R5000.10 GeoData Management

Volume 1

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Chapter 1
Introduction

Welcome to the R5000.10 GeoData Management class. This course introduces you to the Landmark utilities that help you manage your projects and data. The class covers the various data loaders that the OpenWorks software provides and gives you practice using them. This course will give you the background to approach the problems inherent in data loading, create projects with different subsets of your data, understand some basic data model concepts, and use the various project and data management utilities.

Course Objectives

This manual is designed to be used with the R5000.10 GeoData Management course. Refer to the exercises during class and use the manual for reference when you return to your workplace.

Briefly, this manual explains:

- Basic geodata and input/output techniques
- How to create an OpenWorks project database
- How to load and view different forms of well data
- How to load and view different forms of curve data
- How to use various data management editors and utilities
- How to export well and curve data
- How to import and export map data
- How to create interpretation projects

OpenWorks Software: An Introduction

This course concentrates on the Well Data project management and data loading utilities and requires that the OpenWorks and GeoDataLoad software R5000 be installed.

What Is OpenWorks Software?

The OpenWorks software is a framework for integrating multiple geoscience disciplines into the same shared working environment, Release 5000 advances the OpenWorks software into the DecisionSpace software environment and encourages increased integration. There are major data model changes in this release to provide enriched functionality and support increased integration. This integrated framework includes:

- Integrated data visualization
- 3D and 2D seismic interpretation
- Well log analysis
- Geologic interpretation
- Mapping
- Velocity modeling
- Data management

These applications work together in an integrated environment, which means that you can run several applications at the same time and share data among them. A shared database eliminates the redundancy of entering the same data into several different applications.

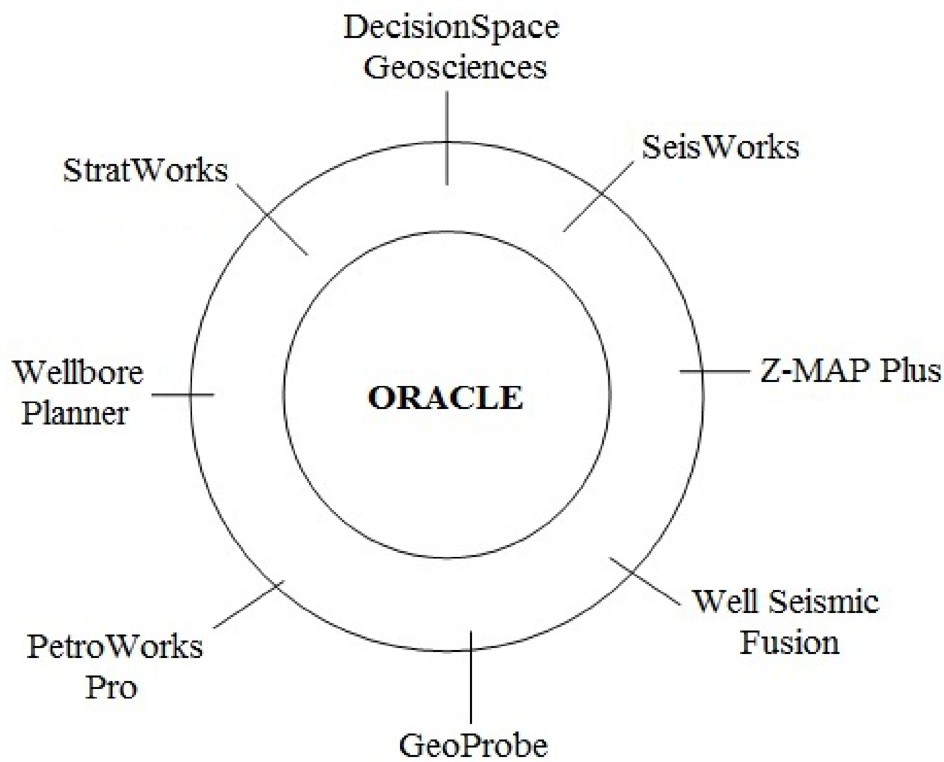
The key features of the OpenWorks environment that make it possible to integrate various applications are:

- Common application launcher
- Standard operation for all OpenWorks applications
- Integrated data management
- Oracle Advanced Queuing (AQ) data messaging and the Pointing Dispatcher™ (PD) software for communication among applications
- Shared utilities
- Support for third-party development

The OpenWorks software is based on the Oracle relational database system. The OpenWorks data model includes over 800 tables and more than 7,500 attributes organized in the Oracle database.

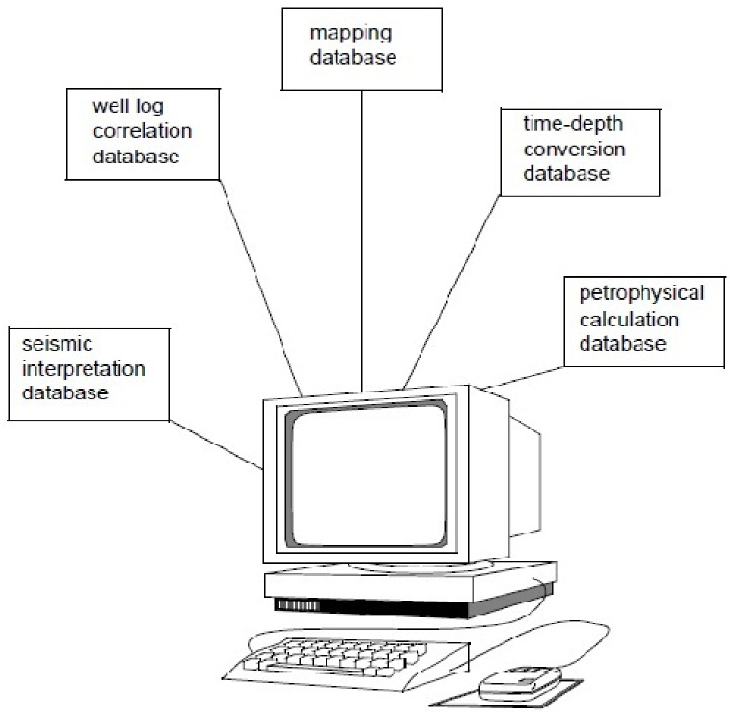
The OpenWorks Software/Oracle Relationship

The OpenWorks software resides outside of Oracle and uses information stored in the database (wells, curves, grids, point sets, faults, and 2D horizons). Landmark applications run off of the OpenWorks software.



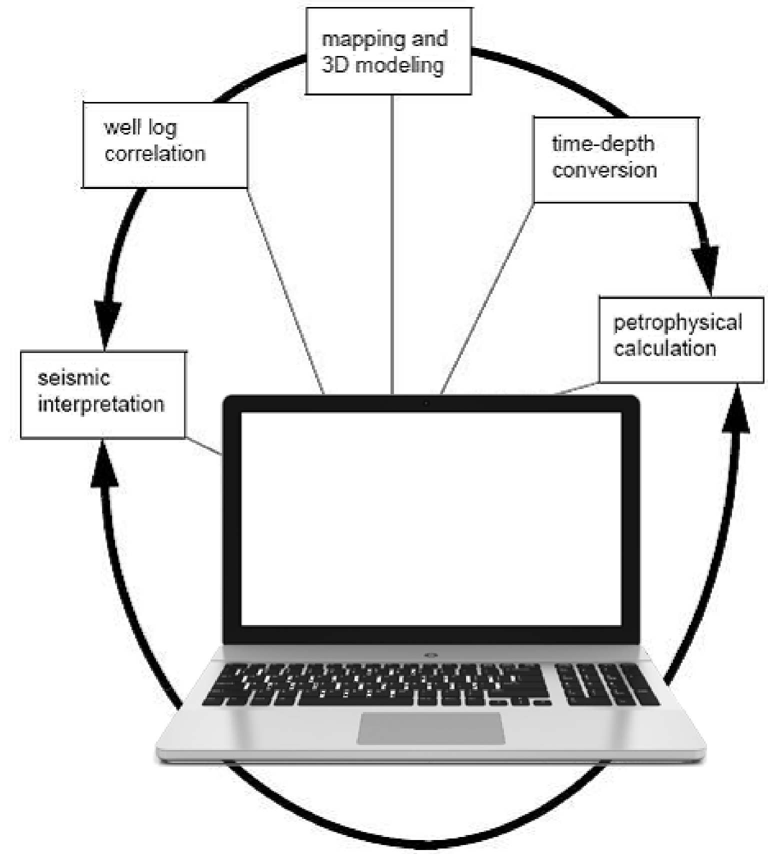
Unintegrated Applications

Before the OpenWorks software, multiple geoscience applications could not be run simultaneously on the same computer. Many geoscience applications were written only for use on a particular brand of computer, and you often could not interact with more than one application at a time or transfer data between applications.



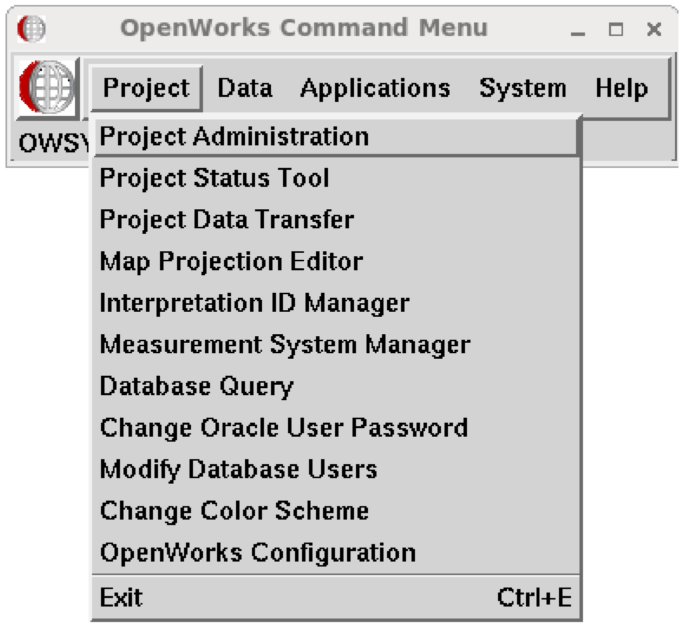
Integrated Applications in the OpenWorks Software

The OpenWorks software lets you work the way you are accustomed to working without a computer. That is, you can view a wide variety of data, study multiple problems at the same time, and analyze the same set of data in many different ways.



Project Management Utilities

The project management utilities are found under **Project** on the OpenWorks command menu.

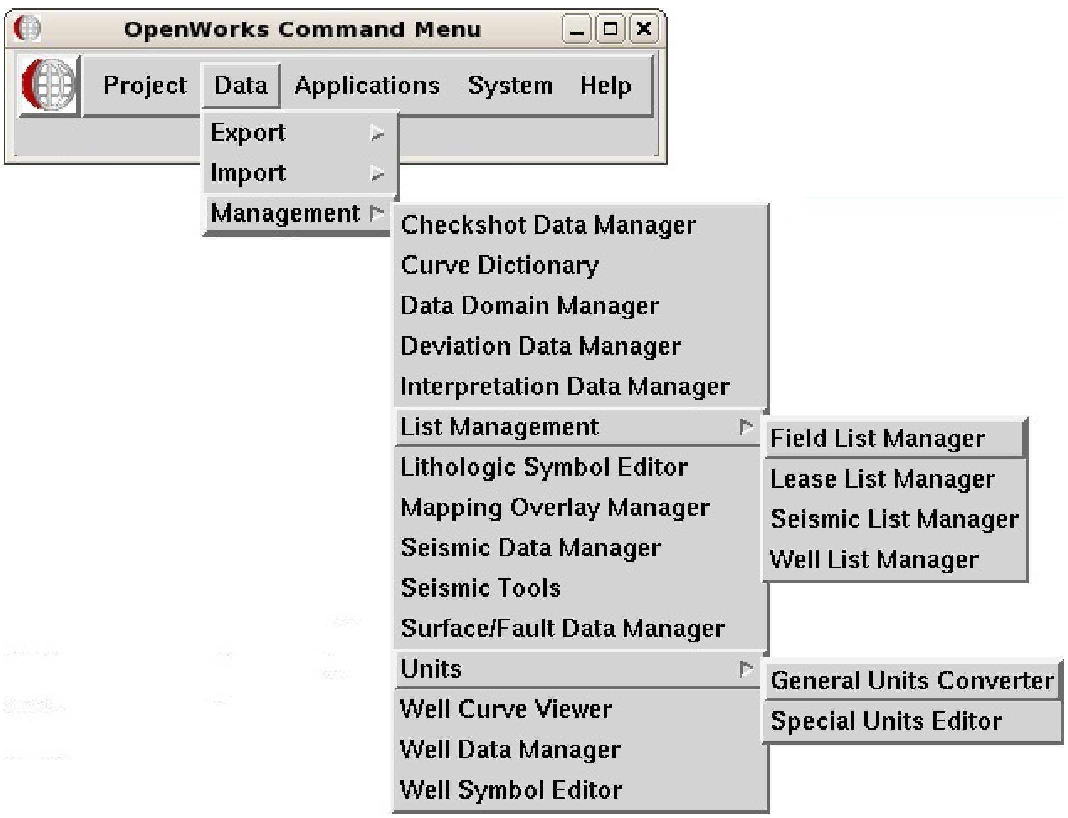


Utility	Purpose
Project Administration	Performs administrative tasks, such as backing up, restoring, and deleting projects. You must have project manager access to projects to perform these tasks.
Project Status Tool	Allows you to define OWSYSID, current project, current interpretation ID, measurement system, current well list, and preferences.
Project Data Transfer	Transfers data from one OpenWorks project to another.
Map Projection Editor	Defines cartographic reference systems that will be used to store and display project data.
Interpretation ID Manager	Builds and maintains a list of valid interpretations IDs for use by the OpenWorks software and other Landmark applications.
Measurement System Manager	Creates a customized measurement system for a new OpenWorks project. The OpenWorks project must be created after creating the new measurement system.
Database Query	Provides a way for running Oracle SQL (Structured Query Language) statements or scripts.

Utility	Purpose
Change Oracle User Password	Allows you to change your password.
Modify Database Users	Allows system administrators or users with administrator rights to add, update, and delete Oracle users and their access to the database.
Change Color Scheme	Allows you to change color scheme of the application.
OpenWorks Configuration	Allows system administrators or users with administrator rights to set the location of OpenWorks configuration files.

Data Management Utilities

The data management utilities are found under **Data > Management** on the OpenWorks command menu.



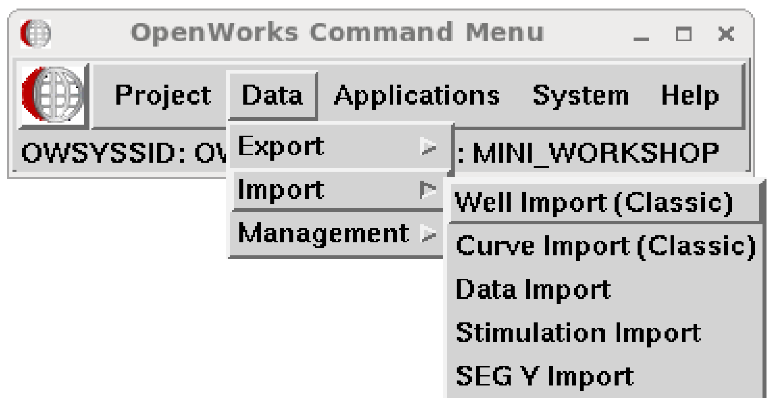
The following table lists the various utilities and explains the purpose of each one:

Utility	Purpose
Checkshot Data Manager	Display time-depth tables graphically, edit or delete time-depth pairs, and merge, generate, or delete time-depth tables.
Curve Dictionary	Manage list of logs and curves that can be manipulated and displayed in applications.
Data Domain Manager	Manage reference tables used by various Landmark applications.
Deviation Data Manager	View, merge, and delete deviation surveys, generate position logs, and edit and delete points on deviation surveys.
Interpretation Data Manager	View and delete grids, point sets, fault centerline sets, fault polygon sets, and contours.
List Management > Field List Manager	Create, modify, select, and view lists or subsets of the fields in a project.
List Management > Lease List Manager	Create, modify, select, and view lease lists, and to view information about leases in the lists.
List Management > Seismic List Manager	Create, modify, select, and view seismic line lists and to view detailed information about seismic lines in the list.
List Management > Well List Manager	Create, modify, select, and view wells and their associated curves, picks, zones, and zonal attributes.
Lithologic Symbol Editor	Create or modify the patterns used to indicate different types of lithology.
Mapping Overlay Manager	Convert mapping overlay data to the Landmark ZGF file format and convert cartographic reference system so that applications can share this data.
Seismic Data Manager	View, edit, and manage seismic data. Supported data types include seismic lines and surveys, seismic data sets, horizons, processing history, and file storage areas.
Seismic Tools	Use this set of utilities with seismic data. Refer to the SeisWorks® software online documentation.
Surface/Fault Data Manager	Add, delete, and edit surfaces/faults an stratigraphic unit to OpenWorks.
Units > General Units Converter	View and edit table. column names, and original units of measure. You must have manager access to projects to perform these tasks.
Units > Special Units Editor	View and edit unit types and unit abbreviations of special data types that are not converted to the measurement system by an OpenWorks project (project managers only).

Utility	Purpose
Well Curve Viewer	View well curves.
Well Data Manager	View, edit and manage well data.
Well Symbol Editor	Create your own symbols for wells or edit standard well symbols.

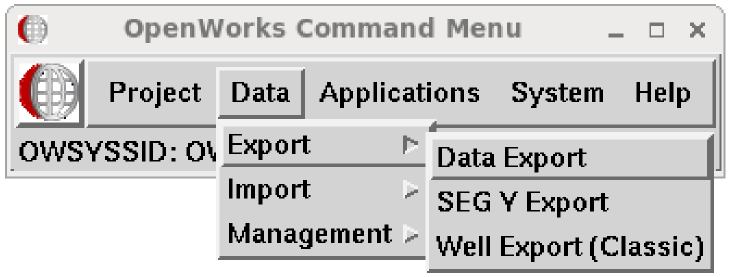
Data Import/Export Utilities

The data import and export utilities are found under **Data > Import** and **Data > Export** on the OpenWorks command menu.



The following table lists the various data import utilities and explains the purpose of each one.

Utility	Purpose
Well Import (Classic)	Loads and previews ASCII well data, and defines and tests data format files.
Curve Import (Classic)	Loads well log curves, position logs, directional surveys, synthetic seismograms, and time-depth tables into the database.
Data Import	Imports various types of data to a project database from ASCII or binary file format. Also imports depth Calibrated Log Images in .SIF, .DRA and .REG formats.
Stimulation Import	Imports monitor well and treatment well information from data files into the database.
SEGY Import	Loads 2D and 3D SEGY disk data into Landmark formats.



The following table lists the various data export utilities and explains the purpose of each one.

Utility	Purpose
Data Export	Exports various types of data from a project database to one of several formats: all Landmark, custom, or Z-MAP formats. You can also create a new format.
SEG Y Data Export	Exports 2D and 3D seismic data into SEGY format.
Well Export (Classic)	Transfers well or curve data from the OpenWorks database to the console or to external files, using predefined or user-defined formats.

Database Concepts and Terms

The OpenWorks system uses the Oracle relational database management system for storing and retrieving project data. This section provides basic information about relational databases.

The Relational Database Management System (RDBMS)

An RDBMS is a software system that stores data according to the relational model. The stored data are represented as tables which are made up of rows and columns. Each distinct group of data managed by an RDBMS is called a database. The RDBMS provides a controlled interface to the databases, allowing multiple users to access and change the data without corrupting it.

A database contains information needed by users and their applications. The database is an integrated collection of data sets such as wells, logs, and tops.

Databases exist independently from any particular user or application.

Data Organization

Within a database, related data is grouped into *tables*, which are composed of *rows* and *columns*. Within a row, a particular piece of data is called a field.

The following diagram illustrates part of a typical database table.

WELL_ID	WELL_NAME	WELL_NUMBER
23	CACTUS LAKE	#16
124	HOUSTON	#23
85	EASTERN REFF	#31

Row Column Field

Accessing Data in the Database

When the RDBMS accesses the data in the database, the database identifies data using a unique identifier value known as keys.

A key is a group of one or more fields in a row that uniquely distinguish the row from the other rows in the table.

You might think of keys in terms of a personnel record file. Information used to uniquely identify employees in an organization might include first name and last name. Within an employee database, in order to be recognized as identifying an employee, a record would have to contain unique First and Last Name fields.

There are two types of keys:

- Primary keys are used to identify a row within a table.
- Foreign keys are used to link related data contained in separate tables.

In the following example, WELL_ID is the foreign key that links table WELL_HEADER with table OW_DATA_SOURCE.

WELL_ID	WELL_NAME	WELL_NUMBER
23	CACTUS LAKE	#16
124	HOUSTON	#23
85	EASTERN REFF	#31

Key

WELL_ID	DATA SOURCE	PICK SURF ID
23	APV	24
124	SBO	63
85	JPT	78

The OpenWorks R5000 Data Model contains over 800 tables.

OpenWorks Software Data Model

When building applications, developers use a data model to imitate your company's information needs and business processes. This data model is the key to understanding how information in the database is organized.

Entity-Relationship (ER) Diagrams

Entity-relationship diagrams represent the overall structure of the database. Entities are drawn in boxes. Relationships are drawn using lines and symbols.

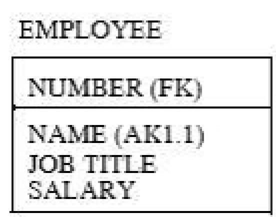
Entities

A data model is composed of entities. An entity is a piece of information. Each entity (table) contains the attributes (fields) that describe it. Relationships of entities are evaluated in two directions.

Two types of fields exist within an entity: attributes and primary key attributes. Primary key attributes are located at the top of the entity above the horizontal line. They are part of a unique key that identifies a row of data. Attributes are listed in the lower section of the entity rectangle.

- Items below the line with an alternate key (AK) can also uniquely identify a row. An AK of 1.2 is the second part of the first alternate key.
- A foreign key (FK) indicates that an item is a foreign key to another table.

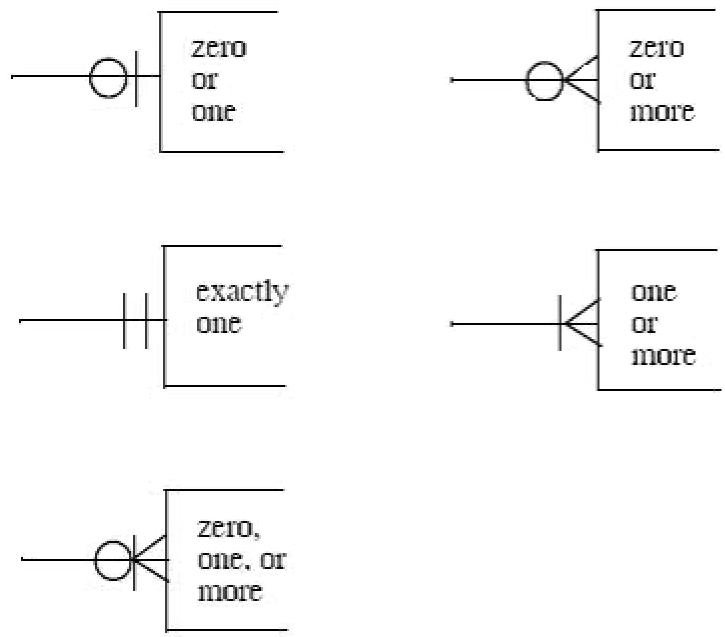
The example below is an EMPLOYEE entity (table). NUMBER is the primary key attribute. It is a FK to another table (not displayed). NAME is an alternate key that also uniquely identifies a row in the entity. JOB TITLE and SALARY are attributes of the EMPLOYEE entity.



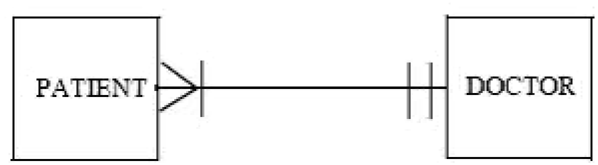
Relationships

Solid lines connecting two entities indicate identifying, or mandatory, relationships. Dotted lines represent non-identifying relationships and are optional. Names of relationships are written above the line.

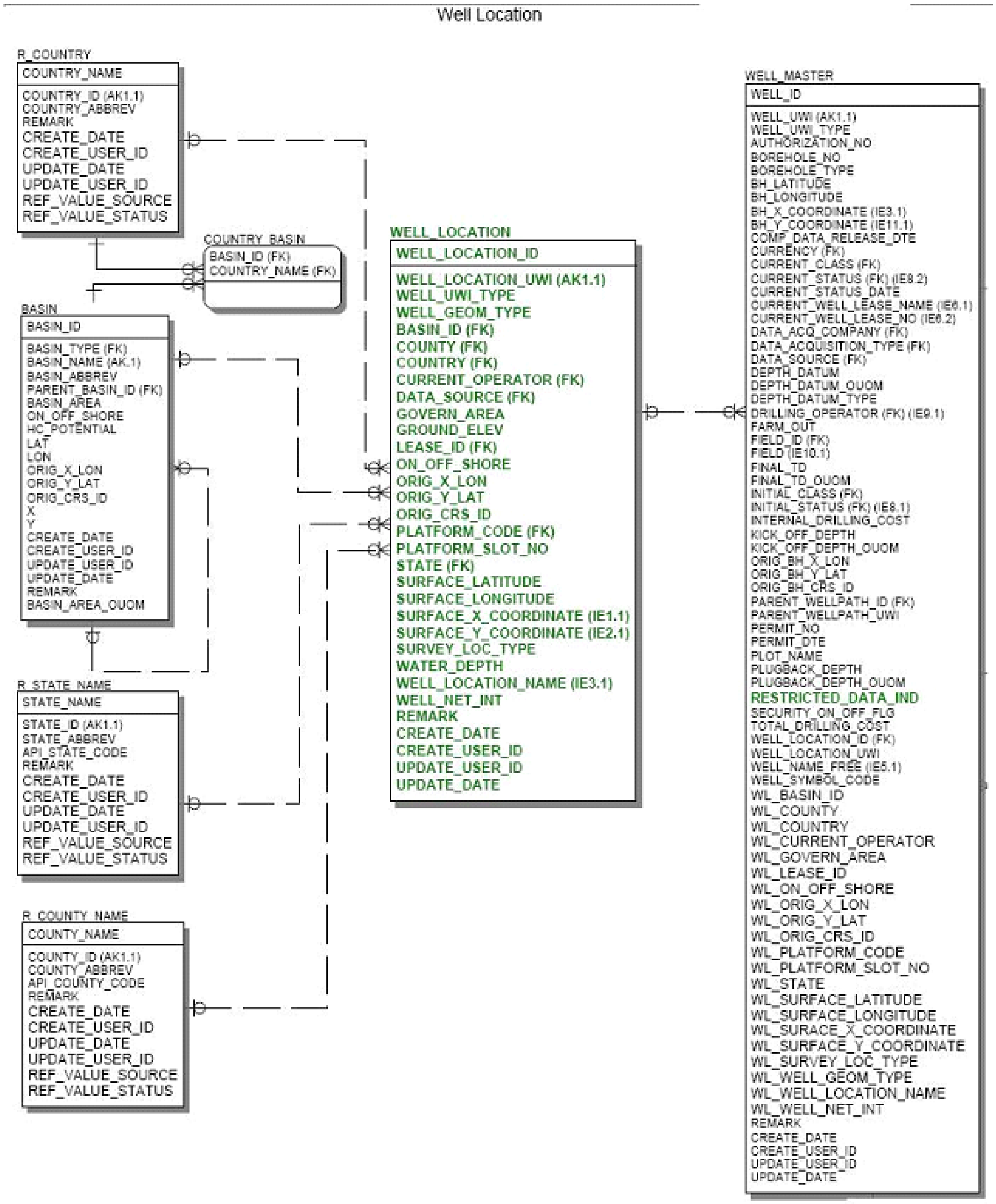
The following symbols define relationships in an ER diagram:



Given the symbol definitions above, review the example below. A patient has exactly one official doctor. The doctor, however, has one or more patients.



The following ER diagram is an example of relationships within the OpenWorks data model.



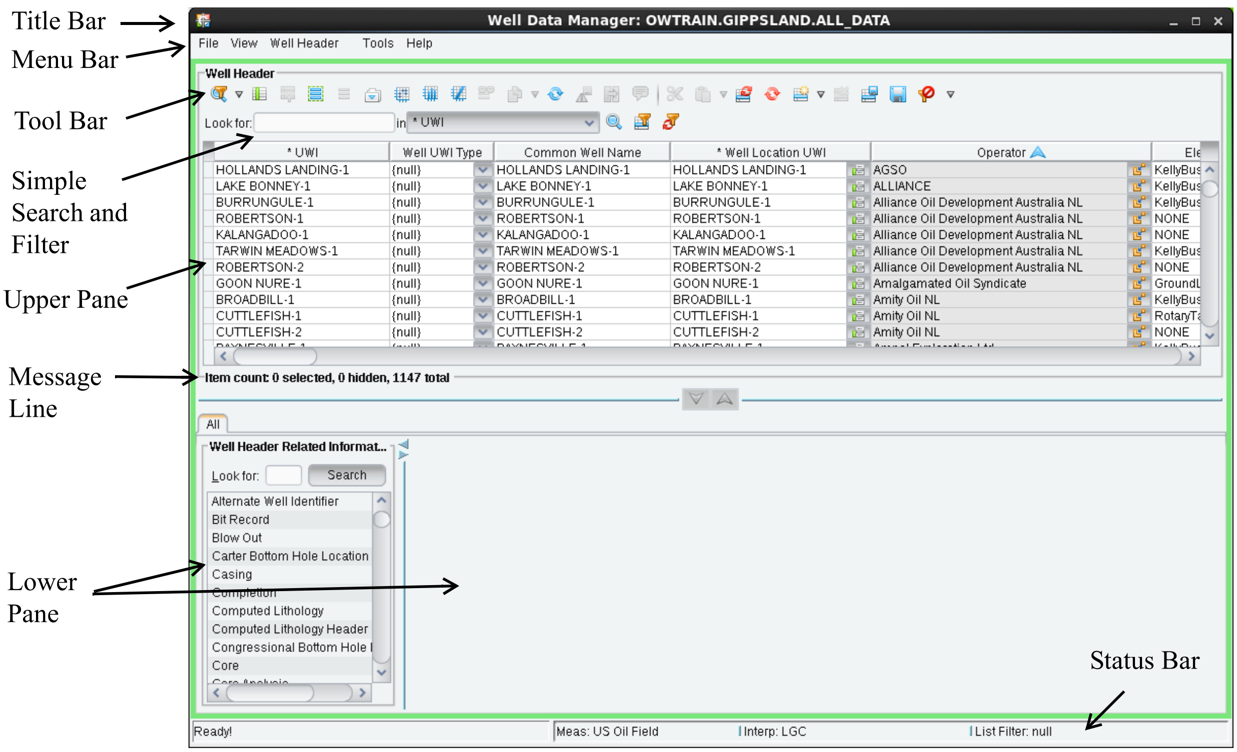
Managing OpenWorks Software Windows

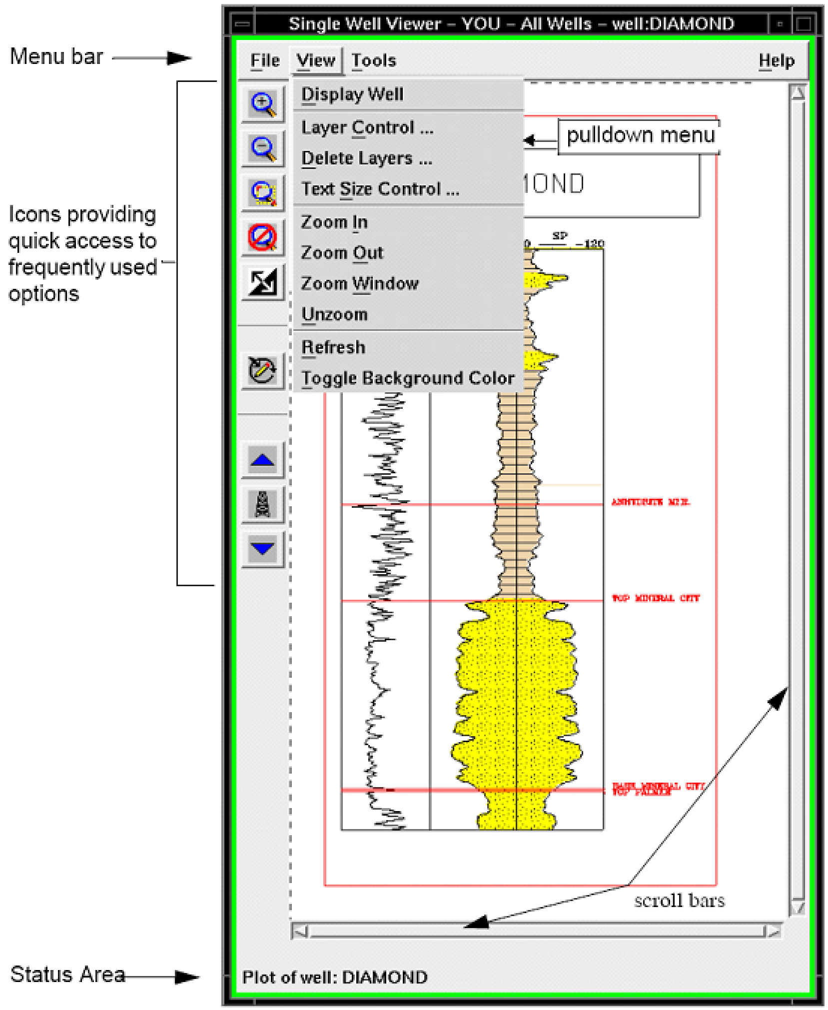
Many of the OpenWorks applications in R5000.10 are enhanced in terms of usability and increased functionality. Each application window allows you to perform specific tasks in a single window and navigate easily through the workflow.

Understanding Menu Conventions

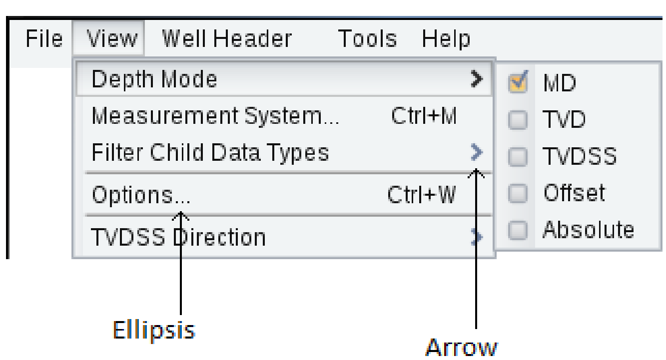
Some of the OpenWorks utilities have changed their appearance for R5000, whereas some utilities keep the R2003 appearance. We will see an example of menu conventions in both types of windows; Well Data Manager window and Single Well Viewer in the StratWorks® software.

This is an example window from Well Data Manager. The window has the following parts: title bar; menu or menu bar; toolbar; various panes; sections or tabs; and a status bar. When you first open Well Data Manager, it has two panes (upper and lower), and the lower pane is further divided in two panes. Each pane, depending on the data displayed, may have just a search function and a toolbar. The bottom of some panes may have a message line that indicates how many items are selected, hidden and displayed in the table.


Title Bar
Menu Bar
Tool Bar
Simple Search and Filter
Upper Pane
Message Line
Lower Pane
Status Bar
Well Data Manager: OWTRAIN.GIPPSLAND.ALL_DATA
File View Well Header Tools Help
Well Header
Look for:
Item count: 0 selected, 0 hidden, 1147 total
Well Header Related Informat...
Search
Ready!
Meas: US Oil Field
Interp: LGC
List Filter: null



Clicking any option in the menu bar reveals a drop-down list of subsidiary options. Items on a menu can be followed by ellipses, arrows, or no punctuation.



Ellipsis

An ellipsis (...) after a menu item, as in “Measurement System...” from the *View* menu, indicates that a dialog box displays if you click on this option.

Arrow

An arrow (→) after a menu item, as in “Depth Mode (→)” from the *View* menu, indicates that if you click on this option, additional cascading menu options display.

No Punctuation

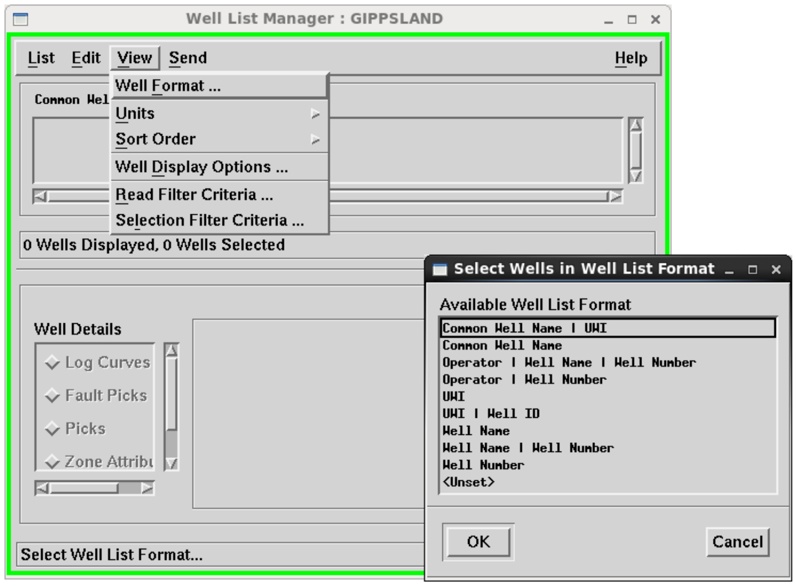
Menu options with no punctuation perform the specified task immediately or put you in the right mode to perform the specified task. For example, when you select **Save All**, the data in the Well Data Manager is immediately saved.

Hot Keys

A hot key allows you to select a menu option by typing a single letter. Hot keys are indicated by an underscored letter in the option name. In the Well List menu bar, for example, the initial letter of View is underlined. To display the View drop-down list, press **<Alt + v>**.

You can also use hot keys to select an option from a drop-down list by simply typing its underlined letter. For example, type `f` to select **Well Format** from the *View* drop-down list.

Hot keys are only supported in legacy applications.



Press <Alt-v> to access the pulldown menu.

Press <f> to select Well Format.

The Well Format dialog box appears.

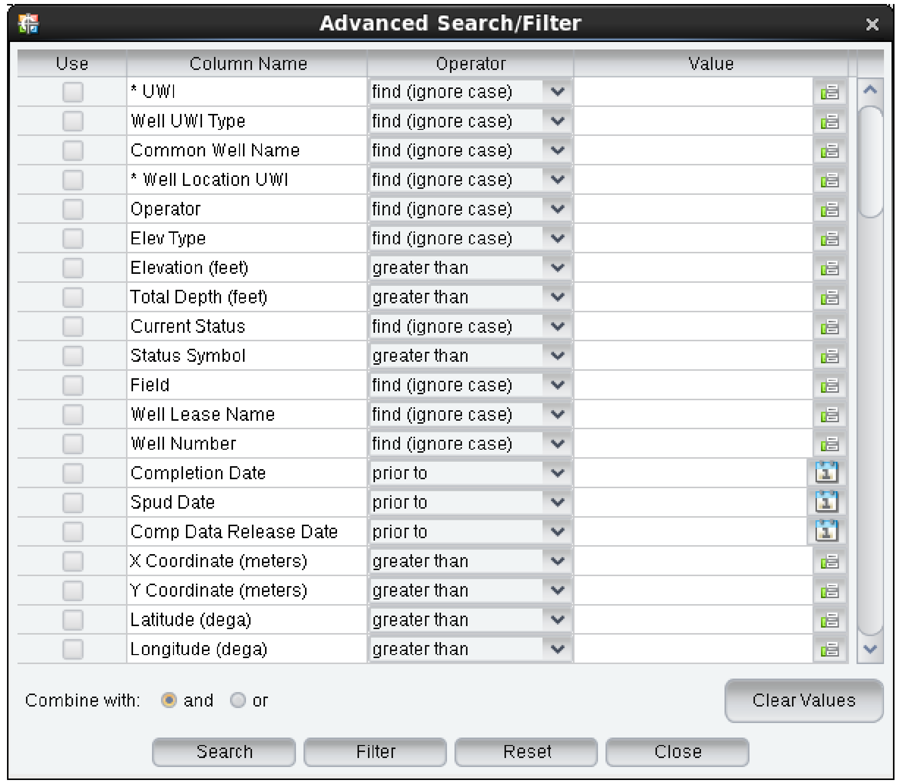
Icons R5000

Icons are provided in every application window to give you quick access to frequently used options. The most common icons in OpenWorks R5000 allow you to perform various tasks such as search, copy, export, add, delete, and save in the data window. Some application windows have additional icons that perform specific tasks for that particular application.

A description of some of the new icons that are introduced in OpenWorks R5000 follows.

The **Advanced search and filter within table** icon opens the Advanced Search/ Filter window. You can specify search details specific to a data table.

A minimum of one search criterion must be specified in this window to perform an advanced search.

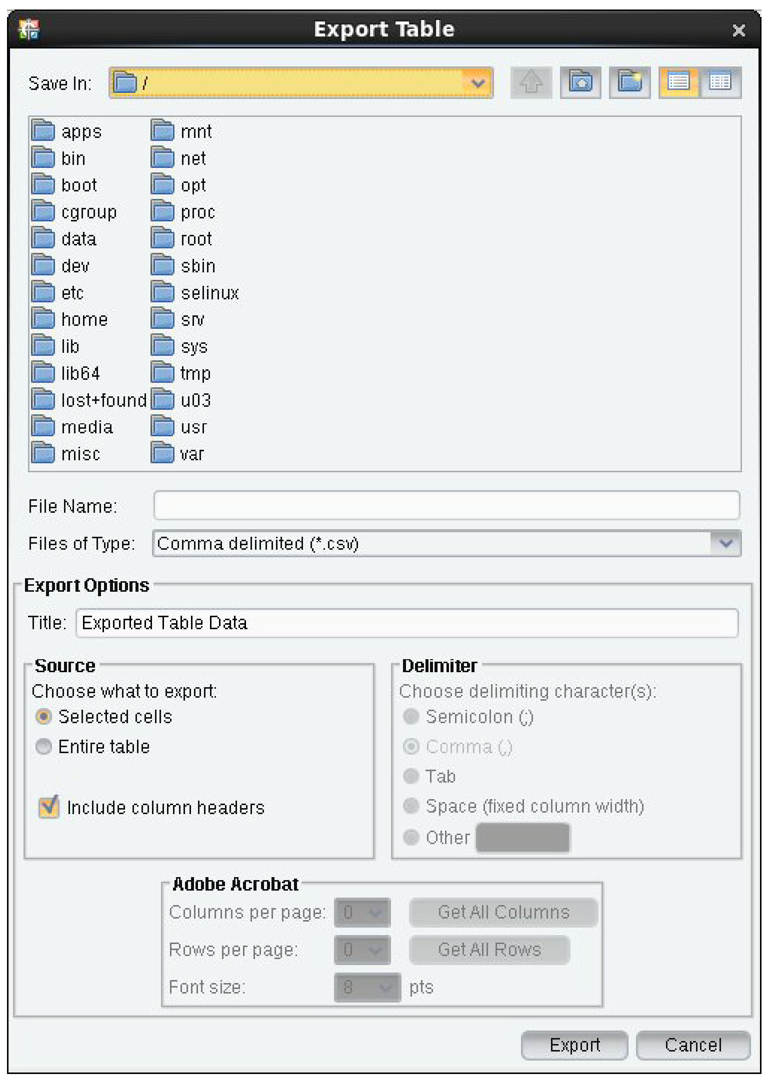


The Advanced Search and Filter window allows you to enter search criteria for all columns currently in the table. A search can be performed for a single attribute or for a combination of attributes.

The **Select all** icon selects all columns and rows in the data table.

The **Deselect all** icon deselects all selected rows in the data table.

The **Export to various file formats** icon opens the Export Table window. You must specify the location to save the file, file name, file type, export options, and source details.



In OpenWorks R5000, the home directory was the default export directory, and also allows you to navigate to a new export path. The same path is displayed the next time you choose the export option. The selected data in a table and its secondary data (if any) are exported. The various export file formats are .pdf, .csv, .xls, .html, .spc, .tab, .txt and .xml.

The **Send selected rows via PD** icon moves selected rows from one application to another application using PD™ software.

The **Add rows icon** opens the Add Rows window. You must specify the number of rows and the location of the row you want to add either at the top or bottom of the list or below the selected row.

The **Delete selected rows** icon deletes all selected rows from the database. The selected details turn red when selected.

The **Save selected rows icon** saves the details of the selected rows. Details are saved to the database and the screen remains open.

The **Save all rows icon** saves all details of all the rows in the window to the database. The screen remains open.

The **Revert selected rows icon** reverts the details of the selected rows to the previously saved version of the data.

The **Revert all rows icon** reverts all details of all rows in the window to the previously saved version of the data.

Simple Search and Filter

The Simple Search and Filter feature of OpenWorks R5000 helps you to look for data in a simplified manner. The Simple Search and Filter function is displayed in a horizontal row above the data table.

The Simple Search and Filter function allows you to search or filter data based on data in one column in a table. To use this function:

1. Type a value in the text box.

2. Click the **Search** icon ( ) to select rows in the table where the values in the column match the criteria.

3. Click the **Filter** icon ( ) to hide rows where the values in the column do not meet the criteria.

Selecting the Search option displays data as a highlighted row in the data window, whereas the Filter option displays the data that meets the search criteria.

OpenWorks R5000 supports Advanced Search and Filter, which is explained in the previous section. The Simple Search and Filter only allows you to base your search/filter on one column in the table, whereas the Advanced Search and Filter allows you to enter criteria for all columns displayed in the table. Simple Search and Filter does not support operators such as *greater than* or *between*, whereas Advanced Search and Filter does.

Icons R2003.0.0

Icons are provided along the left side of some application windows to give you quick access to frequently used options, such as windowing, zooming, and changing the background graphics color.

The most common icons are shown below. Some windows also have additional icons specific to the tasks done in that particular application.

The **Zoom in** icon lets you select a point to be the center of the display and enlarges the display by a factor of two.

The **Zoom out** icon lets you select a point to be the center of the display and reduces the display by a factor of one half.

The **Reset Zoom** icon restores display to the original scale.

The **Zoom window** icon lets you select an area for enlargement by drawing a rectangle on the display.

