

Chapter 1

Getting Started

Upon completion of this course, you will be able to:

- Use Well Query to subset well data
- Use Survey Query to subset seismic data
- Display 2d and 3d Seismic Lines
- Digitize and edit fault segments
- Display fault surface and fault segment maps
- Digitize horizons
- Display horizon time and amplitude maps
- Auto-pick horizons from seed picks
- Convert time horizons to depth
- Contour time and depth horizons

Author Copy

Select **Project > Author Management** to open the **Author Management** dialog box (Figure 1.1), which allows you to create, display, re-name authors, select active author, delete authors and copy interpretation owned by an author to the active author.

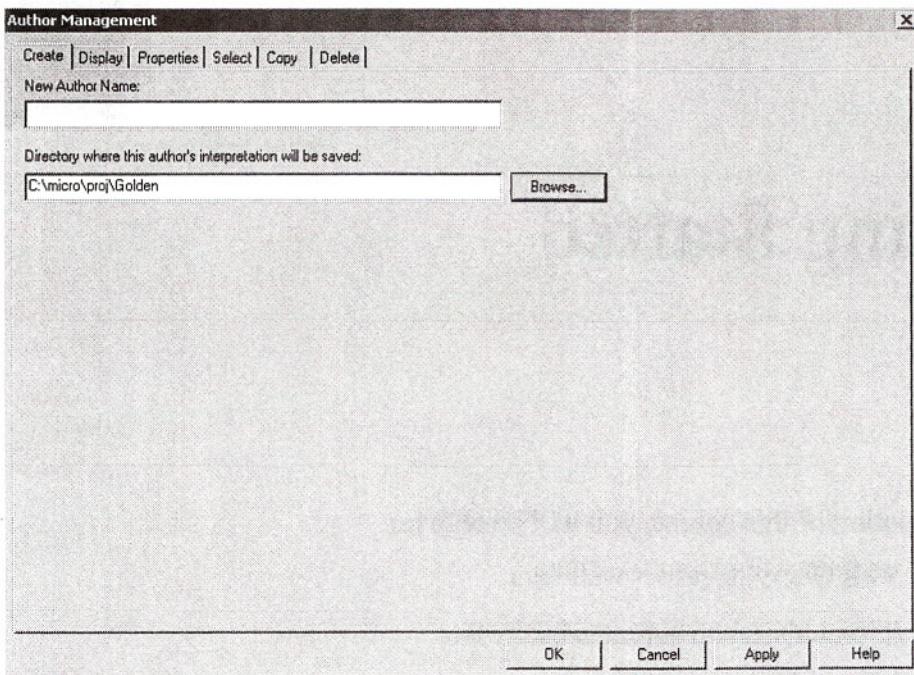


Figure 1.1 — Author Management dialog box

Copy tab

The **Copy** tab (Figure 1.2) offers functionality to copy all or selected interpretation from one author in the project into the another (active) author's directory within the same project. There are nine data categories listed that can be copied;

- Horizons
- Faults
- Grids
- Contours
- Formation Tops
- Fault Cuts

- Models
- Fault Polygons
- Other Categories

Note: Additional authored data that is not listed as an authored category includes: Zones, PAKnotes, Calculator Output, Unassigned Faults, Composite Logs and Sessions

If multiple authors are created in a project and working concurrently, then the active author can only read or view another author's interpretation. If the active author copies interpretation from another author and now owns the copied data, then that copied interpretation is editable.

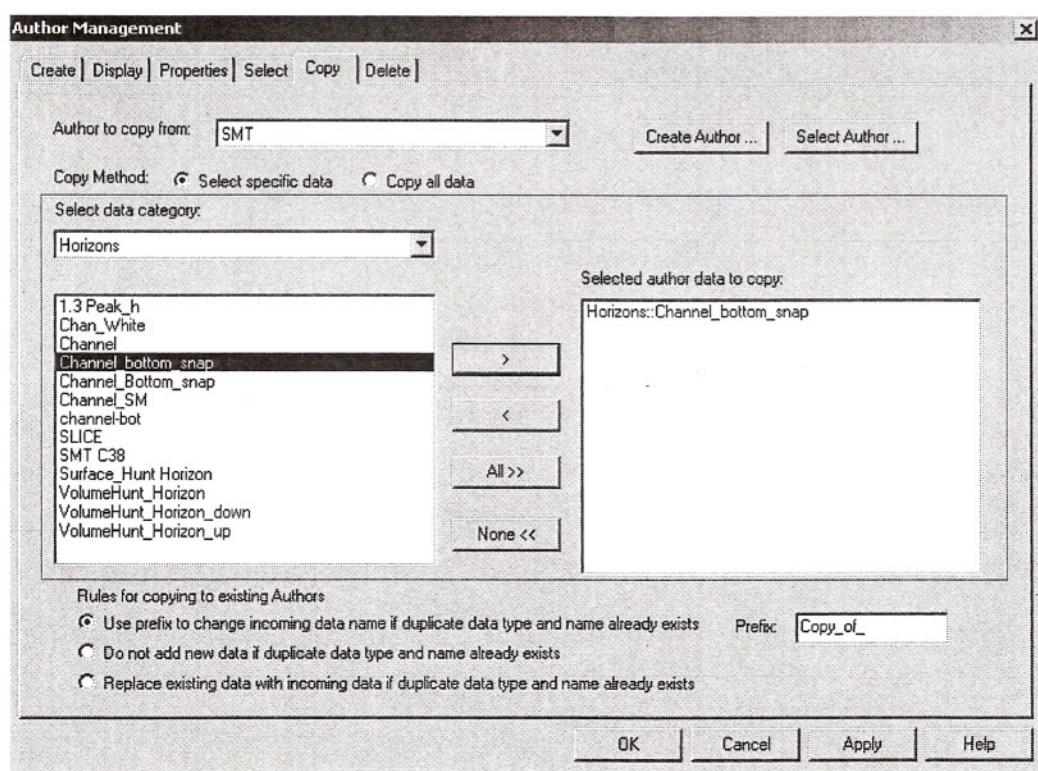


Figure 1.2 - Copy tab in the Project Author Management dialog box

Copy Data to a new Author

1. In the Author Management dialog box click the **Copy** tab.
2. In the dialog box click the down arrow next to **Author to copy from**; and select SMT.
3. Toggle ON **Copy all data**.

