* uses, the maximum size for a hole name can be between 8 and 16 characters and must not contain blanks, though this restriction means that the user can take backup copies of the files and give them names such as holename copy.dbf and leave them in this subdirectory and *LogCheck* will ignore them.

Currently, the filenames of all data types for a hole are the same therefore care must be taken when moving files ensuring that they are placed in the directory for that data type in the destination project. Where there is a `.dbf` file and a corresponding `.dbt` file it is essential that any deletion, renaming or moving is applied to both files. If not, the comments for the hole will be lost.

For example, for each hole, there can be a file in the Headers, Drilling and Geology folders, each with the same name – their contents being defined by the folder they occur in. For example, the diagram on the left shows the .dbf and .dbt geology files for holes AVC030C, AVC031C, AVC032, AVC033, and the equivalent files for the Headers folder on the right.





11.3.2 Exports Subdirectory

The Exports subdirectory is the default directory for exporting data. The files in this subdirectory have the following extensions:

.TAG	Sample tags for putting in sample bags,
.CSV	Text listings in comma delimited format for exporting data to spreadsheets,
.TXT	Text listings. In Tab delimited format, they can be used for exporting to word processors or spreadsheets. In fixed width format, they can be used for reading in a text editor,
.DMP	Dictionary listings in MineScape/GDB format for exporting to MineScape /GDB,
.DBS	Hole data listings in MineScape /GDB format for exporting to MineScape /GDB,
.DIC	Dictionary listings in Minex format for exporting to Minex,
.DAT	Hole data listings in Minex format for exporting to Minex,
.DCL	Dictionary listings in Vulcan format for exporting to Vulcan,
.DBL	Hole data listings in Vulcan format for exporting to Vulcan.

This subdirectory and these extensions are the defaults used by the program. The user can specify other subdirectory and filenames with other extensions when actually exporting the data.

11.3.3 Graphical Editor Definition Files Subdirectory

This folder contains Graphical Editor Definitions which specify the LAS variable names, and values of the left edge, right edge and colour to be plotted in the Graphical Editor. There is a separate file with a .dbf extension for each graphical editor definition.

11.3.4 HoleSet Subdirectory

Another of the data types in *LogCheck* is a Hole Set Definition data type. Once the user has entered a Hole Set Definition it can be used for opening a specific set of holes which can then be plotted, reported on or exported. Hole Sets are defined in one of four ways: by picking off a list, by importing, by defining a section or by setting up a query. For a particular Hole Set there are two files:

HoleSetName.MEM	information defining the type of the Hole Set called *HoleSetName;*
HoleSetName.DBF	information defining the holes in the Hole Set called *HoleSetName.*

Hole Set Definitions may be deleted, copied or renamed by deleting, copying or renaming these files. Note though that Hole Set names must not contain blanks.

11.3.5 Imports Subdirectory

This is the default directory used by *LogCheck* when importing dictionary and data files from other systems. The user can specify other directories when importing the data.

11.3.6 Interval Subdirectory

Once the user has entered an Interval Definition it can be used for opening a specific interval within holes which can then be plotted, reported on or exported. Such intervals may be, for example, the cored interval or the interval within a certain number metres of the roof of a specified seam.

For a particular Interval definition there is only one file:

IntervalName.MEM	Information defining the Interval called *IntervalName.*

Interval Definitions may be deleted, copied or renamed by deleting, copying or renaming the file. Note though that Interval Definition names must not contain blanks.

11.3.7 LAS Subdirectory

Downhole geophysical data used by the program must be in LAS format. The directory where these files are stored for a project is specified by the user in the Project Details of the project. If the user does not specify a LAS directory then the program uses this subdirectory of the project directory.

When looking for LAS data the program not only searches the directory but all levels of subdirectories below this directory. The only limitation is that the name of the combined subdirectories below this directory plus the filename must be less than or equal to 32 characters and must not contain any blanks.

After the user has accessed any LAS data, the LAS subdirectory will also contain the files:

LAS Dictionary.DBF	a dictionary of the variable names used in the LAS files;
LAS Dictionary.MDX	an index into the dictionary of variable names.

These files are automatically created or updated whenever the user opens a LAS file in *LogCheck*.

11.3.8 PlanPara Subdirectory

The PlanPara subdirectory contains parameters for drawing hole plans – there is only one file:

PlanParaName.MEM	information defining the hole plan parameters.

11.3.9 PlotPara Subdirectory

The PlotPara subdirectory of a particular project contains the same three files as the PlotPara subdirectory that is located under the *LogCheck* folder. Data in the project PlotPara subdirectory takes precedence over the one in the *LogCheck* folder. As for the default sets, there are four files for each PlotPara definition:

PlotDefinitionName.MEM	The scale, sheet size and section information*;*
*PlotDefinitionName*_Bars.DBF	The depth and RL bar definitions*;*
*PlotDefinitionName*_Titles.DBF	The data for the title block*;*
*PlotDefinitionName*_Tracks.DBF	The definition of each of the vertical tracks.

11.3.10 Plots Subdirectory

This is the default directory used by *LogCheck* when creating plots. The user can specify other directories for storing a plot when actually creating it.

11.3.11 Work Subdirectory

The work subdirectory contains the working files that are created and maintained by *LogCheck*. For example, the files `SEAMS.DBF` and `SEAMS.MDX` contain a summary of the top and bottom of each seam in each hole as well as the file modification time and date for the geology file from which the information was obtained. When the user requests a seam summary the program only needs to update those holes where the geology data has been modified since the last seam summary. Where there are a large number of holes such as a couple of thousand this can reduce the time taken to generate a seam summary from 3 or 4 minutes to a matter of seconds.

The user can delete the files in this subdirectory if necessary, for example, if they become corrupted. When deleting a file the user should also delete all other files in the directory with the same filename but differing extensions. If these files are not there, *LogCheck* will first need to recreate them, which can be a little time consuming if there are many holes in the project.

Appendix A – Query Language Specification

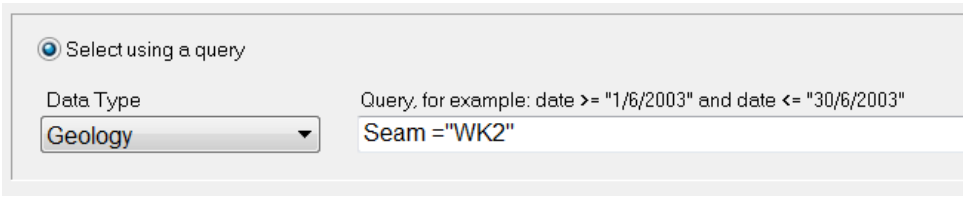
A1. Introduction

Data in *LogCheck* can be selected by using query selection statements. The syntax or rules used to specify a query are those of the DBL (dBASE language) and can be used for selecting records from a database table.