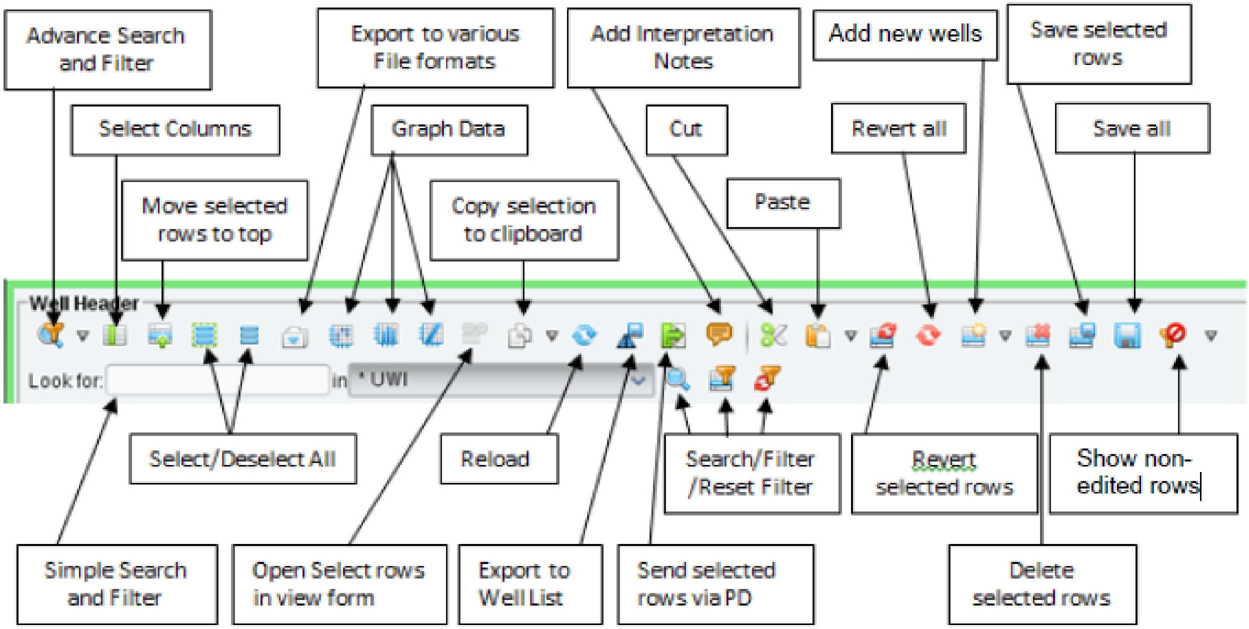
The **Toggle background color** icon switches the background from black to white and vice versa.

The **Refresh display** icon refreshes the screen display.

The **Refresh display with data** icon updates the screen display using the latest information from the database.

Icons R5000.10

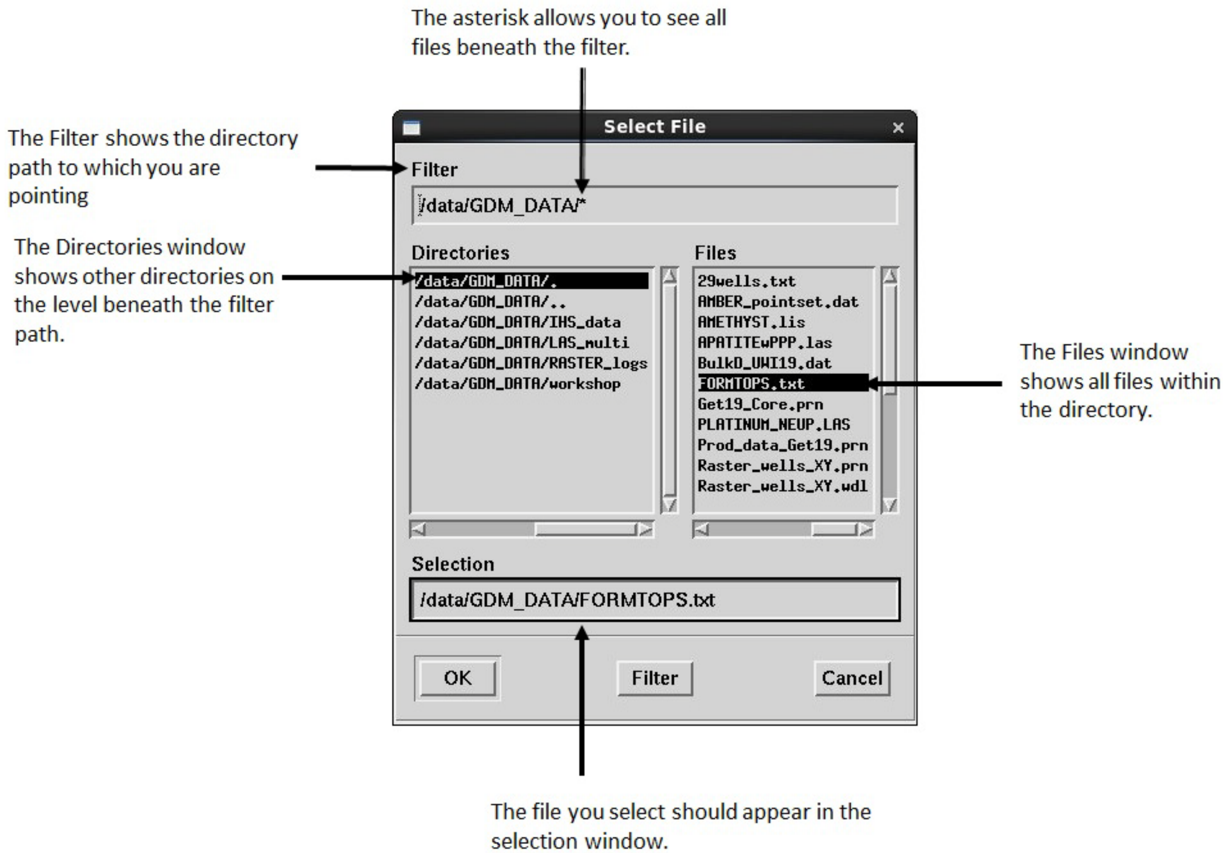
The most common icons for R5000.10 are shown below.



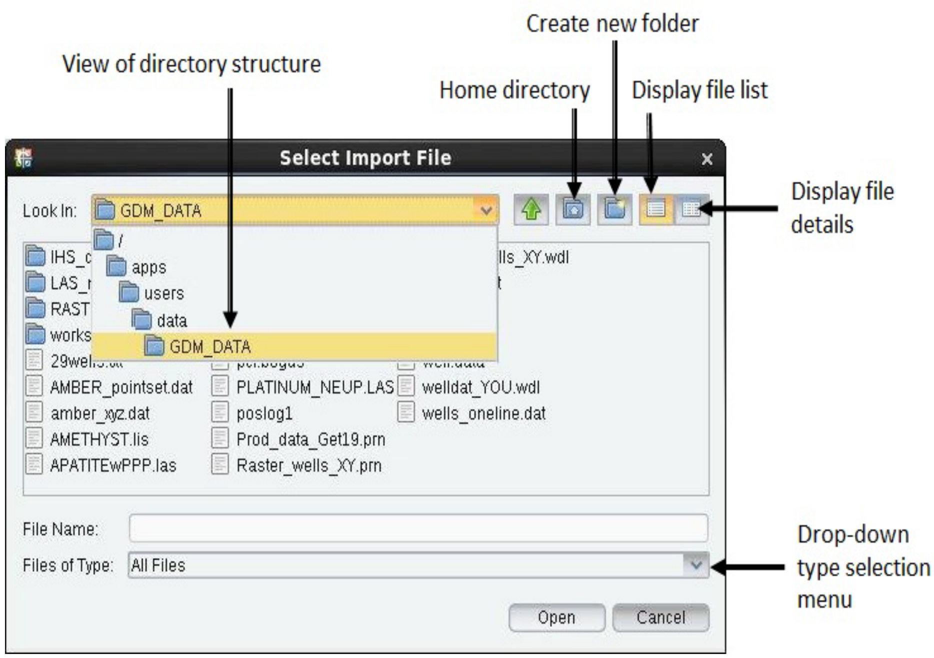
Selecting Files

The Select File window allows you to filter through directories to find the file you need. In classic applications, if you select a directory name in the Directories list box in the dialog box, you need to either double-click or click on the filter button for that directory to become a part of your filter path. Once the directory becomes a part of the filter path, you will be able to see files and directories within the directory.

The asterisk found at the end of the path in your Filter text box allows you to view all fields beneath the filter. To view fields of a certain extension only, *.*extension* should display at the end of the filter path. An example of the classic file selection dialog box follows.



The file selection process has been enhanced in the OpenWorks R5000 applications. In classic applications, a simple two-pane window allows you to navigate through directories and choose the file you need. The new utilities employ a more user-friendly Windows based approach to file selection.



Exchanging Data Among Applications

In OpenWorks R5000, there is a change in data messaging. OpenWorks R5000 uses Oracle AQ to broadcast data change notification. Oracle AQ integrates a message queuing system with the Oracle database. This system ensures that messages are delivered to any application using the project anywhere on the network. The other benefits of the AQ system are as follows:

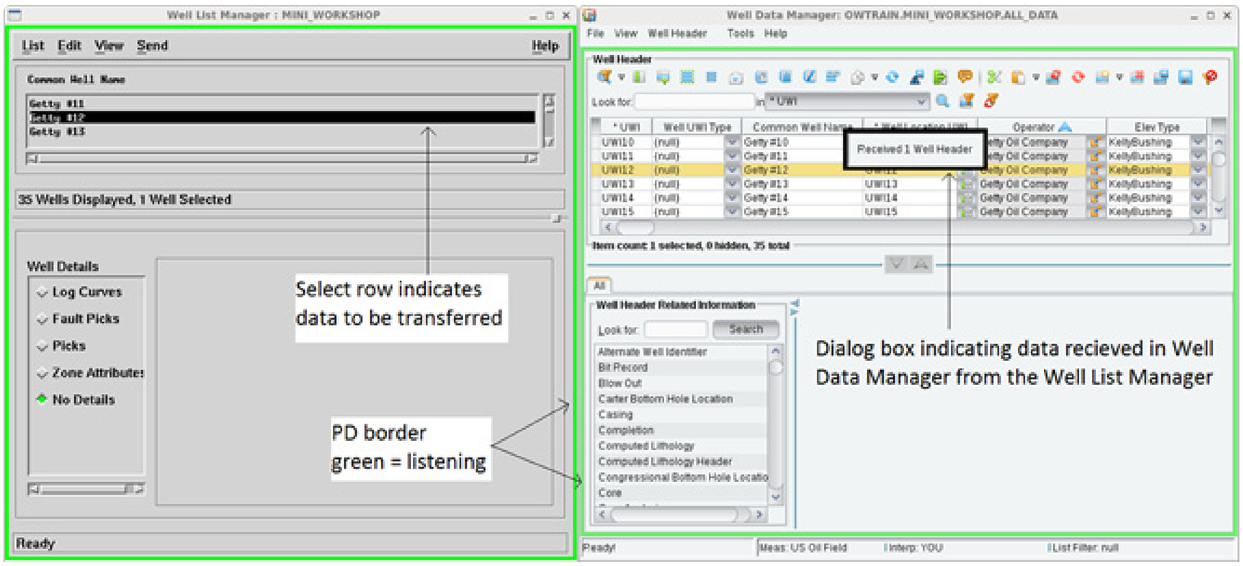
- There is no need for any special configuration to receive messages. You can receive data change messages as soon as you access the database.
- Messages are forwarded to all the interpretation projects that share data. For example, you can change well information in one interpretation project, and all listeners interested in that well are notified.
- New messages are broadcast to define the transaction boundaries. A receiver has the flexibility to update the display at the end of a transaction.
- These changes greatly simplify workflows involving monitoring of real-time data updates across multiple machines on a network.

The Pointer Dispatcher (PD) software is still used for client-side communication. PD software:

- Allows you to easily transfer data among applications running in the OpenWorks environment.
- Receives information and directs it to all listening applications.

You determine the data that is sent from an application and the applications that receive this data.

Applications with the PD software feature are always capable of sending data, but they must be in Listening mode to receive data. A green border indicates a listening window. A red border indicates a window is not listening. In legacy applications, a flying box emanates from the window indicating that data was sent. In the new DecisionSpace software applications, when an event is broadcast, a dialog box displays for five seconds on top of the receiving application displaying specific details about data exchange and confirmation.



Conventions Used in this Manual

Throughout this manual, certain conventions are used in explaining how to access and use various features of the OpenWorks software. You are probably familiar with most of them, but as a reference, a list is provided below:

Menu Options	Menu options and pushbutton names are printed in boldface, for example, **Scaled Plot.**
type: `redfault`	Text that you are required to type is printed in a different typeface (Courier). Type exactly what you see.
type: *`projectname`*	A different typeface (Courier) in italics indicates that you are to supply information. At this instruction, for example, you would type the name of your project.
Click	Move the cursor to the option or object specified and quickly press and release the mouse button. Unless otherwise specified, use **Mouse Button 1**, or **MB1.**
Press and drag	Press the mouse button and hold it down. Click and drag while moving the cursor to the option you want, and then release the button.
Highlight	In a selection box, move the cursor to the item you wish to use and click the mouse button to select it.
Select	Move the cursor to the option or object you want to select and click on it.
Double-click	Click the button twice rapidly without moving the mouse. The first click highlights the option or object beneath the cursor; the second click is equivalent to selecting the **OK** button to accept the selection.
Key	Press the indicated key on the keyboard.

Chapter 2
Creating a Project

Before you can load data onto the workstation, you must have some meaningful way of grouping and specifying the data you want to use for a particular interpretation. To do this, we use the concept of a project.

There are four major steps involved in creating a project database:

- Defining the project's relationship to world geography by defining a cartographic reference system for the project
- Creating the project
- Assigning interpretation IDs to the project
- Importing data

Chapter Objectives

In this chapter you will learn:

- What a project is
- The concept of districts
- How measurement units are handled by the OpenWorks software
- How to create a project
- What a cartographic reference system (CRS) is
- How to create a CRS for your project
- How to assign and manage interpreters for a project
- How to administer projects

Understanding Projects

Release 5000 introduces the concept of an OpenWorks project database with associated interpretation projects. The following sections explain the concept of both project types.

What is a Project Database?

A project database is any logical set of data to be used together on your system.

The amount of data is limited only by the disk space available. Data pertaining to the project physically resides in the OpenWorks project database, whereas the views associated with particular subsets of this data are created in the interpretation projects.

What is an Interpretation Project?

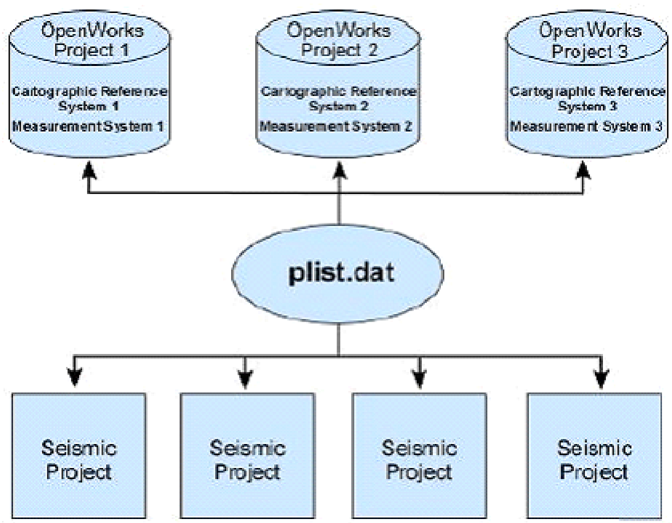
An interpretation project is a subset of data from an OpenWorks project database defined by an area of interest and data selection lists. SeisWorks software project management has been incorporated into the OpenWorks project management utilities in this release. Generally, one interpretation project in the OpenWorks R5000 environment corresponds to one SeisWorks project in the OpenWorks R2003 environment. However, you can control which SeisWorks projects will become interpretation projects. We will discuss in detail the management of interpretation projects in future chapters.

The advantage of this model is that it eliminates the need to duplicate the same master data in multiple OpenWorks projects (as it might have been required in OpenWorks R2003) and creates a more secure environment where users can only access the subset of data they are permitted to use.

A comparison of a project model in R2003 and a project model in R5000 is as follows:

R2003

- Each OpenWorks project is a physical canister of data.
- There is one cartographic system per project.
- Access control is project wide.
- Many customers have literally hundreds of OpenWorks projects to manage.

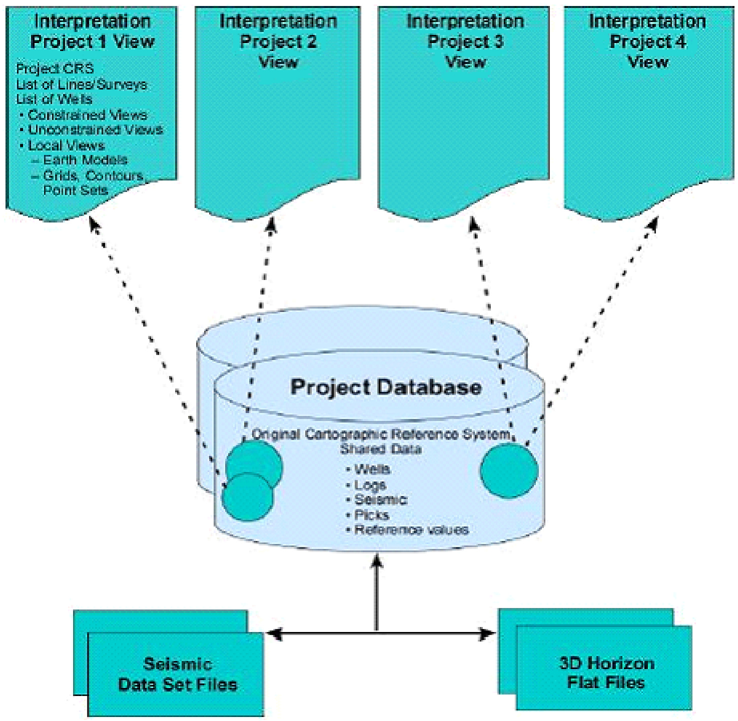


OpenWorks R2003 Project Model

R5000

As projects and their seismic data are upgraded from OpenWorks R2003 to OpenWorks R5000, the master projects and working projects of the SeisWorks software are transformed into OpenWorks interpretation projects. After the initial setup of the OpenWorks R5000 environment, users will have as many or more OpenWorks projects as they had in the R2003 environment.

Due to advancement in the project model, the number of OpenWorks projects databases can eventually be reduced by combining similar adjacent OpenWorks projects into larger regional databases. These regional databases could then comprise several smaller local interpretation projects. The benefit of larger regional projects is that they ensure each asset team is working with the same up-to-date data, creating a more consistent and integrated working environment.



OpenWorks 5000.0.0 Project Model

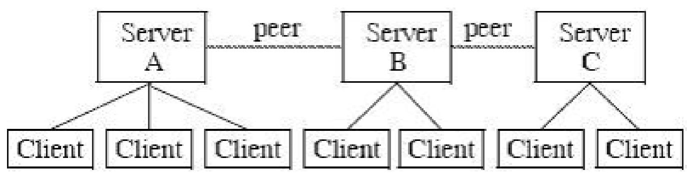
User Access to Both Interpretation Projects and OpenWorks Software Project Database

User access to a project database and its interpretation project is independent. A user does not need to have any access to the project database to access or modify the data in the interpretation project. However, a user must have manager access on the OpenWorks project database to modify the interpretation project in Project Administration. This restriction protects the definition of the interpretation project and eliminates access to data in the project database excluded from the interpretation project.

Accessing Projects Over a Network

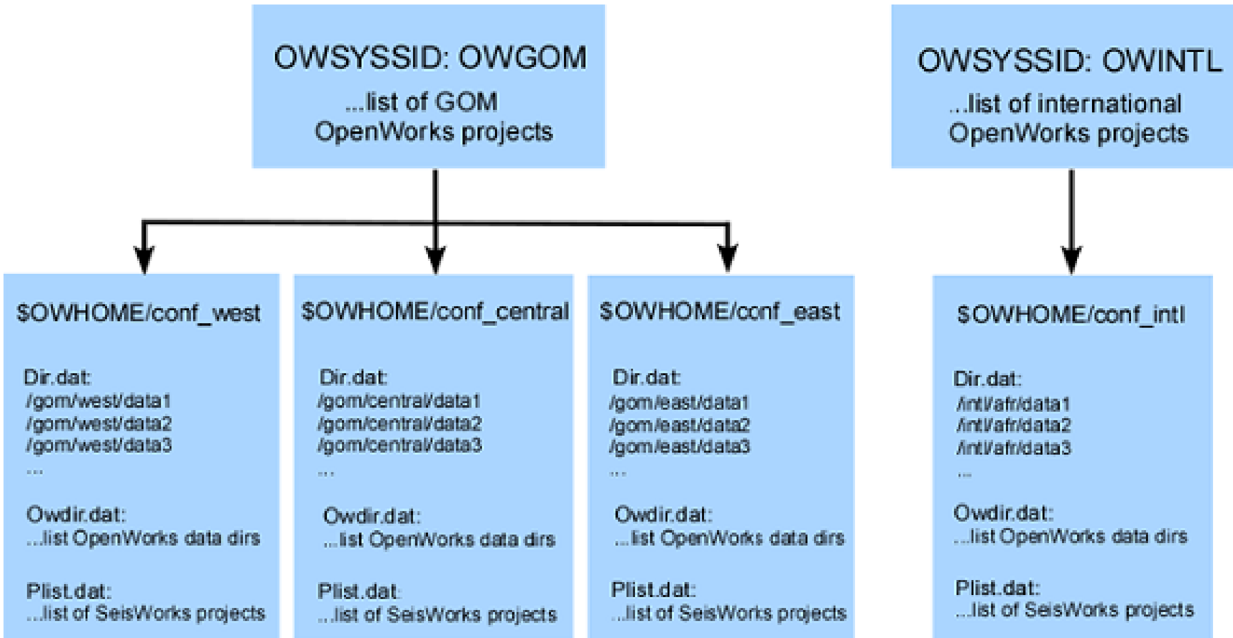
A project database is stored in the Oracle database that is installed with the OpenWorks software. Users with large networks may have multiple databases installed at various locations on the network. Each workstation containing an installed database is called a database server or instance. Each of these servers may have various client workstations that do not have their own installed databases but which can access the server database through network communications (NFS).

If the database servers are linked through peer-to-peer communication, it should be possible for any authorized user working on any of the clients to create, view, or modify projects on any of the servers. For example, in the illustration, it should be possible for a user on a client of Server C to access projects on all three servers. If peer-to-peer communication has *not* been installed, the client workstations will only be able to access projects on their immediate server. In this case, the client of Server C would only see the projects on Server C.



Districts

In previous releases, some companies chose to implement the concept of districts using the OW_PMPATH environmental variable and the name of an OpenWorks database (OWSYSSID). This combination of variable and database name specified a subset list of SeisWorks projects and data directories. Districts allow data managers to subset data into manageable components and prevent the user from being overwhelmed with data outside their area of interest. A typical district configuration in the R2003 environment is described and illustrated as follows.

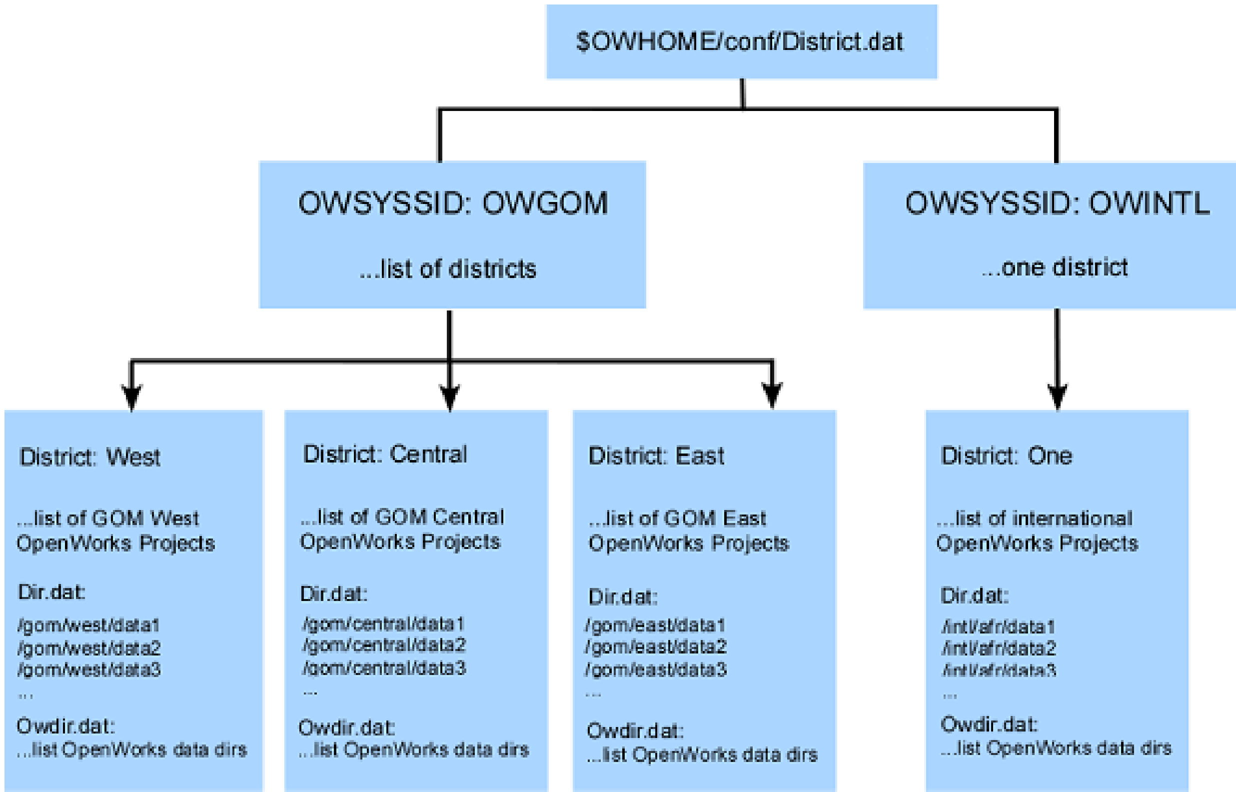


In this example, an R2003.12 site has two OpenWorks Oracle instances—OWGOM and OWINTL—hosting Gulf of Mexico and international projects, respectively. The OWGOM instance contains three districts: east, central, and west. Each district corresponds to a business unit. The OWINTL instance has a single district. In this example, only one district is needed because the international operations are relatively limited. Each district has a unique `plist.dat`, listing the subset of SeisWorks projects in each of the respective areas.

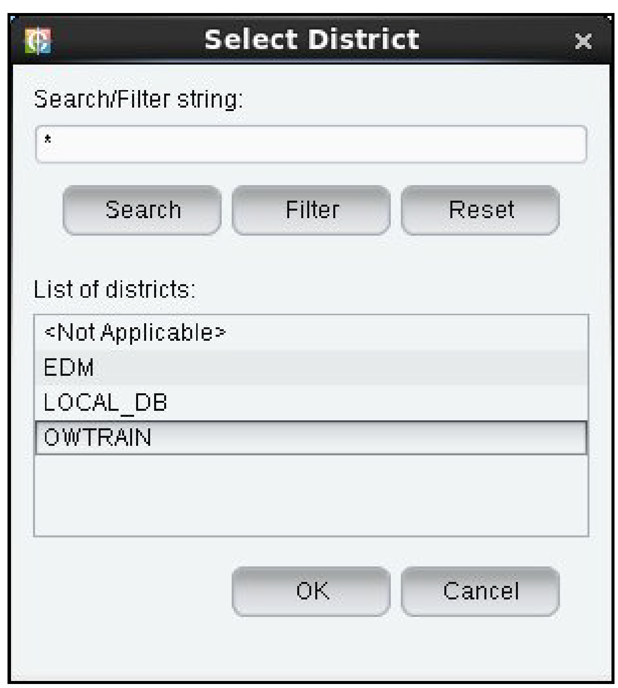
All GOM SeisWorks projects are associated with OpenWorks projects on the OWGOM instance. All international SeisWorks projects are associated with OpenWorks projects on the OWINTL instance. Each district has a unique `dir.dat` and `owdir.dat` used to configure the storage of SeisWorks and OpenWorks data for each business unit.

With the elimination of the `plist.dat` file in the OpenWorks R5000 environment, the same functionality cannot be achieved by changing the environment; therefore, the concept of districts has been formally introduced in this release.

OpenWorks R5000 supports districts by adding the required attribute of District to the project list table. The configuration is described and illustrated as follows.



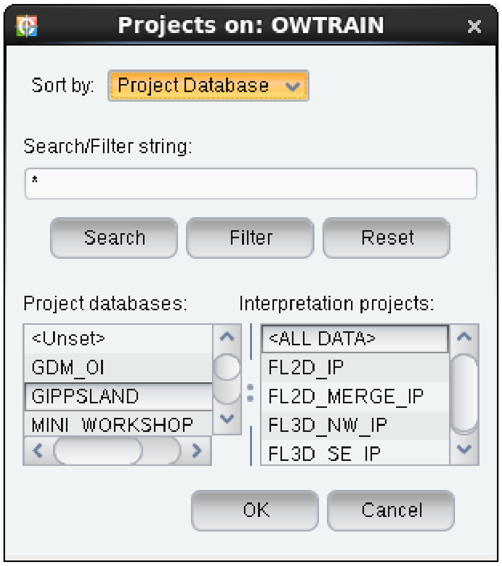
When you start a session, you first choose a district. The OpenWorks software refers to the `district.dat` file to determine the OSWYSSID.



The district.dat file is located in the $OWHOME/conf directory and is required to run the OpenWorks software. The district also determines the path to the dir.dat and owdir.dat files. OW_PMPATH is no longer used. OW_CONF_DIR is used to determine the location of the district.dat file. All applications now reference the district.dat file to get the path to the dir.dat and owdir.dat files to access data.

As detailed in the diagram above, it is important to highlight the relationship between OWSYSSIDs, districts, and projects. OpenWorks projects can only belong to one district and districts can only be associated to the projects on one OWSYSSID. However, you can have multiple districts on each OWSYSSID.

In addition, the Project Selection dialog box has been changed to support districts. You now have an option to sort the project data either by project database or by all projects, which for most users, is a more appealing way to view district data. The first mode, Sort by Project Database, is a two-column dialog box, which allows you to first choose the project database and then select the desired interpretation project associated with that project database.



The second mode is Sort by All Projects, which presents a flat list of interpretation projects. This list contains every project in the selected district for which you have access. Rows in the list representing interpretation projects display only the interpretation project name.

The ability to filter project selection by district provides you with a more familiar and manageable list of projects. Further, the formal support of districts helps prevent you from becoming overwhelmed by data outside your area of interest.

What is the Benefit of Using Districts?

- Allows users to be presented with a shorter project list, containing only relevant projects.
- Enables separation of data by district for security or ownership purposes. System administrators will have the availability to control user access at several levels.
- The average user should only see the districts and projects that apply to him.

What Type of Data is Affected?

- Project database data
- Flat file data

Steps Required to Set Up an OpenWorks Software Project Database

There are potentially four major steps required to set up a project:

1. Define a cartographic reference system (CRS) for the project. This is necessary only if the appropriate CRS is not already defined.
2. Create a project.
3. Assign an interpreter.
4. Import data into the project.

You can create as many projects as needed for the various sets of data you plan to study. Administering multiple projects is easy using the Project Administration utility described later in this chapter.

Using Project Data with Applications

Once projects are set up, you can start running applications using the loaded data. You can run several applications at the same time, all accessing the data in the same project. If any application creates, deletes, or modifies the data, all of the other applications are immediately aware of the change.

Units Handling in the OpenWorks Software

In the OpenWorks software, units are handled using the concept of measurement systems. A measurement system provides a preferred unit for each type of measurement that can be handled in the OpenWorks software. This ensures that all data is handled consistently by OpenWorks applications.

This section describes the measurement systems in the OpenWorks software and describes the options provided for storing, displaying, loading, exporting, and editing measurable quantities of data.

- **Measurement System Manager** allows you to create a customized measurement system for a new project database.
- **Project Measurement Systems** provide default units of measure handling for all measurable quantities stored in an OpenWorks project. These systems may be set in Project Create.
- **Session Measurement Systems** provide default units of measure handling for all measurable quantities displayed and loaded during an OpenWorks session.
- **Measurement Systems set by Applications** are used to display, load, and export well data using units of measure that are different than those specified by the project and session. These systems are set within the appropriate application.
- **Surface Distance Units Handling** describes how the OpenWorks software determines and stores surface distance units.
- **Special Units Editor** allows you to edit unit types (what is being measured, for example, porosity, electric potential, and gamma count rate) and unit abbreviations (how it is being measured, for example, meters, MCF, and millidarcies) of certain types of data within an OpenWorks project.
- The **General Units Converter** allows you to view every combination of table name, column name, and original unit of measure (OUOM), as well as the expected database unit for each table name and column name, in an OpenWorks project. You may edit data values within the General Units Converter.

Measurement Systems Available in the OpenWorks Software

The following measurement systems are available in the OpenWorks software:

- U.S. Oil Field
- U.S. Oil Field (metric depth)
- SPE Preferred Metric
- Canadian Metric
- U.S. Oil Field DMS
- Metric DMS
- CDS Metric
- CDS U.S. Oil Field (International ft)

These are described in detail below. All of these measurement systems are available for project, session, display, data import, and data export purposes.

U.S. Oil Field

U.S. Oil Field is predominately U.S. English units with metric units for some log curve and engineering data. The units are designed to correspond to those used by U.S. oil companies. The U.S. Oil Field measurement system corresponds to the English measurement system in previous versions of the OpenWorks software.

U.S. Oil Field Metric Depth

U.S. Oil Field Metric Depth is the same as U.S. Oil Field for all units except depths, which are in meters. This measurement system is intended for U.S. oil companies operating internationally. “U.S. Oil Field Metric Depth” mirrors U.S. Oil Field, except:

- Depth measure is meters
- Length borehole is meters
- Elevation is meters

SPE Preferred Metric

Society of Petroleum Engineers (SPE) Preferred Metric represents the common metric units used in the oil field. It is based on the publication *The SI Metric System of Units and SPE Metric Standard* from the Society of Petroleum Engineers (SPE).

SPE Preferred Metric corresponds to the Metric measurement system in previous versions of the OpenWorks software.

Canadian Metric

Canadian Metric mirrors SPE Preferred Metric, except:

- Density hydrocarbon liquid is kg/m^3 (not g/cm^3)
- Density liquid is kg/m^3 (not g/cm^3)
- Density solid is kg/m^3 (not g/cm^3)
- Permeability is mD
- Viscosity dynamic is Pa.s (not cP)
- Interval transit time is µ/m (not µ/ft)
- Slowness is µ/m (not µ/ft)

U.S. Oil Field DMS and Metric DMS

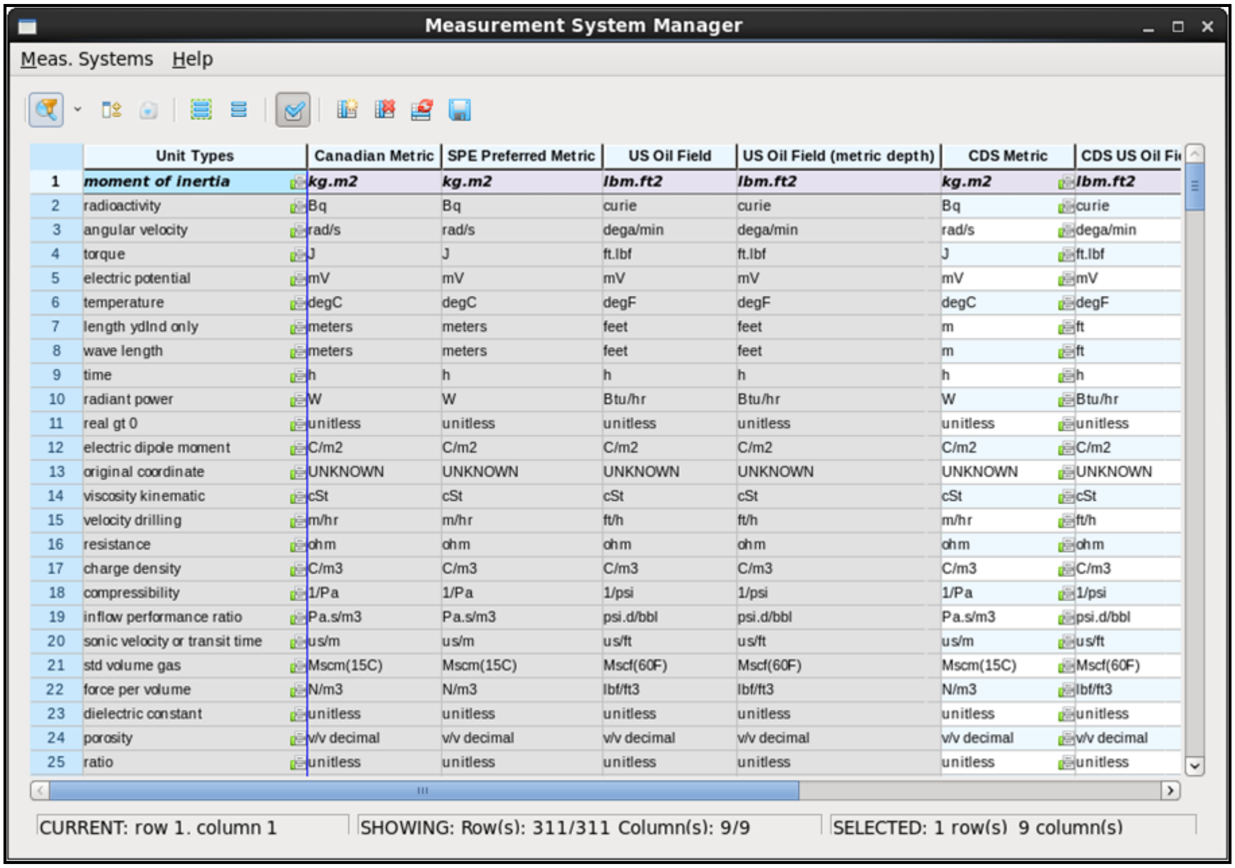
These two are very similar to the US Oil Field and SPE Preferred Metric described previously, but they were developed specially for using with DecisionSpace Management System (DMS) Application.

CDS Metric and CDS U.S. Oil Field International ft

These two are very similar to the U.S. Oil Field and SPE Preferred Metric described previously, but they were developed specially for using with Corporate Data Store (CDS) application.

Measurement System Manager

Sometimes your project will use a set of measurements that differ from the measurements in one of the standard systems. The Measurement System Manager allows you to create a customized measurement system for your OpenWorks project. In order to create a new measurement system, it is suggested that you begin with the standard system that most closely matches the units in your project. Use this system as a template and modify only those measurements that require different units.



	Unit Types	Canadian Metric	SPE Preferred Metric	US Oil Field	US Oil Field (metric depth)	CDS Metric	CDS US Oil Fi
1	**moment of inertia**	**kg.m2**	**kg.m2**	**lbm.ft2**	**lbm.ft2**	**kg.m2**	**lbm.ft2**
2	radioactivity	Bq	Bq	curie	curie	Bq	curie
3	angular velocity	rad/s	rad/s	dega/min	dega/min	rad/s	dega/min
4	torque	J	J	ft.lbf	ft.lbf	J	ft.lbf
5	electric potential	mV	mV	mV	mV	mV	mV
6	temperature	degC	degC	degF	degF	degC	degF
7	length ydlnd only	meters	meters	feet	feet	m	ft
8	wave length	meters	meters	feet	feet	m	ft
9	time	h	h	h	h	h	h
10	radiant power	W	W	Btu/hr	Btu/hr	W	Btu/hr
11	real gt 0	unitless	unitless	unitless	unitless	unitless	unitless
12	electric dipole moment	C/m2	C/m2	C/m2	C/m2	C/m2	C/m2
13	original coordinate	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
14	viscosity kinematic	cSt	cSt	cSt	cSt	cSt	cSt
15	velocity drilling	m/hr	m/hr	ft/h	ft/h	m/hr	ft/h
16	resistance	ohm	ohm	ohm	ohm	ohm	ohm
17	charge density	C/m3	C/m3	C/m3	C/m3	C/m3	C/m3
18	compressibility	1/Pa	1/Pa	1/psi	1/psi	1/Pa	1/psi
19	inflow performance ratio	Pa.s/m3	Pa.s/m3	psi.d/bbl	psi.d/bbl	Pa.s/m3	psi.d/bbl
20	sonic velocity or transit time	us/m	us/m	us/ft	us/ft	us/m	us/ft
21	std volume gas	Mscm(15C)	Mscm(15C)	Mscf(60F)	Mscf(60F)	Mscm(15C)	Mscf(60F)
22	force per volume	N/m3	N/m3	lbf/ft3	lbf/ft3	N/m3	lbf/ft3
23	dielectric constant	unitless	unitless	unitless	unitless	unitless	unitless
24	porosity	v/v decimal	v/v decimal	v/v decimal	v/v decimal	v/v decimal	v/v decimal
25	ratio	unitless	unitless	unitless	unitless	unitless	unitless

Project Measurement Systems

A project measurement system provides default units of measure handling for all measurable quantities stored in a project.

You select a preferred storage unit for all measured quantities when you create a new OpenWorks project. The project measurement system cannot be changed, so it should be the most accurate measurement system for the project as a whole.

Session Measurement Systems

Even though you cannot change a project's measurement system, you can change how the OpenWorks software displays and loads measurable quantities by specifying a session measurement system. A session measurement system provides default units of measure handling for all measurable quantities displayed and most measurable quantities loaded and exported during an OpenWorks session, so it should be the most accurate measurement system for the data you will be working with during a session. It can be the same as the project measurement system, or it can be different.

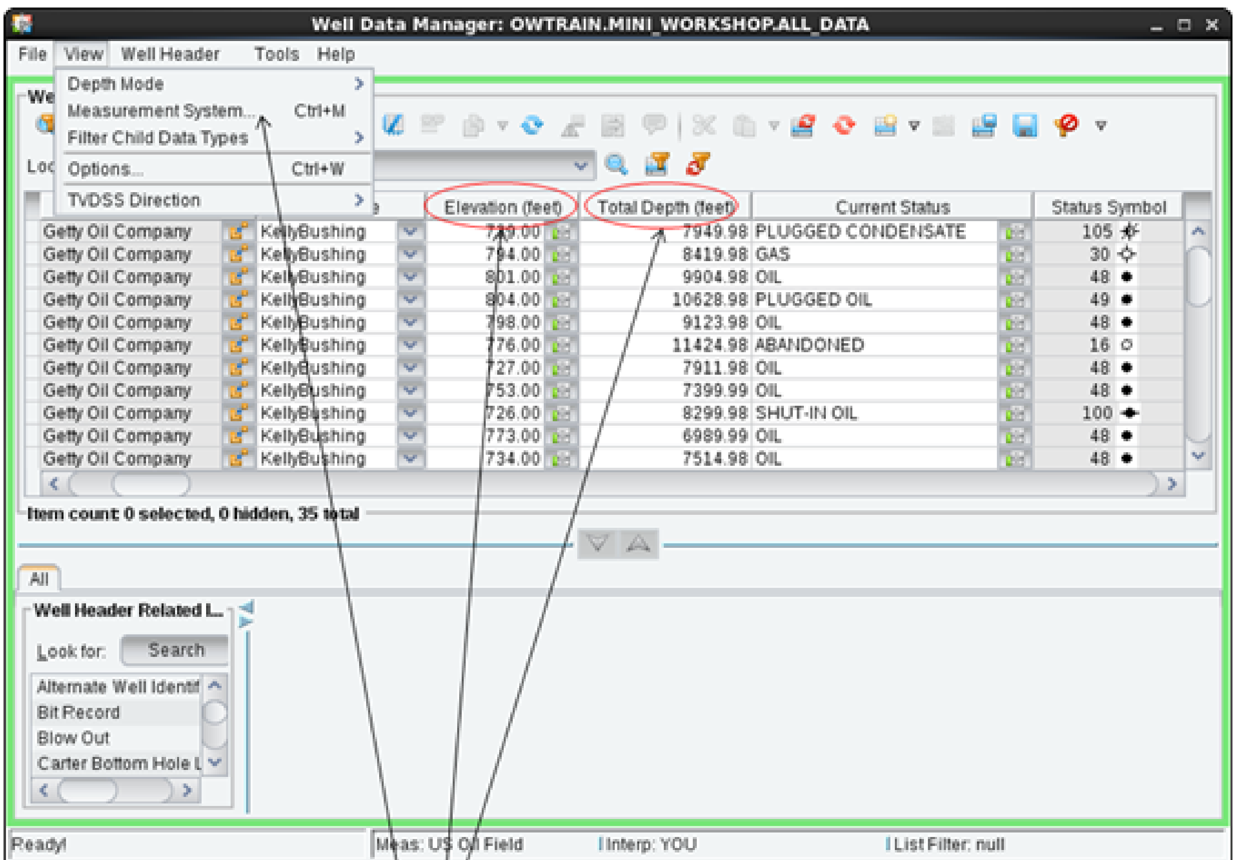
Once set, the session measurement system is the default used by all applications that you subsequently start during an OpenWorks session.

You set the session measurement system using Project Status Tool (discussed later in this chapter) or by selecting a measurement system when you start one of many OpenWorks applications.

Measurement Systems Set by Applications

Three OpenWorks applications, **Well Data Manager**, **Well Import (Classic)**, and **Well Export (Classic)**, allow you to override the session measurement system without redefining it for the session and without affecting any other applications.

Well Data Manager lets you display values using a measurement system other than the session measurement system. For example, if your session measurement system is SPE Preferred Metric, but you want to view well depths using U.S. Oil Field, you set the **Well Data Manager's View > Measurement System** to U.S. Oil Field. No other applications are affected by this setting in Well Data Manager.



You can override the session measurment system using the View option.

Well Import (Classic) and Well Export (Classic) allow you to load and export data using a measurement system other than those specified by the project and session.

> **Note**
>
> For data management purposes, the original units of the data as loaded are stored in fields with an original units of measure (Ouom) suffix. If there is any question as to whether the correct conversions have been performed, you can compare the original units in the Ouom field with the project storage units.

Surface Distance Units Handling

In the OpenWorks software, surface (linear) distance units are defined by the project cartographic reference system (CRS).

These surface distance units represent "cartographic distances" that are closely related to x, y coordinates. Units that are tightly tied to project x, y values, such as position log offsets, are stored using the surface distance units defined by the project CRS; they are not converted to the project measurement system. In addition, these units are displayed using the surface distance units defined by the project CRS, not those defined by the session measurement system.