4. Under **Rules for copying to existing Authors**, toggle ON the second option; Do not add new data if duplicate data type and name already exists.
5. Click **OK**.
6. View the **Author Copy Summary** dialog box that opens and click **Close**.
7. View the copied data in the **Project Tree**. If you expand a data folder in the **Project Tree** note the data item now lists the new author in parenthesis.

Select Wells to Display by Query

Before you start to interpret, it may be prudent to identify and organize the well and seismic data in the project by creating subsets of the data. The **KINGDOM** software provides two query tools designed to help organize well data and seismic data. We will examine both queries through a series of exercises.

Query by Formation Tops

In this exercise we will create well subsets based on several criteria. The Well Query feature is an effective tool to organize well data.

1. From an active basemap window menu, click on **Wells > Select Wells to Display > By Query** to display the **Query Wells** dialog box (Figure 1.3).

Displayed in the Well Query dialog box are the **File**, **View**, and **Query** menu items and the **Select Categories** items, which you can use to sort a well database.

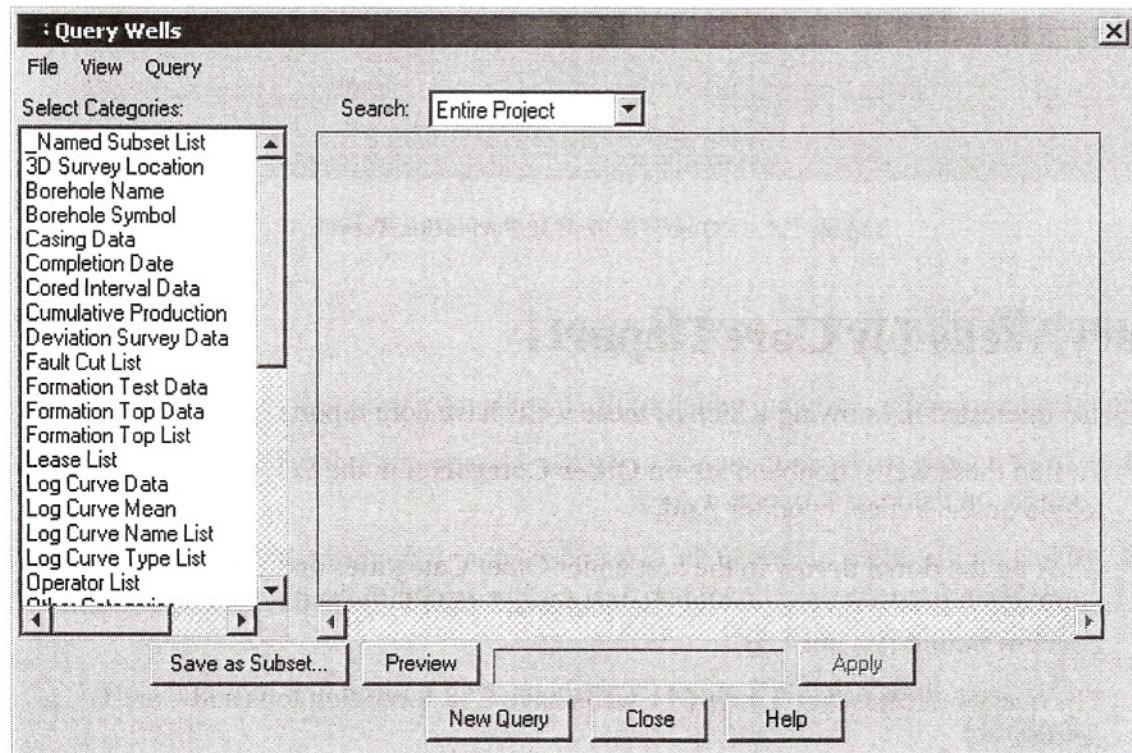


Figure 1.3 — Query Wells dialog box

2. Start by double clicking on **Formation Top List**. A query box containing Formation Top Names is displayed to the right of the category list.
3. Select the formation top of interest, **C38**.

4. Click on the **Preview** button at the bottom of the dialog box to view the number of wells that satisfy the query. In our example, there were 21 wells loaded and the query found 21 wells that had C38 formation tops (Figure 1.4).

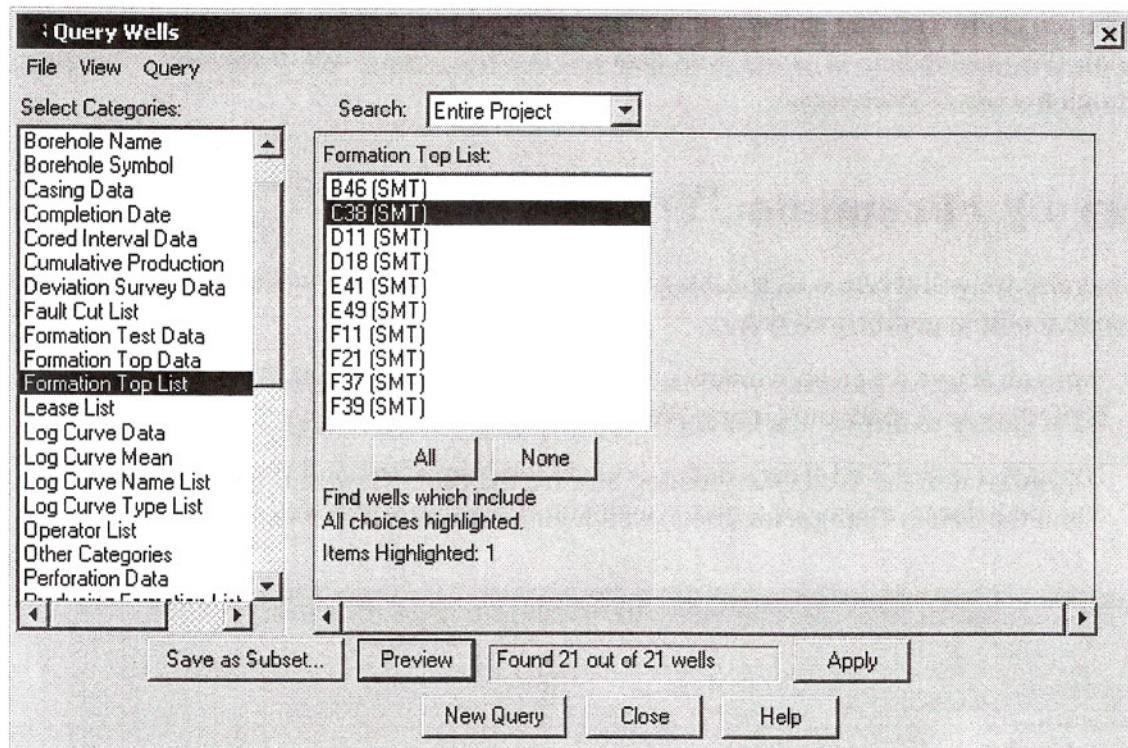


Figure 1.4 — Query Wells C38 Formation Tops

Query Wells for Core Reports

We are also interested in knowing which of these wells have core reports.