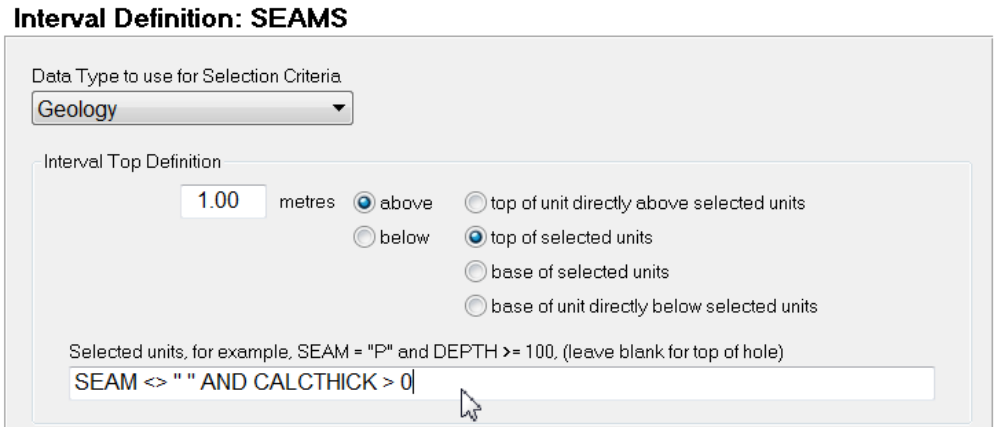
The query selection syntax is used in the following places in *LogCheck*:

- In hole set definitions, when selecting the holes by query.
- Interval definitions.
- Filtering data in *LogCheck* summaries.
- Definitions for specifying a level for aligning the vertical position of holes in a section.

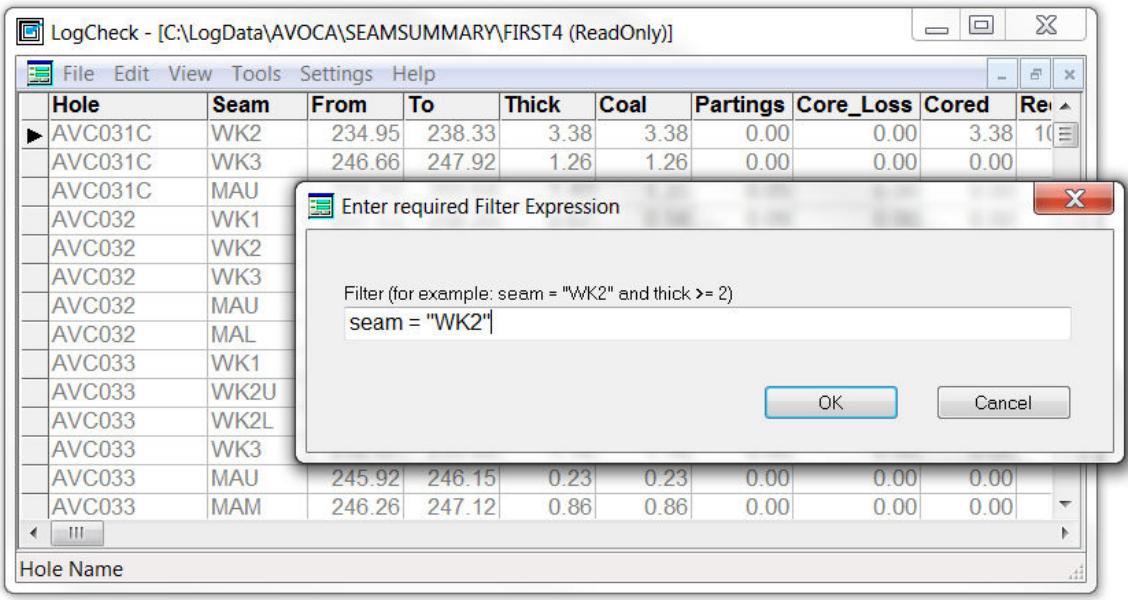
An example of using a query to select a group of holes is as follows (see Chapter 5). In this example, *Seam* is the variable name at the heading of the Seam/horizon column when editing Geology data. This query will include all holes where seam "WK2" has been logged. Note that character strings such as "WK2" requires the double quotes.



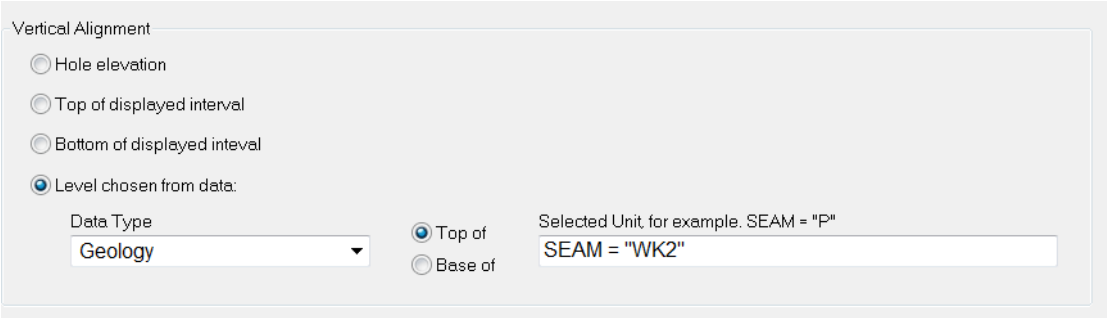
Part of a screen that uses a query to select an interval is shown below (see Chapter 5). This example selects intervals where the top interval is 1.0 m above a unit that is a seam (SEAM <> " "), and not a horizon (ie, CALCTHICK > 0):



As an example of using a filter, if a Seam Summary is opened, go to Tools > Filter and a dialog requesting a filter expression is displayed. This dialog allows you to restrict the rows that are displayed to those that satisfy the filter expression – in this example, only seams that start with "WK2" will be displayed after this filter is applied.



A query can be used to specify the vertical alignment of a plot definition. The following example is from the Section tab of a Plot Definition file and aligns the holes on a section so that the top of the WK2 seam is at the same level for each hole on the section.



Appendix A2 – Writing Selection Queries

Selection queries involve some kind of restriction on the data that is selected. This is done by specifying some kind of restriction on a variable – a variable is one of the columns on a database table, for example the column named Seam in Geology data.

Example 1. In a Hole Set Definition, to select only holes that have a seam that starts with "GU0":

```
SEAM = "GU0"
```

The column names and text values are not case sensitive, for example, both *Seam* and *seam* would also work. Also, when comparing numeric values, the quotes ("…") are left off numeric values. Operators that can be used to select data include:

- Comparison operators,
- Logical operators,
- dBASE functions.

The Comparison Operators

The comparison operators consist of equality and relational operators as follows:

Equality Operators		Relational Operators	
==	Exactly equals	<	Less than
=	Equal to, or begins with	>	Greater than
<> or #	Not equal	<=	Less than or equal
		>=	Greater than or equal

The following examples use the thickness ("Thick") or seam columns in hole seam summaries.