Other surface distances (e.g., seismic facility spacings and line lengths) are more descriptive in nature and are stored according to the project measurement system. These units convert between feet and meters and between miles and kilometers for display using the units defined by the session measurement system.

General Units Converter

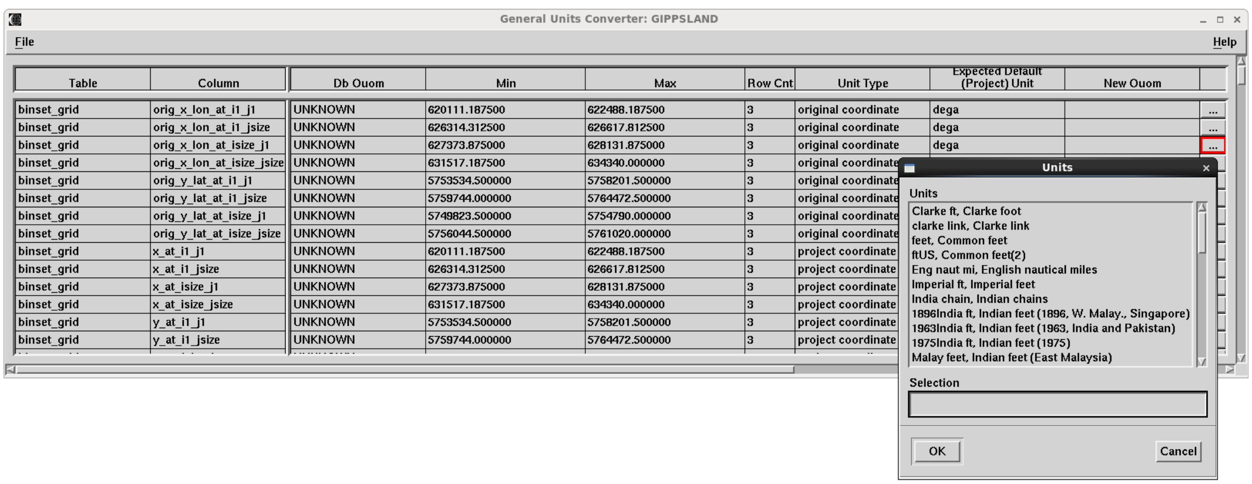
The General Units Converter allows project managers to view and correct data in an OpenWorks project. They can view each combination of Table, Column, and Ouom. If the value of Ouom is incorrect, the data value is corrected by selecting a new unit of measure.

This General Units Converter displays the following items:

OUOM :
Original Unit of Measure

- **Table**: The name of the data category.
- **Column**: The name of the data item.
- **Db Ouom**: The original unit of measure loaded with the data.
- **Min**: The range of minimum or left values.
- **Max**: The range of maximum or right values.

- **Row Cnt**: The number of database rows that are represented by each row in the spreadsheet. Each row in the spreadsheet corresponds to one or more rows in the database that have the same value for these fields.
- **Unit Type**: What is being measured; for example, project coordinate, depth measure, angular distance, or time depth measure.
- **Expected Default (Project) Unit**: The unit of measure you expected the data to be in when you take into account the unit type of the column and the measurement system presently associated with the project.
- **New Ouom**: The unit of measure that the data is actually in; for example: meter, degree, Celsius, or second angular.
- **Coefficients A, B, C and D**: These fields contain the system generated multipliers to convert from the New OUOM to the Expected Unit.



Select the ellipsis (…) to change the unit in which data values are measured.

Special Units Editor

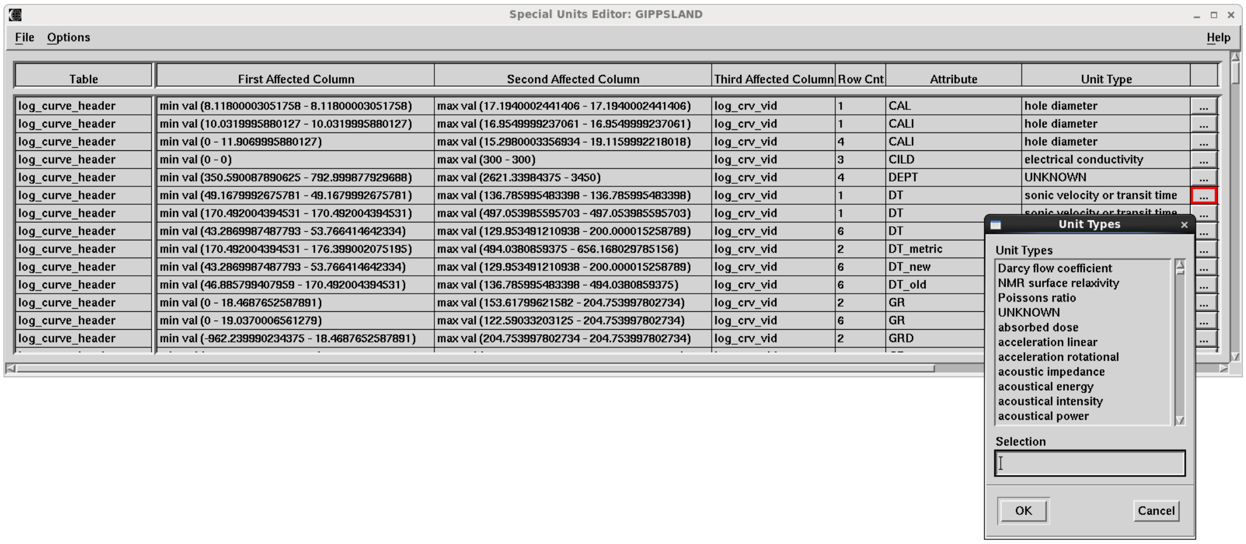
All data loaded into a project will be converted into the unit of measure specified by the Project Measurement System. Some types of data, however, are not automatically converted to the units of the project measurement system because they use measurement systems that are unlike that of the project. The Special Units Editor allows you to edit unit types and unit abbreviations. Unit abbreviations reflect how measurements are reported. The database must have a record of every abbreviation used for each unit type in order to relate them and do calculations. Permeability is an example of unit type. Each unit type can have multiple units of measurement defined for it, including a variety of abbreviations for the unit of measurement. An example of unit abbreviation for permeability measured in millidarcies is mD.

When you modify the unit type or abbreviation for a row in the Special Units Editor and save the change, all rows in the database corresponding to that row are modified, allowing you to update whole sets of data in one operation.

The following list explains the items in the Special Units Editor:

- **Table** is the name of the data category.
- **First Affected Column** is the name of the first column whose unit is specified by the unit description and Ouom column in this spreadsheet row.
- **Second Affected Column** is the second database field whose units are determined by this particular Ouom column when an Ouom column is shared by two or more fields.
- **Third Affected Column** is the third database field whose units are determined by this particular Ouom column when an Ouom column is shared by three fields.
- **Row Cnt** shows how many database rows are represented by each row in the spreadsheet.
- **Attribute** is the name of the quantity being measured.
- **Unit Type** is the quantity being measured.
- **Old Unit Abbrev** is the abbreviation for the unit as it was loaded.
- **Unit Description** describes the unit. Most (but not all) of the special unit tables carry a unit description in addition to the Ouom field.

- **New Unit Abbreviation** is your abbreviation for the unit.



Click on ellipsis (…) to edit unit type or unit abbreviation.

> **Note**
>
> You must be the project manager to launch the General Units Converter and the Special Units Editor. For more information on the General Units Converter and Special Units Editor, refer to the online manual located under the **Help** menu.

Creating a Project Database

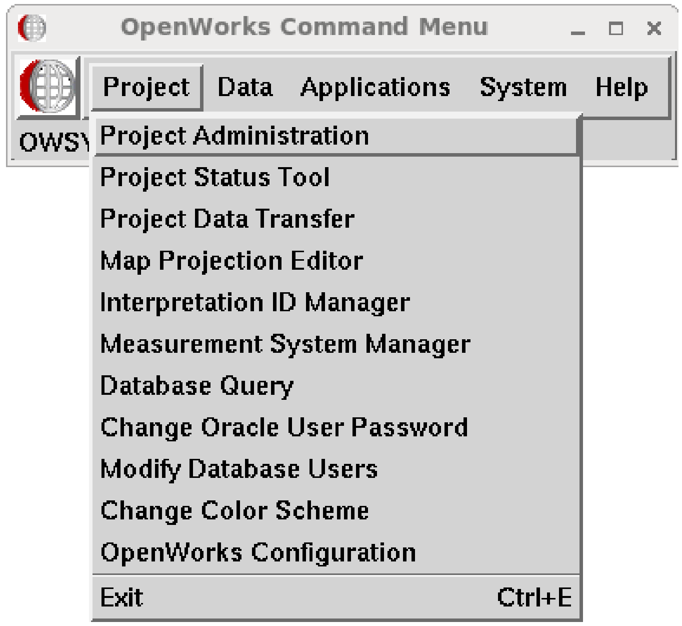
All OpenWorks applications require access to a project database or an interpretation project. You can use the Project Administration utility to create both.

When creating a project, you specify:

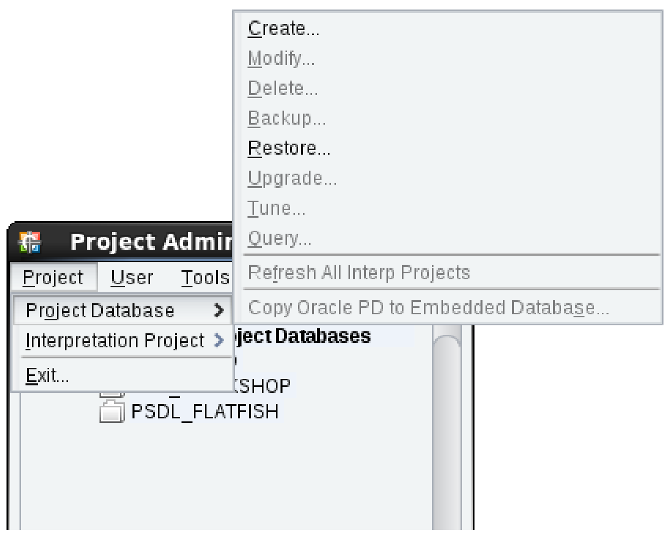
- A project name and description
- The OpenWorks SID (instance) to use for storing the project data (if you have access to multiple databases)
- The OpenWorks district
- The CRS to use for storing map coordinates in the database
- The default measurement system
- The input CRS, for defining the AOI
- The geographic boundaries of the project area (AOI)
- The size of the project

These defaults are the standard settings that the OpenWorks software will use to store the data, and for all applications where these settings are not already specified. You can improve the accuracy and performance of your system by selecting defaults that best match your project characteristics.

To create a project, from the OpenWorks command menu, select **Project > Project Administration**.

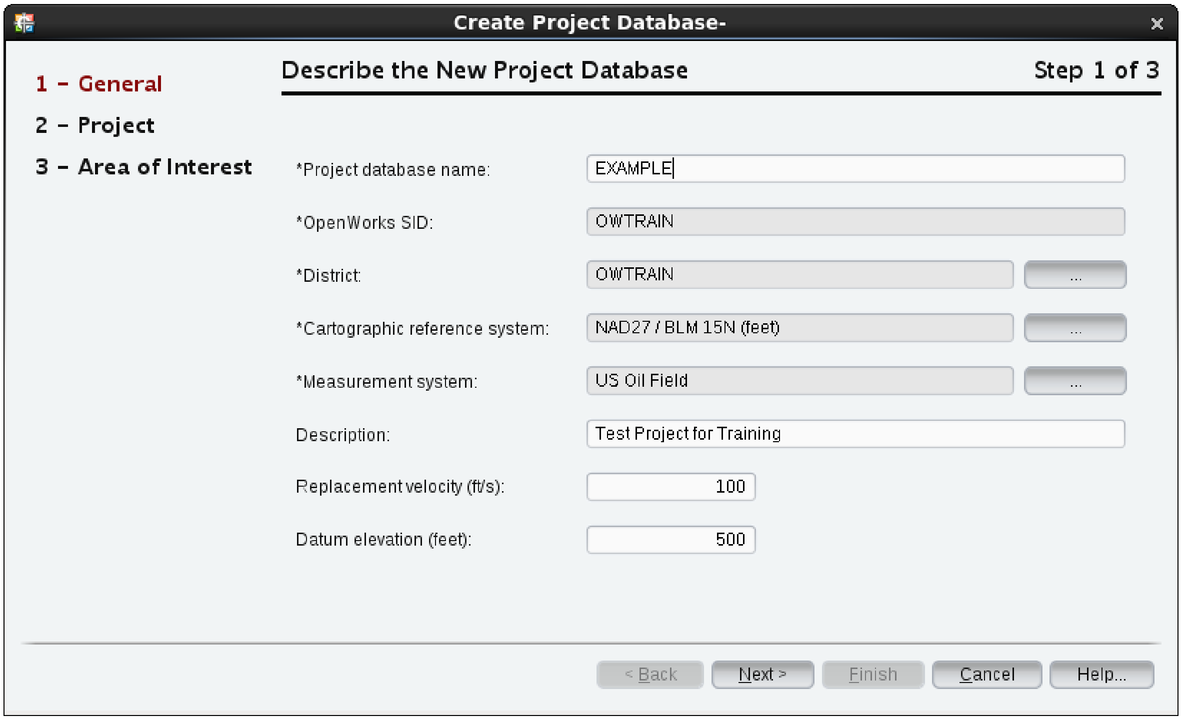


Select **Project > Project database > Create**.



The Project Create dialog box displays. Use this window to enter the parameters for a new project.

Step 1 - General



Project Database Name

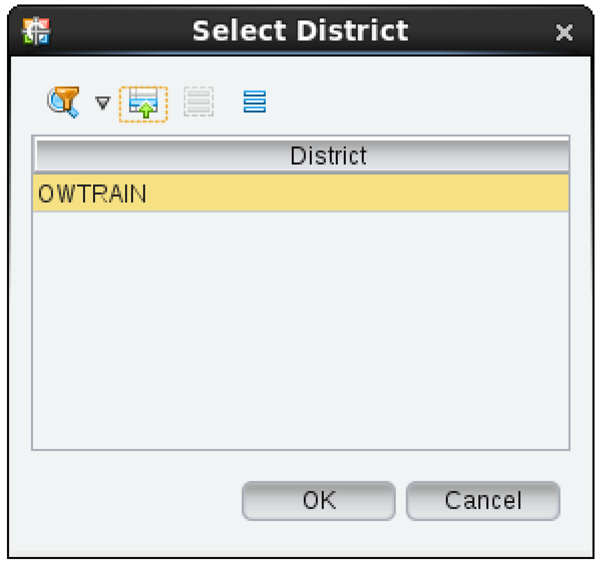
Project database name must start with an alphabetic character, followed by any combination of letters, digits, or underscores and can be up to 20 characters long. Other characters, such as spaces or dashes, cannot be included in the name.

OpenWorks SID

This is the name of the Oracle *Instance* of the database server you want to use for storing the project.

District

If several districts are configured, select the one you want to use. By default, the one that is used by the actual session will appear selected.

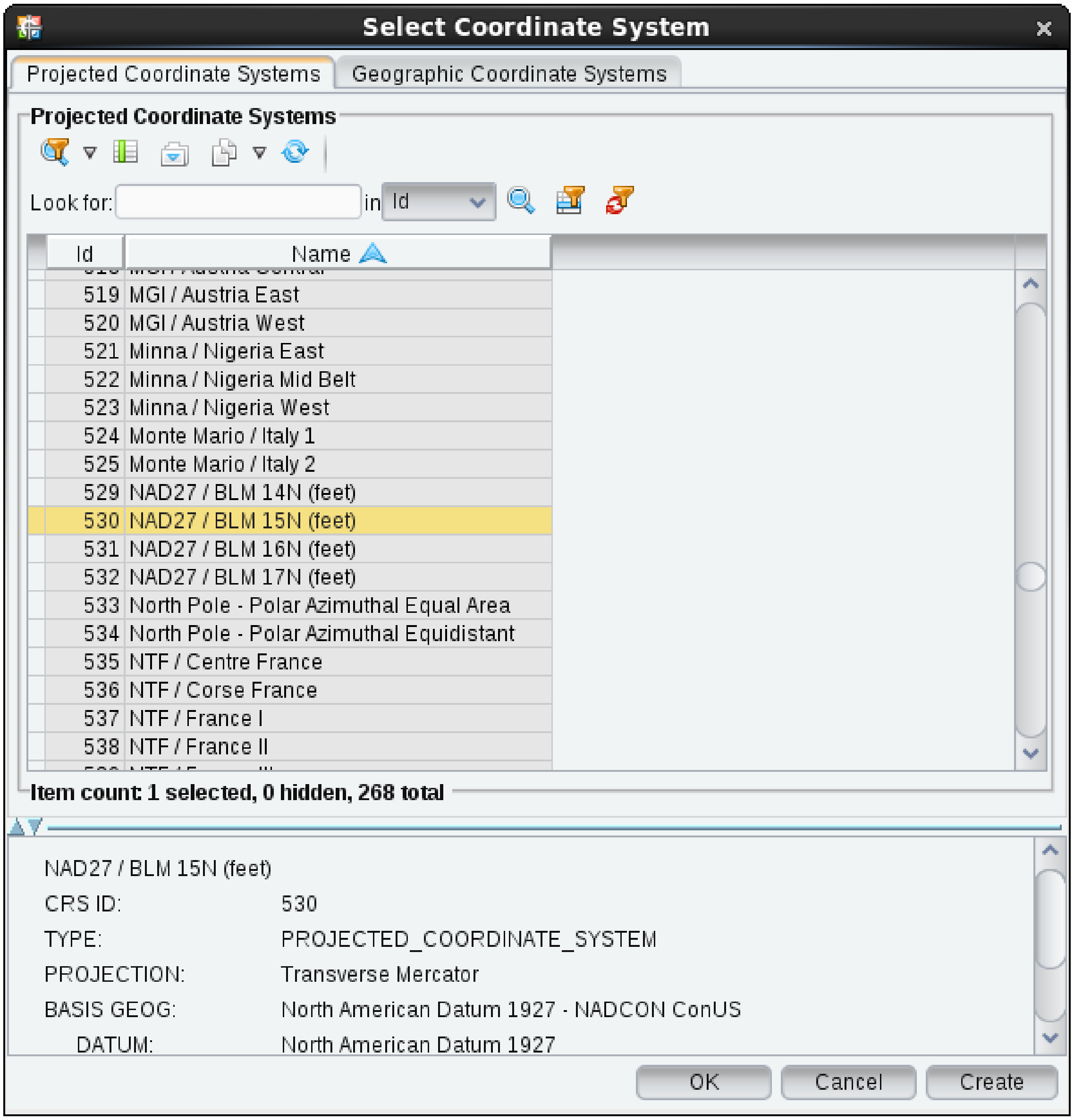


Cartographic Reference System

A CRS provides a geographic frame of reference for your data. When you create an OpenWorks project, you specify a CRS to use to store and calculate project data. This is called the project CRS. The project CRS should be the same projection system that was used to locate the original project data.

There are two basic types of cartographic reference systems that you can chose from or create—those based on geographic coordinate systems (latitude/longitude or lat/lon) and those based on projection coordinate systems (*x, y* coordinates).

Cartographic reference systems are described in detail in the next section of this chapter.

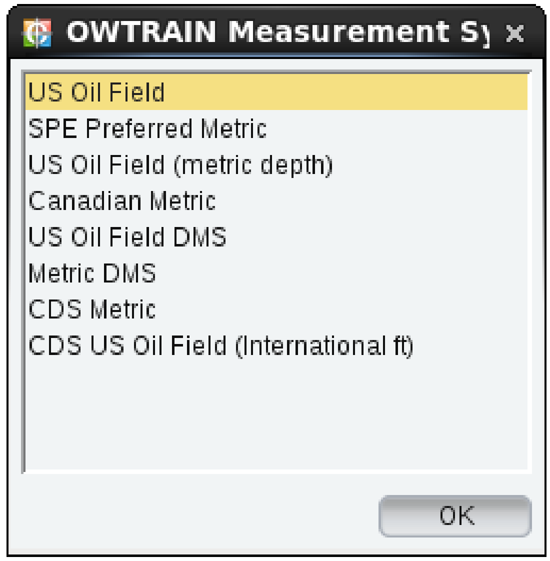


Measurement System

The measurement system sets the default units for storing data in the project database. All data are stored in project-specified units and converted at load time from incoming units to project units.

Although Landmark applications can display data in any units, you should select the measurement system whose units are used most often, so that the OpenWorks performance is not slowed down by frequent unit conversions.

Units Handling and Measurement Systems were discussed in detail earlier in this chapter.



Description

The Description field is where you can type a brief description of your project.

Replacement Velocity

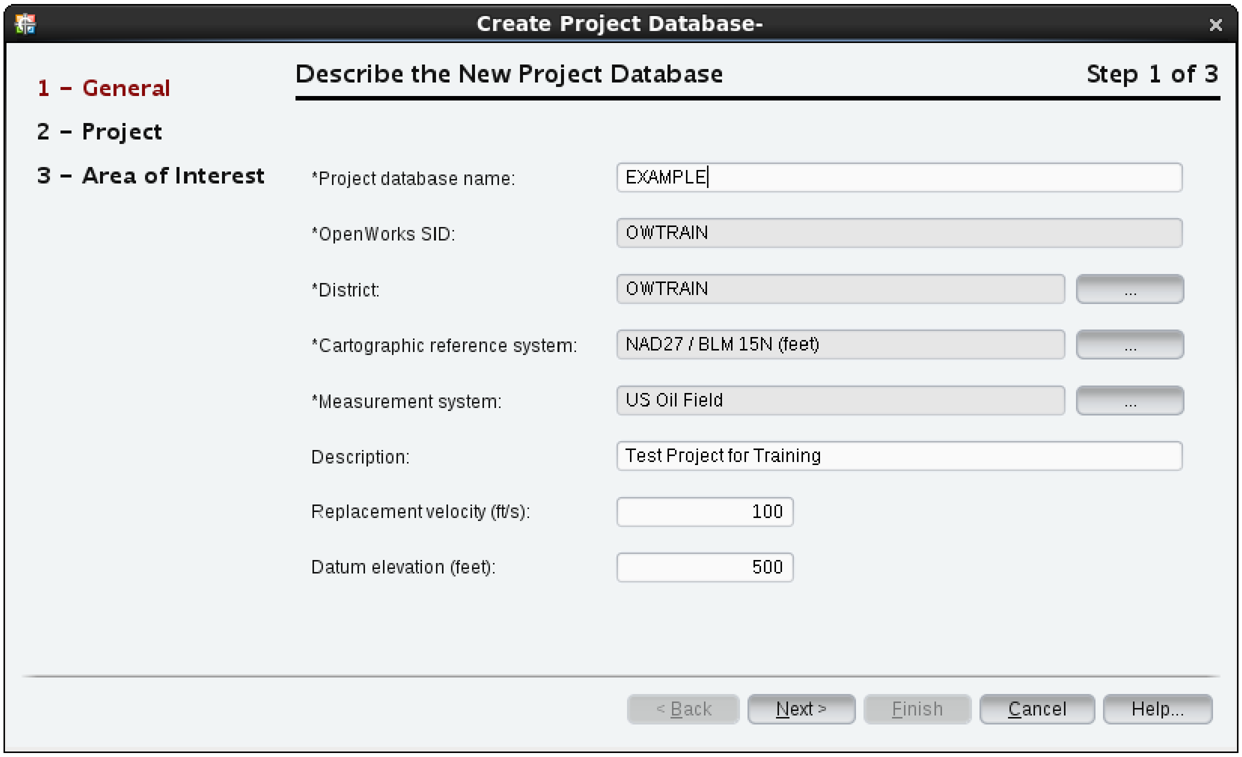
The velocity used in shifting time and depth values. The time value is the interval between the Kelly Bushing and the start of the logs. The default is zero.

Datum Elevation

The elevation used to reference all depths; it is the vertical position at which all the seismic data within the project are at zero time.

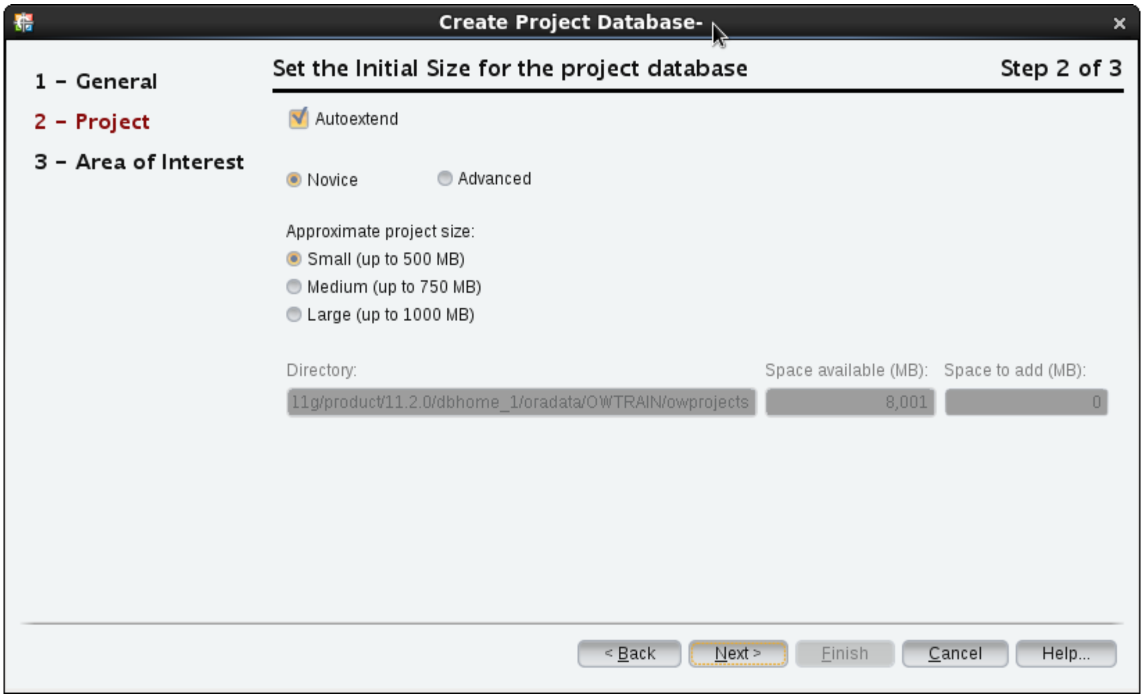
- Measured relative to sea level
- Units are feet or meters depending on the chosen project measurement system
- Negative values are below sea level, positive values are above sea level

- The default is zero (sea level)



Once you have all options set, click the **Next** button to go to the next page of creating a project database.

Step 2 - Project Size



Autoextend

The size of an Oracle tablespace is initially determined by the values you specified at the time the Oracle database was installed. With the **Autoextend** feature activated, the files are increased in specified increments up to a specified maximum. Setting your data files to extend automatically provides the following two benefits:

- Reduced need for immediate intervention when a table runs out of space
- Ensures applications will not halt because of failures to allocate sufficient space

Of course, an Oracle file system cannot grow larger than the remaining disk space of the file system on which the Oracle file resides. So monitoring available disk space is an important task.

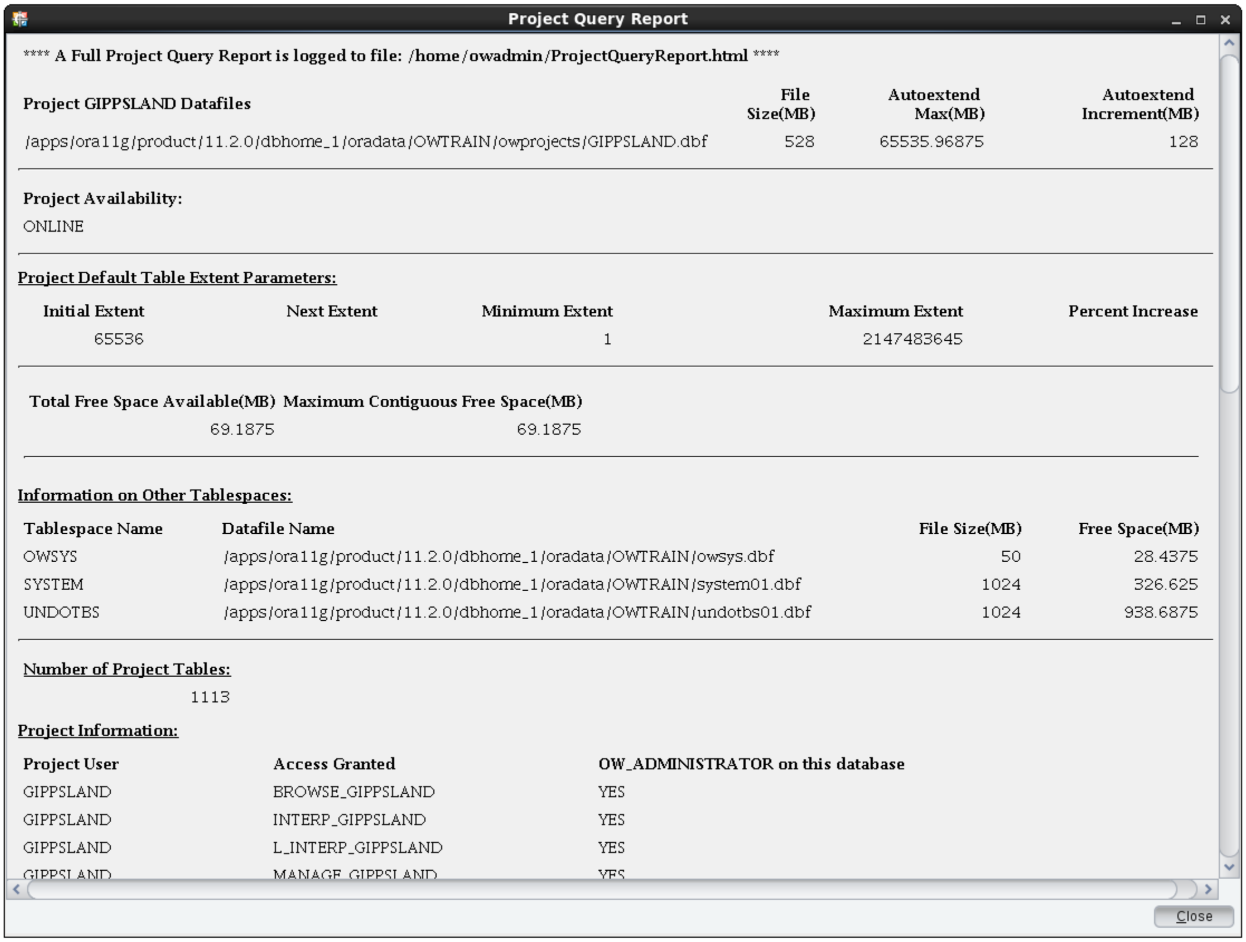
Autoextend will be turned on or off by your System Administrator. Regulations on user privileges and disk space vary from company to company. Ask your System Administrator if your company uses Autoextend.

> **Note**
>
> Monitor disk space usage frequently with Autoextend. If Autoextend is set, you are advised to monitor disk space usage regularly. If a data file attempts to grow beyond the available remaining size of a file system, a fatal error will occur.

Project Tablespace

You must specify the size of the tablespace used to store the project. You can view the amount of available tablespace in **Project Administration > Project > Project database > Query**. However, if you ever fill up the tablespace inadvertently, your database will fail (unless you have Autoextend turned on). For this reason, it is very important that you allow more than enough tablespace at the beginning of a project to accommodate all the data you expect to load or generate for the project but not so much that you waste space.

Although you can add tablespace as your project grows by selecting **Project Administration > Project > Project database > Modify**, you cannot reduce the project’s tablespace.


Project Query Report

**** A Full Project Query Report is logged to file: /home/owadmin/ProjectQueryReport.html ****

Project GIPPSLAND Datafiles	File Size(MB)	Autoextend Max(MB)	Autoextend Increment(MB)
/apps/ora11g/product/11.2.0/dbhome_1/oradata/OWTRAIN/owprojects/GIPPSLAND.dbf	528	65535.96875	128

Project Availability:
ONLINE

Project Default Table Extent Parameters:

Initial Extent	Next Extent	Minimum Extent	Maximum Extent	Percent Increase
65536		1	2147483645	

Total Free Space Available(MB)	Maximum Contiguous Free Space(MB)
69.1875	69.1875

Information on Other Tablespaces:

Tablespace Name	Datafile Name	File Size(MB)	Free Space(MB)
OWSYS	/apps/ora11g/product/11.2.0/dbhome_1/oradata/OWTRAIN/owsys.dbf	50	28.4375
SYSTEM	/apps/ora11g/product/11.2.0/dbhome_1/oradata/OWTRAIN/system01.dbf	1024	326.625
UNDOTBS	/apps/ora11g/product/11.2.0/dbhome_1/oradata/OWTRAIN/undotbs01.dbf	1024	938.6875

Number of Project Tables:
1113

Project Information:

Project User	Access Granted	OW_ADMINISTRATOR on this database
GIPPSLAND	BROWSE_GIPPSLAND	YES
GIPPSLAND	INTERP_GIPPSLAND	YES
GIPPSLAND	L_INTERP_GIPPSLAND	YES
GIPPSLAND	MANAGE_GIPPSLAND	YES

Close

Estimating Project Tablespace

If you ever fill up the tablespace inadvertently, your database may fail to access your project. For this reason, it is important to allocate enough tablespace for a project to accommodate all the data you expect to load (or generate).

> **Note**
>
> The minimum project size is 500 MB.

There are several general guidelines you can follow to determine how much tablespace your project requires.

Raw Data Greater Than 20 MB

If the current set of curve data and the expected amount 2D horizon data are greater than 20 MB, use the following formula to estimate the OpenWorks project tablespace size:

(150 MB size of the raw data) + (1.5 * size of curve data) + (2 * size of horizon data)

Raw Data Less Than 20 MB

1. Set the project tablespace size to Small.

2. Overestimate and then Backup and Restore.

Create your project, allocating much more tablespace than you will require. Load your data, then use **Project Administration > Project > Project Database > Modify** to determine how much tablespace you actually need.

If you need to reduce the size you gave initially to the project, use **Project Administration > Project > Project Database > Backup** to backup your project and **Project Administration > Project > Project Database > Restore** to restore it, specifying the correct amount of tablespace.

Although this workflow is a time consuming process it has the added benefit of not only giving you a chance to adjust the space, but it will compress extents in the Oracle tablespace, which can improve performance.

> **Note**
>
> Check tablespace frequently during data loading, especially when loading curves, time-depth tables, map data, or very large well data files. You do not want your project to run out of tablespace. Note that you can add tablespace as your project grows, but you cannot reduce the amount of allocated tablespace. If the autoextend feature is turned on, Oracle will automatically allocate additional tablespace as needed. If autoextend is not on, use the **Project Administration > Project > Project database > Modify** option to add tablespace as needed.

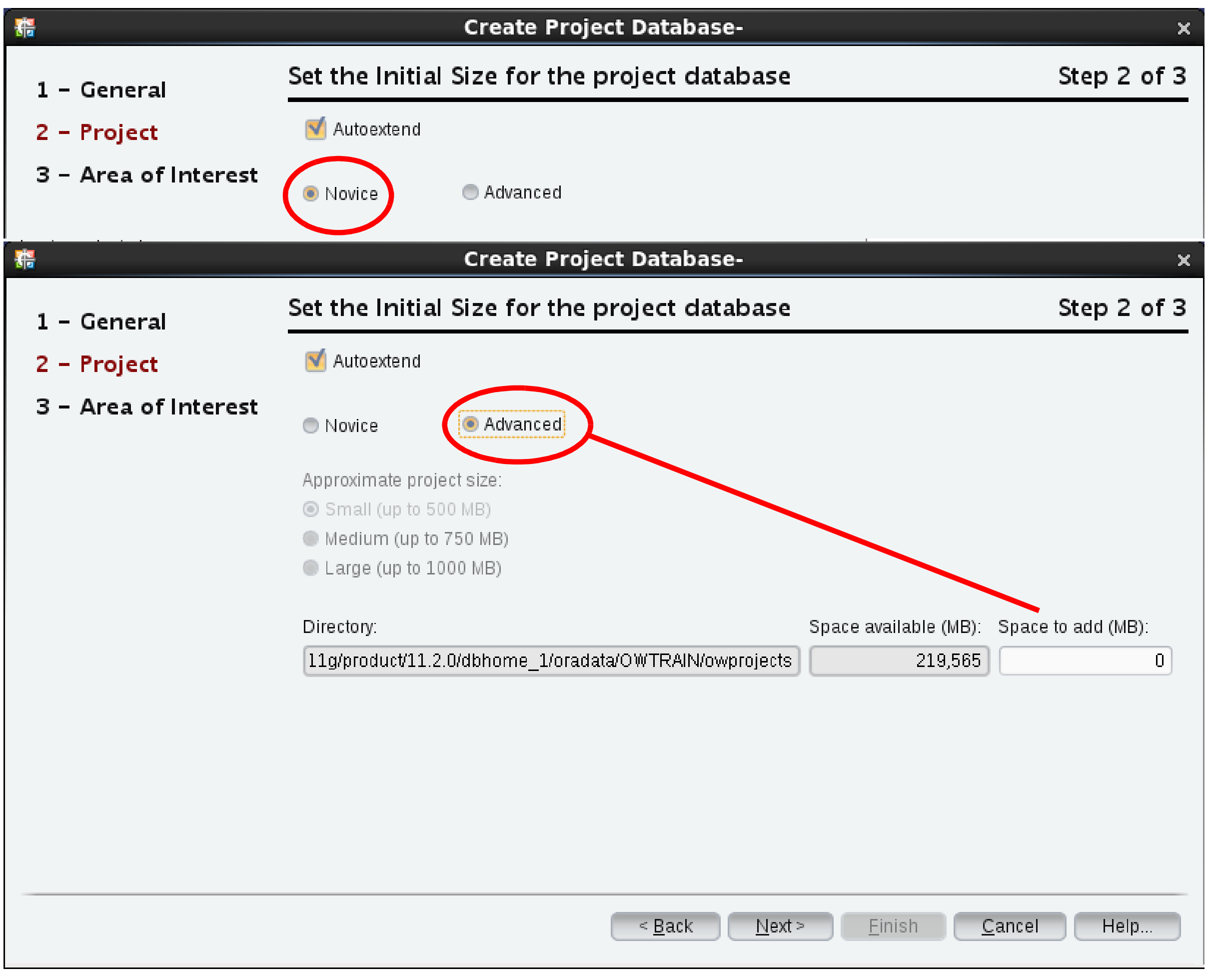
The most simple and accurate way to manage project space is to configure projects to **Autoextend**.

Defining Project Size

The Project Create wizard provides two modes for allocating tablespace for your projects. You toggle between these modes using the Novice and Advanced buttons provided.

- **Novice:** Most users will use this option to specify the general size of the project they want to create. Small is limited to 500 MB, medium is limited to 750 MB, and large is 1000 MB.

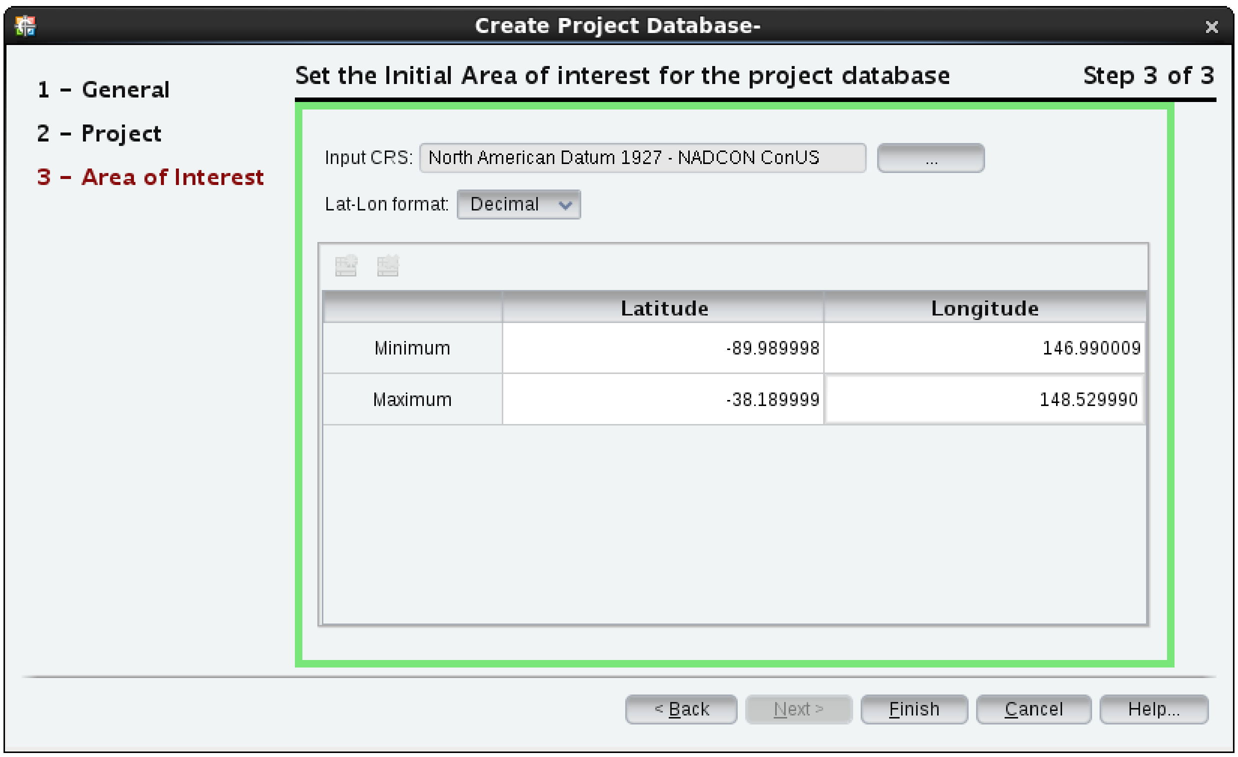
- **Advanced:** Some users may want to view available tablespace locations and specify the actual amount of space to reserve for their projects at each location. In Advanced mode, you see the name and size of all available tablespace locations. A blank is provided for you to enter the amount of space you want to use for your project at each of these locations.



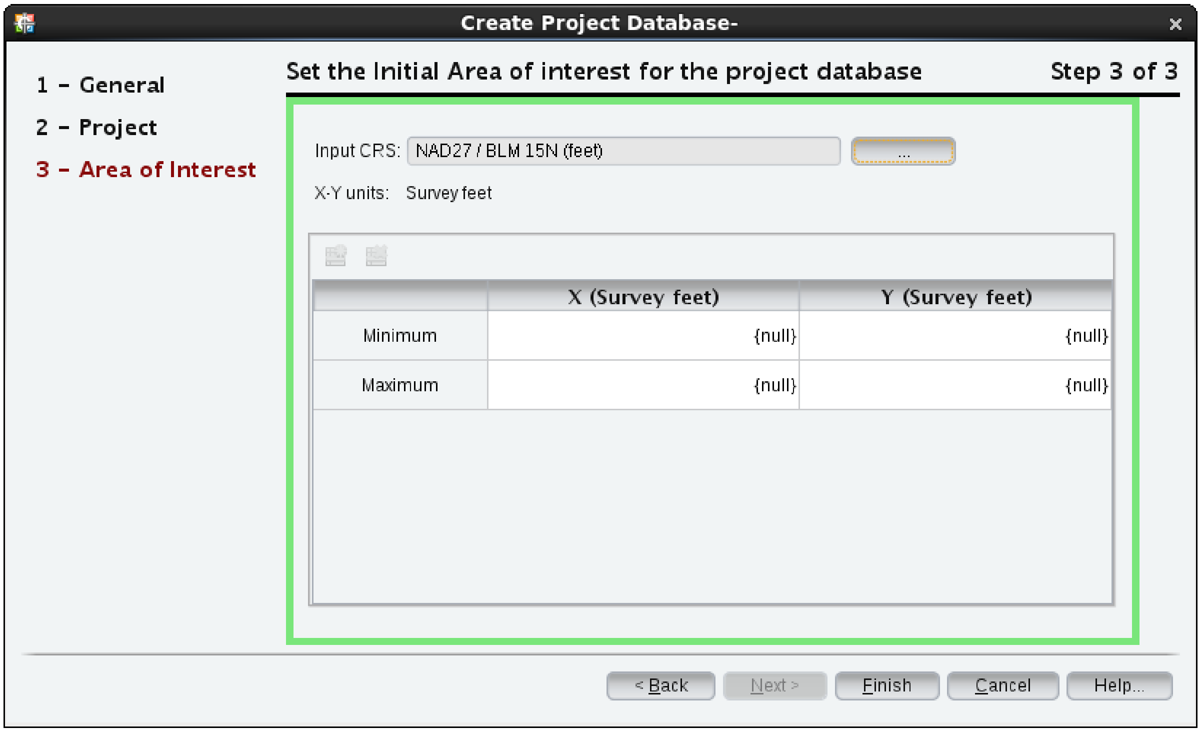
After setting the desired size for the project, click **Next** to go to third step.

Step 3 - Defining the Area of Interest

The area of interest is defined by the minimum and maximum coordinates of the geographical area covered by your project. You can define which Coordinate Reference System you are going to use for setting your AOI. If you select a Geographic Coordinate System for your area of interest, the coordinates will be defined in latitude and longitude. These coordinates can be entered either as decimal numbers or degrees-minutes-seconds. Use positive numbers to express degrees North and East and negative numbers for degrees West and South. For example, latitude –30.5 equals 30 degrees 30 minutes South.