1. To find these wells, double click on **Other Categories** in the Select Categories list, toggle on the logical operator **And**.
2. Click on the **down arrow** in the box under Other Categories and select **Core/Lithology Data** from the drop down list. Select **Core 1 (SMT)** from the list and click on the **Preview** button (Figure 1.5).

The query indicates that 3 out of 21 wells have C38 formation tops and Core 1 reports.

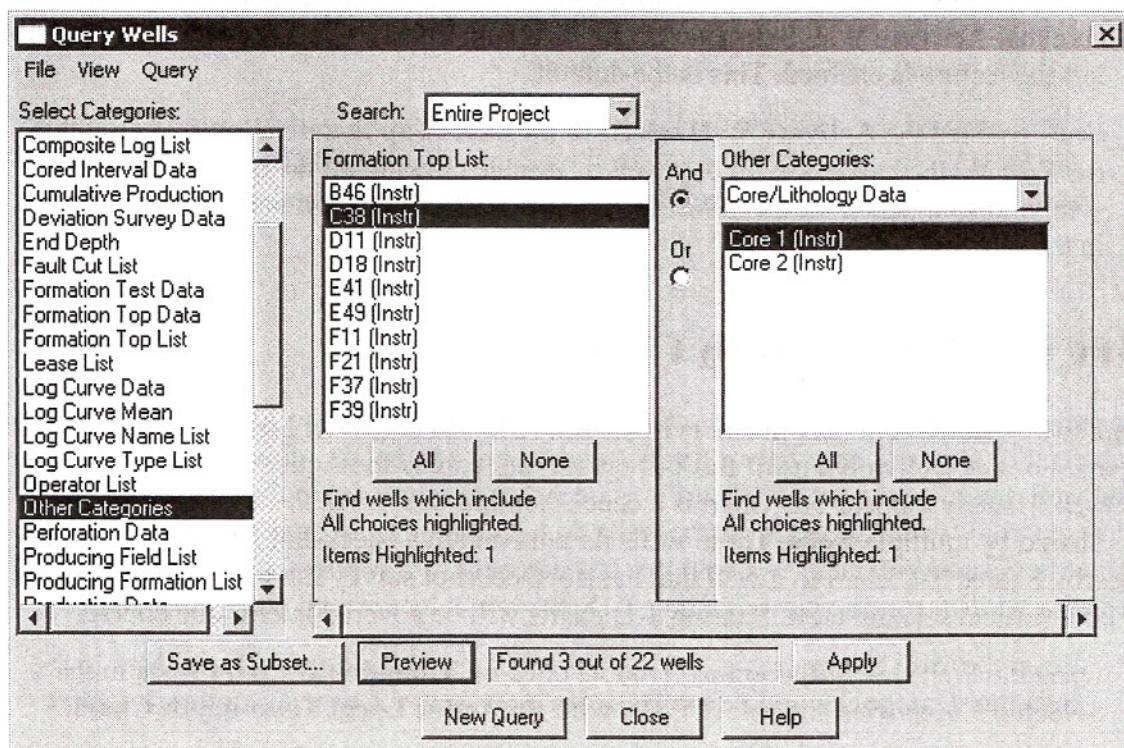


Figure 1.5 — Query Wells C38 Core1

3. To dynamically update the basemap with the subset of wells found, click on the **Apply** button on the lower right portion of the **Query Wells** dialog box. The **Base Map** now shows only the wells resulting from the well query.
4. These new wells can be saved as a subset by clicking on the **Save As Subset...** button in the lower left-hand portion of the **Query Wells** dialog box.
5. When the **Save as Subset** dialog box opens, type in the new subset name “**Wells with Cores**”.
6. Choose **Dynamic Subset** to apply this query to all future wells that may be added to the project.
7. Click on **OK** to close the dialog box and to save the new well subset.
8. Close the **Query Wells** dialog box to return to the **Base Map**.
9. In the **Project Tree**, expand the Wells folder and the Subsets folder. Check the box next to **All Wells** to turn ON all the wells in the project
10. In the ‘Well List’ the user can toggle wells ON and OFF in the active window by simply clicking in the display box next to the well’s name.

11. Click on the **Base Map** with the **right mouse button** and in the pop up menu make sure that **Activate Well Selection on Base Map** is enabled. If a check appears to the left the feature is enabled. This is the default.

Once enabled the **Activate Well selection on Base Map** feature allows you to open the **Edit Wells** dialog box for any well by double clicking on the bottom hole well symbol displayed on the **Base Map**. The Edit Wells dialog box will be covered later in the course.

Query for Time-Depth Charts

There are two types of Time-Depth charts in the **KINGDOM** software: Local T-D and Shared T-D charts. For any well only one of the T-D chart types can be the Active Time-Depth Chart for that well. Usually a Local T-D Chart is a checkshot that was run in the well. A Shared T-D Chart is shared by multiple wells. These wells do not contain a checkshot survey. By assigning a nearby Shared T-D chart to a well that has no checkshot survey the well path can be displayed on a vertical seismic view. Sharing T-D charts will be covered later in the course.

1. Open the Well Query dialog box. Double click on **Time-depth Chart Data** in the **Selected Categories** and select **Wells with an Active Local Time-depth Chart**.
2. Select **Preview**.

There are NO active shared Time-depth charts in this survey, so your answer should be “*Found 0 out of 21 wells*”.