Example 2. Select seam intervals where the thickness equals 0.20:

```
Thick = 0.20
```

Example 3. Select seam intervals that are exactly the GU0 seam (include a blank after the "0"):

```
SEAM = "GU0 "
```

Example 4. Select seam intervals that match anything starting with "GU0" (note that there is no blank included here):

```
SEAM = "GU0"
```

Example 5. Select seam intervals where the thickness is less than 0.20 (does not include intervals that are 0.20):

```
Thick < 0.20
```

Example 6. Select seam intervals where the thickness is greater than 0.20 (does not include intervals that are 0.20):

```
Thick > 0.20
```

Example 7. Select seam intervals where the thickness is less than or equal to 0.20 (also includes intervals that are 0.20):

```
Thick <= 0.20
```

Example 8. Select seam intervals where the thickness is greater than or equal to 0.20 (also includes intervals that are 0.20):

```
Thick >= 0.20
```

Example 9. Select seam intervals where the thickness does not equal 0.20.

```
Thick <> 0.20
```

Note: when a column containing a date value is used, the date is converted to a string. This means that if a column in *LogCheck* contains a date such as 1/6/2010, it is converted to "01/06/2010", so in a query expression, any single day or month values require a leading "0". For example: date < "01/06/2010" should be used, not: date < "1/6/2010".

The Logical Operators

The logical operators are AND, OR and NOT. Compound conditions are formed by connecting two or more conditions using the logical operators. The rules of precedence for operators, from highest to lowest are as follows:

1. All comparison operators
2. NOT
3. AND
4. OR

You should use parentheses not only to document your logic, but also the significant differences in the results with/without parenthesis.

Example 10. Select all holes with seam GU0, and where this seam is at a depth of greater than 100m:

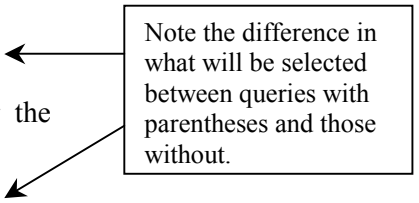
```
SEAM = "GU0" AND Depth > 100
```

Example 11. Select all holes with seam GU0 or GU1, and this seam is at a depth of greater than 100m:

```
SEAM = ("GU0 " OR "GU1 ") AND Depth > 100
```

Example 12. Select all holes with seam GU0 (no matter the depth), or the seam is GU1 at a depth of greater than 100m:

```
SEAM = "GU0 " OR "GU1 " AND Depth > 100
```



Example 13. Select all holes with seam GU0, and this seam is at a depth of greater than 100m and less than 120m:

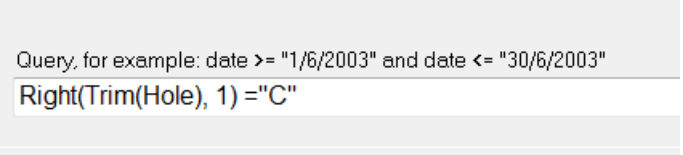
```
SEAM = "GU0" AND Depth > 100 AND DEPTH < 120
```

The dBASE Functions

There are many dBASE functions can also be used in a query to select data. The most commonly used functions that operate on string are as follows:

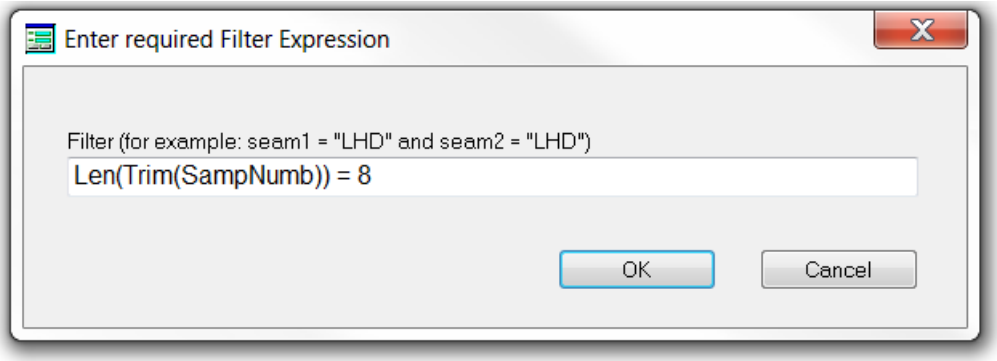
- Right(variable, number): Return the rightmost number of characters;
- Left(variable, number): Return the leftmost number of characters;
- Len(variable): Return the number of characters in the variable.
- Trim(variable): Trims any leading or trailing blanks from a variable.

Example 14. For a Hole Set definition named CORED, select headers for all holes where the hole name ends in a "C":



In this case the Trim function firstly removes any blanks from the file name to achieve the match, then the Right function only returns those holes whose name ends in "C".

Example 15. When viewing a sample summary, use a filter to only display sample numbers whose length is exactly 8 characters:



Appendix B – Standard Plot Definitions

B1. Introduction

LogCheck comes with a standard list of plot files. These include:

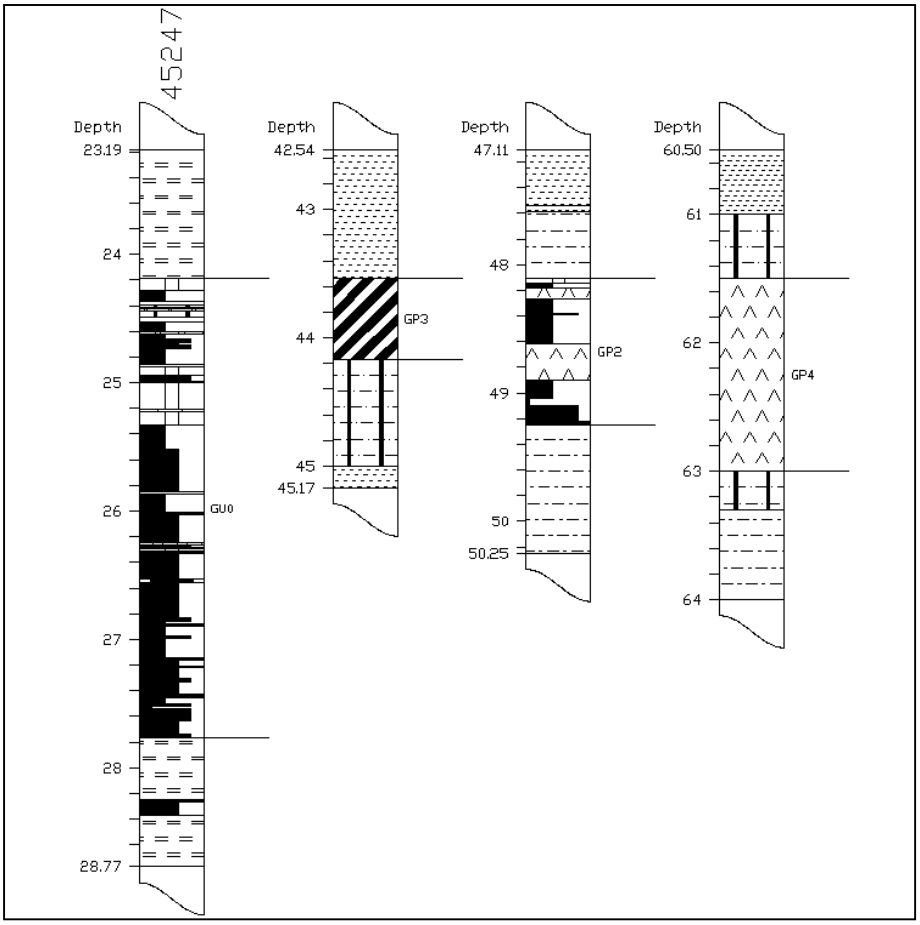
- A *seams only* plot at 1:20
- Entire hole with Geophysics (Density Gamma and Calliper)
- Stacked plots of individual holes in A4 and A3, at scales of 1:20, 1:100, 1:200.
- Section plots without horizontal scale (ie sit 10mm apart for a fence diagram) on A4 and A3 at 1:100 and 1:200.