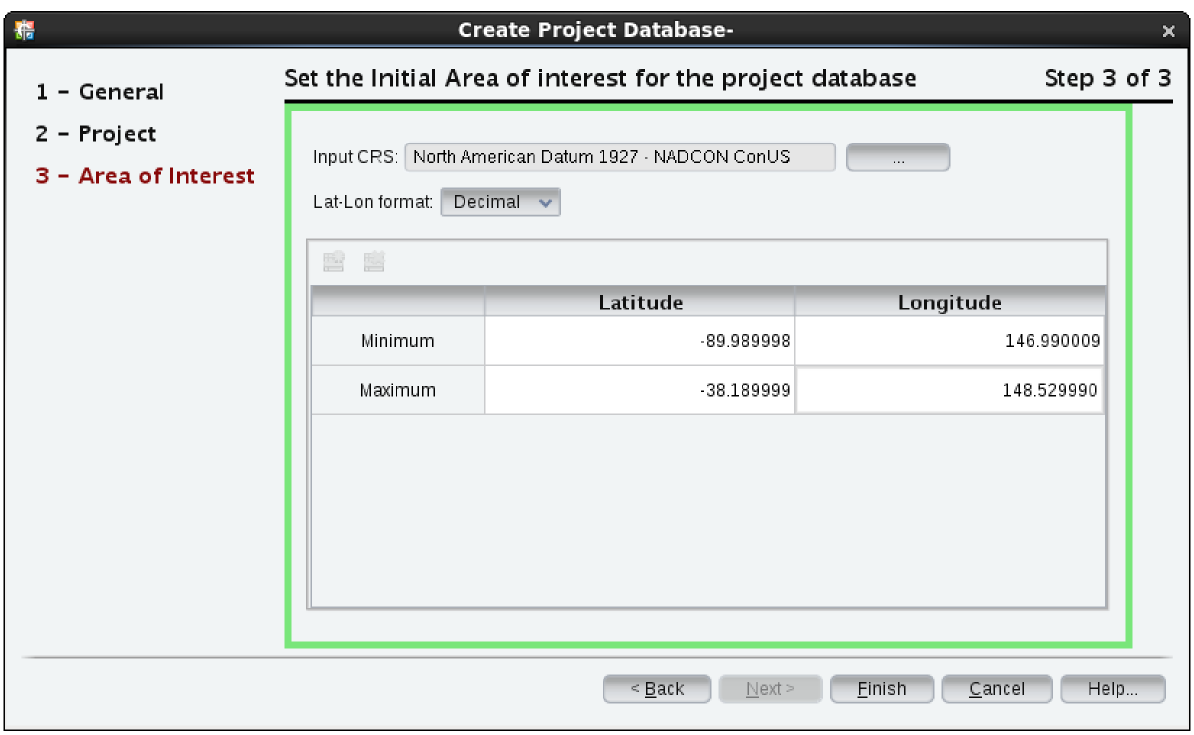


But if you set the Input CRS to a Projected Coordinate System, your AOI will be defined by the minimum and maximum X and Y location.

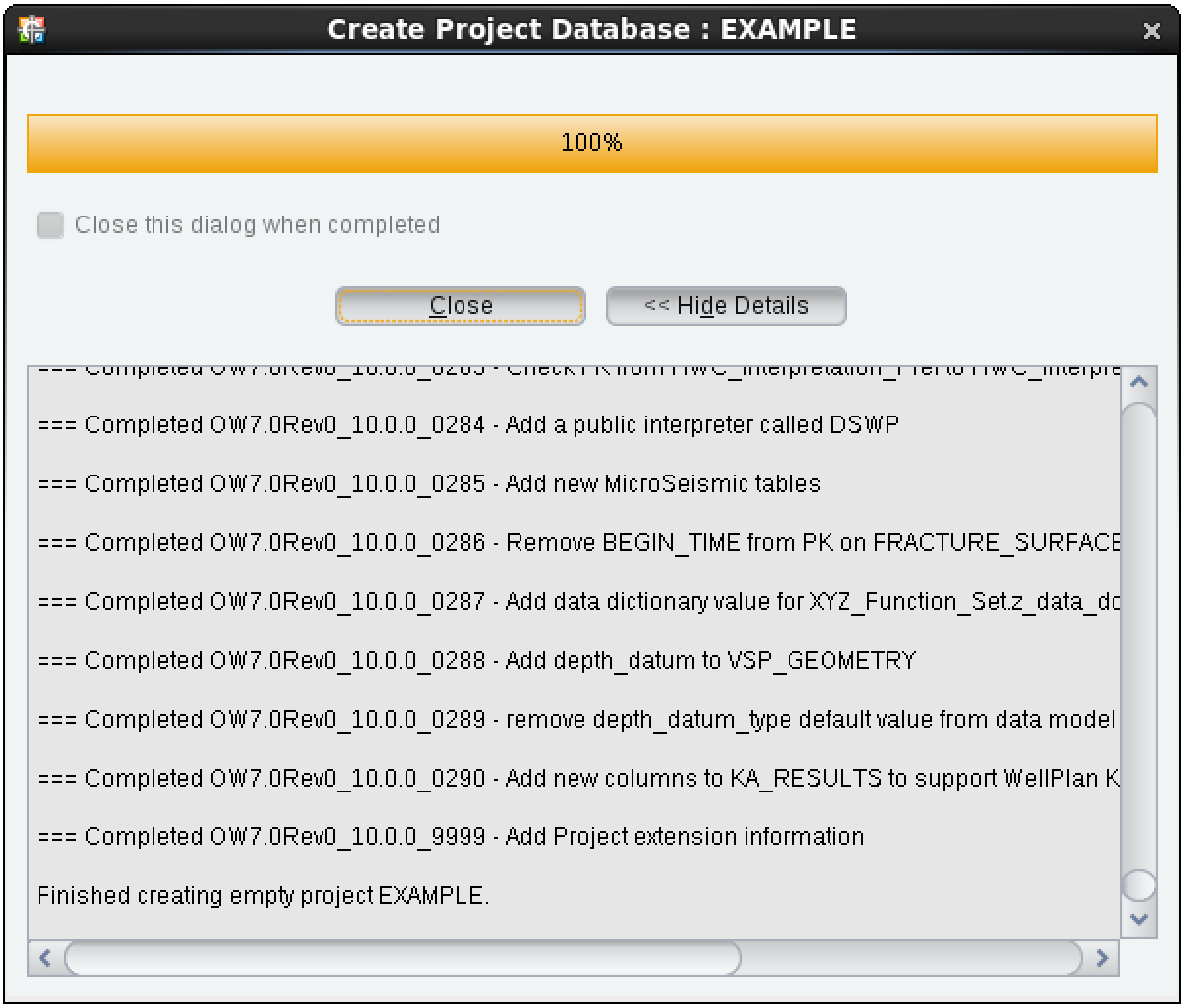


You can change areal extents later in **Project Admin > Project > Project database > Modify**.

When you finish defining areal extents for your project, click the **Finish** button and the project creation process will start.



This process may take minutes, up to an hour, depending on the server capacity. After the process is finished, you will see a window like the one shown in the following figure.



Cartographic Reference Systems

A main purpose of Landmark software is to provide accurate visualization of geoscientific data. A major part of that accuracy lies in the ability of the software to pinpoint locations on a map with great precision.

The Landmark Map Projection Editor helps ensure this precision by letting you define a CRS for each project and each set of data that will be loaded into your system. The CRS creates a frame of reference for all calculations of latitude, longitude, northing and easting (x and y), and surface distance.

CRSs are stored in the OpenWorks database and so are available to any project using the same database.

This section overviews the basic information you need to know in order to define a CRS.

For additional information on cartographic concepts, you may want to purchase a copy of *Map Projections—A Working Manual*, a publication of the U.S. Geological Survey (Professional Paper 1395) which is available from the U.S. Government Printing Office in Washington D.C. This is a trustworthy source book on the basic principles of cartography and the various cartographic projection types.

Understanding the Problem

Whenever you try to locate a point on a map, you inevitably encounter the same problems encountered by surveyors and navigators throughout recorded history. Trying to represent the curved surface of the earth on the flat surface of a map always leads to distortions, no matter how carefully it is done.

The problem is fairly simple if you always use the same map and frame of reference—at least the distortions are constant. But what happens when you try to convert differences in degrees of latitude and longitude into northing and easting (x's and y's)? Or when you try to convert points on one kind of map to points on another type of map? A slight error can throw your calculations off by hundreds of feet.

For example, suppose you have a well located at 90° West longitude and 28° North latitude, and you want to place a new well 6,400 m south and 1,300 m west of the previous one. What will its location be?

What is the relation between latitudes and longitudes (geographic coordinates) and northing and easting (x and y grid coordinates)? How can we show, on a flat grid and in a consistent framework, locations measured under different systems?

The CRS Solution

The problem can be solved through the use of a CRS. A CRS is not a map; instead, it is a way of describing a map that defines all of the assumptions and calculations on which the map is built, including:

- Projection type
- Spheroid
- Geodetic datum
- Prime meridian
- Units of surface measure
- Projection parameters including false easting and northing, origin latitude and longitude, etc., or datum shift parameters

Once a CRS is defined, it is possible to transform measurements made in any CRS to another CRS. Thus, the spatial relation between two points can always be seen by transforming them to a common CRS and viewing their images there. In general, this is how Landmark software ensures accuracy in all of its coordinate positions.

What You Need To Know to Define a CRS

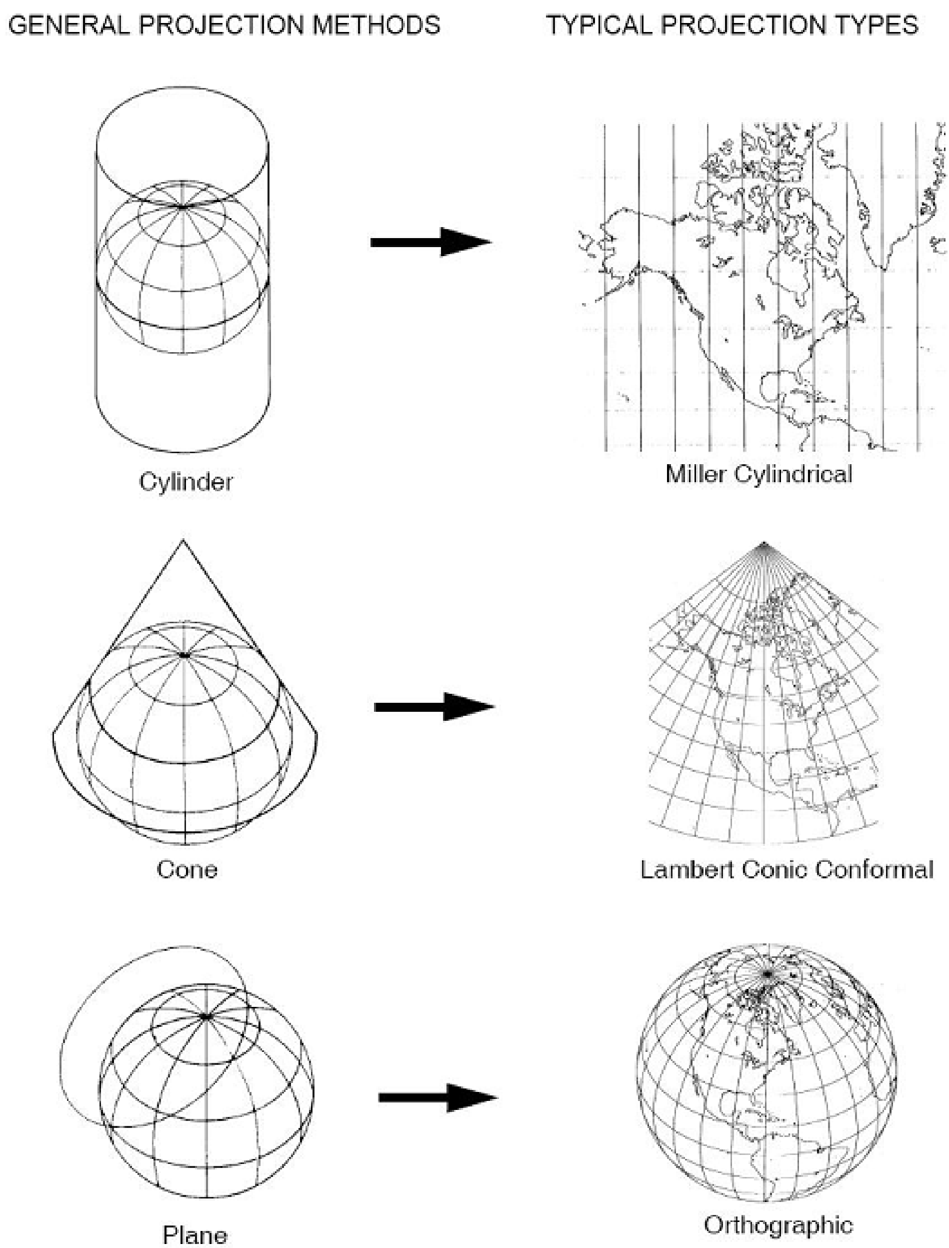
For each CRS that you create, you need to know the geographic coordinate system, projection type, geodetic datum, surface units, and projection parameters to be used. If you do not know this information, ask the supplier of your data. This section explains each of these concepts in more detail for users who are unfamiliar with basic cartography.

There are two basic types of cartographic reference systems that you can create—those based on geographic coordinate systems using latitudes and longitude, and those based on projection coordinate systems using x's and y's.

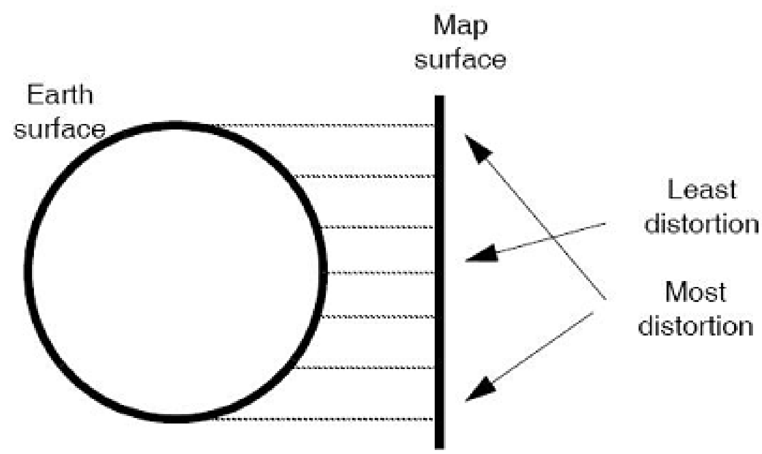
Projection Type

Any map is basically a projection of the curved surface of the earth onto a flat surface. There are dozens of different ways to project a map, but all are based on the three methods listed below:

1. **Cylinder.** The surface of the earth is projected onto a cylinder, which is then cut and unfurled.
2. **Cone.** The surface of the earth is projected onto a cone, which is then cut and laid flat.
3. **Plane.** The surface of the earth is projected onto a plane.



Each of these methods is imperfect, because it invariably produces distortion. To help reduce the distortion, cartographers have developed different projection types for use in different mapping applications. For example, a Lambert Conic Conformal projection seems to produce the least distortion when mapping an area like the State of California, due to the unique shape and size of the state. In general, the best method for any given purpose is the one that produces the least distortion in the region of the earth being studied.



Example of Projection

Spheroid

The problem of projecting the 3D surface of the earth into a flat map is further complicated because the earth is not a perfect sphere or spheroid, but a somewhat flattened sphere called an ellipsoid.

The exact amount of flattening has been calculated in many different ways, with each calculation based on certain assumptions about the geoid—the shape of the earth at sea level. For example, the Clarke spheroid of 1886 was a calculation developed for North America that assumed a flattening of 1/294.98. The WGS 72 spheroid was developed by satellite observation in 1972 and assumes a flattening of 1/298.26.

In this manual, the words “spheroid” and “ellipsoid” may sometimes be used interchangeably.

Geodetic Datum

To further enhance the precision of their maps, map makers develop a smooth mathematical surface called a geodetic datum that provides a “best fit” over the area being studied. The mathematical model of the ellipsoid/spheroid is fixed to a point on the earth.

For example, North American Datum 1927 (NAD27) uses the Clarke 1866 ellipsoid fixed at Meades Ranch in Kansas. The World Geodetic System 1984 (WGS84) datum uses the ellipsoid fixed at the earth’s geocenter.

Geographic C.S.

When you are creating a new CRS, the Map Projection Editor lets you select a geographic coordinate system from a standard list. For any selection, the Map Projection Editor automatically references the correct datum, spheroid, and prime meridian, applying the prime meridian and the equator to a geodetic datum to reference the latitude and longitude coordinates.

Datum Shift

When you create a new geographic CRS, the Map Projection Editor lets you apply a datum shift to WGS84 in several ways. You can select an existing datum shift, select a shift method appropriate for the datum, or you can create a new datum shift. Datum shifts convert between geographic systems with different reference datums and they calculate map projections for conversion between geographic coordinate systems and grid coordinate systems.

Within the OpenWorks software, all datum shifts are defined from a source datum (i.e., the datum listed in the “Datum” field) to a common datum, either North American Datum 1983 or World Geodetic System 1984. The target datum, labeled **Shift Target CS**, is referenced in Map Projection Editor using the name of a geographic coordinate system that includes the target datum.

Units

The Map Projection Editor utilizes the Molodensky, Bursa-Wolf, North American Datum Conversion (NADCON), and National Transformation (NATRAN) version 2 datum shift methods.

Landmark software uses linear units for all measurements of distance and angular units for all latitude-longitude coordinates. When you are creating a CRS, the Map Projection Editor suggests the appropriate units for the projection type. Typical linear units include common feet, Indian feet, imperial feet, and international meters. Typical angular units include radians, degrees of arc, minutes of arc, and grades of arc.

Projection Parameters

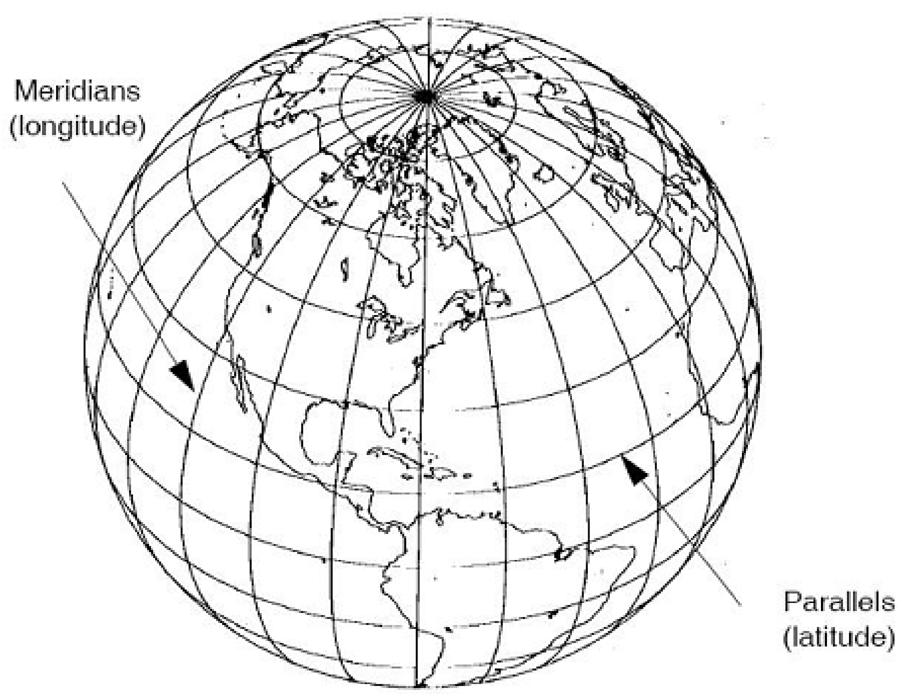
Certain projection parameters may also be required to further specify the mapping system. The parameters required vary by projection type.

When you select a projection type in the Map Projection Editor, the correct parameters are automatically listed for you to fill in. Some of the most common parameters are explained below.

Parallels and Meridians

You can segment a spheroid into 360 degrees both in a north-south direction and in an east-west direction. These angular measurements are called latitude (north-south angles) and longitude (east-west angles).

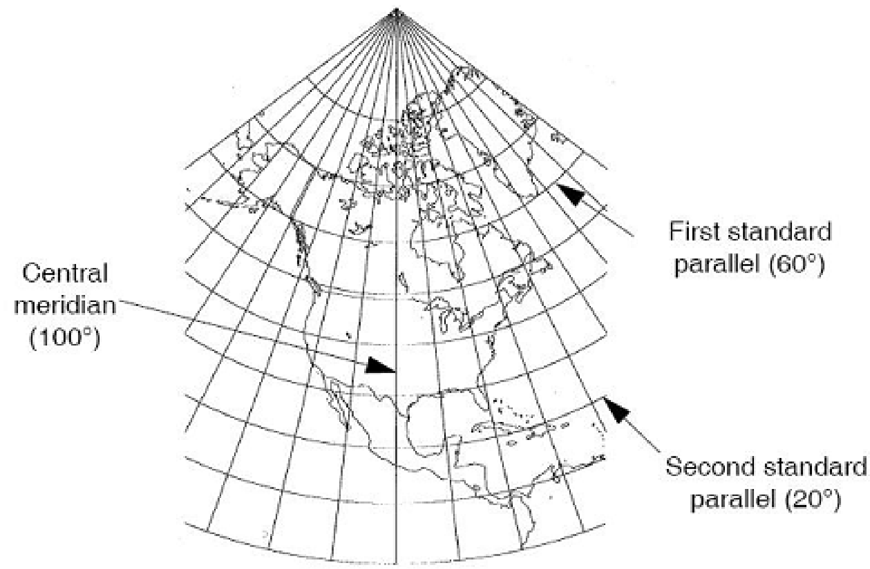
When these measurements are projected as a grid onto the globe, the grid lines indicating latitude are called parallels and those indicating longitude are called meridians.



Some map projections are measured from the point where the reference cone, cylinder, or plane intersects the surface of the earth. Depending on the type of projection, the intersection may occur at one or two points.

The latitudes where this occurs are called the standard parallels.

The figure below shows a Lambert Conic Conformal projection of North America, with standard parallels at 20° and 60°.



Notice that this projection is centered on a central meridian of 100°.

Many projections use this type of parameter to indicate the central north-south axis of the map area.

Origin

The origin is a point on a map where distortion of the area of geographical interest is minimal.

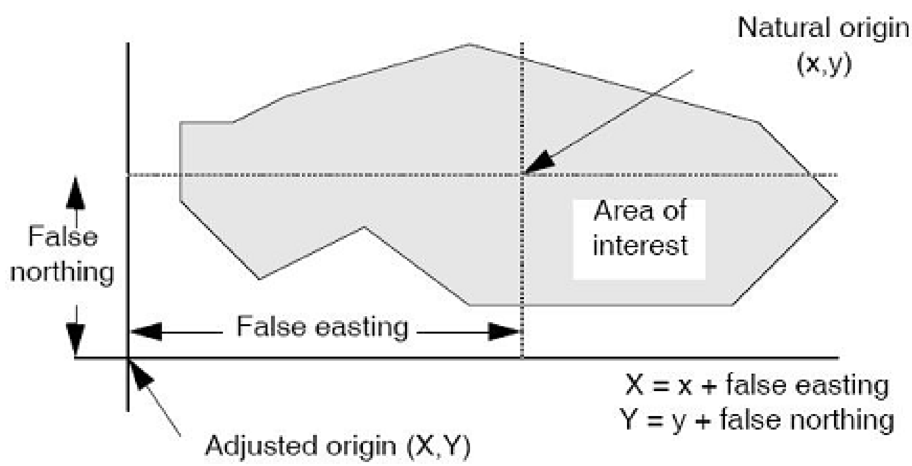
Once you know the point of origin, you can develop an x-y scale for measuring distances in linear units, with x as the east-west component and y as the north-south component. Each projection CRS has a "natural" origin where the latitude-longitude coordinate of the origin corresponds to (x, y) = (0, 0). This natural origin is commonly a point where the distortions are smallest. A common practice is to specify an origin that matches the center of geographical interest.

Positive latitudes refer to the northern hemisphere, negative latitudes refer to the southern hemisphere. Positive longitude is measured eastward from the reference meridian. Negative longitude is measured westward from the reference meridian.

False Easting and False Northing

When you place the origin at the center of the area being studied, it causes many coordinates to be negative, since many points will lie west of the y axis and south of the x axis (see diagram below). To avoid this inconvenience, you can adjust the origin so that it lies southwest of the area being studied. This adjustment has the effect of putting the entire area into the positive quadrant of the two axes. This adjustment, made to avoid negative coordinates, is called false easting and false northing.

The figure below illustrates the concepts of false easting and false northing. In this figure, (x, y) represents the natural origin at the center of the area being studied and (X, Y) represents the adjusted origin after false easting and false northing have been applied. If (X,Y) is defined as (0,0), then all coordinates in the area of interest will be positive numbers.



Putting It All Together

As you can see, there are many specifications that go into a CRS, and often it is impossible to define a point on the map unless you know the assumptions underlying the CRS. For example, if the coordinates of a well are 2.5 and 58.3, this has no meaning until we know more about the CRS. If the CRS is specified as

- Prime meridian: Greenwich
- Geodetic datum: European Datum 1950
- Spheroid: International 1924
- Surface measure: dega (degrees of arc)

then we know that the well is near the middle of the North Sea.

However, the same coordinates could be used to define a location near Houston, Texas, if the CRS specifications are as follows:

- Projection Type: Transverse Mercator
- Basis Geog. CS: North American Datum 1927
- Prime Meridian: Greenwich
- Geodetic datum: North American Datum 1927
- Spheroid: Clarke 1866
- Surface measure: meters
- False Easting: 500000
- False Northing: 0
- Meridian Scale Factor: 0.9996
- Origin Latitude: +29.5 (29.5° N)
- Origin Longitude: –94.5 (94.5° W)

Notice that the parameters required to specify different CRSs can vary widely, as shown by the two examples above. A set of parameters for a CRS constitute a CRS definition in the OpenWorks software. The Map Projection Editor manages the storage and display of these specifications in an intelligent way.

Standard Projection Types

To reduce confusion resulting from the wide variety of possible reference systems, cartographers have agreed upon standardized types, which are particular projections with prespecified parameters designed to be used for particular geographical zones. Two of these standardized types are the Universal Transverse Mercator (UTM) System and the State Plane Coordinate System. Two other commonly used projection types are the Self-reference (or stand-alone) and the Geographic Latitude/Longitude projection types.

This section discusses these four commonly used projection types.

- Universal Transverse Mercator
- State Plane
- Geographic Latitude/Longitude
- Self-reference (stand-alone)

Universal Transverse Mercator

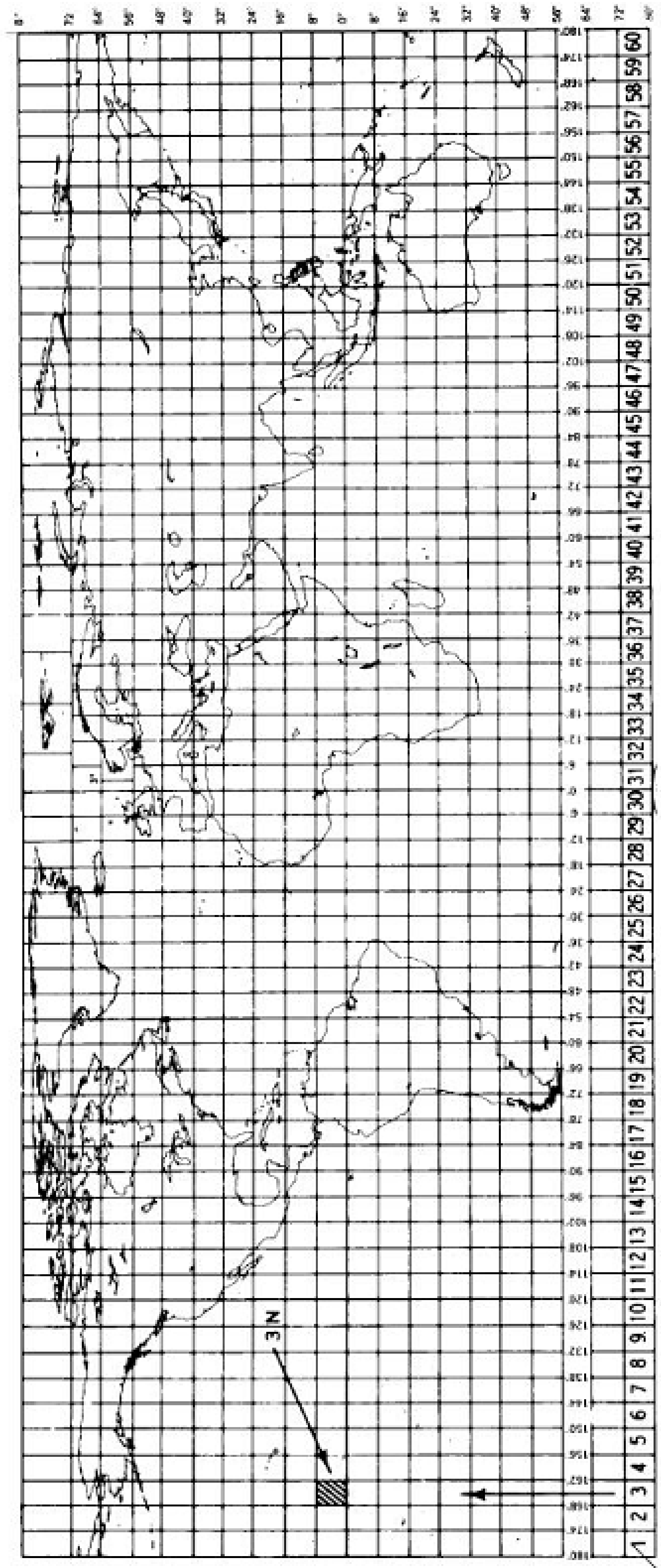
The Universal Transverse Mercator System includes 120 zones that cover the entire earth. These zones are defined by 60 longitudinal zones, each six degrees wide, and two latitudinal zones (the northern and southern hemispheres). Each of these zones has a prespecified Transverse Mercator projection with a central meridian at the center of the longitude zone and a prespecified false easting and false northing.

The northern and southern zones for the same longitudes are identical except for their false northing values.

For the northern hemisphere, the equator at the central meridian is considered the origin. The false easting is 500,000 meters and the false northing is 0. For the southern hemisphere, the equator is still considered the origin. The false easting is 500,000 meters and the false northing is 10,000,000 meters. Maps made with this projection can be pieced together with a mismatch at their edges of no more than 1:1,000.

Example

Look at the figure on the next page. The longitude zone for the west coast of Australia is 50 and the hemisphere is southern. What are the UTM longitude zone and hemisphere for Florida, USA?



Universal Transverse Mercator Projection (UTM)

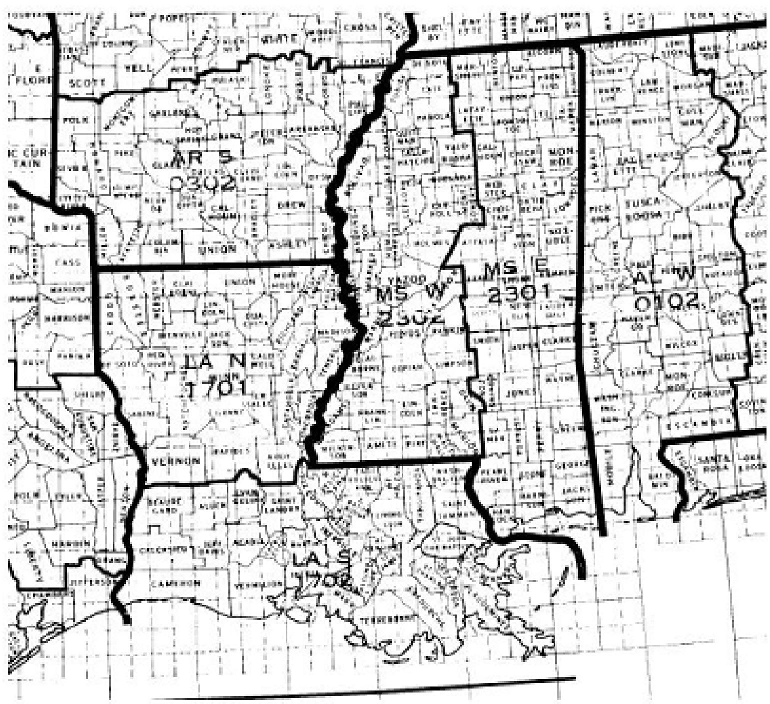
State Plane

This CRS type divides each state and some USA possessions into one or more zones, usually following county lines.

The ability to divide the states into horizontal or vertical zones produces a series of maps with minimal distortion. Each horizontally oriented zone is produced using a Lambert Conic Conformal projection that minimizes distortions around the standard parallel(s). Each vertically oriented zone is mapped with a Transverse Mercator projection that minimizes distortion around the central meridian. The Alaskan Panhandle is a slanted strip that is mapped with an Oblique Mercator projection. The Guam zone uses a Polyconic projection. Consequently, maps made using State Plane systems can be pieced together with an edge mismatch of no more than 1:1,000.

An important feature of the State Plane system is its use of physical monuments implanted by surveyors. The (x, y) and latitude-longitude coordinates of these monuments have been computed and tabulated twice, first in 1927 and again in 1983. The survey results are known as the 1927 North American Datum and the 1983 North American Datum.

When you create a CRS using the State Plane projection type, you specify the geographic coordinate system and the zone of interest. The system suggests the units of surface distance, and provides the prime meridian, datum, spheroid, and datum shift parameters.



Geographic Latitude/Longitude

This system, also known as a Geodetic system, works with longitude and latitude data.

When you create a CRS using this projection type, you specify the datum, the datum shift, and enter a description of the CRS. The system suggests the prime meridian and angular units, and provides the spheroid that is appropriate for the datum.

Geographic should not be used as the project default because Landmark applications work with rectilinear coordinates (x, y). The constant conversion that is necessary to work with a Geographic project projection is far too time consuming. The Geographic projection is useful however, for reading latitude/longitude data into a project.

Self-Reference (Stand-Alone)

This is the projection type for x, y data for which a true cartographic projection is either not fully known or not in the Map Projection Editor's available projections. This type of CRS provides a means of keeping the data in the database without performing coordinate transformations on it.

Self-reference limitations are:

- The concepts of false eastings and false northings are not applicable to this CRS type.
- Data stored under a stand-alone CRS cannot be converted to or from other coordinate systems.

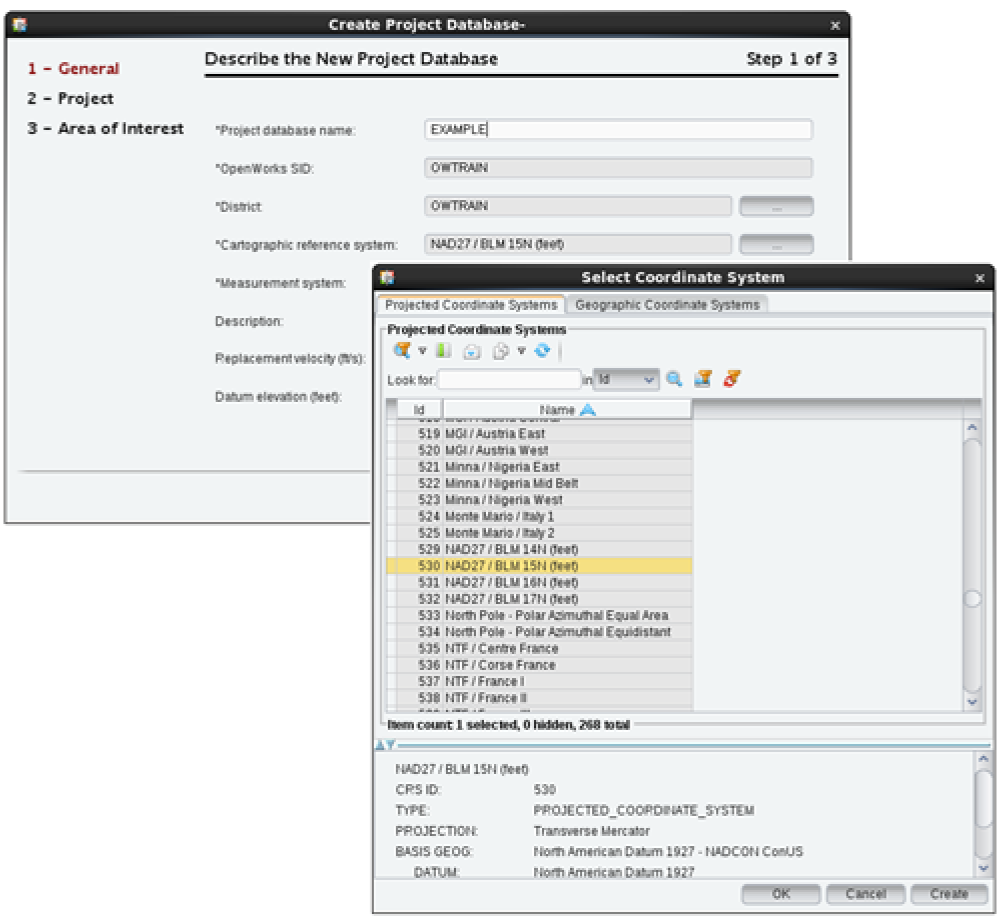
Selecting or Creating the Project CRS

For every new project, you must create a CRS for that project, or you must select a CRS that is already available. There are two basic types of cartographic reference systems that you can select from or create—those based on geographic coordinate systems (latitude/longitude) and those based on projection coordinate systems (x/y).

You must use the Map Projection Editor to create a CRS. You can start the Map Projection Editor from inside Project Create or from the OpenWorks Command Menu.

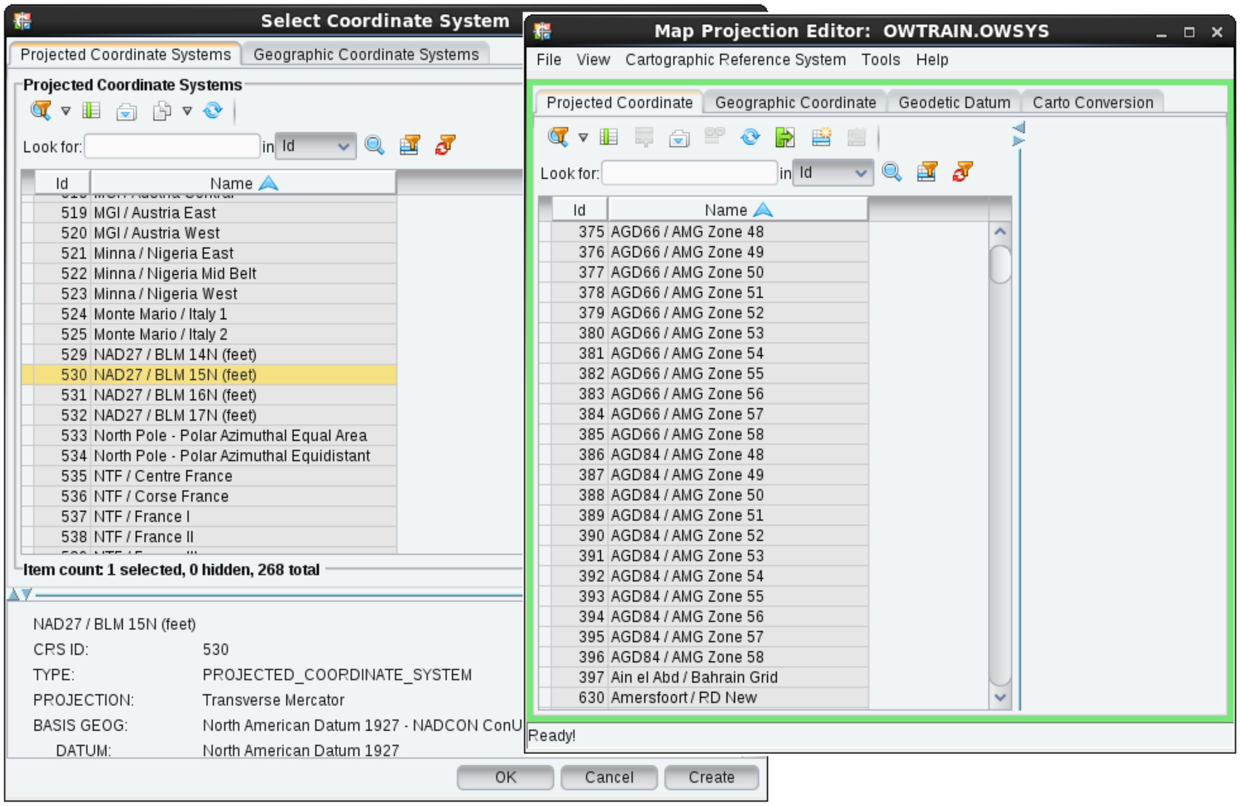
Selecting a Cartographic Reference System

For example, to select a Cartographic Reference System, you would press the List button under Cartographic Reference in the main Project Create window. The CS Selection window displays.



Creating a CRS

To create a CRS, click the **Create** button. The Map Projection Editor window displays.



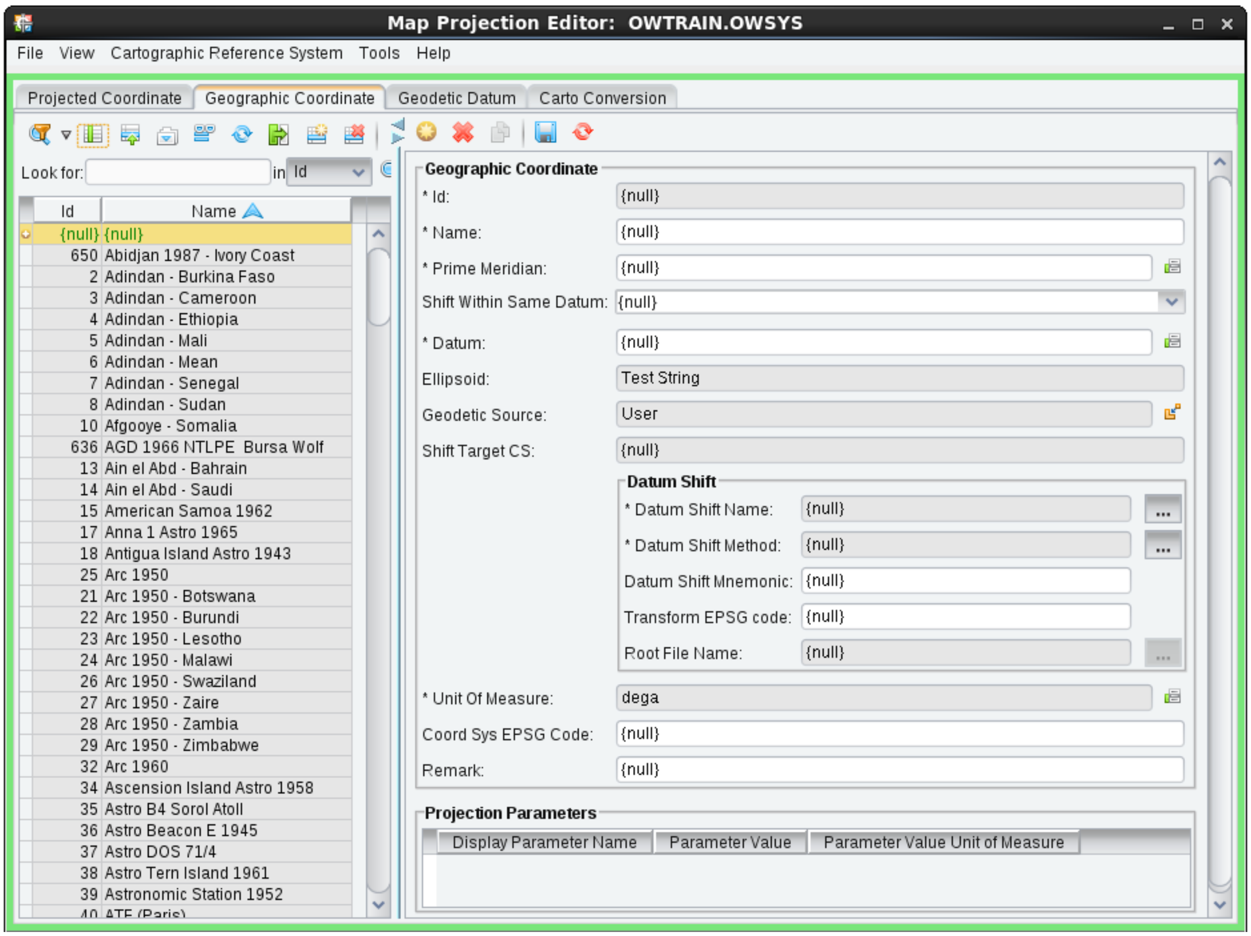
The main Map Projection Editor window contains a series of drop-down menus and a list of available CRSs (those that have already been defined). The Projected Coordinate Systems show the coordinate systems using x, y coordinates, and Geographic Coordinate Systems show the coordinate systems using latitude/longitude values. You can use either list to select a CRS for editing, viewing, or deleting.

Map Projection Editor allows you to define a frame of reference for your project data in the OpenWorks database instance within the scope of its geographic coordinates. Map Projection Editor incorporates third-party software licensed from Blue Marble Geographics. The Blue Marble software calculates datum shifts to convert between geographic systems with different reference data and also calculates map projections to convert between geographic coordinate systems and grid coordinate systems.

The OpenWorks software uses the Petrotechnical Open Software Corporation (POSC) Epicenter model to represent cartographic transformations. This model allows you to store the parameters used in the Blue Marble algorithms in a standards compliant manner. This data model supports user-defined cartographic transforms between projection and geographic coordinate systems and between two geographic coordinate systems.

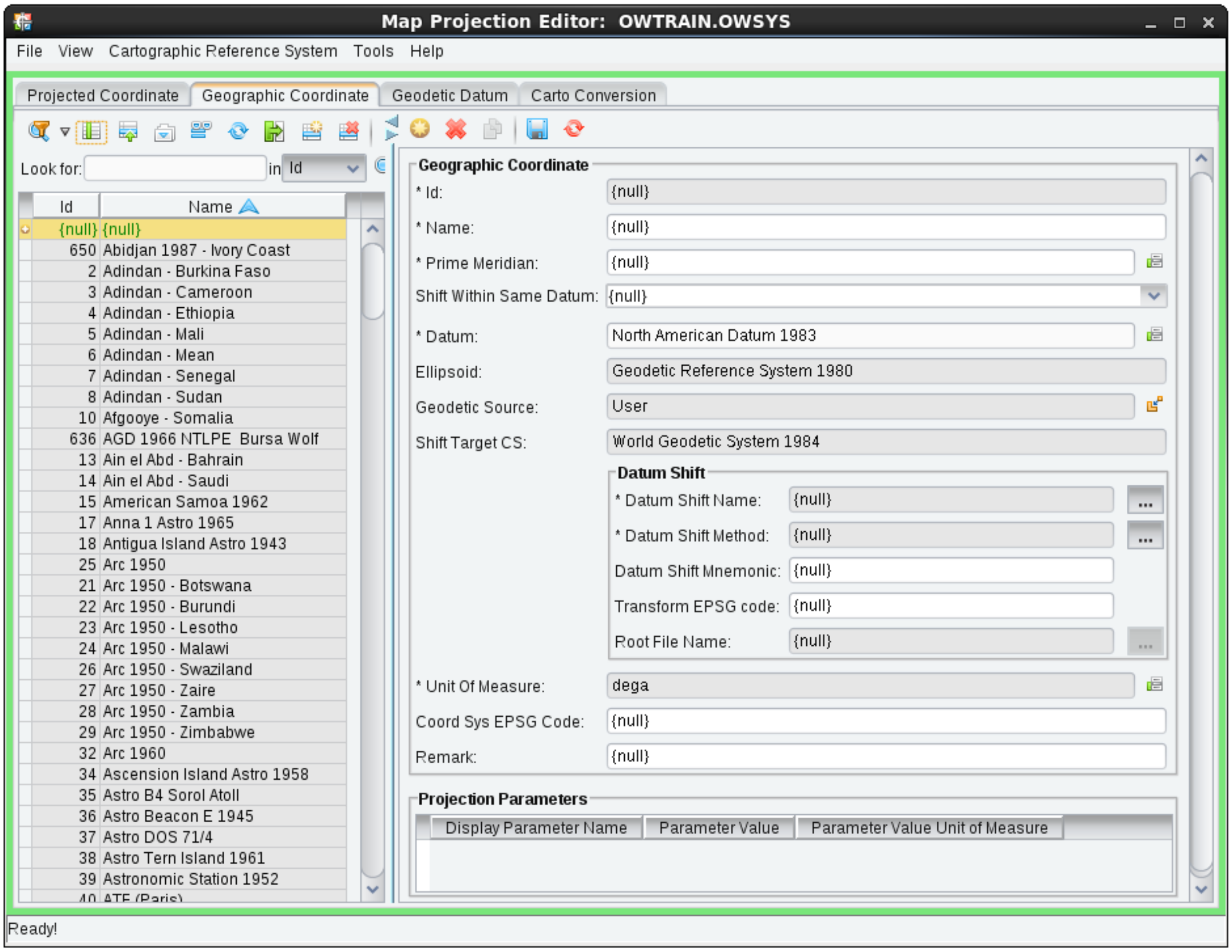
Creating a Geographic (Latitude/Longitude) CRS

To create a new geographic CRS, select **File > New > Geographic Coordinate** from the Map Projection Editor main window.