Try again with **Wells with an Active Shared Time-depth Chart**. Your results should be very different.

Limit the X/Y Range of a field

Consider this scenario: You have a very large mature field and today’s goal is to interpret the southwest side of the field. How would you go about tackling the project?

One way would be to zoom in to the southwest side of the field and just begin. Or, you can go query the area.

1. Click on **Wells > Select Wells to Display > Well Query > Select Categories > XY Location**. The Query Wells dialog box displays the X/Y Range field, highlighted in yellow (Figure 1.6).
2. Input the start and ending X and Y ranges given below, then click either the **Preview** or **Apply** button. Six wells have been selected. These may be saved as a subset.

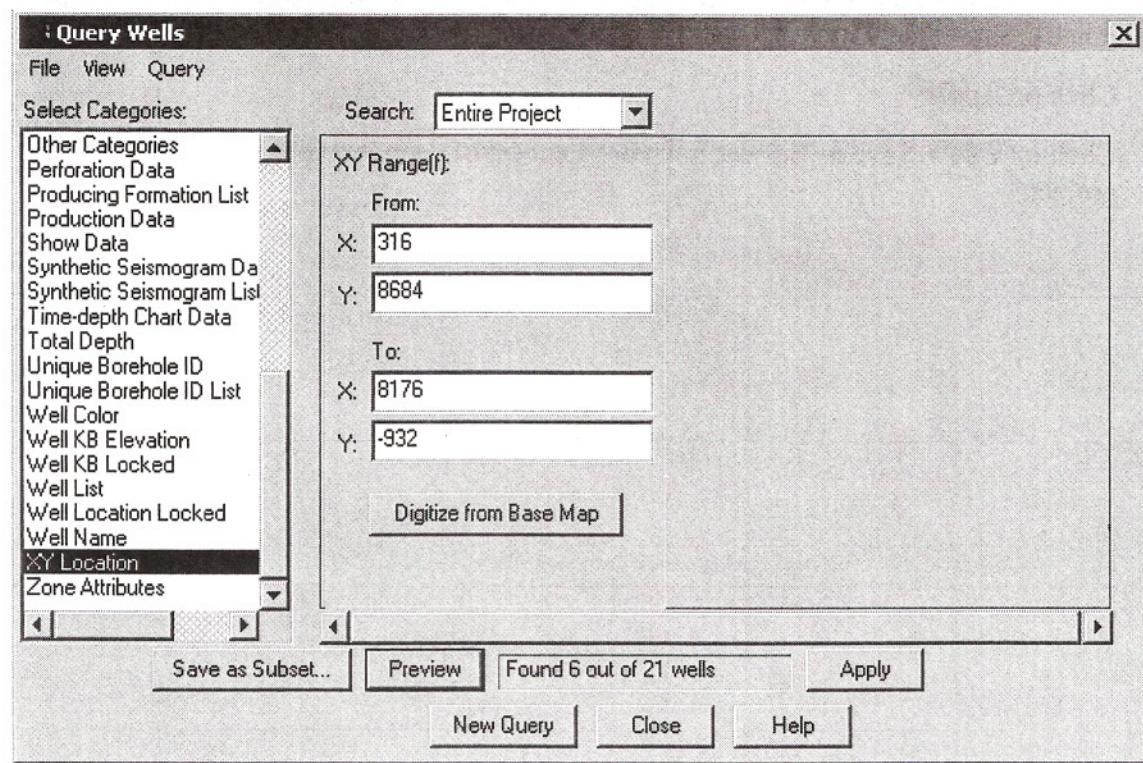


Figure 1.6 — Well Query XY Location

Note: You can also digitize directly from the **Base Map** using **Well > Select Wells to Display > Well Query > Select Categories > XY Location**.

3. Click on **Digitize from Base Map**. The actual digitizing takes place in the active map window.
4. In the active map window click on the upper left corner of the area to be selected, and then click on the lower right to finish selecting the area.
5. In the active map window each corner of the rectangle is denoted by a small black box. Save the subset of wells by clicking on the **Save as Subset** button or on **File > Save As Subset** and name the subset **Southwest Wells**.
6. Click the **Apply** button and the new subset is displayed in the active map window. Click on **Close** to close the query dialog box.
7. From **Project Tree** display All Wells.

Create a Queried Subset of Deep Wells

If your interpretation goal is to interpret the deeper exploratory potential of an existing field, you can create a subset of wells drilled deeper than the last producing horizon.

1. Select Wells > Select Wells to Display > By Query > Total Depth and enter a depth range greater than 7500'.
2. Click on *Apply*.
3. Click on File > Save as Subset to create a subset of deep, exploratory wells for this project.

Well Spreadsheet

Another very useful tool to determine what data is available in the project is the Well Spreadsheet.

Order Wells, Display Coordinates and C38 Top

1. Select Wells > Spreadsheet.
2. From the **Select Category** list choose **Well Information**. Then select **Total Depth**, **X** and **Y** from the **Well Information** list and click on the right arrow.
3. From the **Select Category** list choose **Formation Tops**. Pick **C38** from the **Formation Top** list. Click on the right arrow.
4. Check **Show MD**, **Show Subsea** and **Show wells with data only**.
5. Click **OK**.
6. In the spreadsheet that opens, place the cursor in the **Total Depth** title block and highlight the column.
7. Click on the **A to Z** icon to order the wells by total depth. Notice that the other data columns shift as well.

The screenshot shows a Microsoft Excel-like spreadsheet titled "Spreadsheet". The columns are labeled: Well Name, Well Number, Borehole No, UWI, Total Depth, X(f), Y(f), C38 (Instr), and C38 (Instr). The data consists of 22 rows, each representing a well named "Stratton #1" through "#21", with some being main boreholes and one being a deviation. The "Total Depth" column is highlighted with yellow, and the "A to Z" sort icon is visible in the header. The "C38 (Instr)" column contains values such as -5039.00, -5055.83, -5081.00, etc.