The plot definitions that produce these are described below:

What	Description	Plot Definition	Vertical Scale	Paper Size
Seams Only	Seams-only plot in one plot file.	LC_SEAM	1:20	–
Entire Hole + LAS	Tracks: Lithology + LAS in one bar and one plot file. Orientation: portrait	LC_GEOLAS		–
Stacked Plot	Single hole, lithology in multiple bars; multiple plot files. Tracks: Lithology, Seam, SampNumb. Orientation: portrait	LC_STACK_A4_20 (5m/col)	1:20	A4
		LC_STACK_A3_20 (7m/col)	1:20	A3
		LC_STACK_A4_100 (25m/col)	1:100	A4
		LC_STACK_A3_100 (35m/col)	1:100	A3
		LC_STACK_A4_200 (50m/col)	1:200	A4
		LC_STACK_A3_200 (70m/col)	1:200	A3
Section Plot	Stratigraphic fence plot of seams. Requires hole set and interval definitions. Orientation: landscape.	LC_SECTN_A4_100 (25m/col)	1:100	A4
		LC_SECTN_A3_100 (35m/col)	1:100	A3
		LC_SECTN_A4_200 (50m/col)	1:200	A4
		LC_SECTN_A3_200 (70m/col)	1:200	A3

B2. The Seams-Only Plot Definition

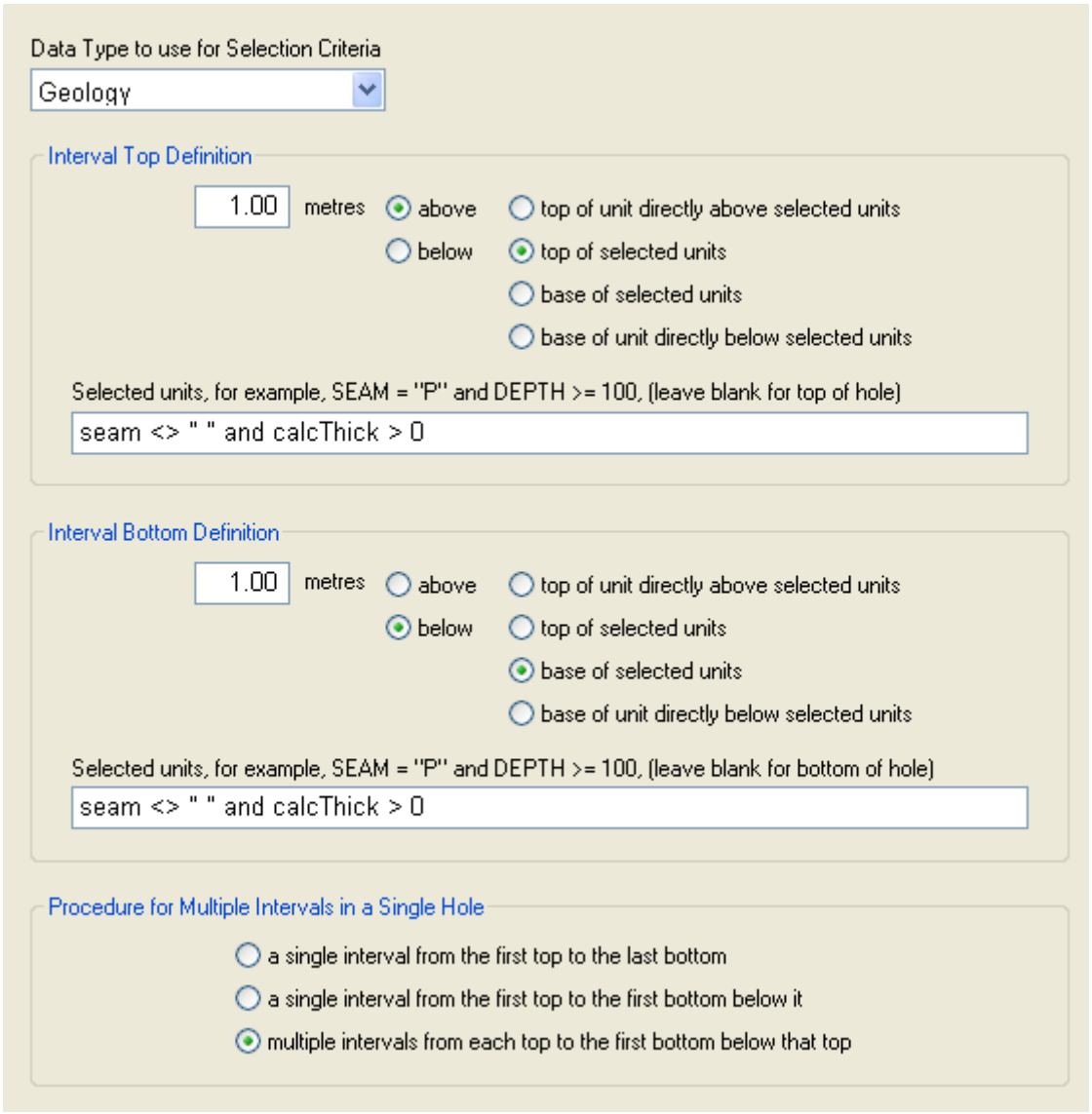
The Seams plot definition (LC_SEAMS) plots the selected seams, where the top of the selected seam is all displayed at the one level, for a single hole.



The steps required to generate this plot are:

- Set up an interval definition (File > New > Interval Definition). An example is shown on the following page.
- Open the data for the required hole (File > Open > Hole Data) and select the required interval definition.
- Generate the plot (File > Plot) and select the LC_SEAM plot definition.