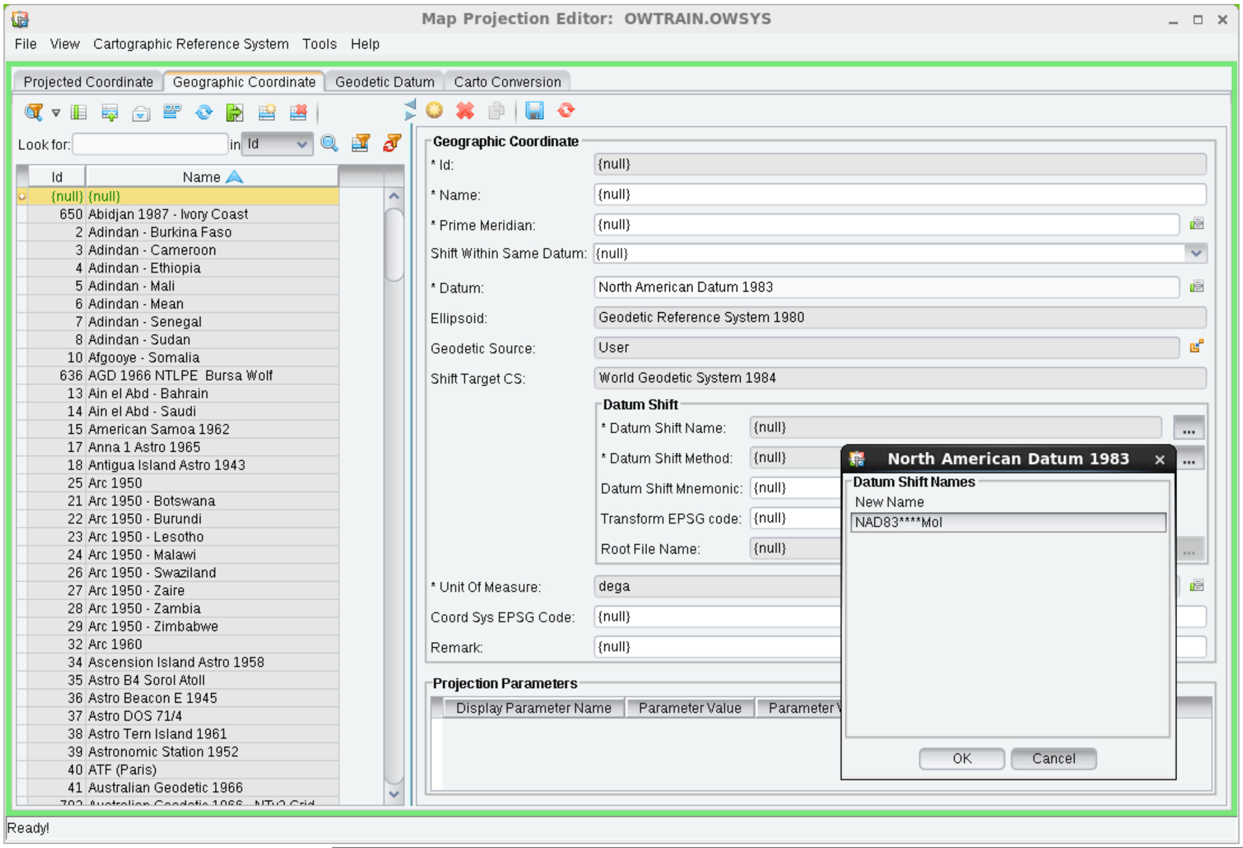
The Map Projection Editor window expands to reflect the most basic required entries for the geographic type.

In this example, `North American Datum 1983` was selected. The system provides default values for the Ellipsoid, Shift Target CS, and Unit of Measure fields.



> **Note**
>
> If the datum is North American Datum 1927, then the Shift Target CS will always be North American Datum 1983. If any other datum is used, the Shift Target CS will always be World Geodetic System 1984.

Since this is a geographic CRS, you must also define the datum shift transformation. In this example, `NAD83****Mol` was selected. The system then automatically selects the appropriate shift method for the selected datum shift.



Datum Shift Methods in the OpenWorks Software

The Map Projection Editor utilizes following datum shift methods:

- Molodensky
- Molodensky-Bedakas
- Bursa-Wolf
- Coordinate Frame Rotation
- NADCON = North American Datum Conversion
- NATRAN = Canadian National Transformation, version 2.

The system lists the name of the datum shift as Datum + Shift Mnemonic (if one exists) + Shift Method.

In **Prime Meridian**, click the **Pick List** icon ( ) to select a meridian. In this example, Greenwich is selected.

You can change the units of surface distance, if desired. Next, type a name for the new CRS in the **Name** field. Your name can be up to **80** characters of alphanumeric text.

Optionally, enter the **EPSG code** for the selected **coordinate system type**. You can enter up to 10 numeric characters.

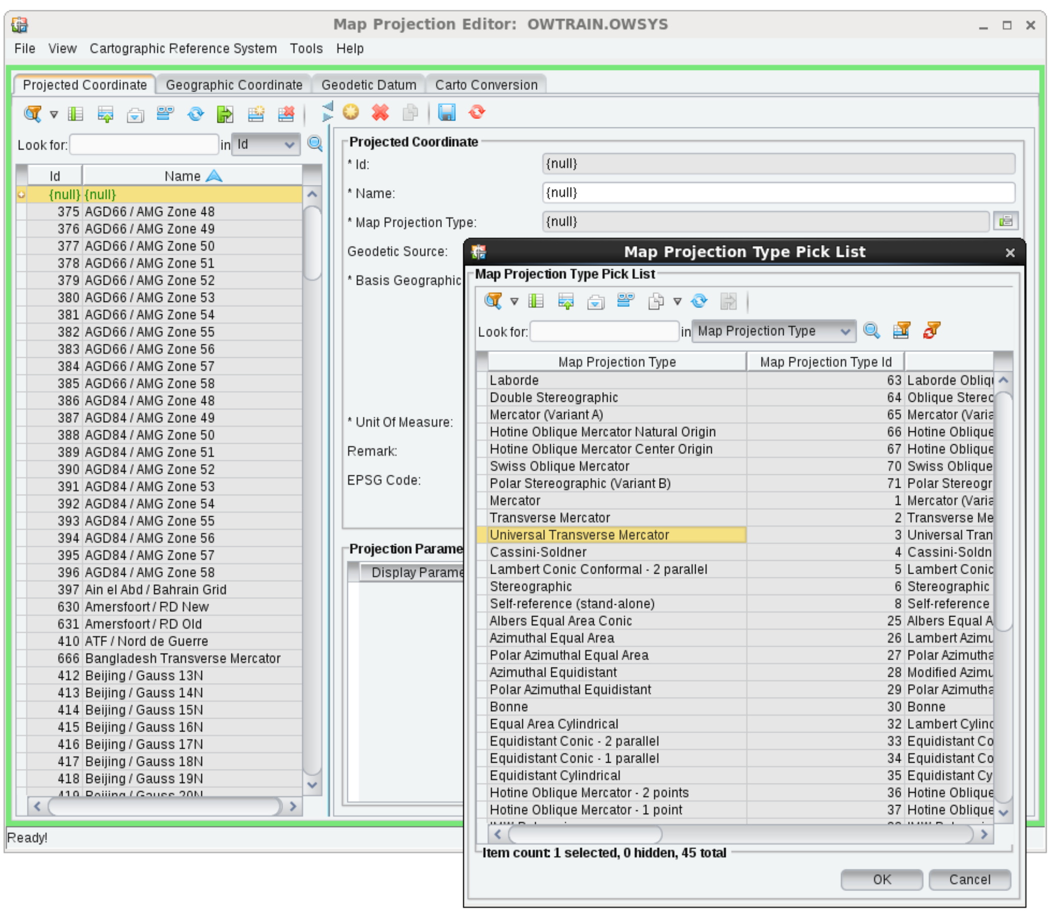
The European Petroleum Survey Group or EPSG, now part of the International Association of Oil & Gas Producers (OGP), compiles and disseminates the EPSG Geodetic Parameter Set, a widely used database of Earth ellipsoids, geodetic datums, geographic and projected coordinate systems, and units of measurement.

In **Remarks**, enter remarks if any.

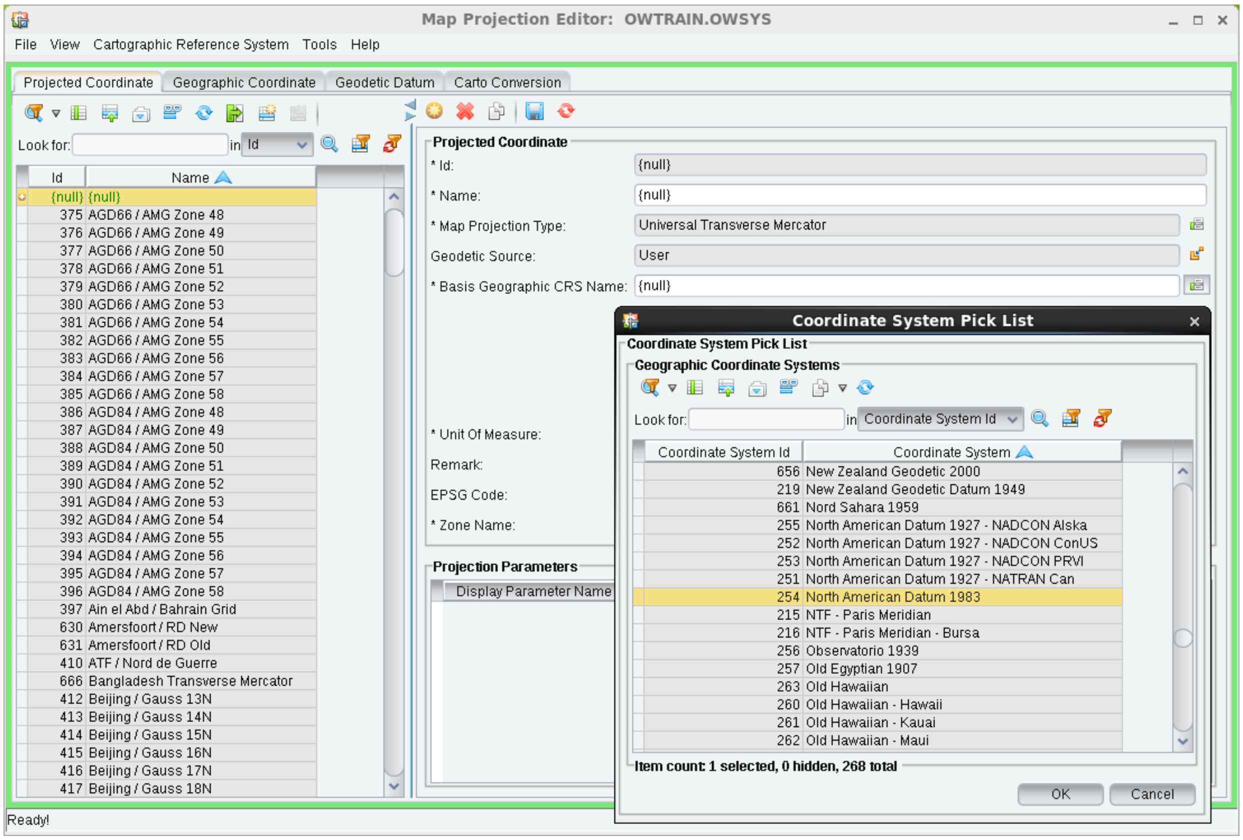
Click the **Save Changes** icon ( ) to save the new coordinate system. The OpenWorks software saves the details, generates an ID for the new coordinate system, and displays the new coordinate system.

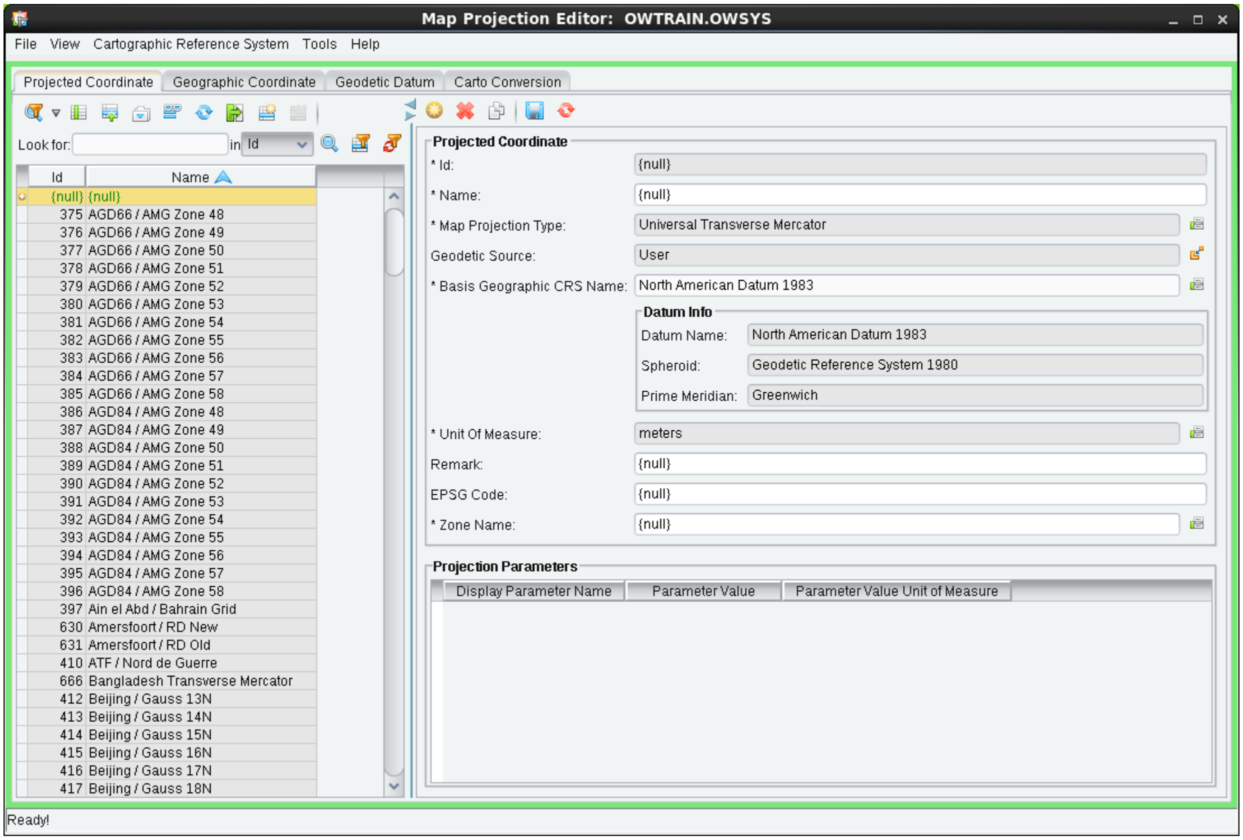
Creating a Projection (X/Y) CRS

To create a new projection CRS, select **File > New > Projected Coordinate** from the Map Projection Editor main window. Next, you select a **Map Projection Type**. In this example, a *Universal Transverse Mercator* projection was selected.



After you select a projection type, the Map Projection Editor window expands to reflect the required entries for this projection type. Select a **Basis Geographic CRS Name**. In this example, `North American Datum 1983` was selected. The system then automatically selects the prime meridian, datum, and spheroid.




Map Projection Editor: OWTRAIN.OWSYS
File View Cartographic Reference System Tools Help
Projected Coordinate
Geographic Coordinate
Geodetic Datum
Carto Conversion
Look for:
in
Id
Id
Name
{null} {null}
375 AGD66 / AMG Zone 48
376 AGD66 / AMG Zone 49
377 AGD66 / AMG Zone 50
378 AGD66 / AMG Zone 51
379 AGD66 / AMG Zone 52
380 AGD66 / AMG Zone 53
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386 AGD84 / AMG Zone 48
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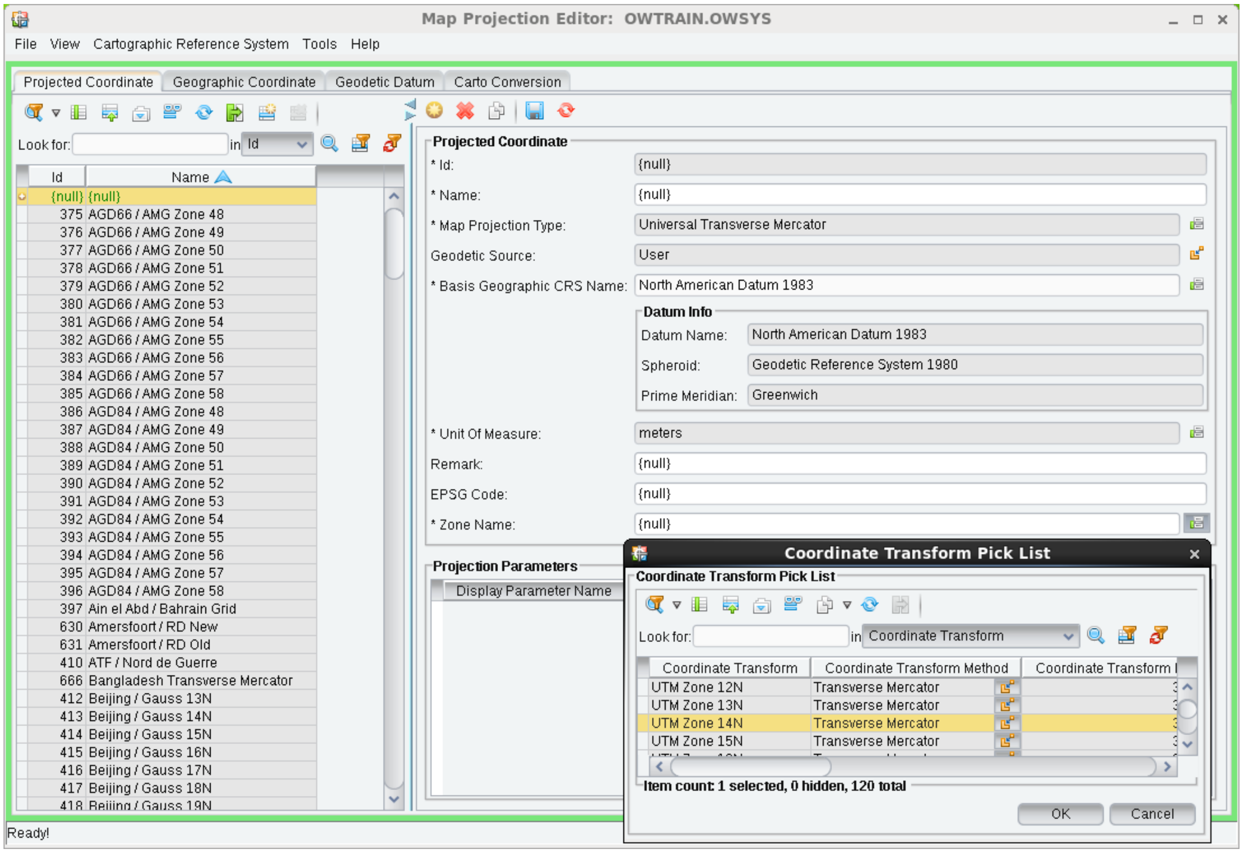
393 AGD84 / AMG Zone 55
394 AGD84 / AMG Zone 56
395 AGD84 / AMG Zone 57
396 AGD84 / AMG Zone 58
397 Ain el Abd / Bahrain Grid
630 Amersfoort / RD New
631 Amersfoort / RD Old
410 ATF / Nord de Guerre
666 Bangladesh Transverse Mercator
412 Beijing / Gauss 13N
413 Beijing / Gauss 14N
414 Beijing / Gauss 15N
415 Beijing / Gauss 16N
416 Beijing / Gauss 17N
417 Beijing / Gauss 18N
Projected Coordinate
* Id: {null}
* Name: {null}
* Map Projection Type: Universal Transverse Mercator
Geodetic Source: User
* Basis Geographic CRS Name: North American Datum 1983
Datum Info
Datum Name: North American Datum 1983
Spheroid: Geodetic Reference System 1980
Prime Meridian: Greenwich
* Unit Of Measure: meters
Remark: {null}
EPSG Code: {null}
* Zone Name: {null}
Projection Parameters
Display Parameter Name
Parameter Value
Parameter Value Unit of Measure
Ready!

For State Plane and UTM projections, you must define the appropriate zone.



In **Unit of Measure**, click the **Pick List** icon ( ) to select the name of a unit of measure.

In **Remark**, enter remarks if any.

Click the **Save Changes** icon ( ) to save the new coordinate system. The OpenWorks software saves the details, generates an ID for the new coordinate system, and displays the new coordinate system.

> **Note**
>
> The Map Projection Editor will always present a list of required entries which are specific to the Coordinate System that you choose.

How the OpenWorks Software Uses Cartographic Reference Systems

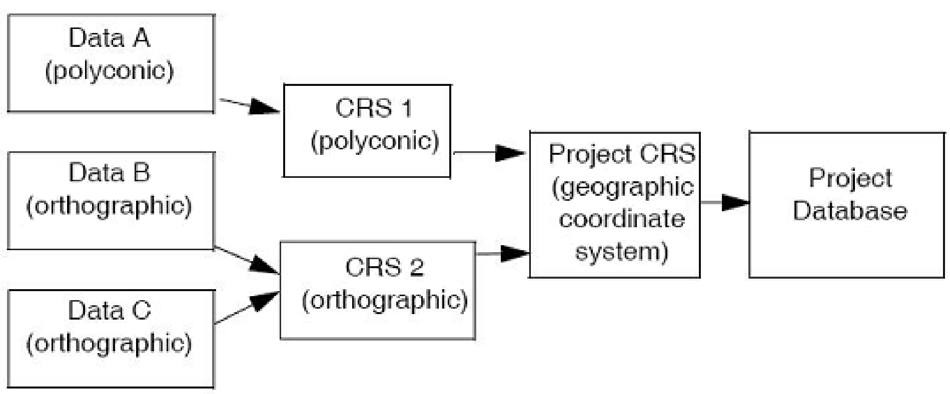
In Release 5000 you can specify one CRS for your OpenWorks project database and a different CRS for your interpretation projects. This allows you to have the CRS that is more accurate considering your original data and a different CRS for using with your applications and for producing maps. The data will be stored in the CRS defined for the project database and when working in the interpretation project, the data will be live and automatically converted to the CRS on the interpretation project.

A valid conversion path must exist between CRS if you select two different CRS for you interpretation project and project database.

When you create a project database, you specify a CRS to use to store and calculate project map data. This is called the project CRS. The project CRS should be the same map projection system that was used to locate the original project data.

Each OpenWorks project database contains a list of common CRS definitions that are used for transforming the coordinates of spatial data from one CRS to another. When you load data to an OpenWorks project, you specify the CRS that was used when the data was recorded. If this CRS does not exist in your OpenWorks project, you must add that CRS definition to the project using the Map Projection Editor. Once the original CRS of the data is defined, the data can be loaded into the project. The loader converts the data to the project CRS.

When you export data, you select an appropriate CRS for export. If the CRS does not exist, again, you create it. If the project uses a different CRS, the exporter converts the data from the project CRS at export time.

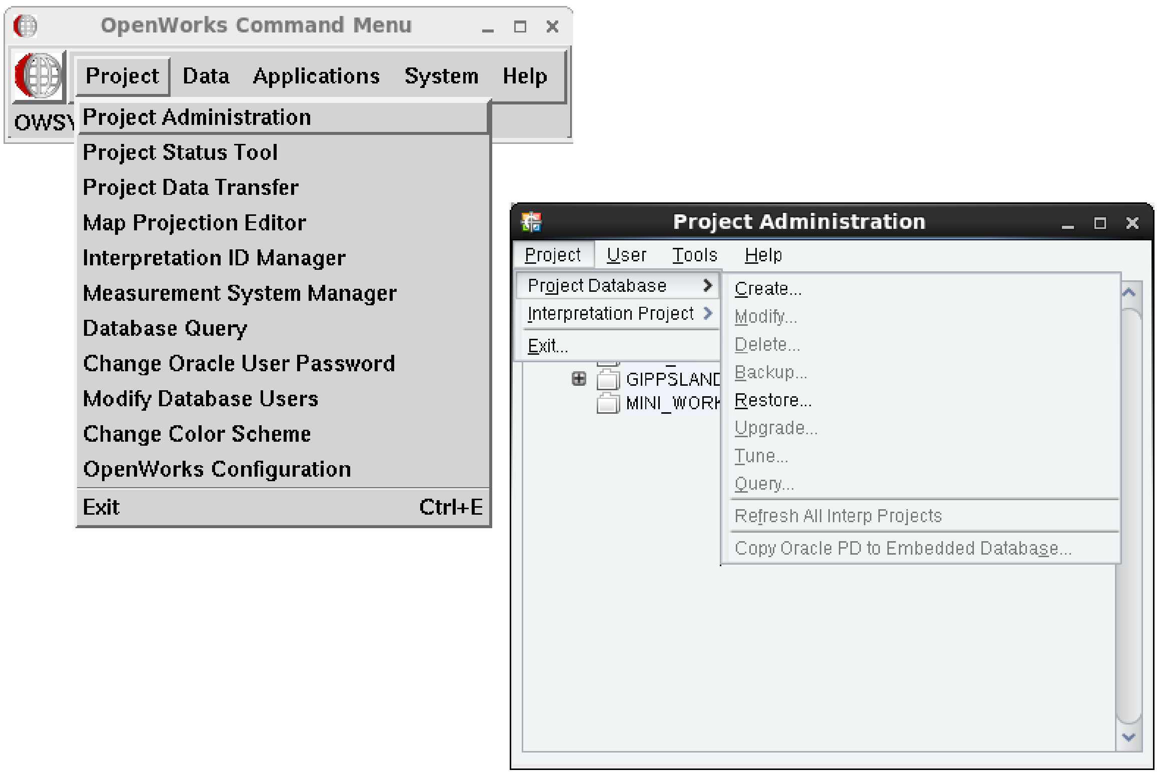


Exercise 2-1. Creating a Project

In this exercise you create a new OpenWorks project database.

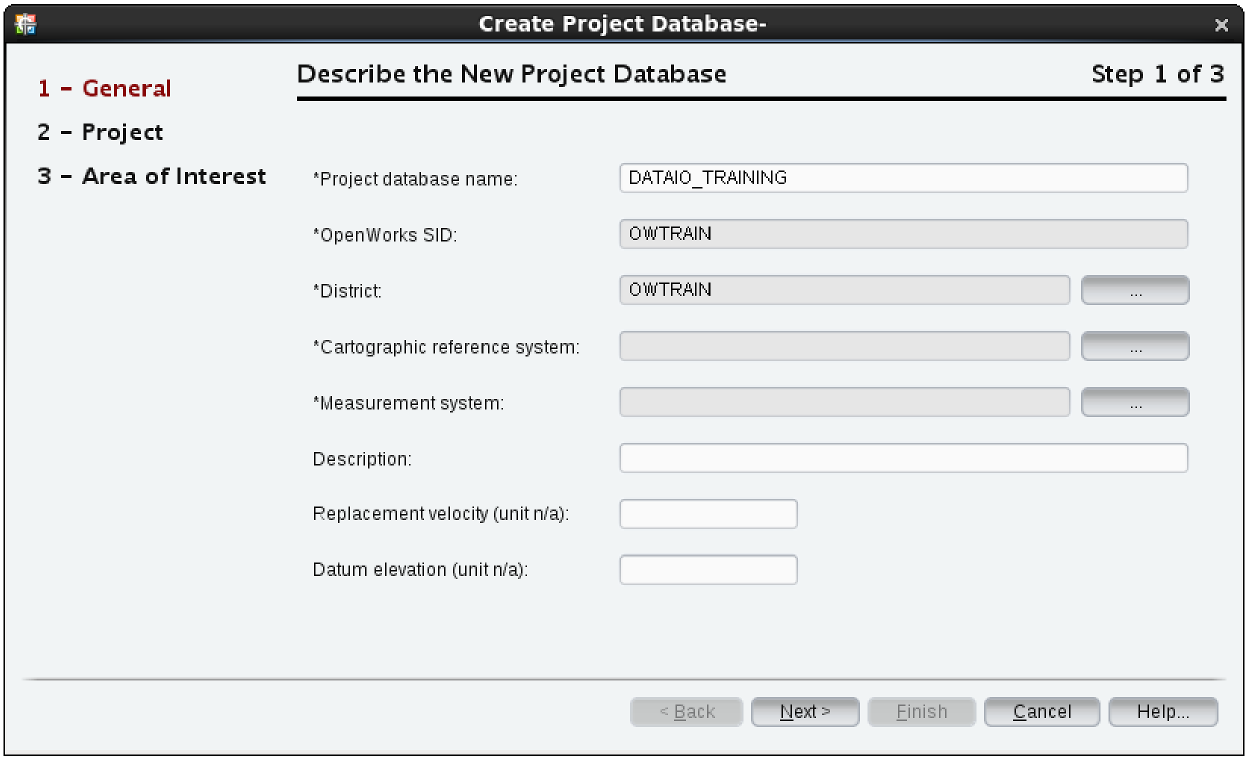
1. From the OpenWorks Command Menu, select **Project > Project Administration**.

2. From the Project Administration window, select **Project > Project Database > Create**.



Step 1 of 3: Defining Name, District, and Measurement Systems

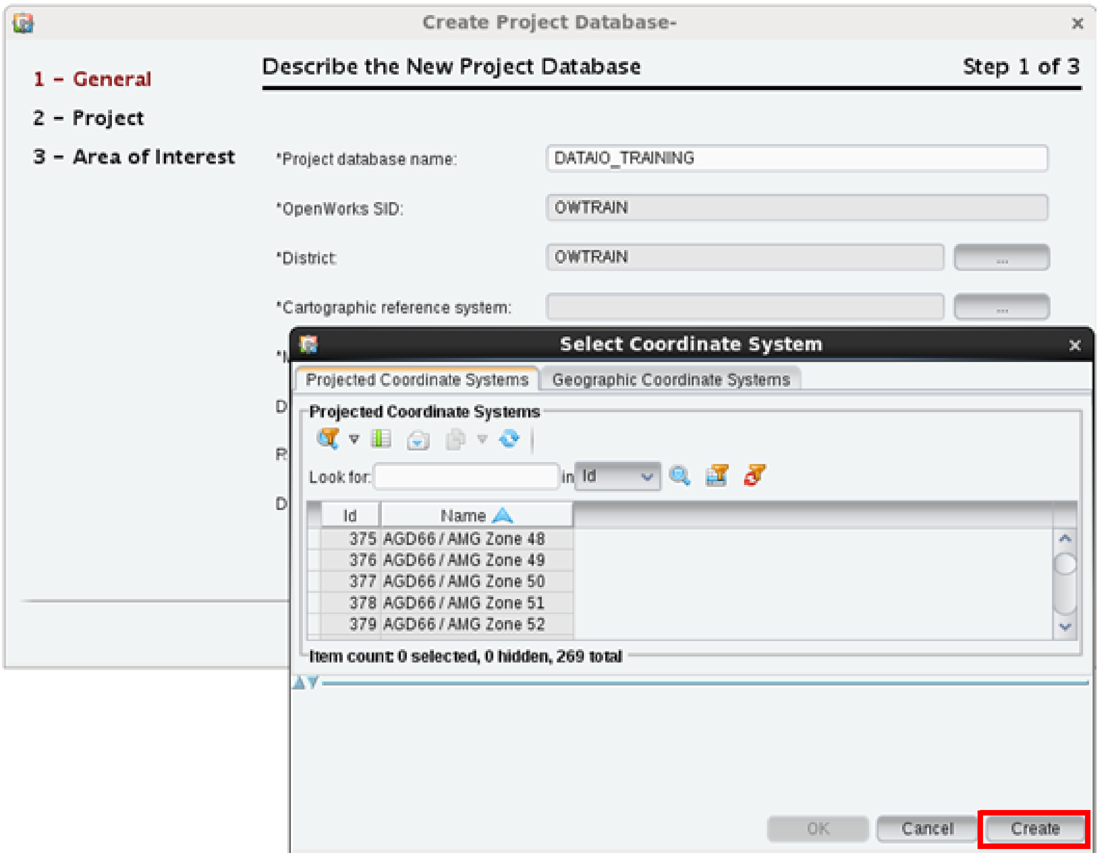
Enter `DATAIO_TRAINING` for the project name and select a district (ask your instructor about the district you should use).



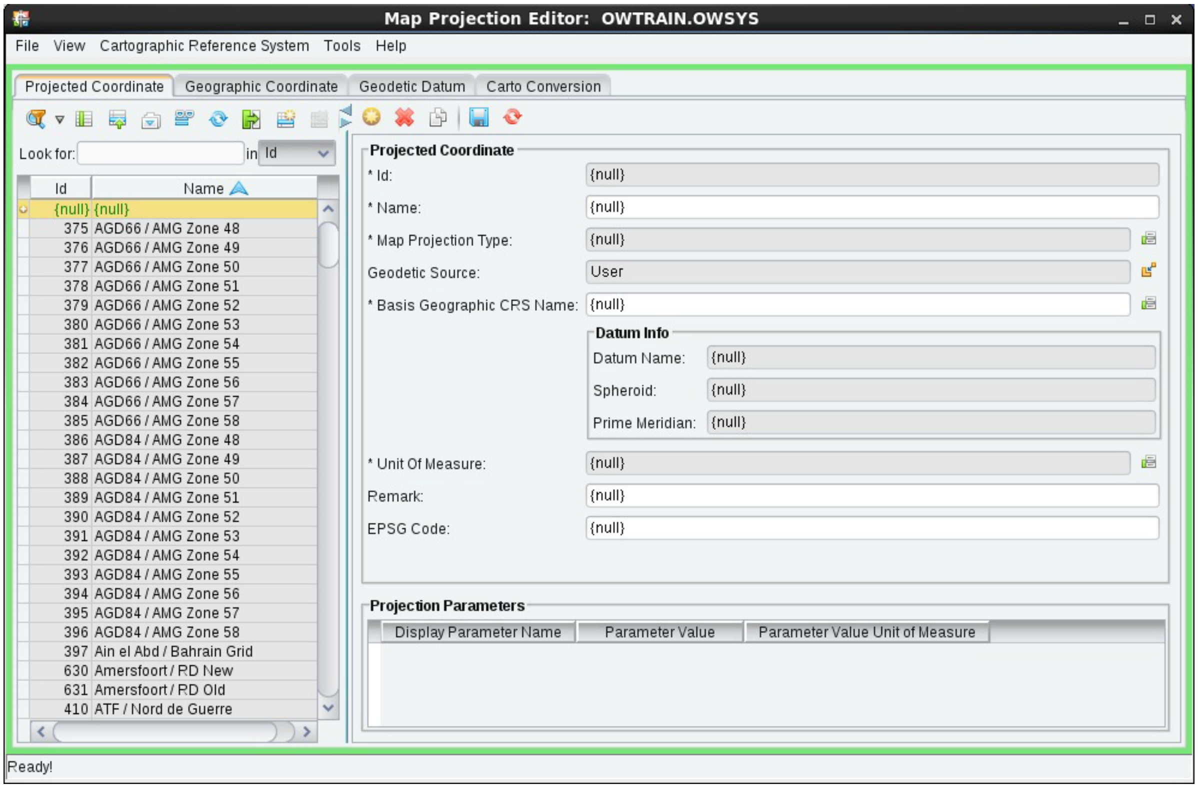
Create Three Cartographic Reference Systems

Create a projection coordinate system named `STexas_your initials`**, by doing the following:**

1. Begin this exercise by clicking on the ellipsis (**…**) to the right of the Cartographic Reference System selection box. Click the **Projected Coordinate Systems** tab and click on **Create**.



The **Map Projection Editor** dialog box displays.



Select **File > New > Projected Coordinate**.

2. In the right pane, in the **Name** text box, specify a name for the projected coordinate system **`STexas_your initials`**.

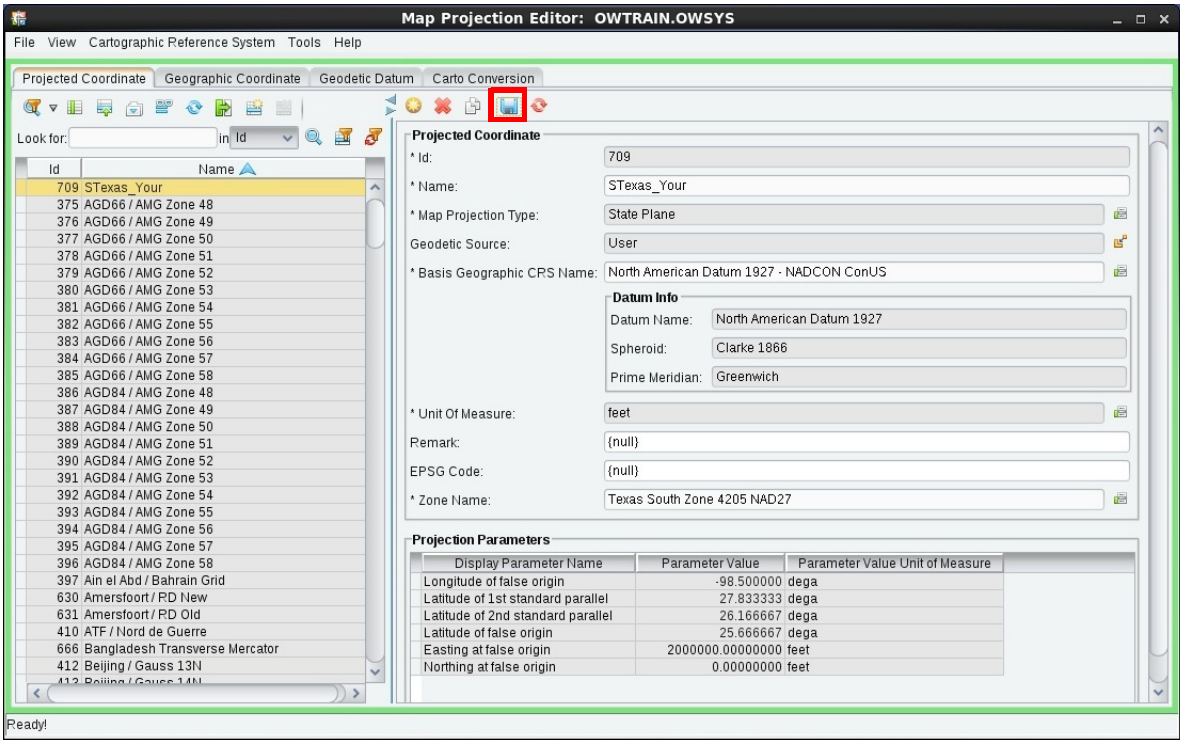
3. Click the **Map Projection Type** List button and select `State Plane` from the list. Click **OK**.

4. Click the **Basis Geographic CRS Name** List button and select **`North American Datum 1927 - NADCON ConUS`** from the list. Click **OK**.

5. Click the **Unit of Measure** list button and select **Common feet (feet)** from the list. Click **OK**.

6. Click the **Zone Name** List button and select `Texas South Zone 4205 NAD 27` from the list. Click **OK**.

7. Click the **Save Changes** icon ( ) to save the new coordinate system.



Create a Projection Coordinate System called
`UTM_14_`*`your initials`* by performing the following steps:

1. In the Map Projection Editor, select **File > New > Projected Coordinate**.

2. In the right pane, in the **Name** text box, specify a name for the projected coordinate system UTM_14_*your initials.*

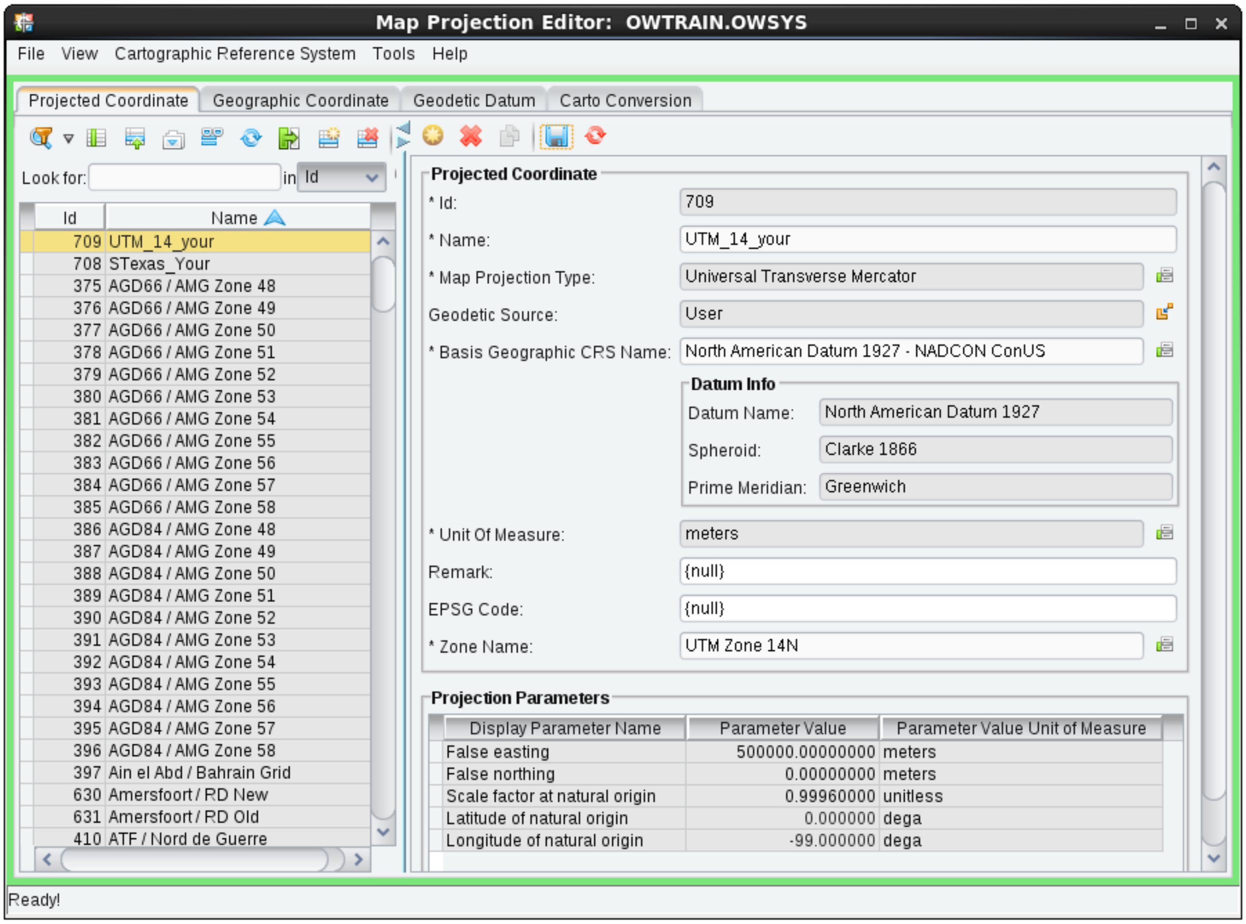
3. Click the **Map Projection Type** list button and select **Universal Transverse Mercator** from the list. Click **OK**.

4. Click the **Basis Geographic CRS Name** list button and select **North American Datum 1927 - NADCON ConUS** from the list. Click **OK**.

5. Click the **Unit of Measure** list button and select **Meters** from the list. Click **OK**.

6. Click the **Zone Name** list button and select **UTM Zone 14N** from the list. Click **OK**.

7. Click the **Save Changes** icon () to save the new coordinate system.



Create a Geographic Coordinate System called `Geographic_<your initials>` by performing the following steps:

1. Select **File > New > Geographic Coordinate** from the Map Projection Editor dialog box.

2. In the right pane, in the **Name** text box, specify a name for the projected coordinate system `Geographic_<your initials>`.