	Well Name	Well Number	Borehole No	UWI	Total Depth	X(f)	Y(f)	C38 (Instr)	C38 (Instr)
1	Stratton #1		main	SMT100	6457.00	3245.00	5115.00	5150.00	-5039.00
2	Stratton #5		main	00005	7034.00	6480.10	14958.61	5170.00	-5055.83
3	Stratton #3		main	55555	7050.00	5840.00	7840.00	5185.00	-5081.00
4	Stratton #4		main	SMT103	7050.00	7800.00	-720.00	5165.00	-5055.00
5	Stratton #16		main	SMT116	7070.00	14560.00	3680.00	5170.00	-5048.00
6	Stratton #6		main	SMT105	7300.00	2970.00	980.00	5198.00	-5073.00
7	Stratton #13		main	55555(2)	7320.00	10120.00	8240.00	5180.00	-4951.41
8	Stratton #7		main	SMT106	7340.00	8920.00	13920.00	5170.00	-5059.00
9	Stratton #18		main	SMT118	7350.00	13080.00	14440.00	5190.00	-5079.00
10	Stratton #9		main	SMT108	7360.00	8640.00	11200.00	5140.00	-5021.00
11	Stratton #11		main	SMT110	7380.00	2188.00	-1009.00	5172.00	-5058.00
12	Stratton #14		main	SMT114	7366.00	6400.00	5080.00	5235.00	-5124.00
13	Stratton #20		main	SMT120	7400.00	12240.00	280.00	5102.00	-4987.00
14	Stratton #12		main	SMT111	7420.00	10920.00	5520.00	5185.00	-5071.00
15	Stratton #12		devation1	SMT112	7420.00	10920.00	5520.00		
16	Stratton #19		main	SMT119	7486.00	520.00	6960.00	5234.00	-5127.00
17	Stratton #8		main	SMT107	7580.00	14840.00	12400.00	5185.00	-5077.00
18	Stratton #10		main	SMT109	7580.00	1420.00	11090.00	5280.00	-5169.00
19	Stratton #15		main	SMT115	7721.00	10320.00	2920.00	5208.00	-5099.00
20	Stratton #2		main	SMT101	7750.00	14760.00	6960.00	5150.00	-5043.00
21	Stratton #21		main	SMT121	7990.00	2560.00	14320.00	5215.00	-5108.00
22	Stratton #17		main	00017	10000.00	4282.37	10158.58	7819.13	-7221.00

Figure 1.7 — Well Spreadsheet

Note: This Well Spreadsheet application may be edited and saved. The spreadsheet can be exported and imported into Excel.

8. In the spreadsheet click on the **Export** icon to open the **Export** dialog box.

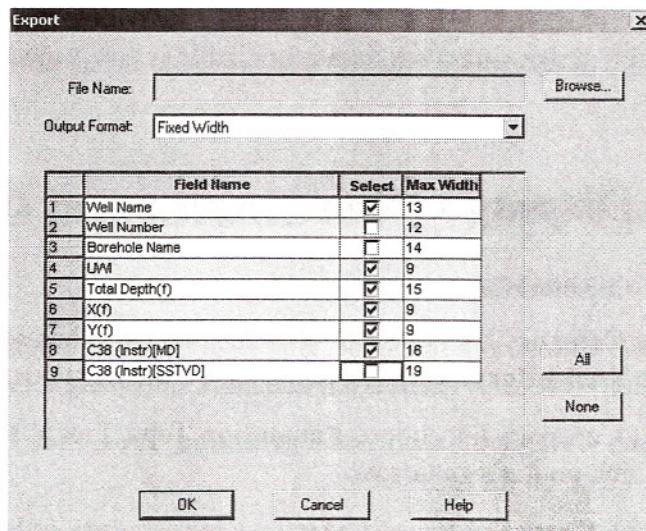


Figure 1.8 — Export dialog box for Well Spreadsheet

9. In the dialog box, use a **Fixed Width** output format and uncheck **Well Number**, **Borehole Name** and **C38 (SSTVD)**.
10. Click the **Browse** button and save the spreadsheet in the Golden project folder. Name the file **C38 spreadsheet**. Click **Save**. Click **OK** to exit the **Export** dialog box.
11. Open Excel from the Microsoft **Start** button.
12. In Excel select **Data > Import External Data > Import Data**.
13. In the dialog box that opens, navigate to the **Golden** project folder.
14. In the File name window type in ***.dat** and hit return.
15. Select the **C38 spreadsheet.dat** file and click **Open**. Work through the Excel wizard to load the data.

Note: The **KINGDOM** spreadsheet can be copied and pasted into Excel by highlighting the columns to copy and clicking the right mouse button. Select the option to copy with headers. The copy can be pasted into Excel.

Display Surveys by Query

Select Seismic Surveys to Display by Survey Query is very similar to Well Query. In the **KINDGOM** software, a seismic survey is defined as a single 2d line or a single 3d survey. Surveys can be grouped into subsets. Subsets can be built by using the Survey Query tool.

1. Select **Surveys > Select Surveys to Display > By Query...** to open the **Survey Query** dialog box (Figure 1.9).
2. Scroll through the **Select Categories** and double click on **Seismic Data**. Select **Surveys with Seismic Data Loaded**.
3. Then select **Seismic Data Type** from the Select Categories and double click on it to place it on the **Survey Query** dialog box. Select **Amplitudes (Time)** and **Preview** the query. All five surveys contain seismic data and Amplitudes (Time).