The definition for seams is contained in the SEAMS interval definition, as follows

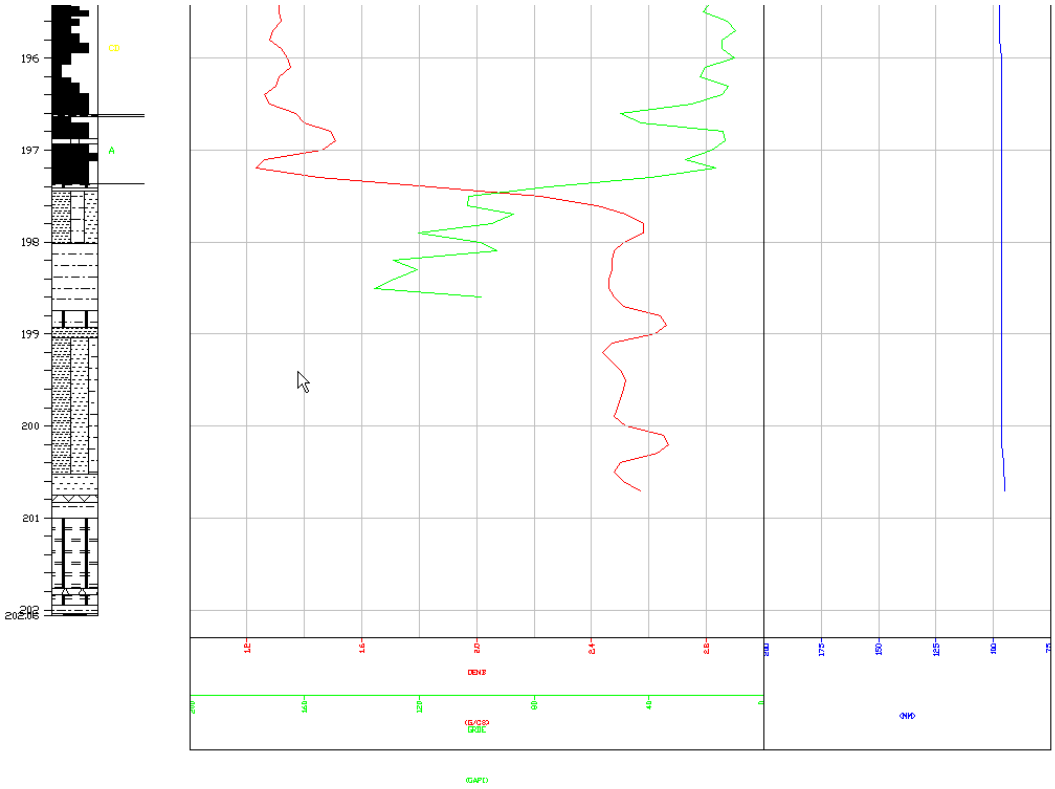


:

In this definition, all seams are picked up where the seam thickness is non-zero; the second part of the interval selection (calcThick > 0) is necessary to exclude any horizons.

B3. Entire Hole with Geophysics

The standard plot LC_GEOLAS plots the entire hole as one bar with the LAS data plotted in tracks (DENB, GRDE, CADE) to the right, for example:



The Tracks tab of this plot is as follows:

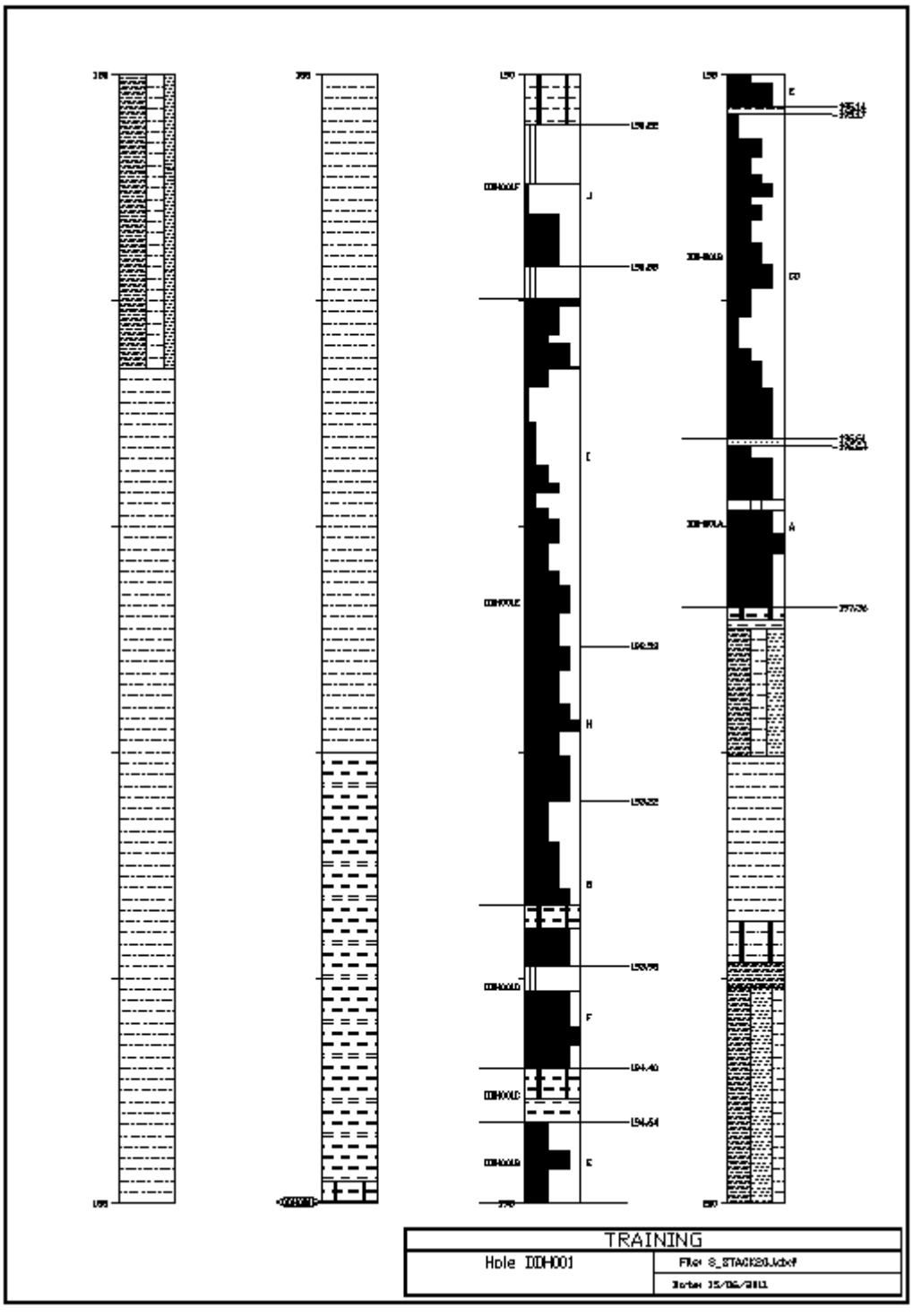
	XOrig	Width	Data_Type	Variable	Disp_Type	Layer	Colour	Fill
▶	0.0	10.0	Geology	LI	Pattern	LI		
	10.0	10.0	Geology	SEAM	Value	LI	SEAM	
	30.0	125.0	LAS	DENB	Line Trace	LI	1	
	30.0	125.0	LAS	GRDE	Line Trace	LI	3	
	155.0	62.5	LAS	CADE	Line Trace	LI	5	

The steps required to generate this plot are:

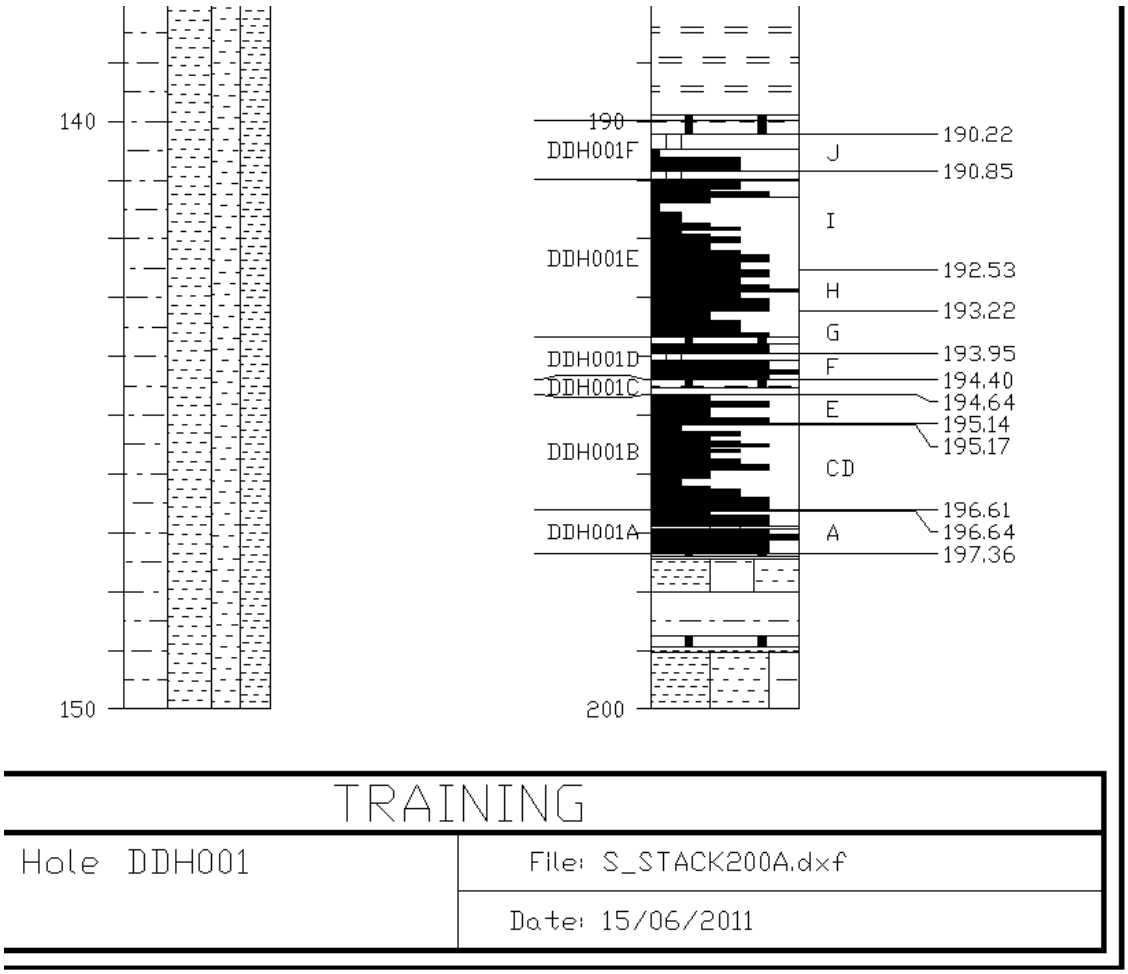
- Open the Geology data for the required hole (File > Open > Hole Data) and select the required drill hole.
- Generate the plot (File > Plot), select the LC_SEAM plot definition and save the plot file.
- Open the LAS data (File > Open > Hole Data and select LAS data from the Data Type drop down box), then go to File > Plot, and append the data to the existing plot.

B4. Stacked Plots

The stacked plot definitions plot hole data at scales of 1:20, 1:100 and 1:200 in multiple bars, for as many plot files as are required, on A4 or A3 sheets. The following example using hole DDH001 was produced using LC_STACK_A4_20, plotted on an A4 sheet:



The following figure shows details of the LC_STACK_200 plot, with the sample number on the left of the column, and seam on the right:



The Tracks tab of the stacked plot definitions is as follows:

	XOrig	Width	Data_Type	Variable	Disp_Type	Layer
▶	-10.0	10.0	Geology	SAMPNUMB	Description	0
	0.0	12.5	Geology	LI	Pattern	0
	12.5	10.0	Geology	SEAM	Value	0
	22.5	10.0	Geology	SEAM	Boundary Depths	0

The steps required to generate this plot are:

- Open the data for the required hole (File > Open > Hole Data) and select the required hole set or interval definition.
- Generate the plot (File > Plot) and select one of the LC_STACK plot definitions.

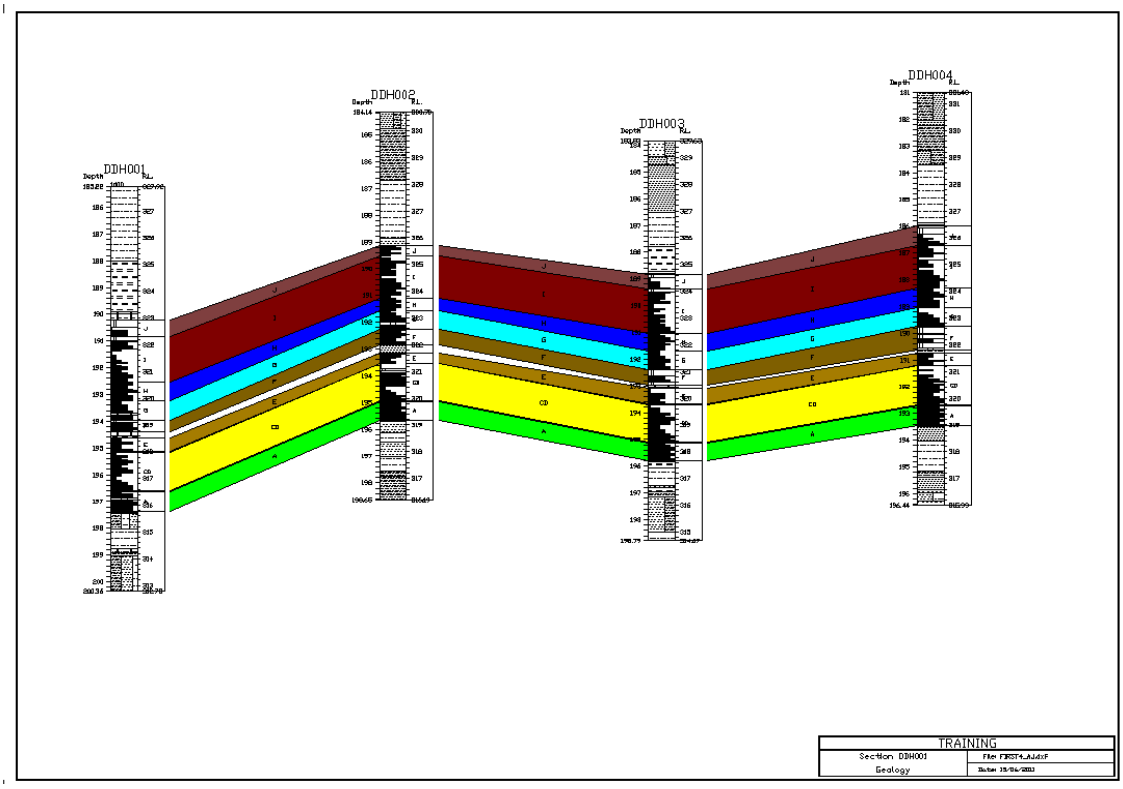
B5. Section Plots

A *LogCheck* section plot draws a stratigraphic fence plot, by correlating seams between the holes specified in a hole set definition, interval definition, or combination of the two. There are four standard section plots, as detailed in the table in the introduction to this appendix:

- LC_SECTN_A4_100 (25m/col)
- LC_SECTN_A3_100 (35m/col)
- LC_SECTN_A4_200 (50m/col)
- LC_SECTN_A3_200 (70m/col)

This standard plot definition draws at a vertical scale of 1:100, and plots to an A3 sheet. In the Sections tab of this plot definition, the Vertical Alignment is set to Hole Elevation.

In the Border tab, the Offset of Top Left Corner from Top of First Hole on Left may need to be adjusted for all holes to appear within the plot border. The following plot used a vertical offset of 70 mm and horizontal offset of -70 mm:

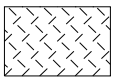


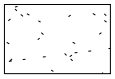
The steps required to generate this plot are:

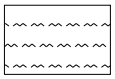
- Open the data for the required hole (File > Open > Hole Data) and select the required hole set, interval definition, or combination of hole set / interval definition.
- Generate the plot (File > Plot) and select one of the LC_SECTION plot definitions.

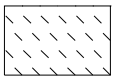
Appendix C – Patterns

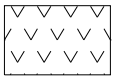
The standard patterns available in *LogCheck* are as follows:

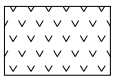

AI - Acid Intrusion

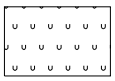

AL1 - Alluvium 1

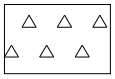

AL2 - Alluvium 2

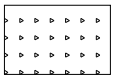

AV - Acid Volcanics

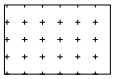

BA1 - Basalt 1

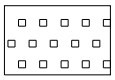

BA2 - Basalt 2

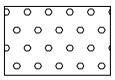

BC - Boulder Conglomerate

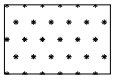

BR1 - Breccia 1

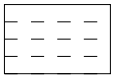

BR2 - Breccia 2

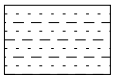

BU - Basement Undiff.