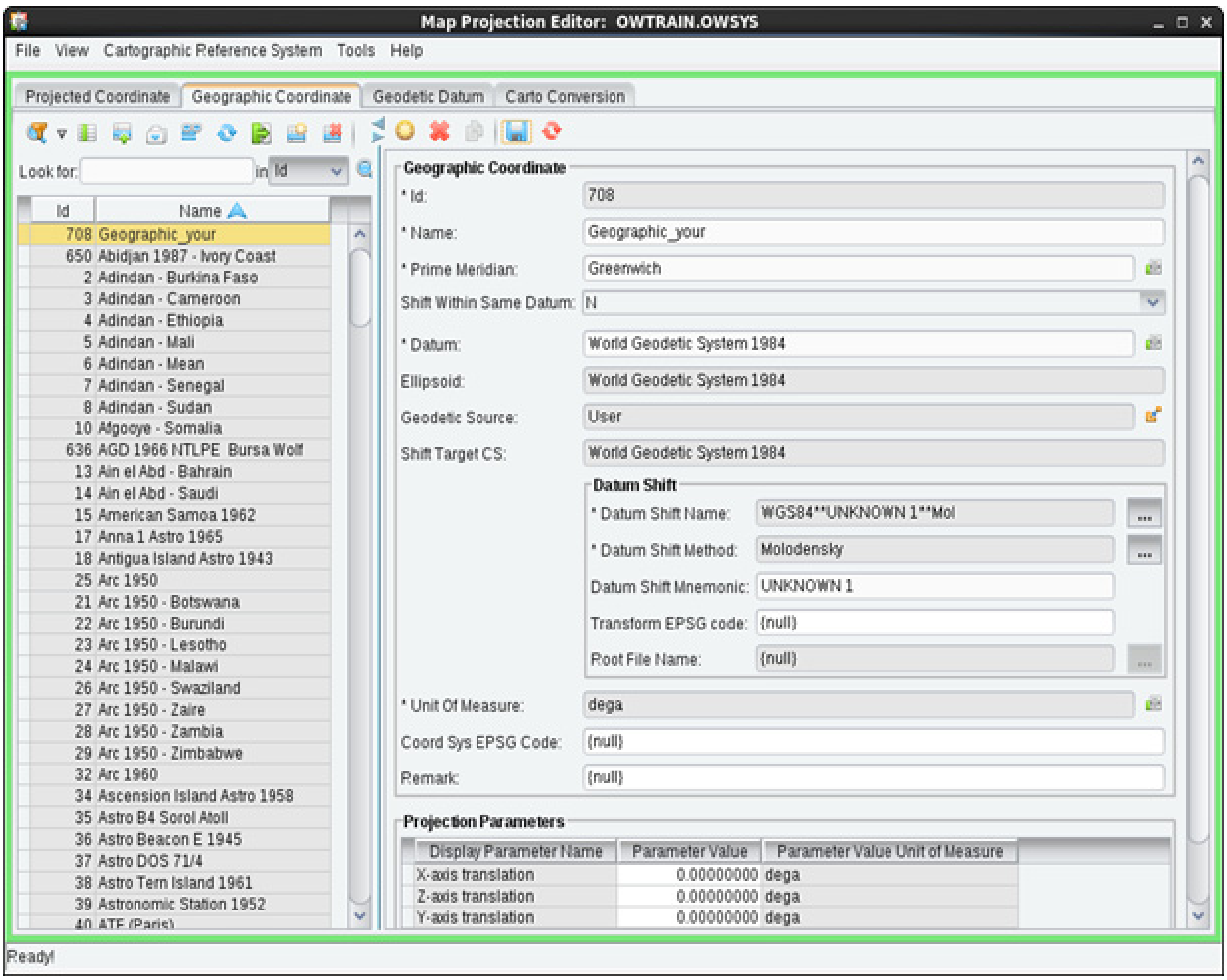
3. Click the **Prime Meridian** list button and select **Greenwich** from the list. Click **OK**.

4. Click the **Datum** list button and select `World Geodetic System 1984` from the list. Click **OK**.

5. Click the **Datum Shift Name** list button and select `WGS84****Mol` from the list. Click **OK**.

6. Click the **Save Changes** icon ( ) to save the new coordinate system.

7. Select **File** > **Close** to close the Map Projection Editor.



Choose a CRS and a Measurement System.

1. The **Select Coordinate System** dialog box should still be open. Select the **STexas_<*your_initials*>** projection coordinate system you just created. Click **OK**.

   If you do not see your newly created coordinate system, click the **Reload Cartographic Reference System data** icon.

2. Set the Measurement System to **U.S. Oil Field**.

3. Click **Next** to go to Step 2 of 3.

Step 2 of 3: Set Size of the Project and Autoextend Option

1. Check the **Autoextend** checkbox.

2. To set the size of the project, select the **Novice** radio button.

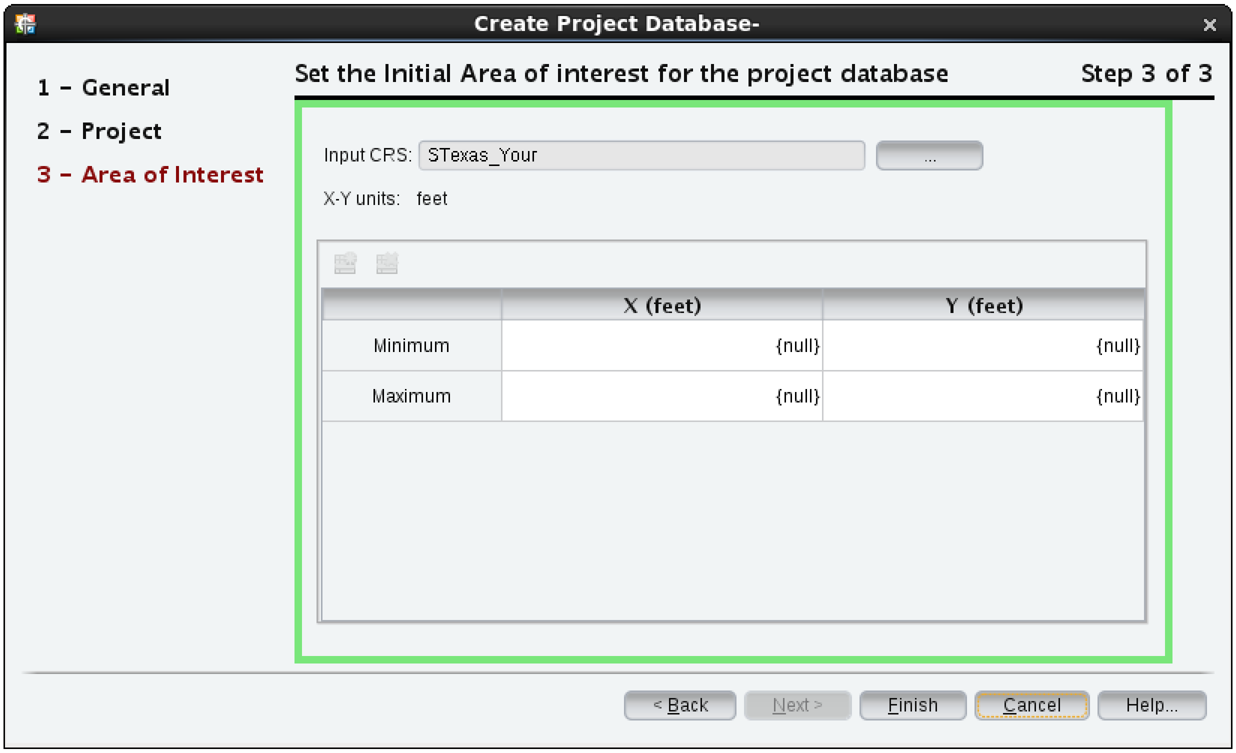
3. In Approximate project size, select the **Small up to 500 MB** radio button.

4. Click **Next** to go to step 3 of 3.

Step 3 of 3: Enter Areal Extent

1. **STexas_<*your_initials*>** should be automatically selected as the input cartographic reference system (CRS).

   Accept defaults for area of interest.



Begin Project Creation

1. Click the **Finish** button to start project creation. This process takes some time because ORACLE is building over 800 tables with thousands of attributes.

2. Click the **Close** button after project creation is complete.

View in the Web OpenWorks (WOW) Software

The Web OpenWorks (WOW) software is a web-based application which integrates the OpenWorks software and other Landmark applications providing an easy way to rapidly browse data across multiple projects without opening each project sequentially in the relevant application.

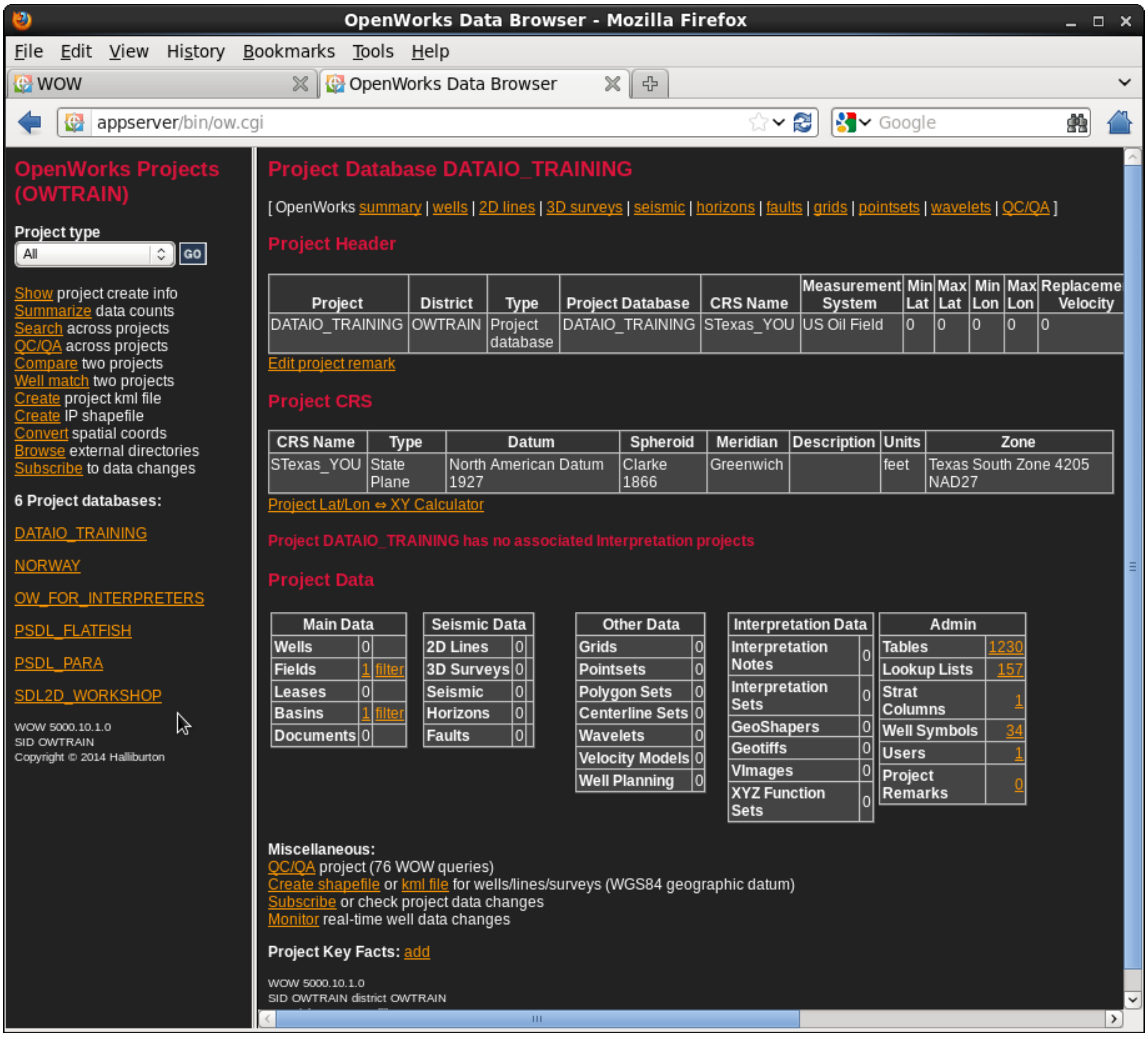
This course uses WOW software in some of the exercises to check and view the data you are loading, along with other methods of checking the data.

To view the project in WOW software, do the following:

1. In the address line of your browser, type **`http://`*`<your machine name>`*`/`**

2. Click **OpenWorks** in the left pane.

3. Click **DATAIO_TRAINING** in the middle pane.



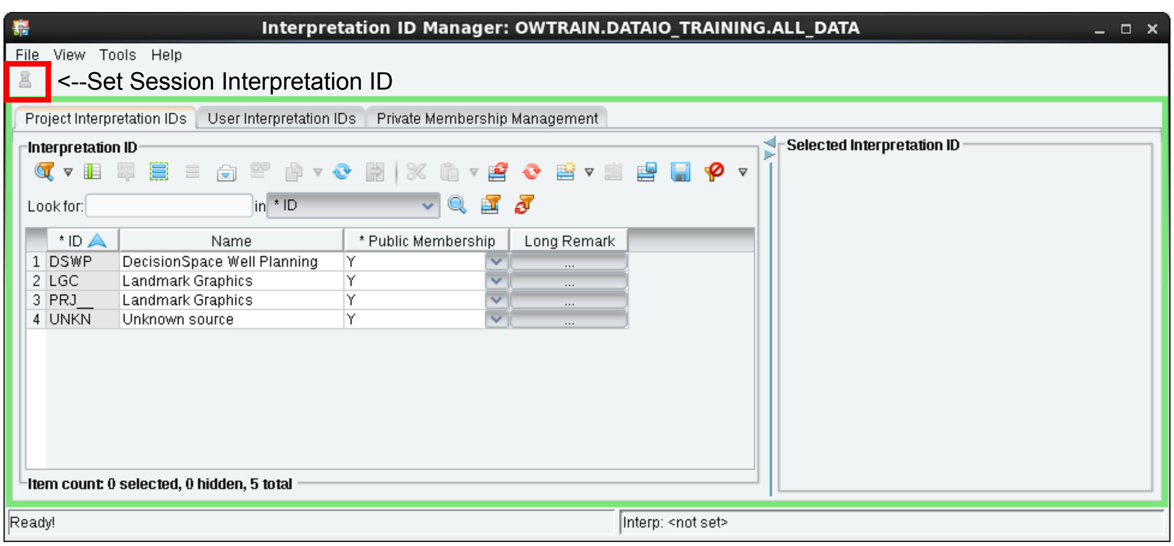
Setting Interpreters

So that several people can access the same project and use each other's data without overwriting it, the OpenWorks software assigns interpreter initials to such data as:

- Well picks
- Fault profiles
- Gridded surfaces
- Well log curves
- Pointsets
- Production

Any time you start an interpretation application, it requests an interpreter if one has not already been provided. This designation is necessary because each well or line event added to the database during data loading or interpretation is tagged with an interpreter.

Enhancements to the interpretation model in OpenWorks R5000 include a clarification of the definition of an interpretation label and the introduction of the shared interpreter concept. These changes enable several users to work collaboratively on the same interpretation without having to coordinate multiple separate interpretation IDs for each individual member of the asset team. In addition, the new Interpretation ID Manager allows you to create and maintain the IDs for a project effectively.



The name of an interpreter from OpenWorks R2003 becomes an interpretation ID in Release 5000. Its meaning has been expanded to include the concept of a shared ID, where the owner of the ID determines which OpenWorks users can use the interpretation ID. This allows the owner to determine who will collaborate on an interpretation.

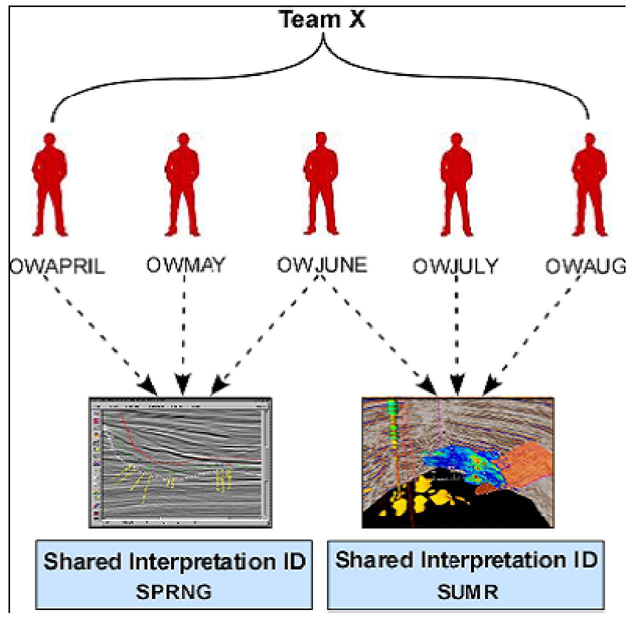
The interpretation ID in R5000 moves away from the idea of an ID referring to a person and toward the concept of a version or a stage in the interpretation of the data in a prospect.

An interpretation ID is a label assigned to a data type to represent a particular version of an interpretation. When an OpenWorks user interprets data in a project, the interpretation ID that the user selected is attached to each element of the interpretation. For example, when the user is creating a well pick, the interpretation ID is attached to the well pick; same is the case with fault profiles, gridded surfaces, or loading well log curves. This designation has three advantages. It:

- Permits the same events to be picked by different interpreters or groups and managed separately, if desired.
- Allows individuals or groups to experiment with different interpretations, classifying each interpretation with a different label.
- Allows you to label data loaded from outside the system.

In addition to the change from an interpreter to an interpretation ID classification, there is now the concept of a shared interpreter. A shared interpreter is an interpretation ID that is accessible to multiple users. The interpretation ID can be shared by a specific list of interpreters who are associated with an interpretation group without having to classify the ID as public.

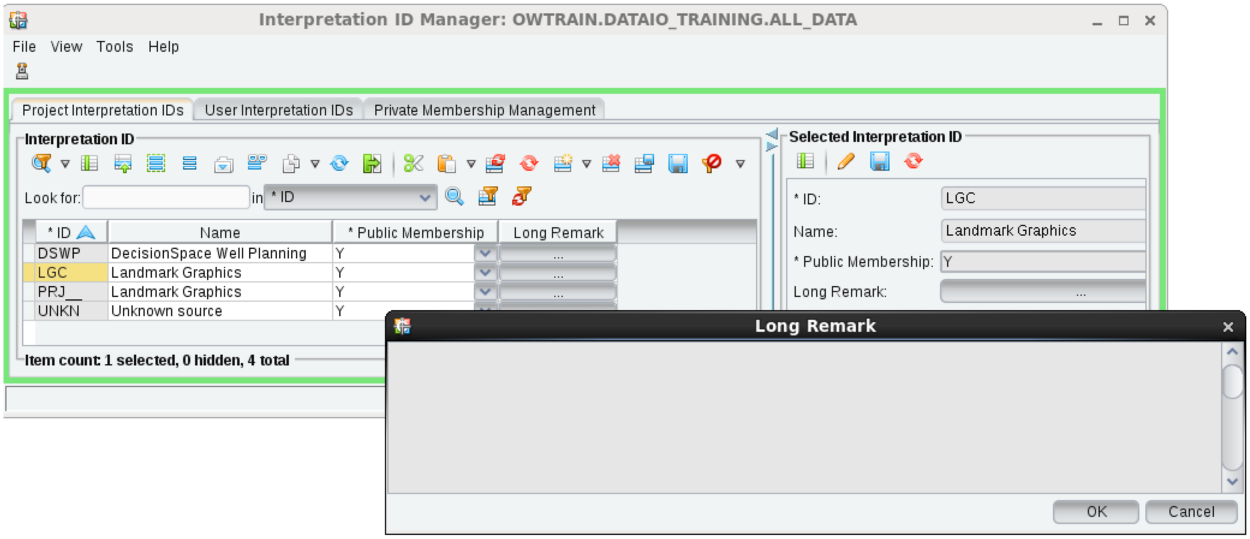
Public (which signifies access to all users) and private (which previously signified access to only one user) interpreters continue to exist as in previous releases but they will not be recommended for collaborative interpretations.



The New Interpretation ID Utility

The new interpretation ID utility builds and maintains the list of interpretation IDs that OpenWorks applications use to keep track of data. An OpenWorks user can use any public or private interpretation ID of which the user is a member. The entries in this list are mostly abbreviations for tracking interpretation versions, but they can also indicate the source of data or some other meaningful designation. You can use the OpenWorks Interpretation ID tool to add, modify, and delete interpretation IDs.

To Open the tool, go to OpenWorks menu and select **Project > Interpretation ID Manager**.



Additional information about the new interpretation ID utility is described below.

- An interpretation ID designation can have a maximum of five upper case characters.
- Name and description are optional fields.
- The description field is replaced with a Long Remark field where you can give a detailed explanation of a particular interpretation ID. In OpenWorks R2003, the description was limited to 120 characters. In OpenWorks R5000, the descriptions do not have size limitations.

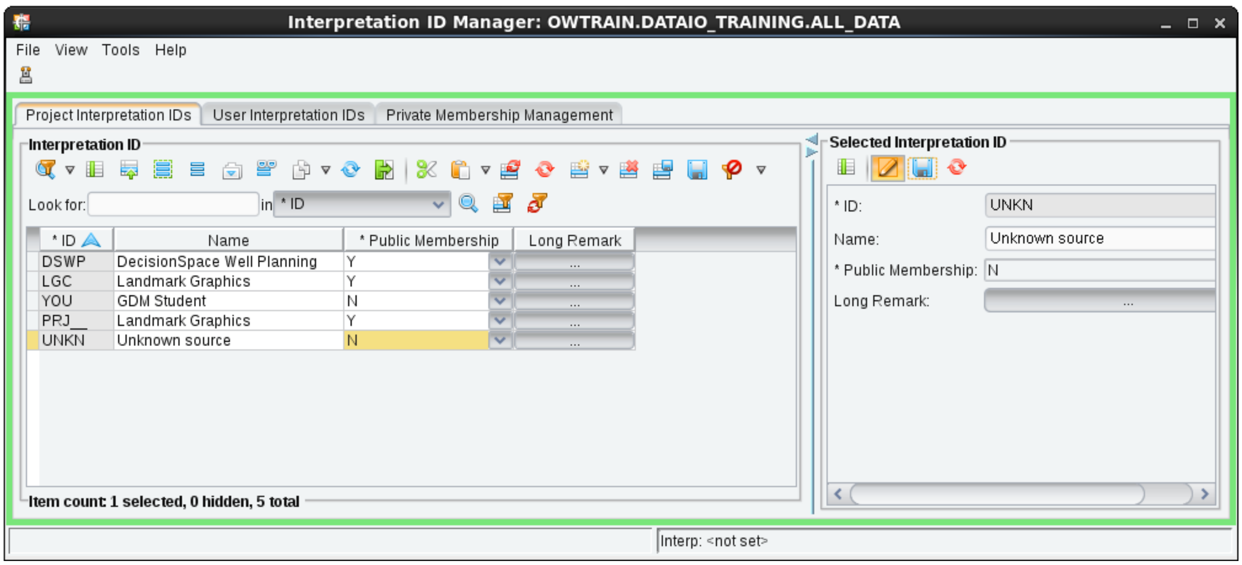
By selecting different view options, you see a list of all interpretation IDs available in a given project or a subset of only those interpretation IDs associated with the current user. Also, you have a view exclusively for management of Shared Interpretation IDs (Private Membership Management).

- The owner or a manager of a private interpretation ID can specify who can use the ID.
- Selecting the **Delete** icon removes the selected interpretation ID from the list of IDs. However, any data that the interpretation ID added to the database is not deleted. You may re-add the deleted interpretation ID at any time to regain access to that data.

- Set session interpreter changes the selected interpretation ID to the current ID for the session.

Creating Interpreters

You use the Interpretation ID Manager tool to add new interpretation IDs to a Project database.



To associate an interpretation ID to a user, that interpreter ID must be set as private. This is done by setting N on the Public Membership field.

If you set an interpreter ID as public, it will be automatically available to all users, so it cannot be assigned to one user in particular, and you will not be able to see it in the Private Membership Management tab.

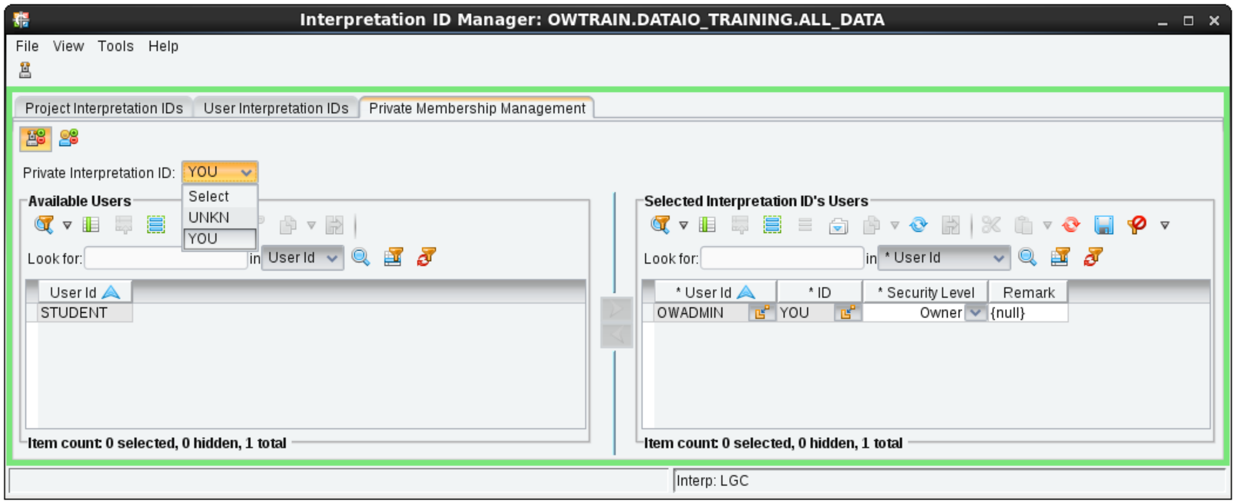
Once you set an interpretation ID as private, you can go to the Private Membership tab and share this interpretation ID among users.

Users vs. Interpreters

The user is the login account. Users own interpretation IDs. That is, if you are logged on as `me1`, you can create multiple interpretation IDs, giving them each different designations. All these ID designations are owned by `me1` but can be shared between users.

To associate interpretation IDs with operating system users or to share interpretation ID, use the Interpretation ID Manager tool.

You can choose between two different views, Interpretation IDs view and Users view.



User Benefits

Changes to the interpretation model allow an interpretation team to work collaboratively on the same interpretation (or version of an interpretation) without needing to coordinate multiple interpretation IDs. Some of the benefits of the changes are:

- Enhanced data security through the ability to associate multiple users to the same interpretation ID without having to make the ID public.
- Ability to capture long free-form remarks about interpretation IDs, thus allowing users to provide a rich description for an interpretation version.
- Intuitive creation/management of interpretation IDs for asset teams.

Interpretation IDs

An interpretation ID is a label assigned to an OpenWorks data type to represent a particular version of an interpretation. Interpretation IDs are set so that several users can access the same project and use each other's data without overwriting it. The OpenWorks software assigns interpreter initials to data such as:

- Well picks
- Fault profiles
- Gridded surface
- Well log curves

When you start an OpenWorks application for interpretation, you are required to set an interpretation ID if one has not already been selected. When an OpenWorks user interprets data in a project, the interpretation ID that the user selected is attached to each element of the interpretation. For example, if the user creates a well pick or fault profile, the session interpretation ID is tagged to the well pick and the fault profile. Tagging has three advantages:

1. It allows the same events to be picked by different interpreters or groups and managed separately, if desired.

2. It allows individuals or groups to experiment with different interpretations, classifying each interpretation with a different label.

3. It allows individuals to label data loaded from outside the system.

Sources

A source is a set of identifying initials that is loaded with data in OpenWorks databases. Source refers to a commercial data source such as PI or Dwights (DWI). An interpretation ID is a person on the system who has access to a project. However, after an interpretation ID changes a set of data, that interpretation ID becomes the data source.

You can view and use data from any loaded source. All commercial data sources are listed in the Interpreter/Source Priority dialog box, but are not listed in the OpenWorks Interpretation ID Manager dialog box because they are not interpretation IDs.

To edit data from a loaded source, you must first create an interpretation ID using the same "initials" as the source.

Users

A user in an interpretation application is the login account. Users own interpretation IDs. That is, if you are logged on as `me1`, you can create multiple interpretation IDs, giving them each different designations. All these ID designations are owned by `me1` but can be shared between users.

Users are given browse, interpret, limited interpret, or manage privileges to a project by the project manager. These project access permissions are completely separate from the security levels of an interpretation ID, which are discussed later in the chapter. The user must first be granted access to the project before the user can be granted access to interpretation IDs. The available levels of project access are:

- **Browse** access lets you view data in the database but not create, edit, or delete any data.

- **Interpret** access lets you view data in the database and create, edit and delete the user's own data only.

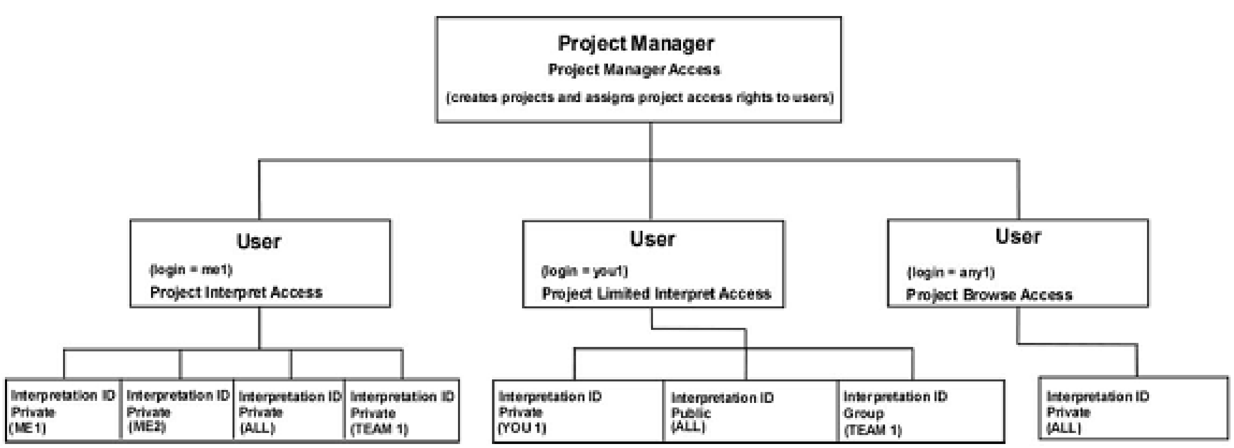
- **Limited Interpret** access has similar privileges as that of the Interpret access but may only create, edit, or delete data in a subset of tables normally used for interpretation. An administrator can alter the list of tables. This list is stored in a table in the database (`OW_ADMIN_UTILS.L_INTERP_MASTER`).

- **Manage** access lets you view, create, edit, or delete data created by the interpreter working in the project. Managers may perform project management functions if the OW_ADMINISTRATOR role is granted.

OW_ADMINISTRATOR Role

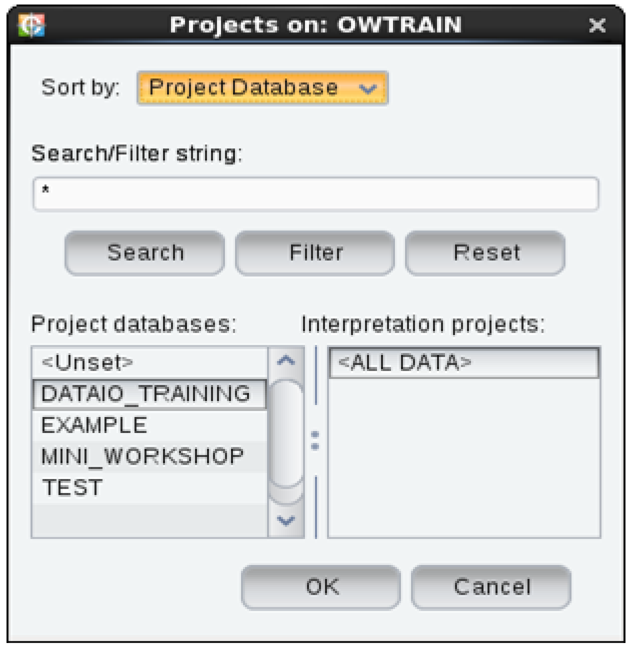
OW_ADMINISTRATOR is an Oracle role. A user who is granted this role is able to create new projects, restore backed up projects, and modify projects for which they have been given Manager status. The OW_ADMINISTRATOR role is granted at the database level.

The relationship between the project manager, users and user access, and interpretation IDs is illustrated in a hypothetical project scenario below.

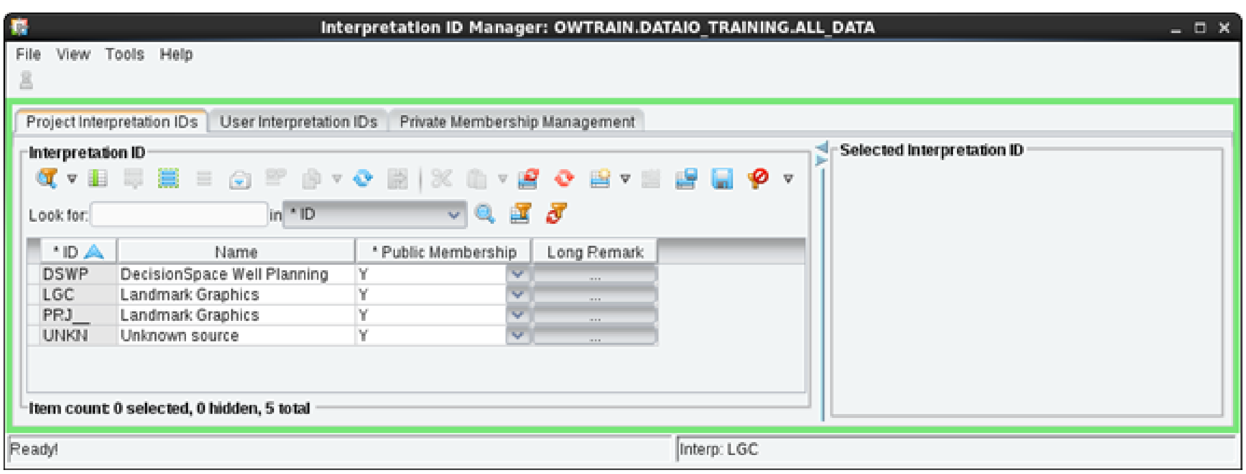


Exercise 2-1. Adding and Setting Interpreters

1. From the OpenWorks command menu, select **Project > Interpretation ID Manager**. The project selection dialog box displays. Select the project just created. Select **<ALL DATA>** for the Interpretation project. Click **OK**.



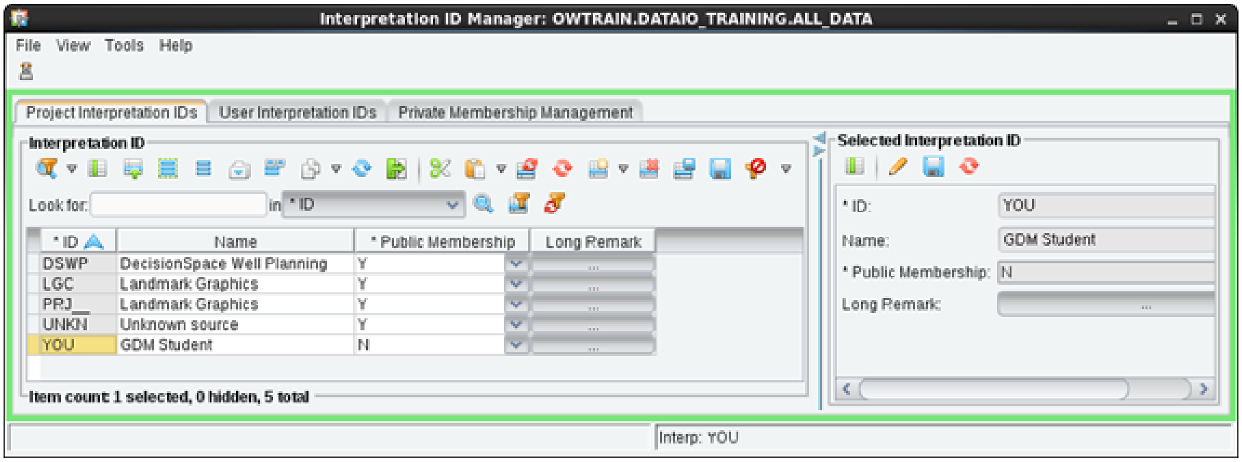
The Interpretation ID Manager dialog box displays.



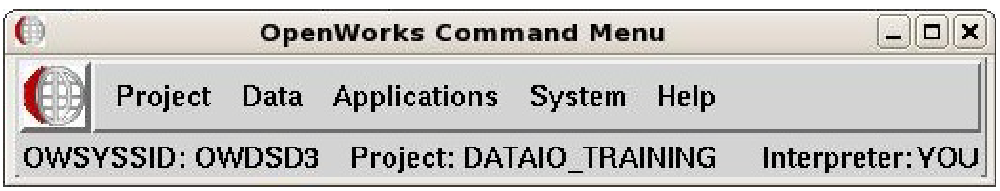
2. Click the **Add new interpretation ID** icon. A new line will be added in the manager for you to edit.

3. Highlight the new line. The right part of the dialog box will display the Selected Interpretation ID information. Type your initials in the *** ID:** box. Name and Long Remark specifications are optional.

4. Click the **Save changes** icon ( ) to create your new ID.



5. To set your new ID as the session interpreter, click the **Save selected rows** icon. The **Set session interpretation ID** icon becomes active; click this icon. Your interpreter displays in the OpenWorks command menu.



6. Select **File > Close** to exit.

The Project Management Utilities

Under the Project menu on the OpenWorks Command Menu, there are other utilities in addition to those we have already used (Map Projection Editor, and Interpretation ID Manager).

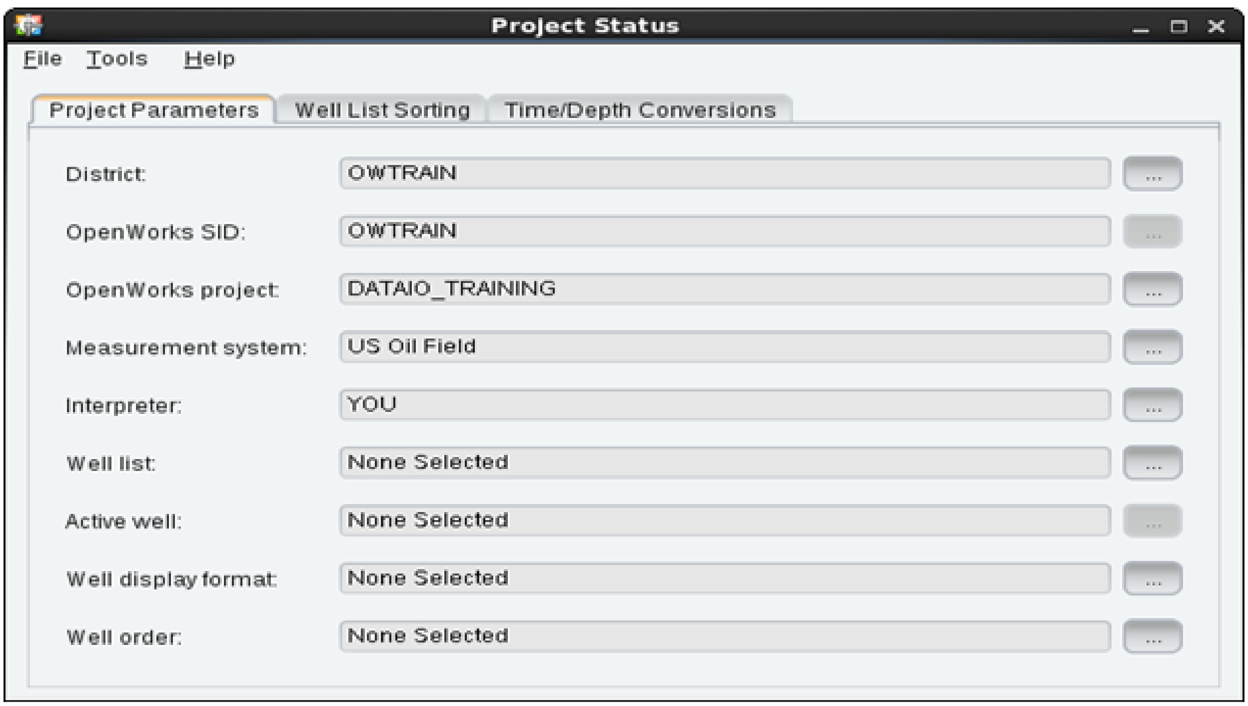
- **Sync Administration** allows system administrators or users with administrator rights for local database synchronization.
- **OpenWorks Configuration** allows system administrators or users with administrator rights to set the location of OpenWorks configuration files.
- **Project Administration** allows you to create, modify, delete, back up, and restore projects. It also allows you to change user access and add or delete users for the project.
- **Project Status Tool** allows you to change a variety of system settings, including the current project, district, interpreter, well list, and well.
- **Project Data Transfer** allows you to transfer data from one OpenWorks project to another.
- **Measurement System Manager** allows you to create a customized measurement system for your OpenWorks project.
- **Database Query** allows you to run Oracle SQL (Structured Query Language) statements or scripts.
- **Change Oracle User Password** allows you to change your password.
- **Modify Database Users** allows system administrators or users with administrator rights to add, update and delete Oracle users and their access to the database.
- **Change Color Scheme** allows you to change color scheme of the application.

Changing Project Status

Use the Project Status Tool to set parameters for use during an OpenWorks session. These parameters include the database, district, project, measurement system, interpreter, well list, well order and well used by the OpenWorks applications. In addition, you can change the sorting methods used to display wells and well lists, or change the format for displaying well names and related well identifiers.

Finally, the Project Status Tool allows you to set a preferred method and curve/model type for time/depth conversions.

To view, set, or change these project parameters, select **Project > Project Status Tool** from the OpenWorks Command Menu. The *Project Status* window opens. The current session parameters are posted in this window:



You can set the values you want and save the session for later use.

Project Parameters

The Project Status Tool contains various project parameters that you can change. Each parameter is discussed in detail on the following pages.

District

Allows you to set the district you want to work with, in case you have several configured.

OpenWorks SID

Will be set depending on the district you have selected.

OpenWorks Project

Allows you to change the project you have set. You can also select a project database or an interpretation project.

Measurement System

Measurement System allows you to set the measurement system for the current session. The system you choose here is used by all OpenWorks measurement system–based applications that you subsequently start during the session.

Interpreter

Interpreter lets you change the current interpreter.

Well List

Well List lets you change the session well list.

Active Well

Once you have selected a well list, you can select a well from that well list to use in OpenWorks well-based applications.

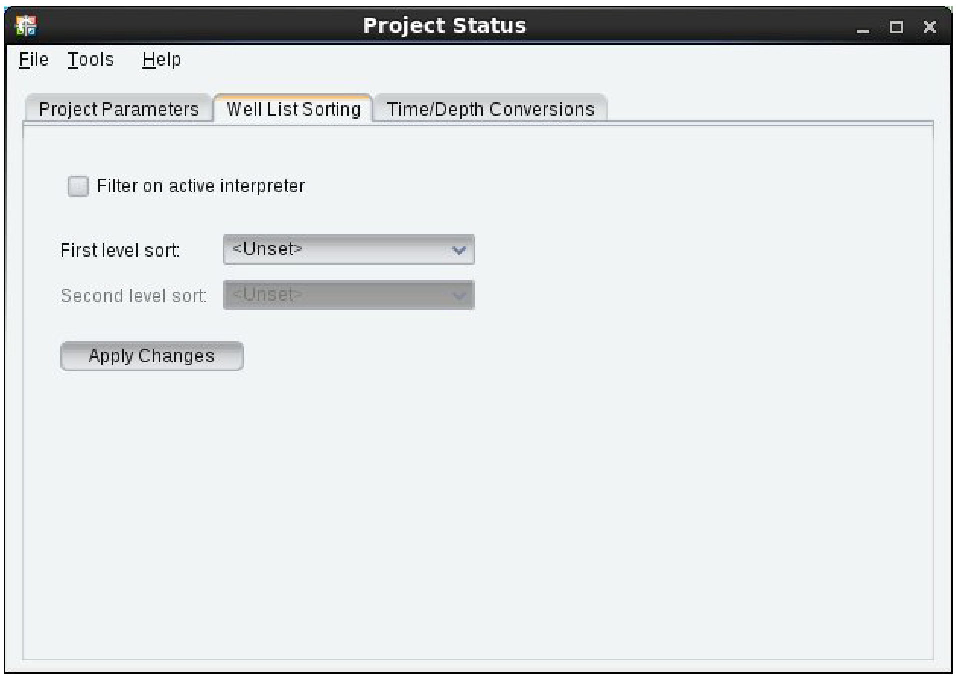
Well Display Format

Here you set how you want the name of your wells to display in the applications.

Well Order

Well Order lets you sort the well list alphabetically or in any other well list order.

Well List Sorting



You can set three levels of sorting.

If you select **Filter on active Interpreter**, the two other options will only sort well lists created by the active interpreter. Then you can choose between other sorting options for first and second level:

- **Alphabetical** option sorts numeric names first, and then alphabetical names.
- Both **Most Recent...** options sort based on the dates when well lists were created.

> **Note**
>
> Change well lists before changing the active well. If you select a different well list, the Well option changes to **None Selected**. For this reason, if you plan to change the well list, always change it before changing wells.

Time Depth Conversion Preferences

The Time Depth Conversion Preferences section of the Project Status Tool has a Set button that allows you to set a pre-defined method for converting time data to depth data (or depth-to-depth) during a session. It allows you to specify whether the well's time-to-depth conversion preference overrides the method selected in the Project Status Tool. The Preferred Method options are:

- **Always Use Well T-D**. This uses the time-depth curve associated with a well.
- **Always Use T-D Model**. This method uses the time-depth curve you specify in the Model/Curve Type area to determine time/depth conversion.
- **Use Preferred by Well**. This method allows the conversion preference to vary by well. If the Time or Depth Priority is set to Well T/D, then the applications will use the time-depth curve associated with the well. If the Time or Depth Priority is set to Session, the application will use the time-depth curve you selected in the Model/Curve Type area.
- **Unset**. This method allows applications to behave as they did before the OpenWorks software allowed you to choose a time-depth conversion preference. If the well has a Time or Depth Priority set to Session, you will be asked to select a time-depth preference.

Model/Curve Types are as follows:

- **T-D Curve**. Selects a time-depth curve from another application.
- **TDQ Function Models**. Selects a time-depth model from the Landmark TDQ.
- **Grid Models**. Selects a grid model created in another application.

Saving Session Parameters

You can save sessions with settings you use on a regular basis and reuse them at a later time.

To save your current session parameters:

In the upper part of the project status window, click **File > Save**, select the directory where you want to save the file, and type the name of the session in the box.

Session files must have a **.ssm** extension. By default, they are saved in your home directory, but you may save them in any directory where you have write access.