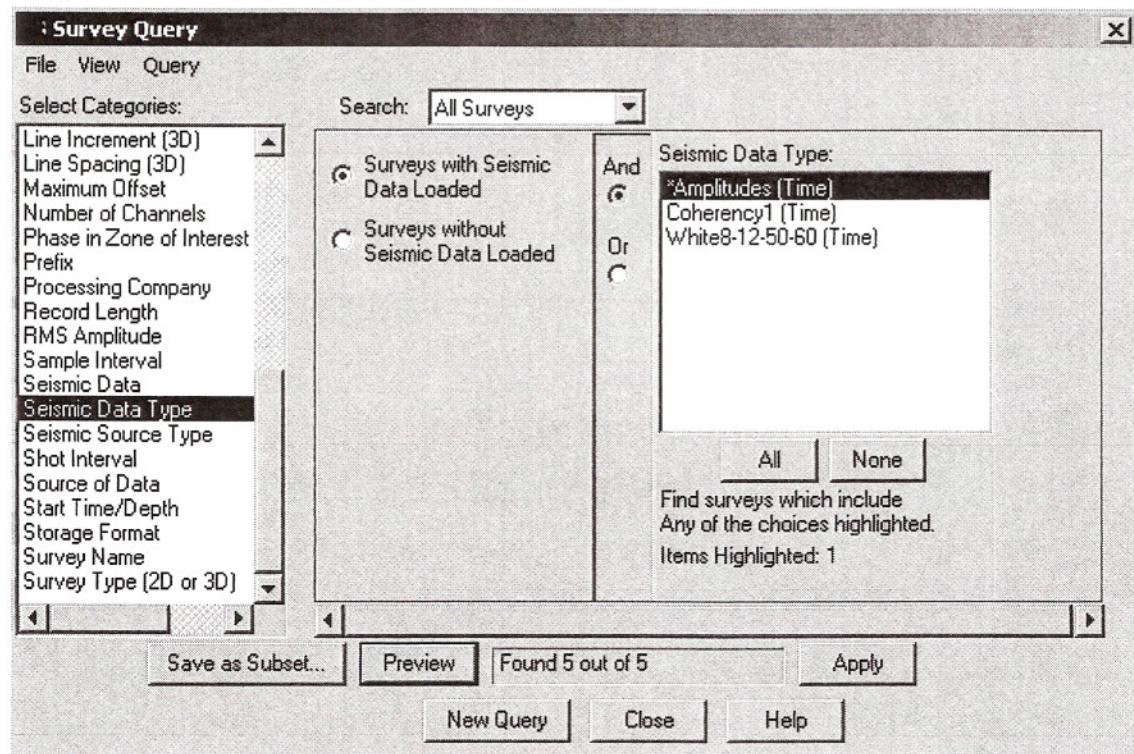


Figure 1.9 — Survey Query dialog box with compound query

4. Select **New Query** to clear the main dialog box.
5. Select the Category; Survey Type (2D or 3D). Toggle on 2D Survey and preview the results. The Preview shows 4 out of 5 surveys contain 2D data.
6. Add the Storage Format Category and toggle ON Contains 32-Bit Format. Click the **Preview** button. The Preview shows Found 1 out of 5.

7. Save this subset as 32 Bit 2d Survey and save as a Dynamic Subset.
8. Toggle on Contains 8-Bit Format and save the query as 8-Bit 2d Survey.
9. Close the **Survey Query** dialog box.
10. The subsets of the surveys are listed in the **Project Tree** and can be turned on or off as desired. Display the different survey subsets on the **Base Map**.

Select Survey Subsets - List or Graphically

In addition to the Survey Query tool the user can build seismic survey subsets using a list or by interactive selection on the **Base Map**. There are four tabbed options (List, Basemap, Polygon, Well) to select seismic surveys and save as survey subsets. In the **List** tab survey subsets can be selected from a list and saved as a survey subset. In the **Basemap** tab, surveys can be selected interactively simply by clicking the left mouse button on the survey in the **Base Map** which puts the selected survey into the Working Set list. In the **Polygon** tab, the user can select surveys by digitizing a polygon on the **Base Map**. Surveys can be selected inside or outside the polygon. In the **Wells** tab, surveys can be selected by proximity to a well list.

Select Survey Subsets

1. Select Surveys > Select Surveys to Display > By List or Graphically (Figure 1.10).
2. Under the List tab, click the << double arrows to clear the Working Set list.
3. Highlight the 3d MIGRATION survey and click the > right arrow.
4. Save as Subset, **Golden 3d**. Click OK.

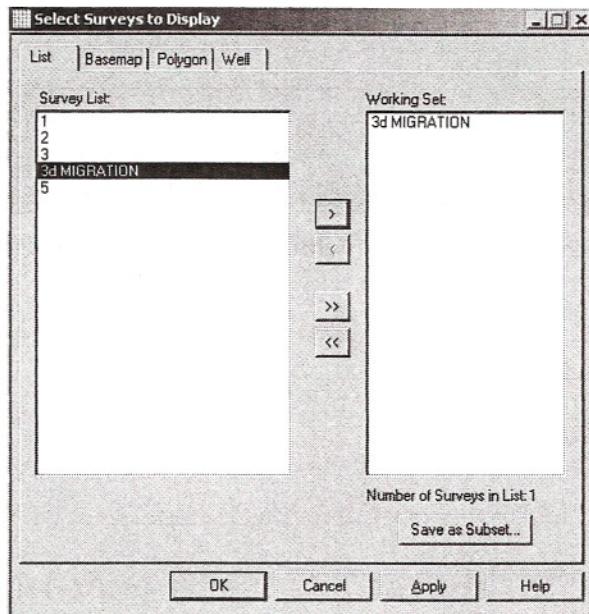


Figure 1.10 - Select Surveys to Display dialog box

Survey Subset Properties

Survey Subset Properties assigns unique colors to survey subsets to make it easier to identify different survey subsets on the **Base Map**.

Assign Survey Subset Properties

1. Select **Survey > Survey Subset Properties** from the main menu.
2. In the survey **Subset Properties** dialog box (Figure 1.11), click the down arrow and select the **8 Bit 2d Survey**. Check the box next to **Enable survey Subset Color** and pick a color. Click **Apply**.
3. Assign colors to the other survey subsets.

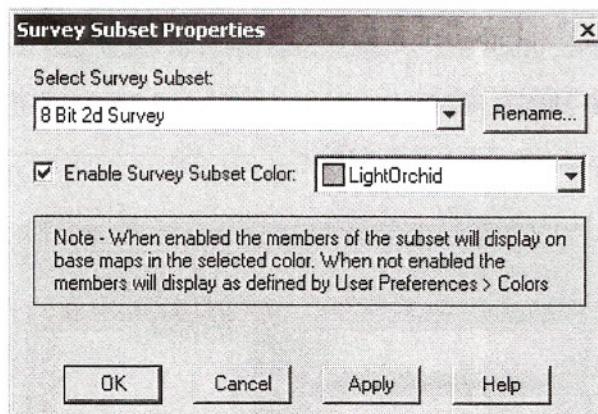


Figure 1.11 - Survey Subset Properties dialog box

Survey Details

Survey Details has been expanded from a single text box to over 30 elements. These elements range from Acquisition Company, to the date the survey was imported to the project, to the processing fold in the various tabbed dialog boxes. None of the entries are required. They are available only for user convenience in documenting information and making queries.