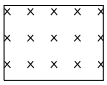

CC - Cobble Conglomerate

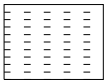

CG - Conglomerate


CH - Chert

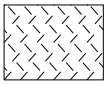

CL - Clay

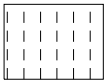

CS - Claystone

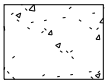

D□ - Dolerite

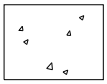

DT - Dirt Band

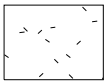

FB - Fault Breccia

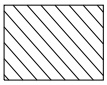

FZ - Fault Zone

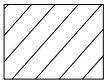

GC - Granule Conglomerate

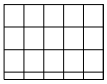

GS - Gravelly Sand

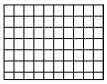

GV - Gravel

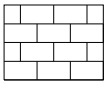

IG - Igneous Rock

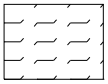

IS - Ironstone

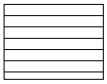

KL - Kaolinite

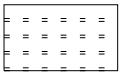

LG - Lignite

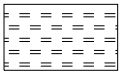

LS1 - Limestone 1

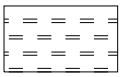

LS2 - Limestone 2

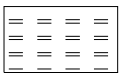

MM - Metamorphic Rock

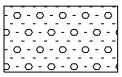

MS1 - Mudstone 1


MS2 - Mudstone 2

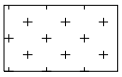

MS3 - Mudstone 3

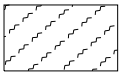

MS4 - Mudstone 4

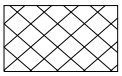

MU - Mud

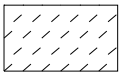

PC - Pebble Conglc

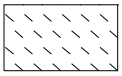

PH - Phyllite

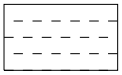

PR - Plutonic Rock


PU - Puggy

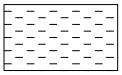

PY - Pyrite

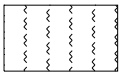

SC1 - Schist 1

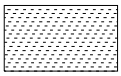

SC2 - Schist 2

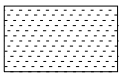

SH - Shale

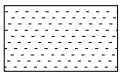

SL - Silt

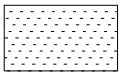

SLA - Slate

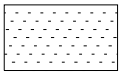

S□ - Soil

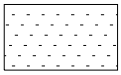

SS01 - Sandstone 1,

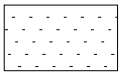

SS02 - Sandstone 2,

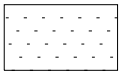

SS03 - Sandstone 3,

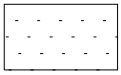

SS04 - Sandstone 4

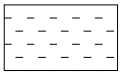

SS05 - Sandstone 5,


SS06 - Sandstone 6,


SS07 - Sandstone 7,

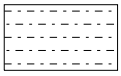

SS08 - Sandstone 8

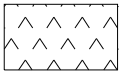

SS09 - Sandstone 9,


SS10 - Sandstone 10

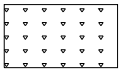

SS11 - Sandstone 11,

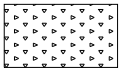

SS12 - Sandstone 12,

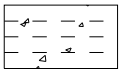

ST - Siltstone

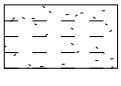

TF1 - Tuff 1


TF2 - Tuff 2


TI - Tillite

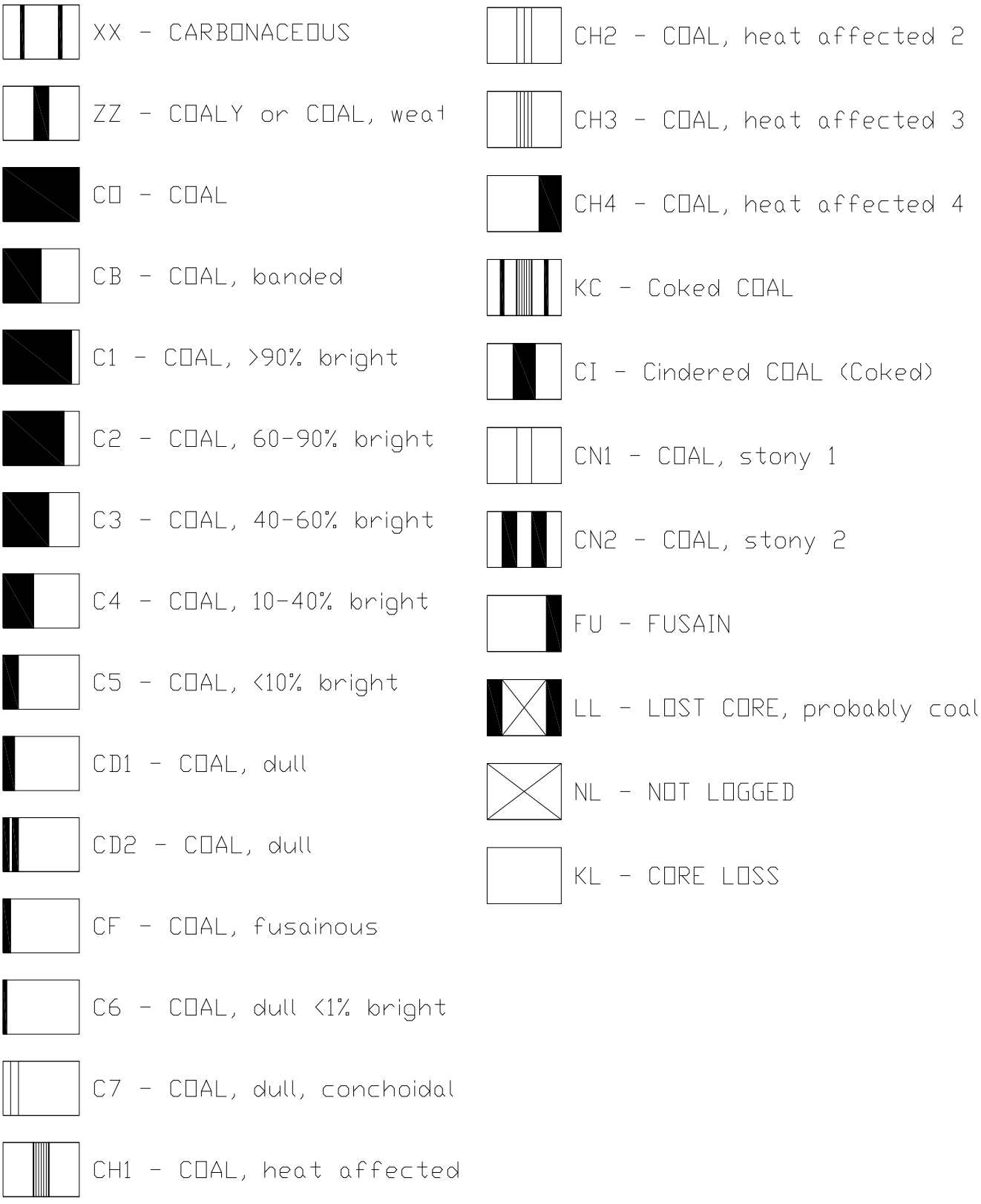

VB - Volcanic Breccia


YG - Clayey Gravel


YS - Clayey Sand

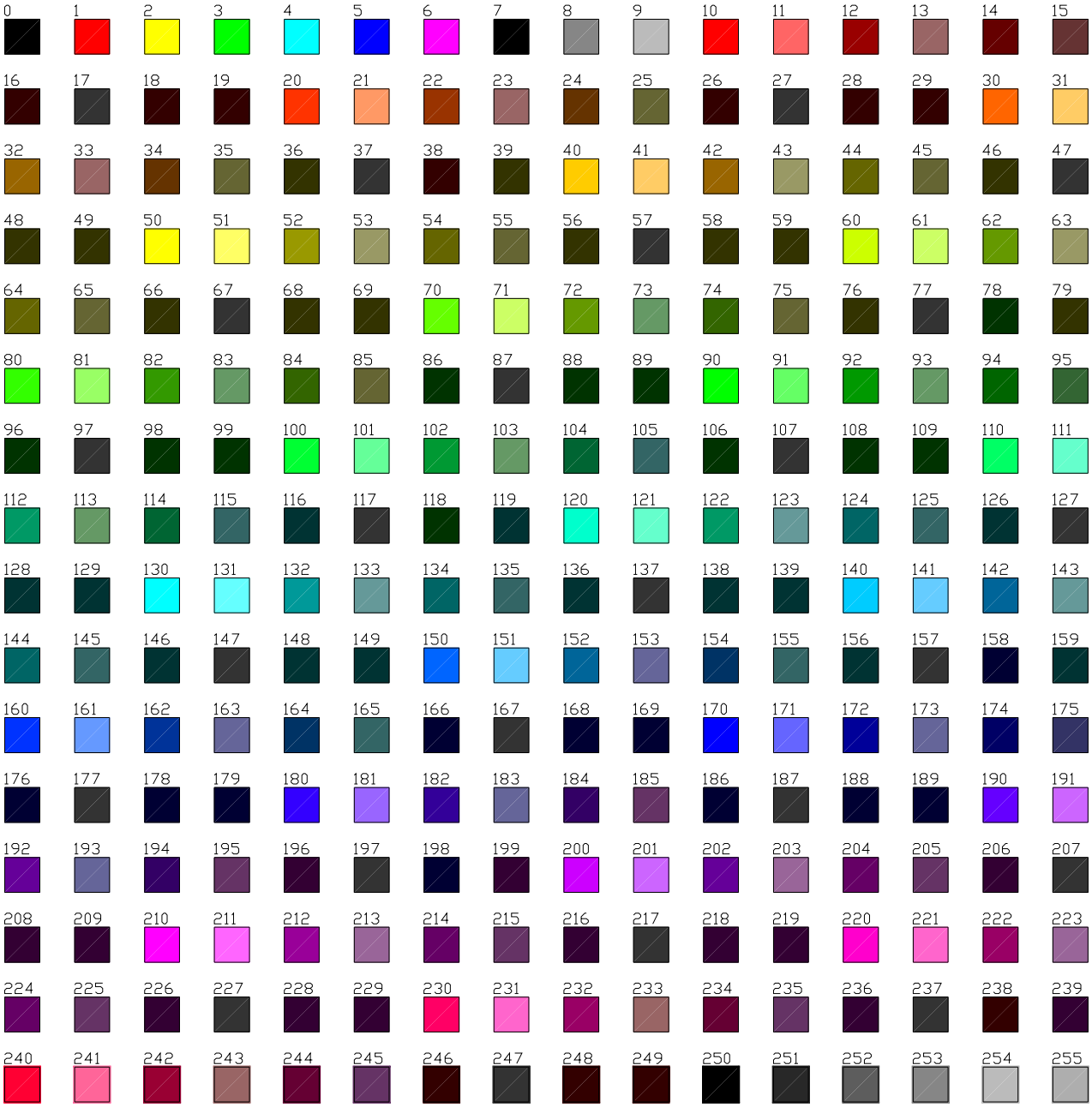
Appendix D – Fills

The standard fills available in *LogCheck* are as follows:



Appendix E – Colours

The AutoCAD colours are as follows:



INDEX

S

T

U

V

W