To open a saved session:

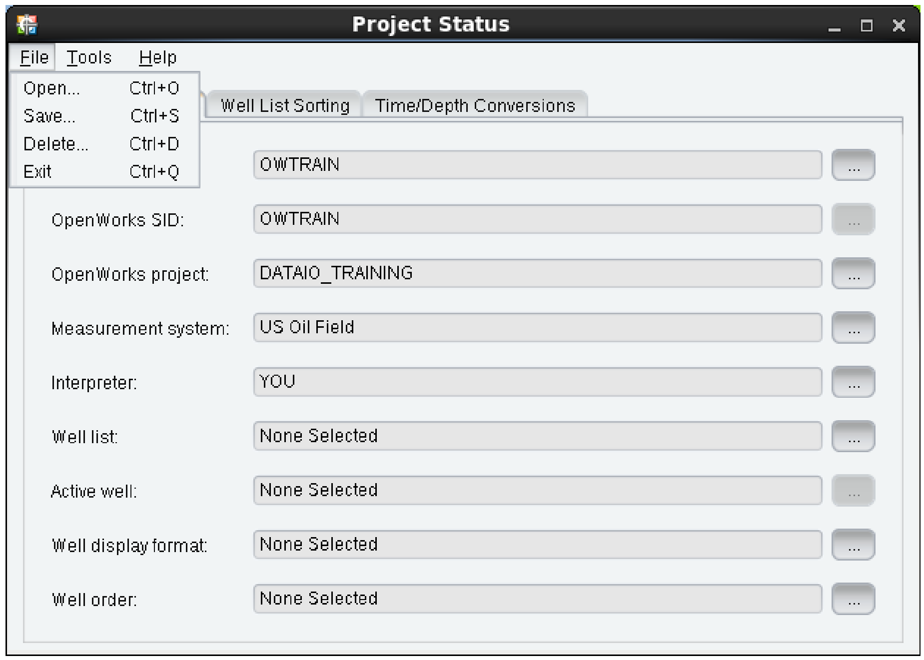
Select **File > Open** and select the session file.

To delete a non-useful session file:

Select **File > Delete** and select the session file.

To exit the Project Status Tool without saving the session:

Select **File > Exit**.



Administering Projects

Project administration is an important part of the OpenWorks software. It allows you to create, modify, delete, backup, restore, tune, and query projects; add and remove users; change user access—all the necessary components defining your multi-user integrated working environment. The Project Administration applications facilitate in implementing the data model changes described earlier.

For using the Project Administration tool, you must have the OW_ADMIN role privileges. To assign this role, see Database Users setup later in this chapter.

Tools for administering projects includes Project database operations and interpretation projects operations.

Project Database

Project Database includes options that allow you to:

- Create a project
- Modify a project
- Delete a project
- Backup a project
- Restore a project
- Upgrade a project
- Tune a project
- Query project information
- Refresh All Interpretation Projects
- Copy Oracle Project Database to Embedded Database

To perform administrative tasks like modify, backup, delete, or upgrade over a project database you should have manage access assigned to the project.

Creating Projects

Selecting **Project > Project Database > Create** will open the Project Create wizard. To review the project creation procedure, see section titled "Exercise 2-1. Creating a Project" on page 2-58.

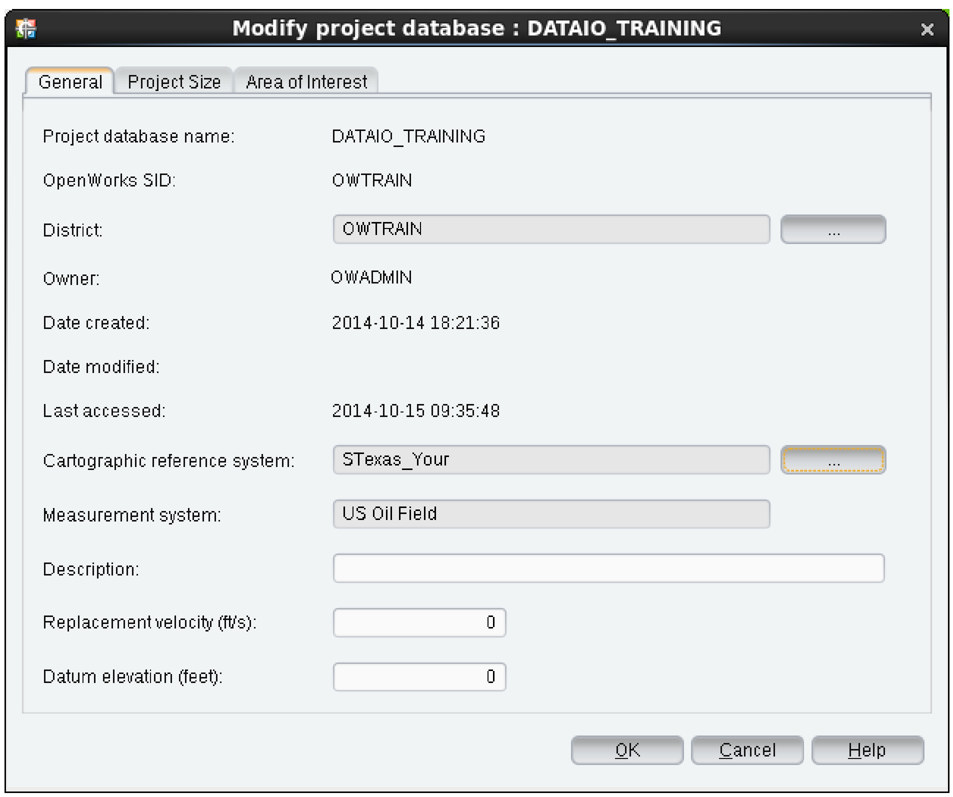
Modifying Projects

The **Project > Project Database > Modify** option brings up a dialog box that allows the project owner to view all and change some of the attributes.

You can modify certain components of the initial project setup, including:

- Project description
- CRS (but this will not reproject your data). This action is not recommended and extreme caution should be taken before changing this parameter.
- District project size (add tablespace)
- Project extent (minimum/maximum latitudes and longitudes)

To modify a project, enter new values to any of these fields, and then click **OK**.



Deleting Projects

To delete a project, select it from the list of Available Projects and then select **Project > Project Database > Delete**. The following warning displays:

> **Note**
>
> Deleting the Current Project. <Project> is the current project for this session and cannot be deleted. To delete this project, you must first use Project Status to either select a different project or <Unset> the current project.

When an interpretation project is deleted, only the data in the interpretation project is deleted. The data is still available to the project database. However, when a project database is deleted, the data in the project and all of its associated interpretation projects data are deleted.

Backing Up Projects

You can back up a project to any directory or storage device on the network if you have manage permission on the project. Backing up a project causes all of the project data and the map projection systems to be copied to the desired directory or storage device in binary format as a single file. The file is portable across platforms. Project data copied in this manner can be restored to the project database using the Restore function.

This procedure backs up a project database and/or their associated external project files (e.g. StratWorks software Cross Section files).

> **Note**
>
> For seismic files that still reside external to the project database in the OpenWorks R5000 environment (3D horizons and seismic data), a bulk external file back up process is recommended.
>
> This process consists of using the archiving program TAR to backup all file systems referenced in the `dir.dat` file located in the `$OWHOME/conf` directory.

Restoring Projects

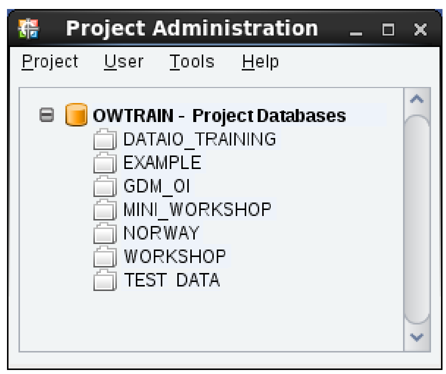
This procedure restores a project database and/or the associated external project files from tape or disk. Project Restore also restores the project map projections. It is not possible to restore to an existing project. Project Restore creates a new project.

When you restore a project, any interpretation projects that were backed up will be also restored. Users are not restored but interpreter IDs are. If users are re-added to a project, they will still have access to their old interpreter's IDs.

Upgrading Projects

The Upgrade function will upgrade a project database of any version since OpenWorks R1998 to the current version of the OW_SYS schema in the OpenWorks database. A project must be upgraded after the project has been restored from a backup in order to be used. In previous OpenWorks software releases if you launched an application after you restored a project, OW would ask if you want to upgrade the project and then begin the upgrading process automatically. Because of extensive changes in the R5000 environment, upgrade now will only take place through **Project Administration > Project Database > Upgrade**.

After you restore a project you will see in the Project Administration window an indicator of which version the project is.



There are essentially six steps to the project upgrade process:

1. Upgrade Project database

2. Migrate production data

3. Migrate 3D project data

4. Migrate 2D master project data

5. Migrate 2D working project data

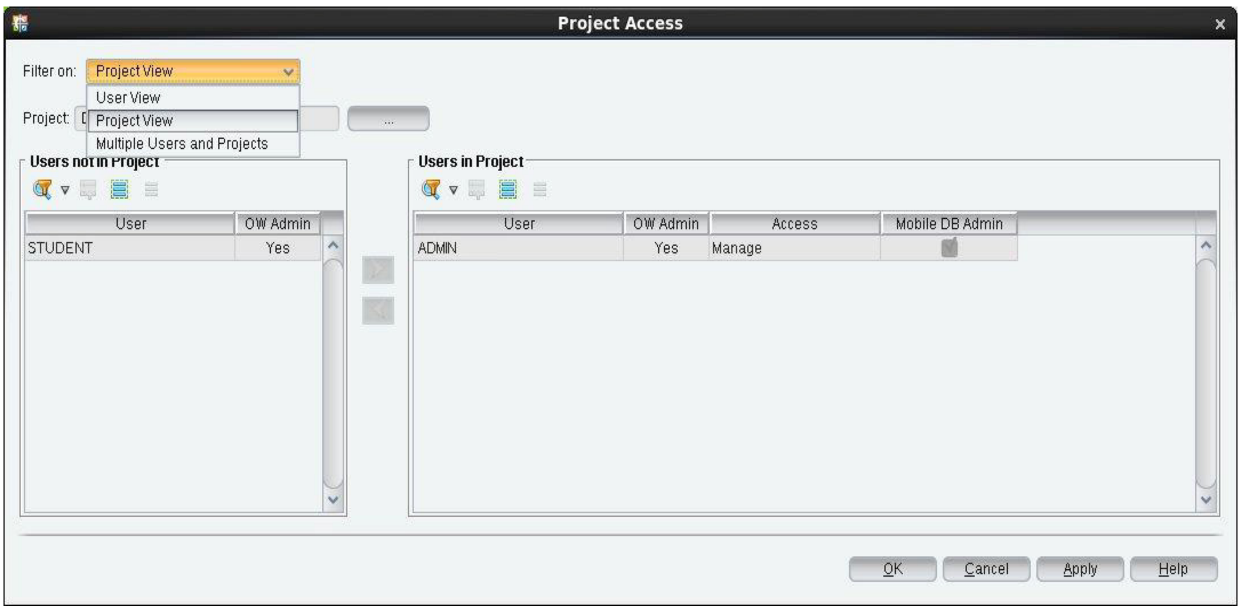
6. Create interpretation projects

Each step performs a variety of actions that completes the process of migrating the project data to the OpenWorks R5000 environment. Details of this process can be found in the Project Administration Manual.

Managing Access to Projects

When you first create a project, you have manage permission on the project, and you are the only person who has access to it. You can grant access to other users by selecting them from a list.

When you add users to a project, you can set the permissions so they can only read or write the types of data that you want them to. To control user access to projects, select **Project Administration > User > Project Access**. This displays the Project Access Administration window.



The drop-down menu at the top of the Project User Administration window toggles between Project view and User view, as shown above.

You can view all the users for a project and add users, remove users, or modify their permissions, as desired.

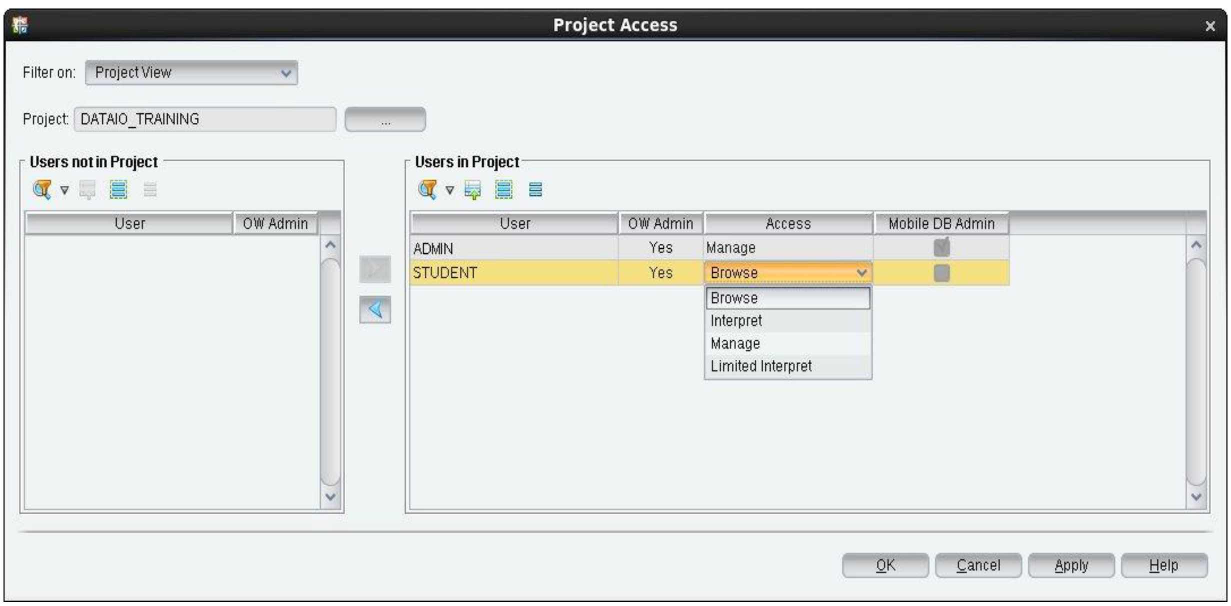
In Project View, for a selected project, the lists at the left are users not authorized to access the project, and on the right we have the list of users that can access the project and their access level.

To move a user from one list to the other, click the username and the appropriate arrow button. When you add a user to a project, that user is given browse permission by default. Other permissions are available (see following table).

User Permissions

Browse	User can view data in the database but not create, edit, or delete any data.
Interpret	User can view any data, create data, and edit and delete their own data only.
Manage	User can view, create, edit, or delete data created by anyone working in the project. May perform project management functions only if OW_ADMIN role is granted.
Limited Interpret	User has privileges as the Interpreter but may only create/edit/delete data in a subset of tables normally used for interpretation.

You can change user permissions in the right portion of the window.

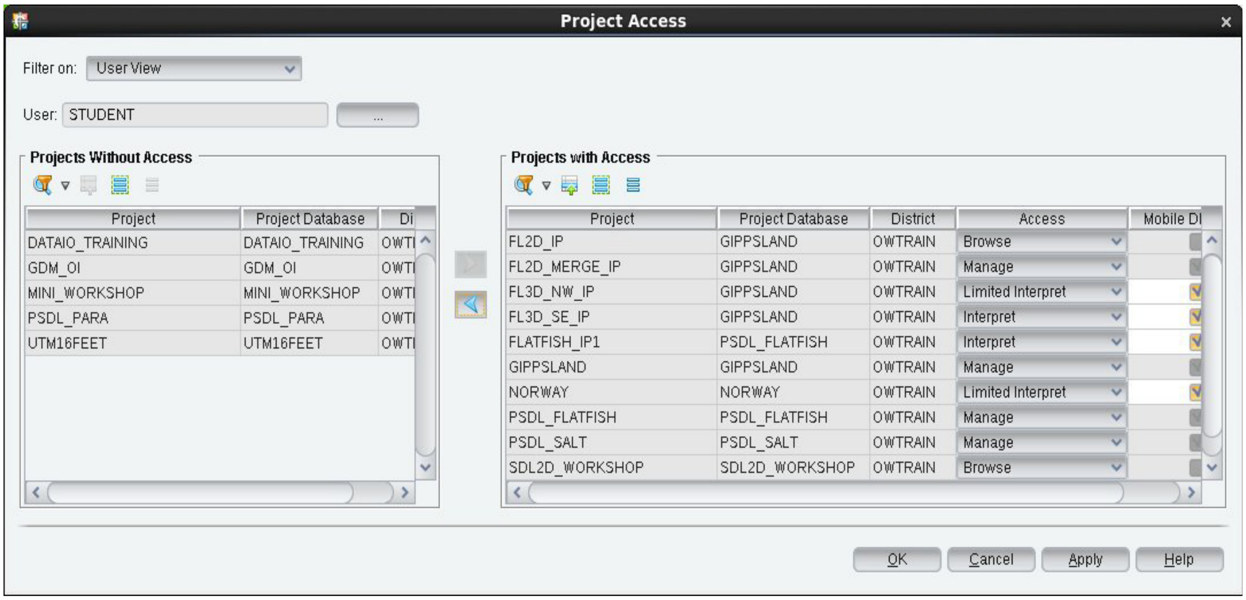


Then click the **Apply** button.

> **Note**
>
> You cannot change the manage permission for the user who created the project. That's the owner of the project and he or she will always have manage permission.

Managing Project Access for Individual Users

You can view all the projects that a user is authorized to access, and add, subtract, or modify access, as desired. The User View dialog box is shown below.



This view lets you select a user and then manage access to all projects for that user. The lists in the User View window show the projects to which a user does and does not have access.

To change the access mode of a project, click the project name and then click the appropriate arrow button to move the project to the desired list.

When you give a user access to a particular project, that user is given Browse permission by default. Other permissions are available (see previous table).

Chapter 3
Loading Well Data

The ASCII Loader and Data Import utilities allow users to load variable formats of well data into the OpenWorks software database. ASCII is an acronym for American Standard Code for Information Interchange. It refers to data or word files that are stored as plain text, rather than as encrypted binary files.

There are two basic types of ASCII well data files: those that have a set number of lines per well and those that have a variable number of lines per well. Using a series of menus and dialog boxes, you specify the data you want to load from an input file and its format.

Chapter Objectives

In this chapter you will learn:

- General guidelines for well and curve data
- What typical ASCII well data input files look like
- How to format and load a data file with a set number of lines per well
- How to format and load a data file with a variable number of lines per well
- How to verify your data load in the DecisionSpace Geosciences software
- How to map current status using Well Symbol Editor
- How to use the Well List Manager to confirm that the data loaded properly by viewing the data and creating a well list
- How to use the Well Data Manager to create wells and sidetracks

A short ASCII well loading workshop appears at the end of this chapter. Results are verified in Well List Manager and the Web OpenWorks (WOW) software.

Before Loading Data

Before you can load well data you must:

- Create a project database
- Define the CRS for your project and input file
- Define at least one interpreter for your project
- Have an input ASCII file that is in fixed column format

The first three bulleted items mentioned above were discussed in Chapter 2. The last item in the list, the fixed column ASCII file, is discussed in this chapter.

The minimum requirement to load a well using the ASCII Loader or the Data Import utility, is the UWI (Unique Well Identifier). If the well is not already in the database, it will create a new well for the current project. You can also specify other data such as well header information or picks.

Landmark recommends that you provide some minimal well header information (e.g., common well name, elevation type, total depth, original x or longitude and original y or latitude, and current status), but these items are not required. In addition, you must include the original CRS of the data. When loading well data, you specify the original CRS so that well data may be loaded correctly.

Notes

- Always use the CRS of the data, not the CRS of the project. The OpenWorks software will convert the data from its original CRS to the project CRS, if they are different.
- Kelly bushing (or a reference elevation such as GL or DF) is essential for any TVDSS display, so do not load any TVDSS data without first establishing a reference elevation for your wells.

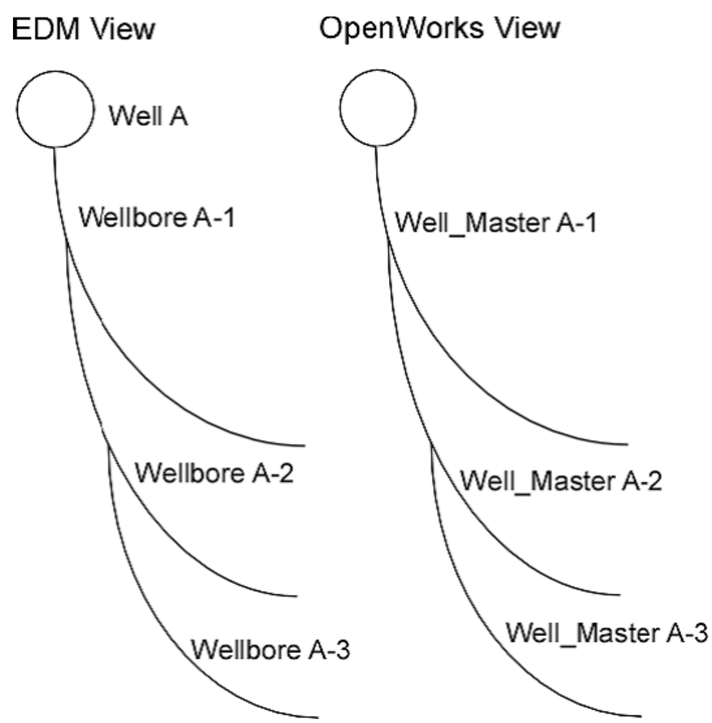
  This is set separately for each well and is not related to the Reference Elevation you set for your project.

Introduction of Well Location in the OpenWorks Software

As mentioned before changes in the OpenWorks data model have been made for R5000. The introduction of the well location table in the OpenWorks software helps to rationalize the OpenWorks software and Engineer's Data Model (EDM) software to create a more integrated working environment.

Before R5000

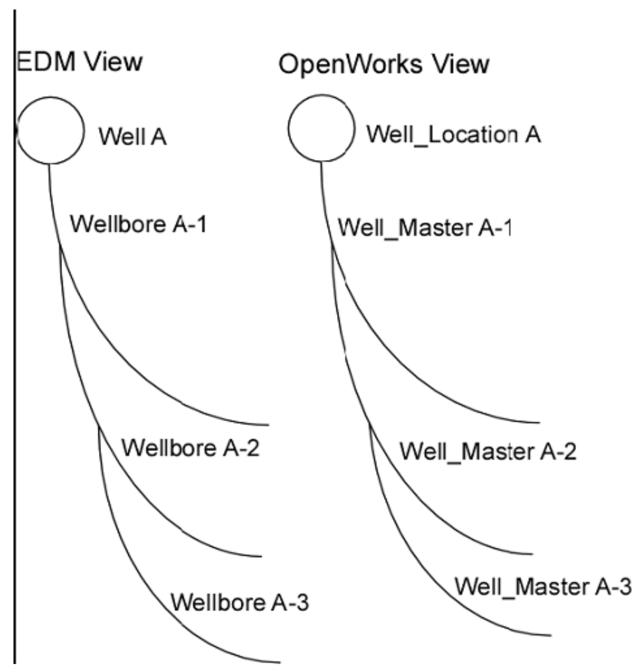
In an EDM model, the surface location is represented as a well and each well has associated wellbores. Whereas in previous versions of the OpenWorks software, the WELL_MASTER table represented the wellbore but no individual surface location was generated to define the well network. Thus, the EDM model was different from the OpenWorks model. A typical view of an EDM well and an OpenWorks before R5000 looked like this:



After R5000

The well model in OpenWorks R5000 is now more like the EDM well model. This change allows for an easy transfer of data between OpenWorks and EDM databases. As in previous versions of the OpenWorks software, the wellbore information is stored in the WELL_MASTER table. However, a new table WELL_LOCATION has been introduced to represent the surface location on a well network, which may contain multiple wellbores.

As far as changes in the database are concerned, the WELL_MASTER table will represent a wellbore as usual, and OpenWorks applications will continue to reference this master table as the main source for well information. An OpenWorks well location is now equivalent to a Corporate Data Source (CDS) or an EDM software well. A typical view of an EDM software well and an OpenWorks well in R5000 follows.



When you upgrade a project from R2003.12 to R5000, or when you load new data to a project in R5000 (using ASCII Loder) you do not have to worry about creating or loading data to this new WELL_LOCATION table, this is automatically generated in the from the WELL_MASTER table information.

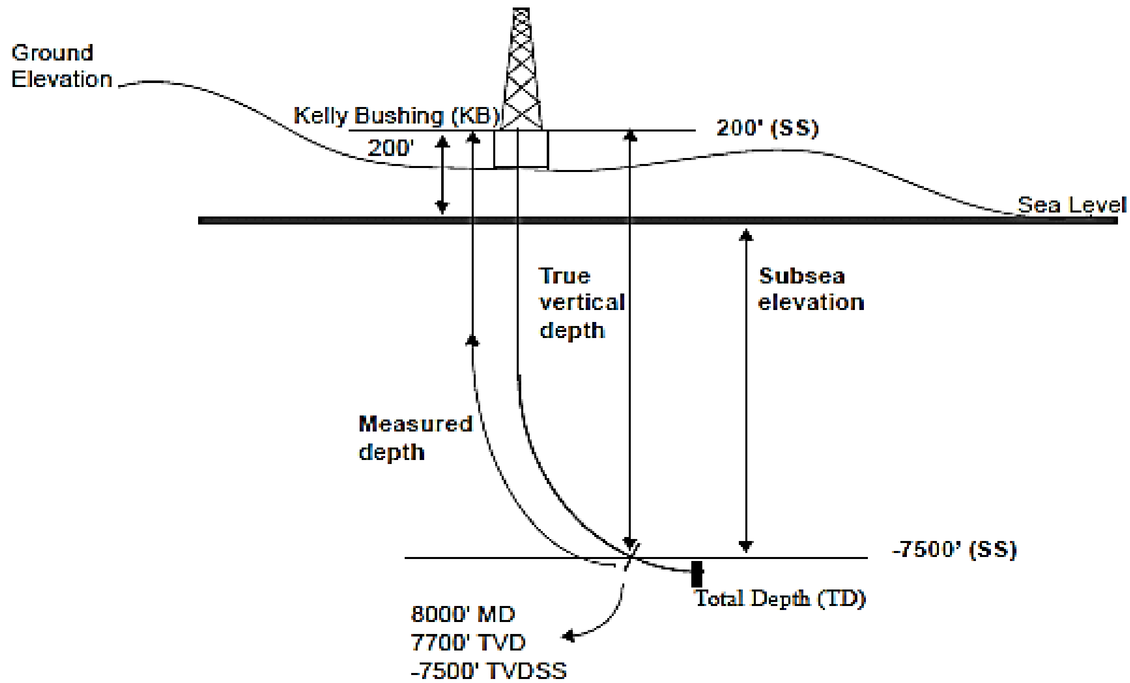
General Guidelines for Well and Curve Data Loading

It is highly recommended, as part of the workflow for data loading, that all new data be loaded into the project database directly, instead of the interpretation projects.

Depth type is an important parameter when deciding the order of curve loading for your wells. Landmark software applications and utilities use one of three depth types:

- **Measured Depth (MD)** is measured along the wellbore, usually from the kelly bushing (KB). You can also measure MD from the derrick floor or ground elevation, depending on the reference used at the well. MD is always expressed as a positive number.
- **True Vertical Depth (TVD)** is measured perpendicular to a horizontal surface. TVD is usually measured from the KB. It can also be measured from derrick floor or ground elevation, depending on the reference used at the well. TVD is always expressed as a positive number.
- **True Vertical Depth Subsea (TVDSS)** is measured perpendicular to a horizontal surface. Zero depth is at sea level. Positive values are elevations above sea level and negative values are below sea level.

The relationship between MD, TVD, and TVDSS is illustrated below.



TVDs are not stored in the database for general well data but they are stored for curve data. Before loading any non-MD well data with the ASCII Loader, you must load directional data (angular directional survey [ADS] or position log) using the Curve Loader. This will enable the incoming depths (in TVD) to be accurately converted to MD for storage and display. (Chapter 5 discusses loading curve data.)

Make sure that your directional data is in agreement with any TVD or TVDSS well log curves you plan to load.

The actual TVD or TVDSS values for your curves should be generated from the same directional survey loaded for the well.

TVDSS values that are below sea level must have a negative sign in the depth field. Landmark G&G applications such as SeisWorks, StratWorks, ZMAPPlus, and DecisionSpace Geosciences conform to this convention. In the Curve Loader, you may apply a (-1) multiplier to the depth field if subsea depth values do not contain a negative sign. However, TVDSS values below sea level are stored with a positive sign in the OpenWorks database. The (-1) sign conversion for TVDSS values is performed on-the-fly between Landmark applications and the OpenWorks database.

For wells to display in the SeisWorks software, at least one time-depth table must be loaded for at least one of your OpenWorks project wells in order to convert well depth to time. A position log (or ADS) must be established for all wells (even straight holes). A position log is automatically created for any well *without* imported directional data with the following two data points:

TVD	x Offset	y Offset
0	0	0
Total Depth (actual value)	0	0

Notes:

The Project Status Tool allows you to set a project-wide method for converting time data to depth data during a session. It also allows you to specify whether the use of the well's depth-to-time data overrides the method selected in the Project Status Tool. For more information on the Time Depth Conversion Preferences in the Project Status Tool, refer to the *OpenWorks Project Management* manual.

Dipmeter data, although related to curve data, is generally loaded using the ASCII loader. It is possible to load dipmeter data using the Curve Loader, but the OpenWorks dipmeter tables are not populated during this load. Because dipmeter data is more complex than log curve data, it is best loaded using the ASCII Loader.

Copying Data from Tape to Disk

To copy data from a tape (in tar format) to your workstation's hard disk, use the following procedure:

1. Determine the name of the tape device:

```
more $OWHOME/conf/device.dat
```

2. Create a directory on your workstation where you wish to copy the data, and change to that directory. For example:

```
mkdir datafiles

cd datafiles
```

3. Copy the files from the tape to the hard disk:

   ```
   tar xvf /dev/rst#
   ```

   Substitute the correct name determined in Step 1 for #. The system copies the files from tape to the disk.

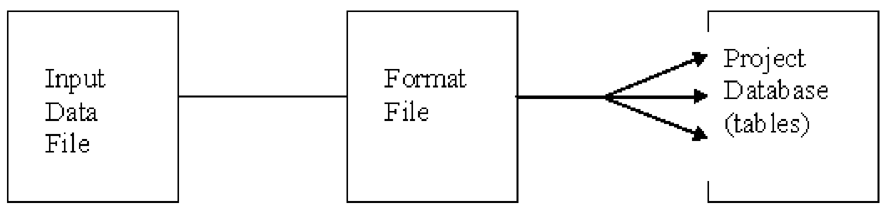
Well Data Input Files

The essential components of data loading are as follows:

- The well data input file, which contains the data you want to load.
- The format file, which describes how the input data is organized.

You should already have the well data input file as a result of your data gathering efforts. *Well data input files have either a set or variable number of lines per well.* When the number of lines per well is variable, format flags in ASCII Data Loader and Tags in Data Import utility are used to identify the data types on each line.

The format file is something you may need to create. The format file acts as a “map” for loading data from the input file into the appropriate tables in the OpenWorks database.

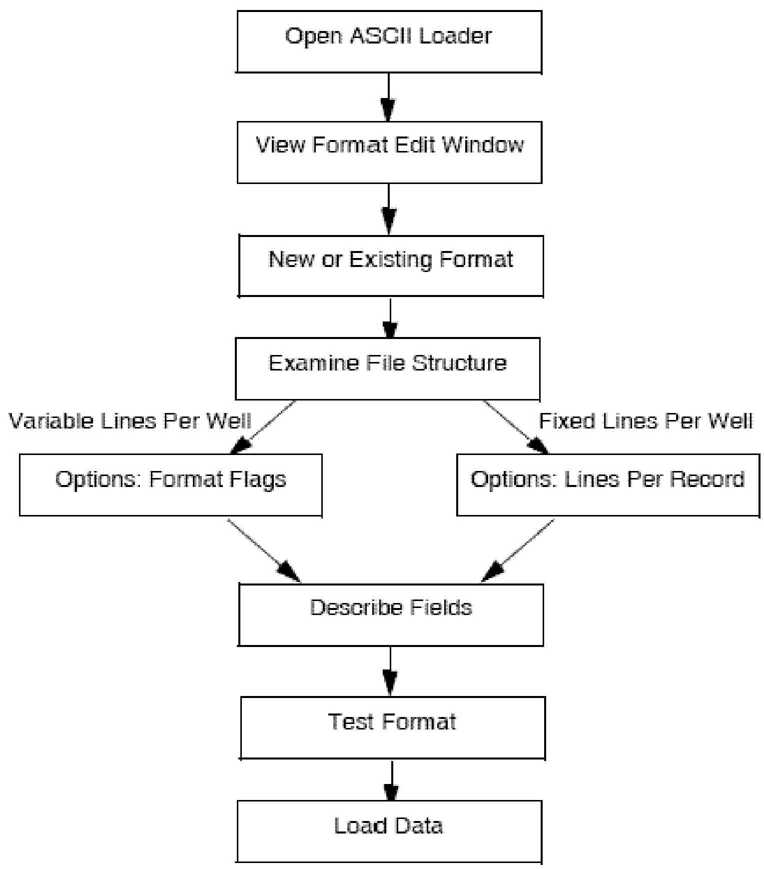


The most time-consuming part of loading well data is creating or editing the format that tells the loader where to look for the data items you want to load. However, once you have created the format file, it can be used repeatedly to load other similarly structured data files.

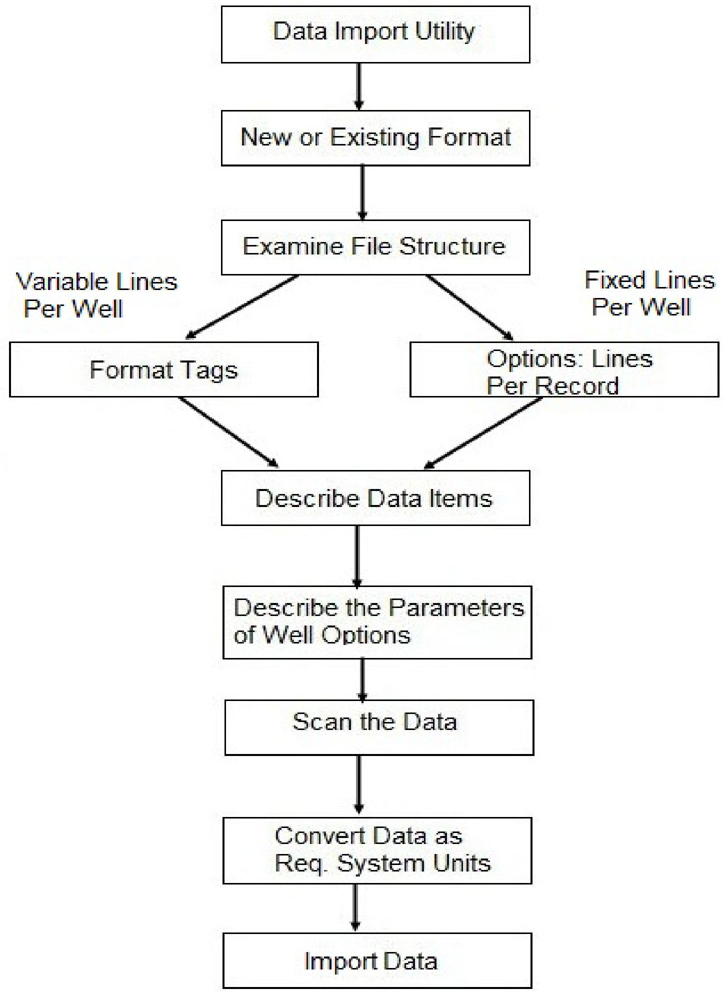
Workflow for Well Data Loading

You can use the Well Import (Classic) or the Data Import utility to scan nearly any type of well data file and load the data. To do this, you must define the format of the well data file so that the loading utility will know where to look for key values such as UWI, Well Name, Depth, and so forth.

To identify the position of key data values in the file, you must either use the Format Editor in the ASCII Loader or the Format Tab in the Data Import utility. These tools allow you to examine the file structure and describe the row and column(s) where the key values first occur. If the file has a fixed number of lines per record, you can define the number of lines per record, and the loading utility will know where to find the beginning of each well record in the file. If the file has a variable number of lines per record, you will need to define some format *flags or tags* so that they can use to tell where each record begins and ends. The following diagram shows the workflow for loading data by using Well Import (Classic) which in turn use ASCII Loader to load the data.

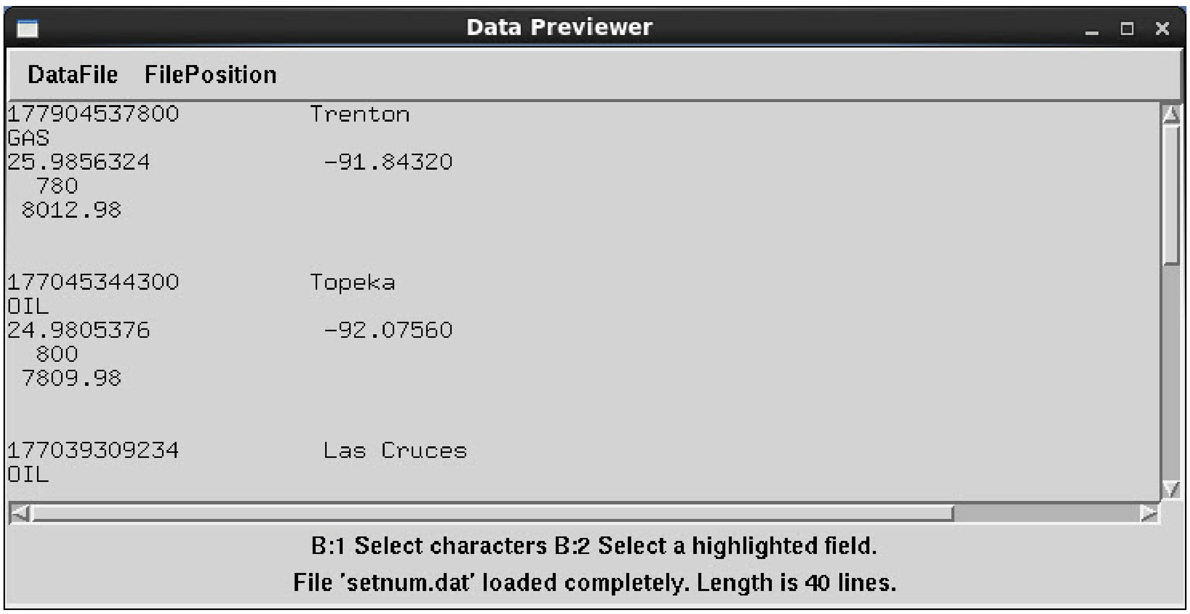


The following diagram shows the workflow of loading data using Data Import utility.



Set Number of Lines Per Well

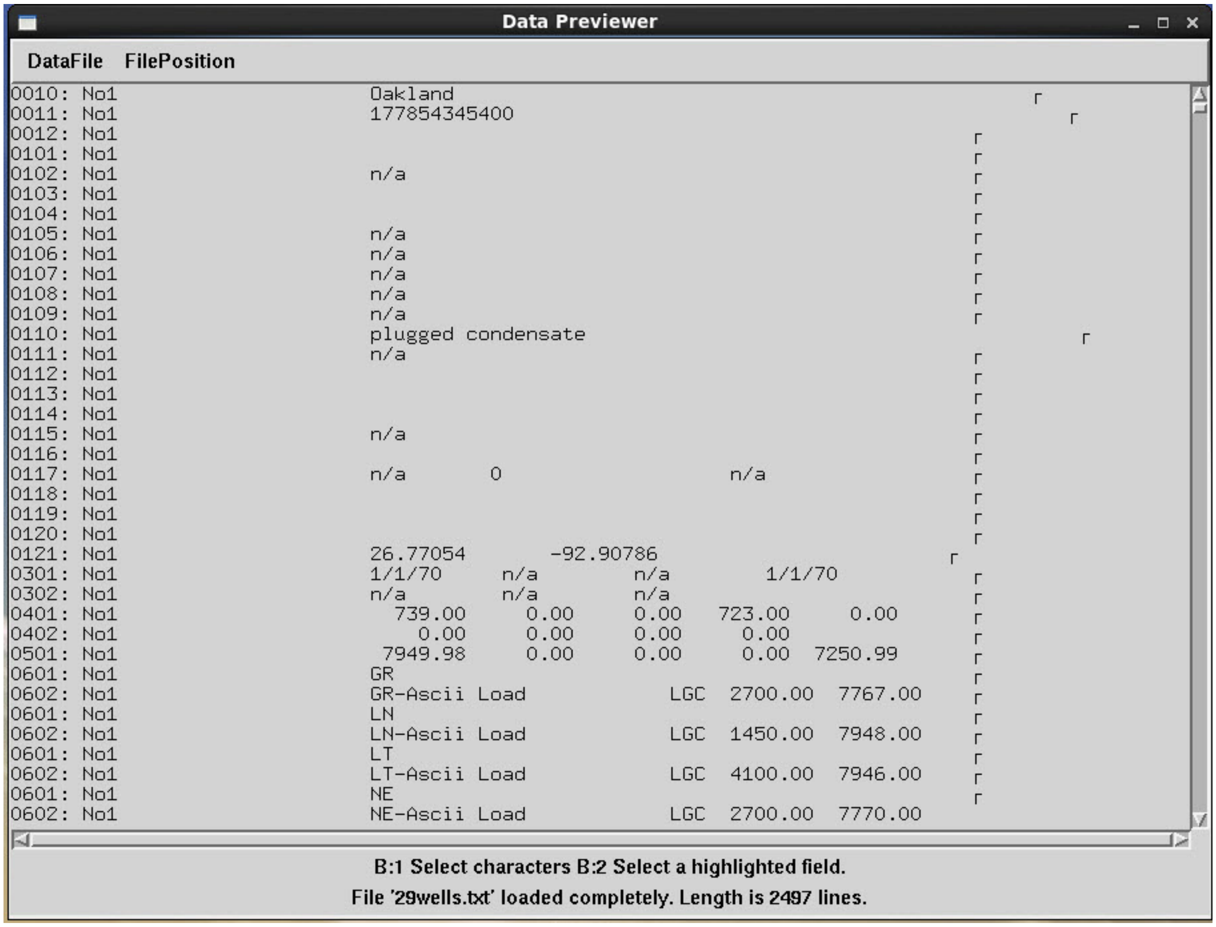
If the input file has a set *number of lines per well*, the loader is able to count the lines to determine where each well begins and ends. A record is a line or group of lines that the loader perceives as a unit. In the case where the input file has a set number of lines per well, the loader views the lines that make up the well as a record. The following illustration is an example of data with a set number of lines per well. In this example, each well consists of five lines. Blank lines are always ignored.



Variable Number of Lines Per Well

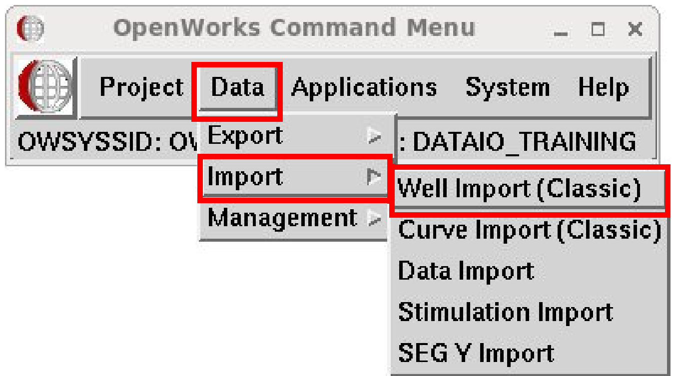
If the input file has a *variable number of lines per well*, then you must use format flags or tags to identify the beginning and end of a well and variations in the data format. They can be one or more unique characters or numbers. In this case, the loader views each line as a separate record.

Below is an example of well data with a variable number of lines per well:

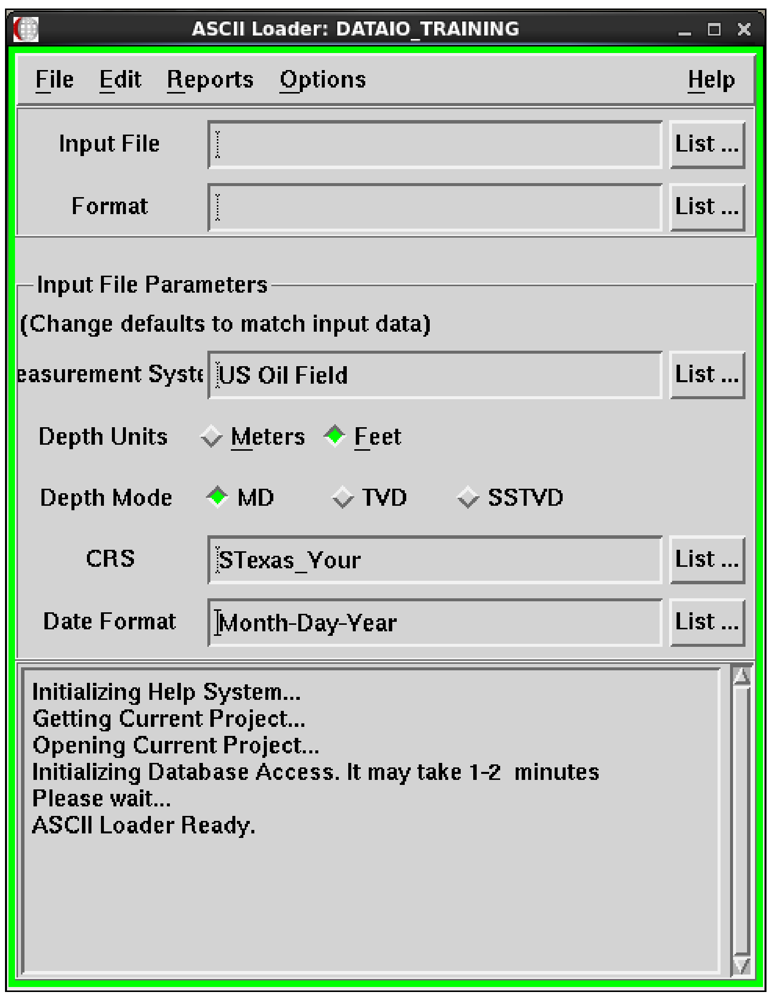


Loading Data with a Set Number of Lines per Well

To start the ASCII Loader, from the OpenWorks Command Menu select **Data > Import > Well Import (Classic)**.



The ASCII Loader main window displays.