Examine Survey Details

- From the **KINGDOM** main window menu bar, choose **Surveys > Surveys Details** to open the **Survey Details** dialog box.

The **Survey Details** dialog box provides the ability to edit the data associated with existing surveys within the working set. This survey data can then be searched and filtered through the **Survey Query**.

An example of the **Survey Details** dialog box is shown in Figure 1.12.

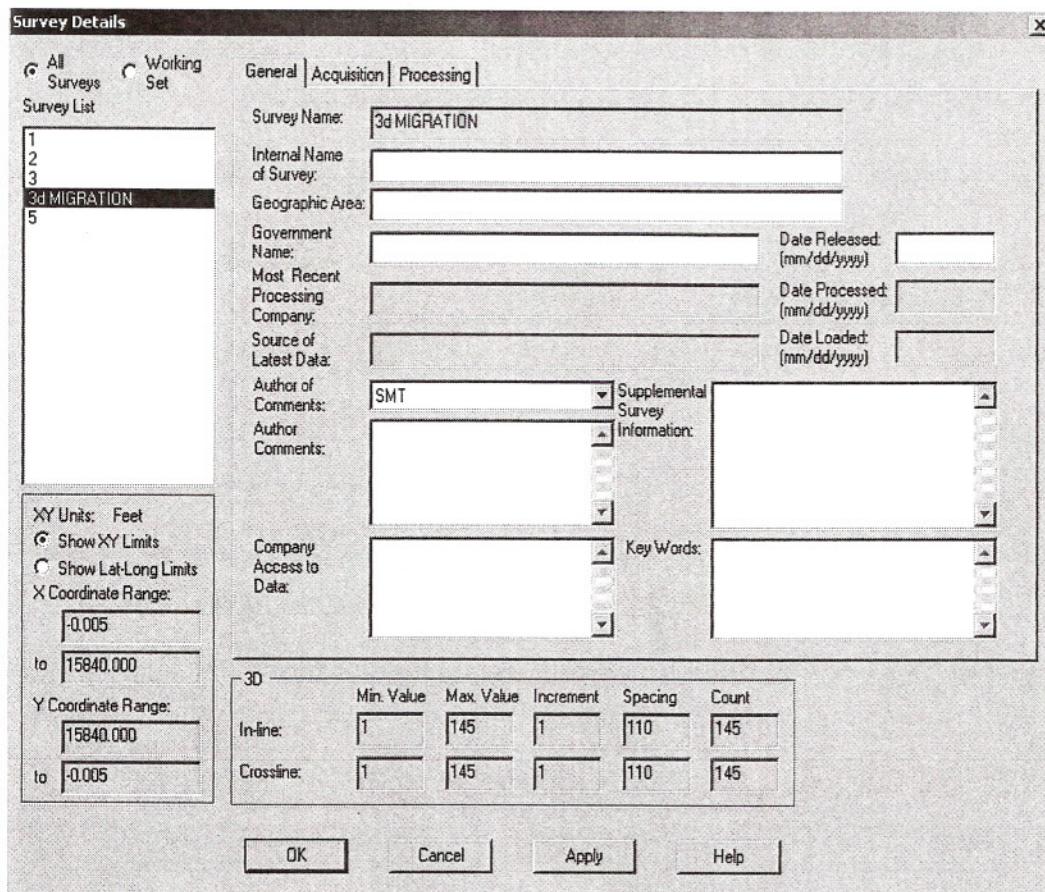


Figure 1.12 — Survey Details dialog box with General tab active

2. Select the **Acquisition** tab and enter **Fairfield** as the **Acquisition Company**.
3. Select the **Processing** tab and add **Fairfield** as the **Processor**. Note that the **New...** button allows you to create a new entry, if needed. Click on **OK** to close the dialog box.
4. Open the **Survey Query** dialog box (**Survey > Select Survey to Display > By Query**) and query on the **Acquisition Company category**. Choose **Fairfield** and click on **Preview**. One out of five surveys was selected. Save it as a new subset if you desire.
5. Close the **Survey Query** dialog box.

Survey Spreadsheet

Spreadsheet functionality allows you to cut and paste survey information from the **General**, **Acquisition** and **Processing** Categories in **Survey Details** to and from Excel.

Copy to Survey Spreadsheet

1. In the **Project Tree** select All Surveys under the Surveys > Subsets folders.
2. From the main menu select **Survey > Spreadsheet**.
3. Choose the **Processing** category and use the <**Ctrl**> key to select the following:
 - **Sample Interval**, **Samples Per Trace**, **Storage Format** and **Record Length**.
 - Click the right arrow to move to the selected items window.
4. Click **OK**.

Tip: Click the gray cell located in the uppermost left corner of the spreadsheet to quickly select all of the cells in the spreadsheet. Use the **Copy** icon or <**Ctrl**> + <**C**> to copy the selection to the MicroSoft clipboard. Use <**Ctrl**> + <**Shift**> + <**C**> to include the headers. After the **Copy** operation is complete, paste your selection into the **Excel** spreadsheet.

The screenshot shows a Microsoft Excel-like spreadsheet titled "Survey Spreadsheet". The table has columns for Survey Name, Data Type, Sample Interval, Samples Per Trace, Storage Format, and Record Length. The data includes various surveys like "1", "2", "3", "3d MIGRATION", and "5", with details such as "Amplitudes (Time)" for Data Type and values like 0.004 for Sample Interval and 1750 for Samples Per Trace. The "Record Length" column contains values like 6.996, 6.996, 6.996, 4.5, 4.504, 4.5, 4.5, 4.5, 4.5, 4.5, and 6.996.

	Survey Name	Data Type	Sample Interval	Samples Per Trace	Storage Format	Record Length
1	1	*Amplitudes (Time)	0.004	1750	8 bits	6.996
2	2	*Amplitudes (Time)	0.004	1750	8 bits	6.996
3	3	*Amplitudes (Time)	0.004	1750	8 bits	6.996
4	3d MIGRATION	*Amplitudes (Time)	0.004	1126	8 bits	4.5
5	3d MIGRATION	Coherency1 (Time)	0.004	1127	8 bits	4.504
6	3d MIGRATION	White8-12-50-60 (Time)	0.004	1126	8 bits	4.5
7	3d MIGRATION	Relative Acoustic Impedance (Time)	0.004	1126	32 bits	4.5
8	3d MIGRATION	Instantaneous Frequency (Time)	0.004	1126	32 bits	4.5
9	3d MIGRATION	Dominant Frequency (Time)	0.004	1126	32 bits	4.5
10	3d MIGRATION	Shale Indicator (Time)	0.004	1126	32 bits	4.5
11	3d MIGRATION	Dip Of Maximum Similarity (Time)	0.004	1126	32 bits	4.5
12	5	*Amplitudes (Time)	0.004	1750	8 bits	6.996

Figure 1.13 — Survey Spreadsheet example

User Preferences

The **User Preferences** dialog box contains eleven tabbed utilities as shown in Figure 1.14. For additional detailed descriptions of each tab please refer the online Help.

From The **KINGDOM** Suite main window menu bar, choose **Project > User Preferences** to open the **User Preferences** dialog box. Click on the **General** tab.

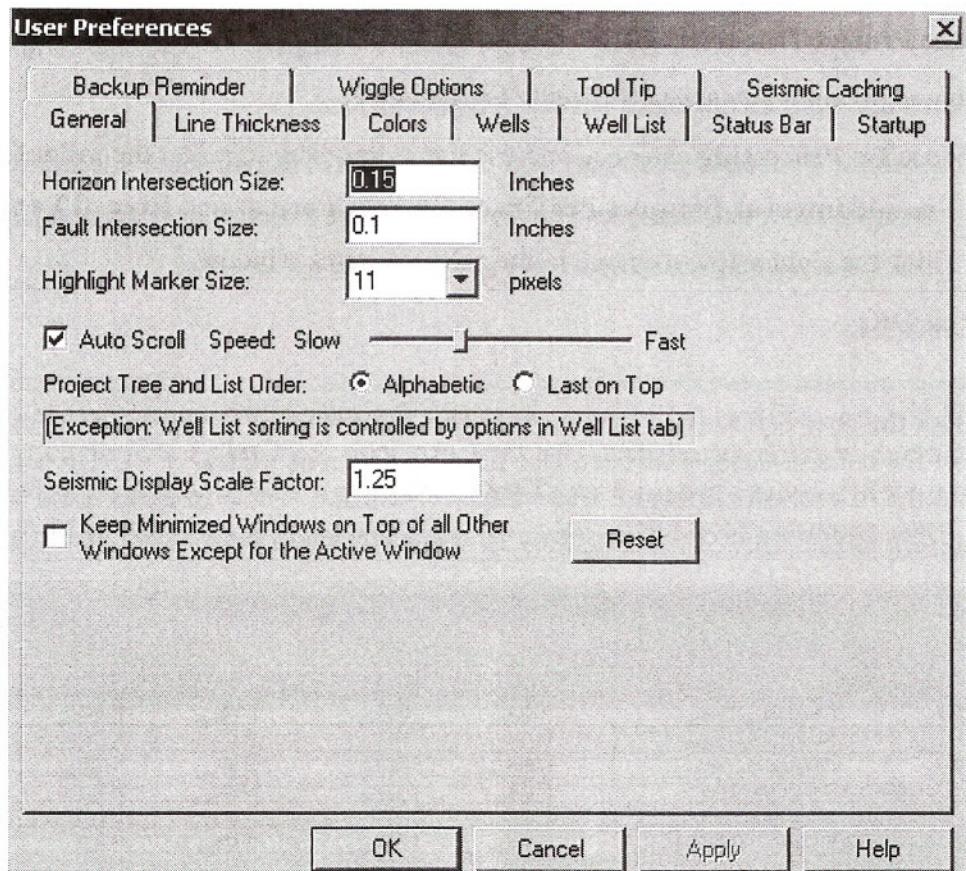


Figure 1.14 — User Preferences dialog box

The **General** tab contains the following elements:

- **Horizon Intersection Size.** Horizon Intersection Size controls the size of horizon intersection circles indicating that a horizon has been interpreted on an intersecting 2D line.
- **Seismic Scale Display Factor.** The Seismic Display Scale factor controls the apparent seismic gain employed by the F5 (increase gain) and F6 (decrease gain) keys on the keyboard. A Seismic Scale Display Factor of 1.1 is especially good for wiggle traces. It will increase the display gain in 10% increments.

- **Fault Intersection Size** Fault Intersection Size controls the size of the fault line intersection, + sign, displayed on the **Base Map** and the size of the digitized nodes on a fault segment, x sign displayed on a vertical seismic section.
- **Auto Scroll.** The Auto Scroll feature is toggled on or off and the speed of the Auto Scroll is adjusted here. The default is **ON**.

The **User Preferences** dialog box contains the following additional tabs:

- **Line Thickness** tab sets the thickness of objects like horizons, faults, and surveys in the project.
- **Colors** tab controls the color of the **Base Map** background and the different types of lines.
- **Wells** tab controls basic display features associated with wells.
- **Wells List** tab selects the data to display in a well list.
- **Status Bar** tab sets the decimal places for items displayed on the status bar.
 - **Show Color Bar File Name** is also toggled **ON** or **OFF** in this tab.
- **Startup** tab determines which windows will be active when the application starts. This tab determines the look of your project upon startup and when continuing sessions.
- **Backup Reminder** tab automates the backup schedule by number of days.
- **Wiggle Options** tab controls the color of wiggle traces in vertical seismic windows.
- **Tool Tip** tab controls the contents of the displayed Tool Tips in the Vertical Seismic, **Base Map** and **SynPAK** views.
 - The **Tool Tip** tab is exclusive to the active Vertical Seismic, **Base Map** or **SynPAK** products. For example, if the **Base Map** is active and the user selects **Project > User Preference > Tool Tip** tab, the information in the Tool Tip tab is exclusive to the **Base Map View**.
- **Seismic Caching** tab enables you to control the use of Random Access Memory (RAM) in the storage and subsequent retrieval of seismic data for display within the KINGDOM software. When this option is Checked On physical RAM is allocated and deallocated as needed to display seismic data of a type you specify (e.g. time slice, in-lines, crosslines).
 - Data stored in RAM can be retrieved at a faster rate than data stored on disk. Seismic Line Caching is especially useful when the data is being displayed across a network or in an order other than the primary order of the disk file