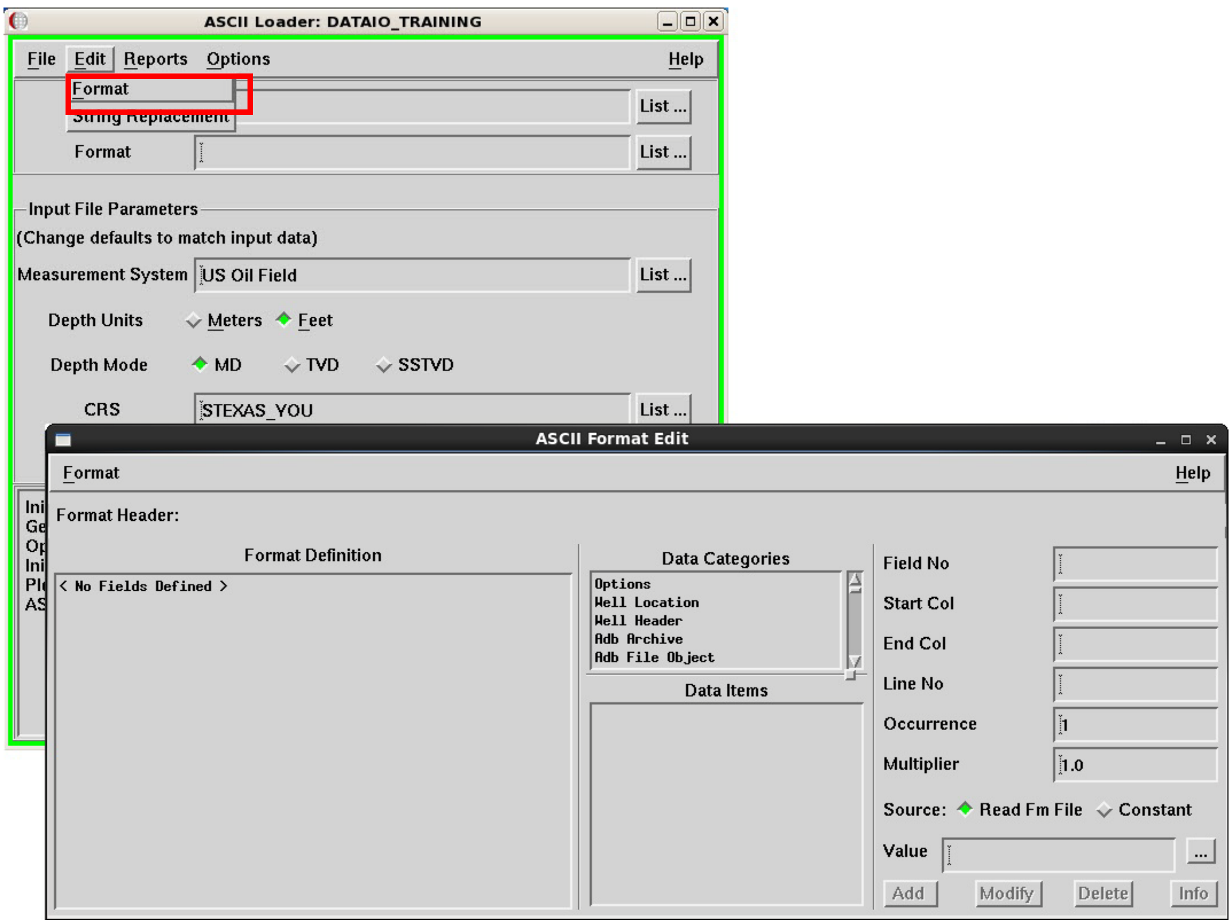


Setting the Input Parameters

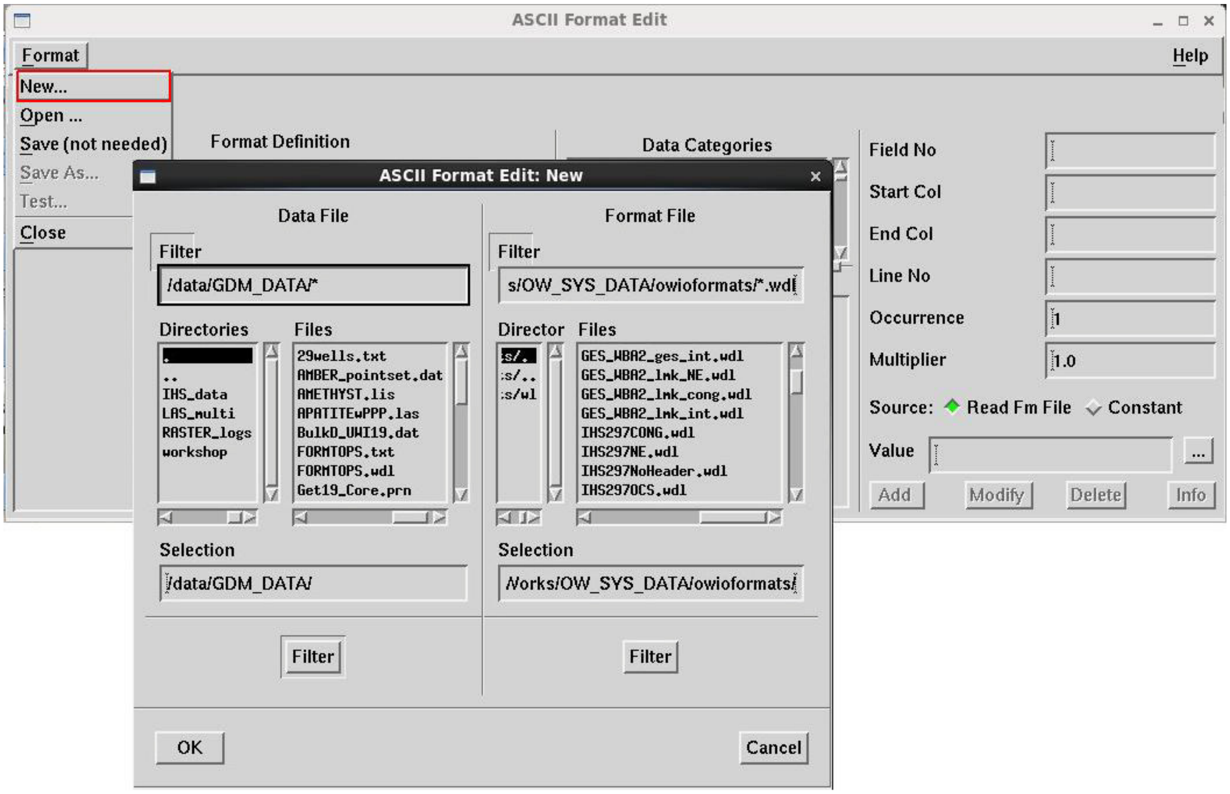
There are two types of input files involved in loading ASCII well data: a data file, which is an ASCII file or a file that contains your data; and a format file, which is a file that describes the structure of the data and instructs the program where to find different items in the data file.

The first step in loading data is to identify the input files.

1. From the ASCII Loader menu bar select **Edit > Format** to display the ASCII Format Edit window.



2. From the ACSII Format Edit window select **Format** > **New** to select a data file and create a new format file, or **Format** > **Open** to select a data file and open an existing format file.



3. Type the name of the input Data File in the Selection field, or use the filter to find the input file and select it.

4. Type in the full name for your new Format File, or select an existing format from the default directory.

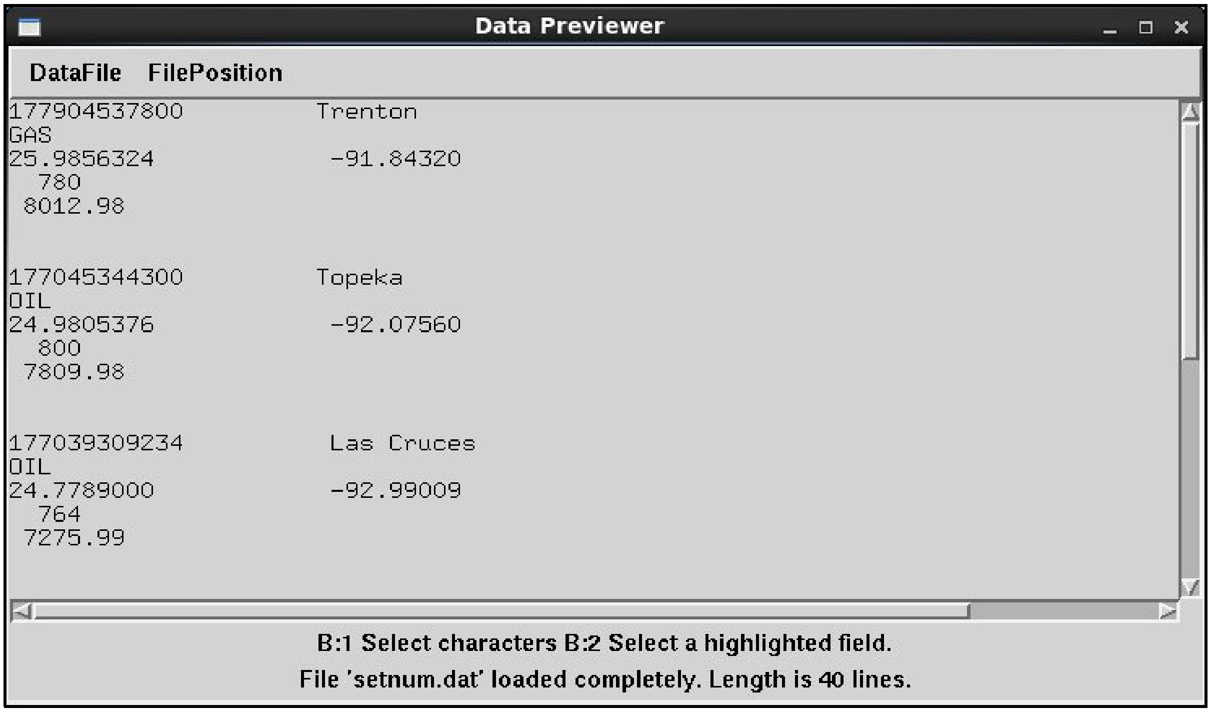
   There are over 60 Landmark-provided well data loading format files in the `OW_SYS_DATA/owioformats` directory. They are designed to accommodate many common ASCII well data loading situations. For a description of many of these formats, review the `README.formats` file located in `$OWHOME/dat`.

Note

The Landmark-provided Well Data Loader (wdl) formats are located in your `OW_SYS_DATA/owioformats` directory. To locate this directory, check the value of the environment variable `OW_SYSDATA_DIR` in an xterm or see the value that was set on the configuration file `$OWHOME/conf/lgcenv.cf`.

5. After specifying data and format files, click **OK**.

   Once data and format files are selected, the ASCII Loader opens a Data Previewer window as shown in the following example.



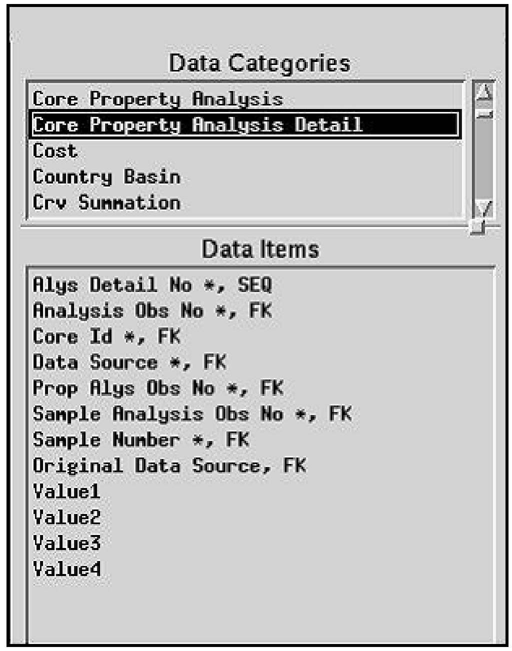
This window displays data from the selected data file and allows you to specify data fields to be loaded by highlighting them as described in the following pages.

> **Note**
>
> A large data file can take a long time to display in the Data Previewer window. Since you only need to work with a few lines of the file to edit a data format, you can press the *Esc* key while the file is being loaded into the window, thus displaying only the beginning of the file.

Specifying Data Items to Load

The ASCII Loader lets you load over 350 categories of ASCII data stored in a wide range of formats. Each data category contains multiple standard fields that the OpenWorks software will recognize. You instruct the loader how to read the data by specifying which columns in your input file contain which kinds of data. You can also set a data item to a constant value if that item is the same value for all of the wells in your input file.

To see how this works, open the ASCII Loader by selecting **Data > Import > Well Import (Classic)** on the OpenWorks menu. To view the data categories and the fields associated with each category, select **Edit > Format** on the ASCII Loader main menu and then click on a data category in the center of the resulting dialog box. The items associated with the data category display in the Data Items list. For example, if you select Core Property Analysis Detail, the following data items display.



6. Use the scroll bar to see additional data items. Special marking codes (*, R, SEQ, FK) are used to indicate special conditions that apply to a particular type of data:

   - **Primary Key** fields are marked with an asterisk (*). Primary Key fields are a set of fields such that the combination of the values of those fields uniquely identifies a data instance (such as a well or a lease ID). Primary Key fields are always required; you must define values for these fields.

   - **Required** fields are marked with an R. You must have a value for all fields marked with an R in order to load the data. Required fields do not add to the unique identification of a data instance (as a Primary Key does) but are required for use or display of the data.

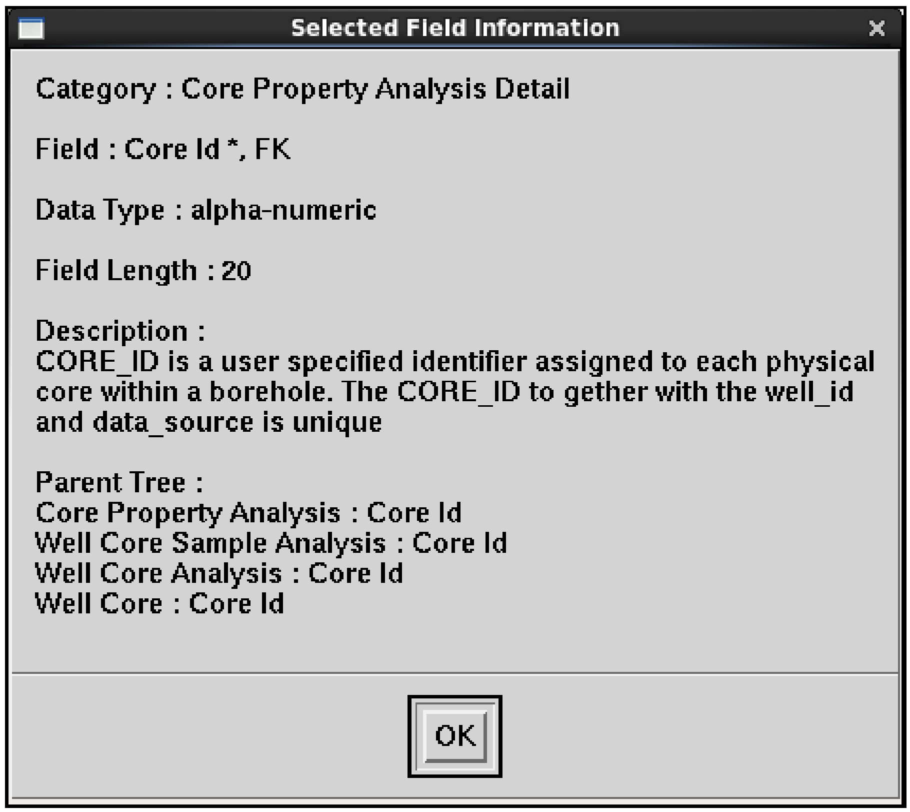
   - **Foreign Key** fields are marked with an FK. These fields reference a data item in a different data category

   - **Sequence No** fields are marked with an SEQ.

Viewing Information about Data Items

You can view database-related information, such as field length, data type, and description, about any data item. You simply select a data item and click the **Info** button in the bottom right corner of the format editor.

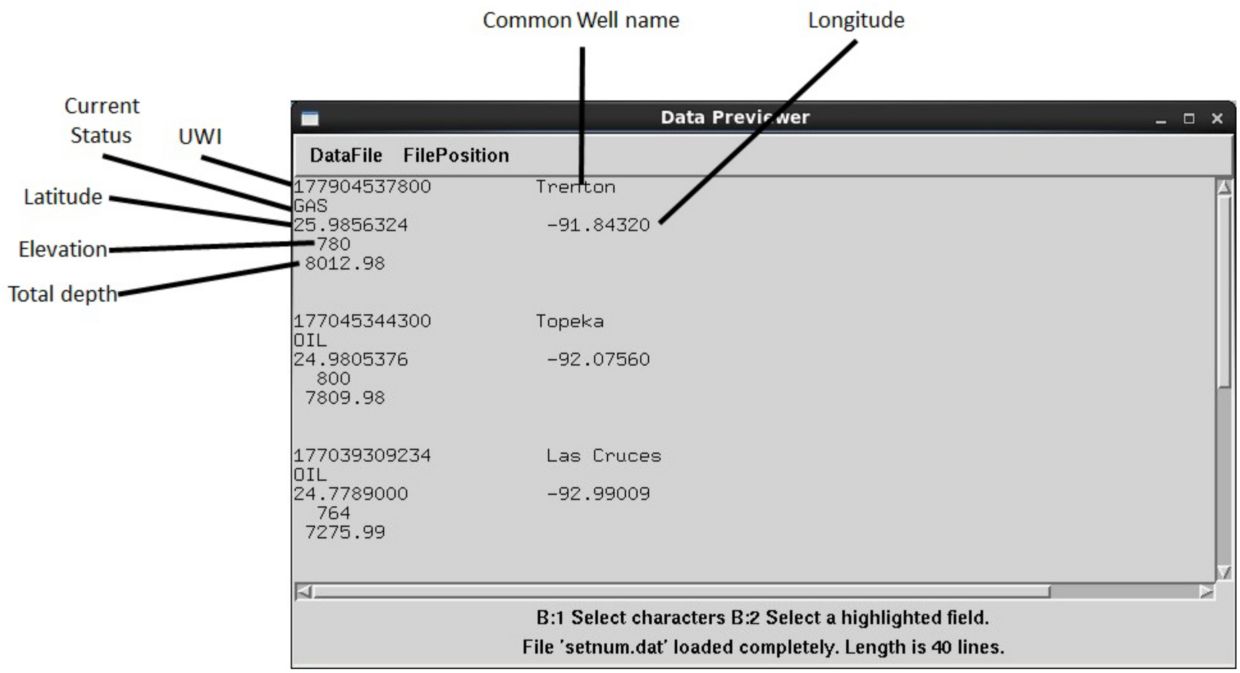
The Selected Field Information window opens. This window also contains the parent class information for foreign key fields. You may find some of this information helpful when troubleshooting data loading errors.



You can also look up all of the predefined values for a data item. Select a data item and click the button next to the **Value** text field.

Describing the Data

Data with a set number of lines per well do not need format flags and tags to differentiate the changes in format. Instead you set a constant value for an option called **Lines Per Record**. Remember that lines per record and lines per well are the same thing in this type of input file. The following example uses the data shown below.

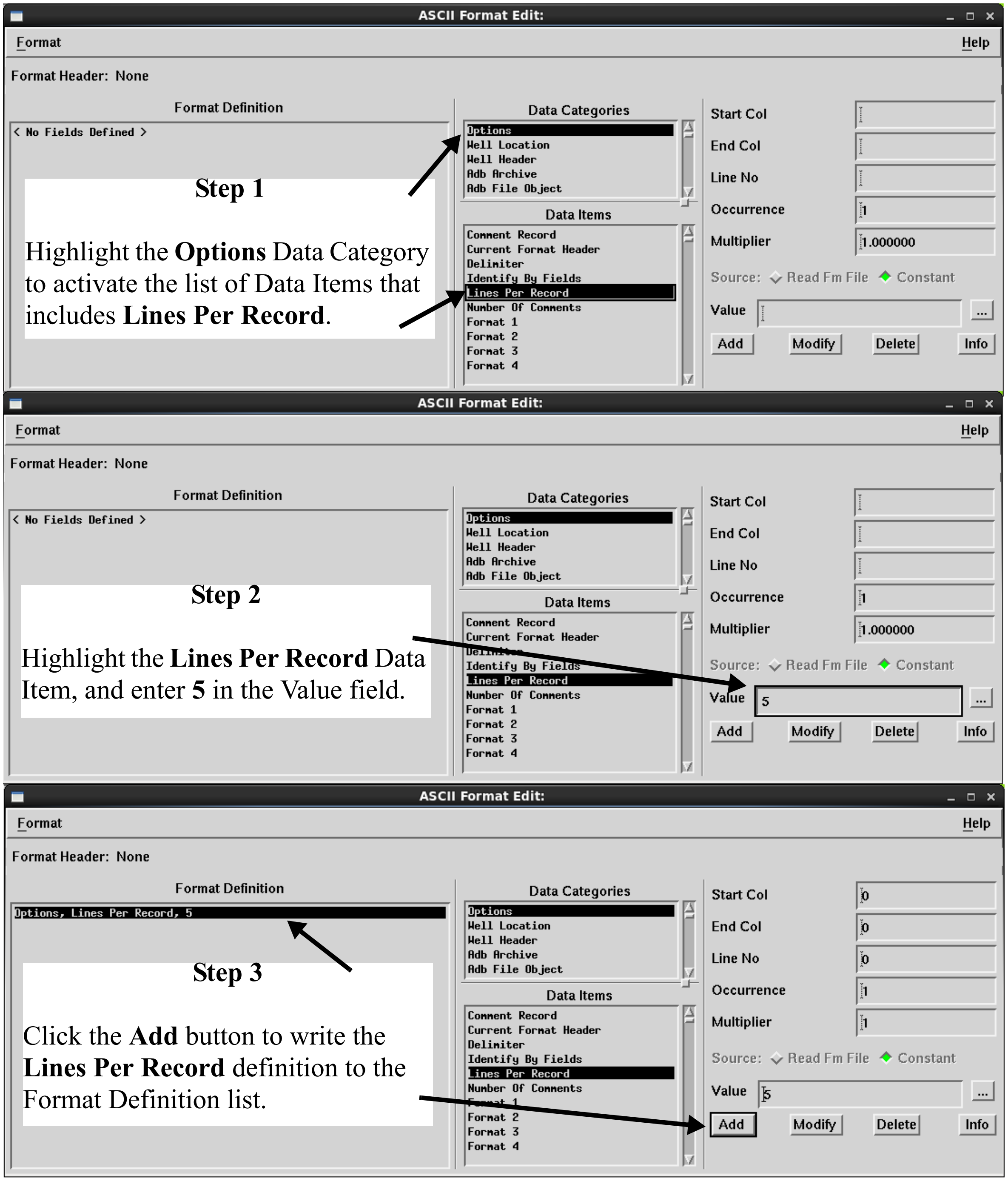


The data file above shows five lines per well. Each well is separated by two blank lines. But since the ASCII Loader ignores blank lines, you can too.

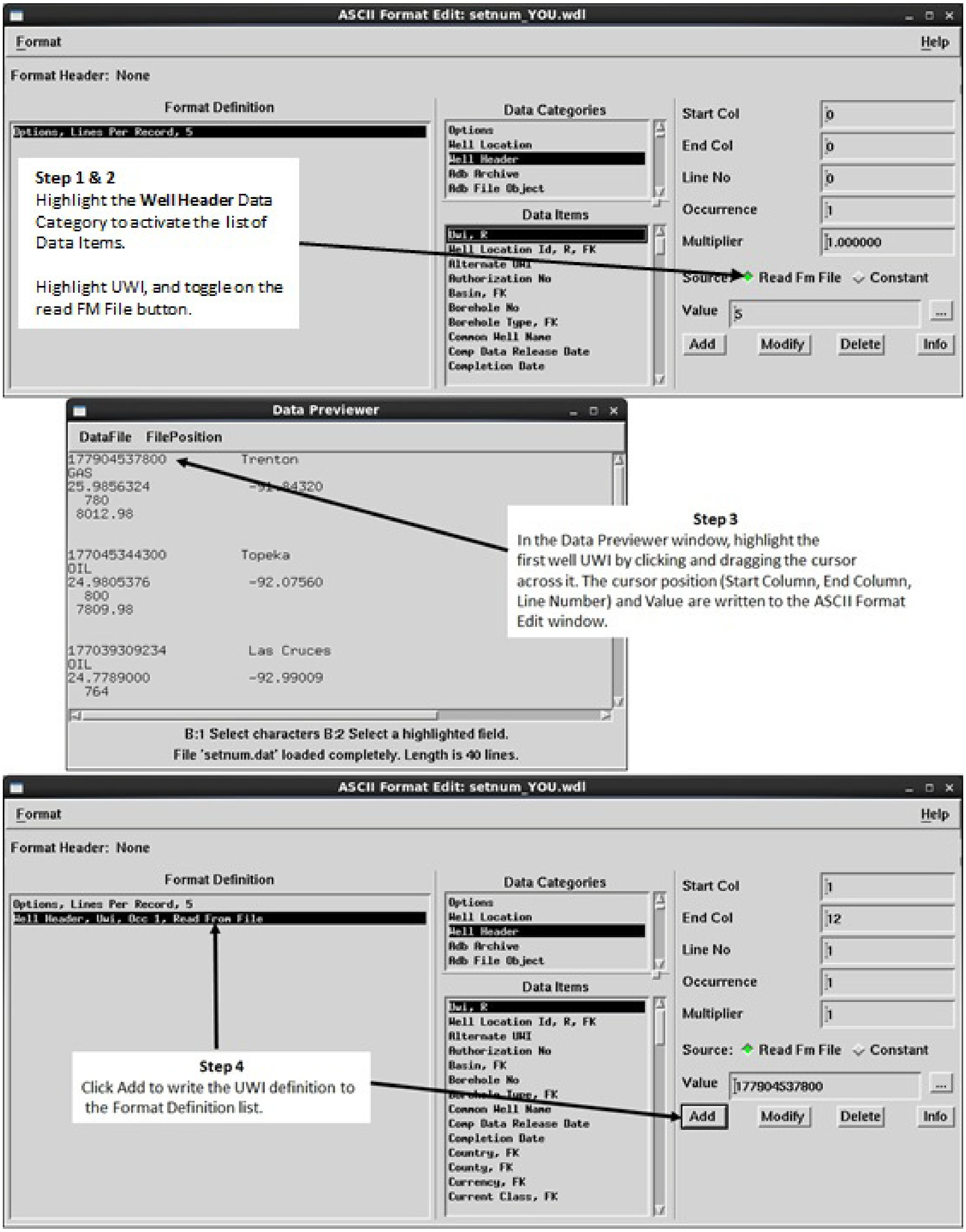
Before you begin describing this, or any file, use the scroll bars to examining the data file to be loaded. Look for patterns to the data structure that are consistent for each well.

The **FilePosition** option on the Data Previewer menu bar is also a useful tool for examining the data file to be loaded. With **FilePosition**, you can page up, page down, page left, or page right through the file. You can jump directly to the first line of the file, the last line, the first column, the last column, or any specific line and column you desire. You can also search for specific alphanumeric character strings.

To indicate that this file contains a constant five lines per well, use the **Options Data Category** as shown here.



Use the **Well Header** Data Category to begin describing the fields in this data set. The first field is UWI.

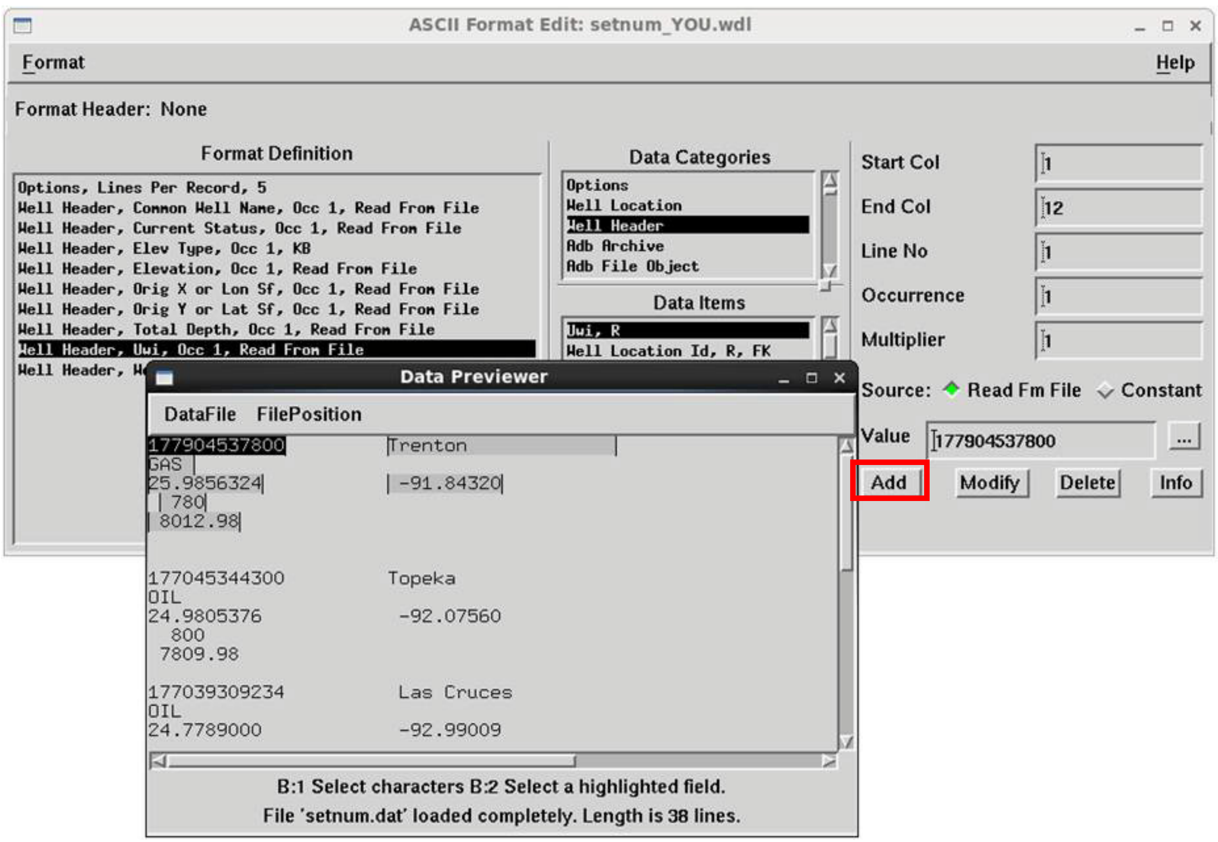

ASCII Format Edit: setnum_YOU.wdl
Format
Help
Format Header: None
Format Definition
Options, Lines Per Record, 5
Data Categories
Options
Well Location
Well Header
Rdb Archive
Rdb File Object
Data Items
Uwi, R
Well Location Id, R, FK
Alternate UWI
Authorization No
Basin, FK
Borehole No
Borehole Type, FK
Common Well Name
Comp Data Release Date
Completion Date
Start Col
End Col
Line No
Occurrence
Multiplier
1.000000
Source: Read Fm File Constant
Value
Add
Modify
Delete
Info
Step 1 & 2
Highlight the Well Header Data Category to activate the list of Data Items.
Highlight UWI, and toggle on the read FM File button.
Data Previewer
DataFile FilePosition
177904537800 Trenton
GAS
25.9856324 -91.84320
780
8012.98
177045344300 Topeka
OIL
24.9805376 -92.07560
800
7809.98
177039309234 Las Cruces
OIL
24.7789000 -92.99009
764
B:1 Select characters B:2 Select a highlighted field.
File 'setnum.dat' loaded completely. Length is 40 lines.
Step 3
In the Data Previewer window, highlight the first well UWI by clicking and dragging the cursor across it. The cursor position (Start Column, End Column, Line Number) and Value are written to the ASCII Format Edit window.
ASCII Format Edit: setnum_YOU.wdl
Format Header: None
Options, Lines Per Record, 5
Well Header, Uwi, Occ 1, Read From File
Country, FK
County, FK
Currency, FK
Current Class, FK
177904537800
Step 4
Click Add to write the UWI definition to the Format Definition list.

Following the steps shown on the previous page, complete your format by describing the remaining fields (Data Items) in the data set.

Note

To describe your data, remember to:

- Highlight the appropriate Data Category / Data Item.
- Click and drag across the desired field in the Data Previewer.
- Click **Add** to write the definition to the Format Definition list.



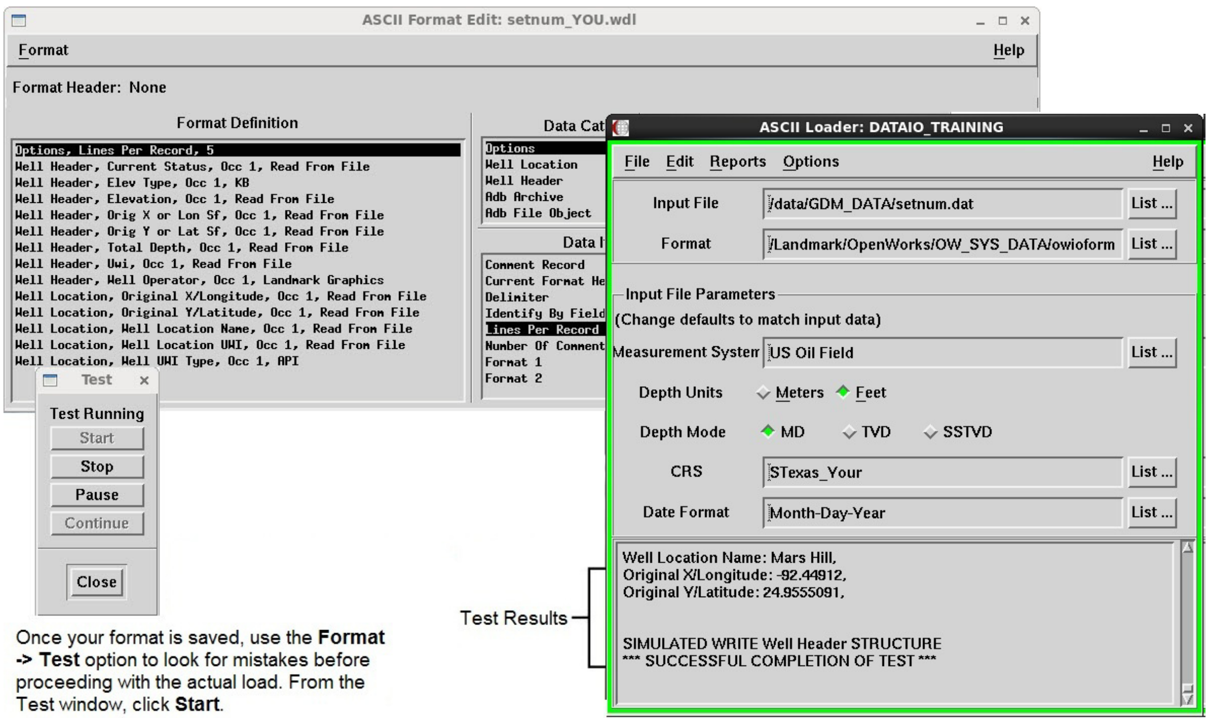
When the last field is formatted, save your format by selecting **Format > Save** (needed) from the ASCII Format Edit window.

Note

Before formatting data items, scroll down through the file and determine your widest column width for that data. For example, a Total Depth field that starts out seven digits wide could become eight or nine digits wide later in the file. If you format the column widths incorrectly, the data will be read and loaded incorrectly.

Testing the Format

Once a format is saved, you should test it before attempting to actually use it to load your data. It is far more difficult to correct incorrectly loaded data than it is to find and correct mistakes in your format file before loading.



Once your format is saved, use the **Format -> Test** option to look for mistakes before proceeding with the actual load. From the Test window, click **Start**.

Test results are written to the Status Area of the ASCII Loader window.

Loading the Data

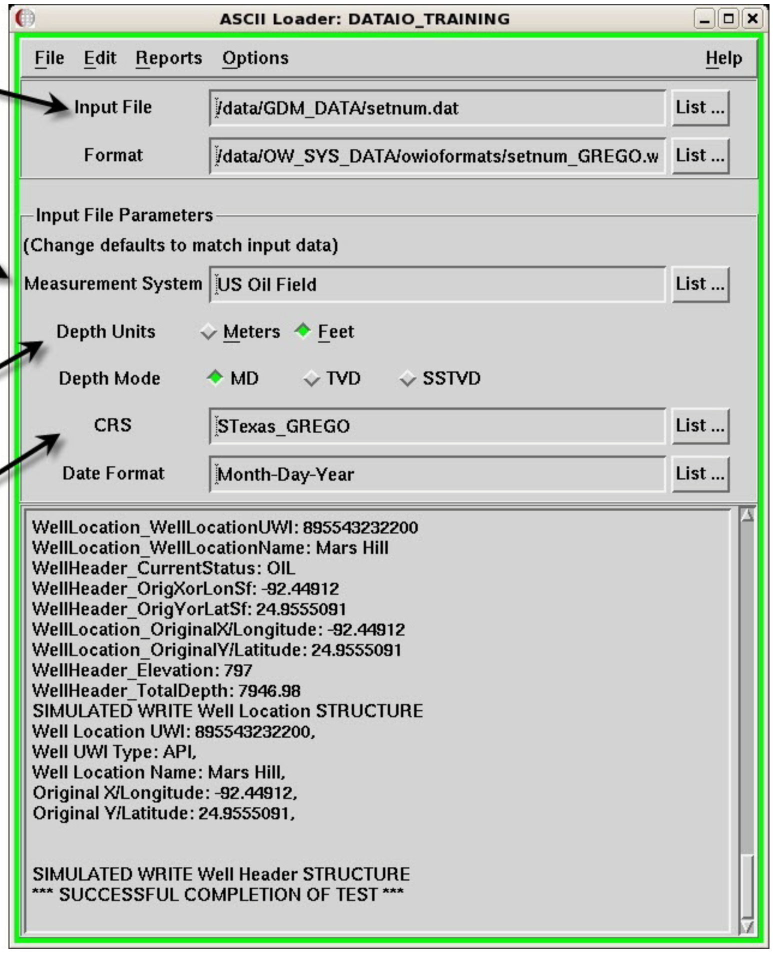
Once your data is formatted, and the format file is saved and tested, you are almost ready to load the data.

Your choice of **File** and **Format** should appear in the first two fields of the ASCII Loader dialog box. If they do not, click the **List** buttons opposite each field to locate and select them

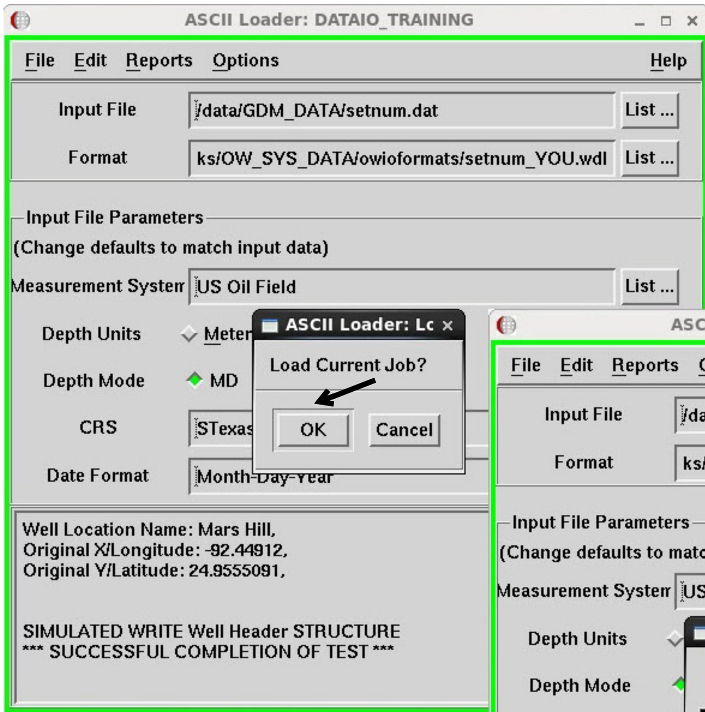
Select the desired session **Measurement System** to provide default units of measure handling for all loaded quantities

Select the **Depth Units** and **Depth Mode** appropriate for your data by toggling on the appropriate buttons

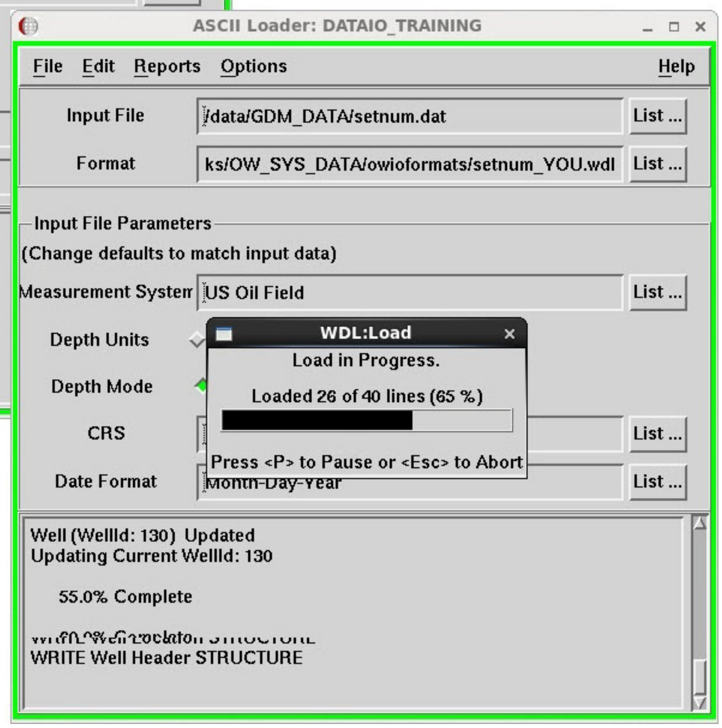
Choose or create the Cartographic Reference System (**CRS**) that applies to your input file. Click the **List** button to choose from a list of existing CRSs. If the CRS that applies to your input file does not yet exist, you will have to create it using the **Project -> Map Projection Editor** option from the OpenWorks



To finally load the data, select **File > Load** from the ASCII Loader window.



Once you select **File > Load**, you must confirm that you want the current load job to begin.



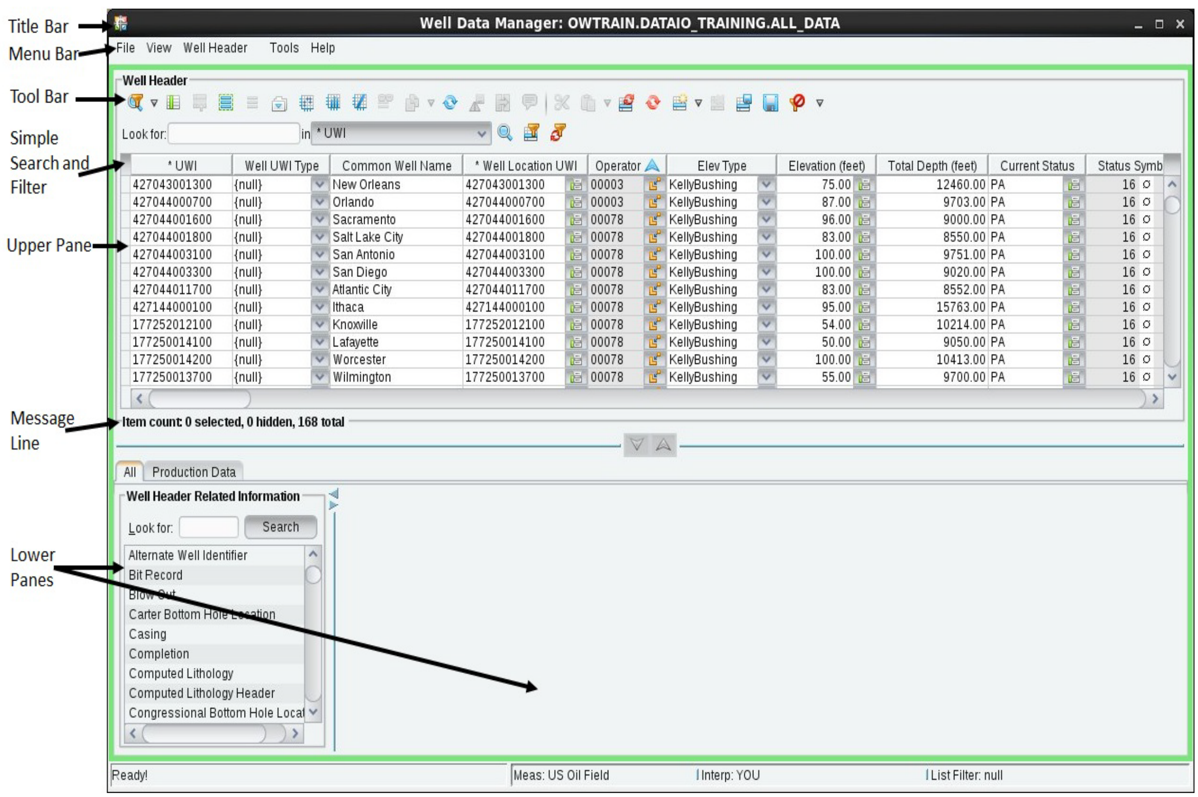
Load progress is displayed in the Status Area. You are prompted when the job is complete.

Viewing/Editing Data with the Well Data Manager

The Well Data Manager allows you to view the well data stored in the database and, depending on your access privileges, to add, edit, or delete the data.

Appearance

The main dialog box of the Well Data Manager is shown below. To view this dialog box, select **Data > Management > Well Data Manager** from the OpenWorks main menu.



Purpose and Use

The data managers are, in essence, your window into the database. The Well Data Manager window has changed in this new release to allow management of the new information incorporated in the data model and enhanced in terms of usability to make data management more intuitive.

The principal uses and key functionality of the Well Data Manager are summarized below.

- The Well Data Manager is used:
  - To retrieve database information about wells
  - To enter or edit well information in the database depending on your access privileges
  - To create or delete wells from the database
  - To easily export data from database
- The Well Data Manager window is divided into two main parts. The upper pane is where you can set the top level focus, to focus on one specific type of data. And the lower panes containing a list of data forms with information related to the top level focus that has been set. When you change your top level focus, lower pane data forms will automatically change. You can then select one or several instances of the data display on the top level focus and you will see related information in the lower part of the window.
- With “browse privileges” for a project, you can view the information for wells in that project. With “interpret or greater privileges” for a project, you can view and edit the database information for wells in that project. (Access privileges are set in the Project Administration utility.)
- The Well Data Manager displays well data in the form of a spreadsheet (i.e. divided into rows and columns of data). You can edit the values in most of the spreadsheet cells. (Fields in gray color are not editable.)
- When you modify data in a table, the corresponding value changes text color to indicate that the table contains unsaved data. (To save data, click the **Save** button.)

- You can “send” wells to the Well Data Manager via the Point Dispatch functionality available from many Landmark applications and utilities (such as Single Well Viewer and Well List Manager). The sent well names display in the Well List field, where you can highlight them, and request the data forms you desire.

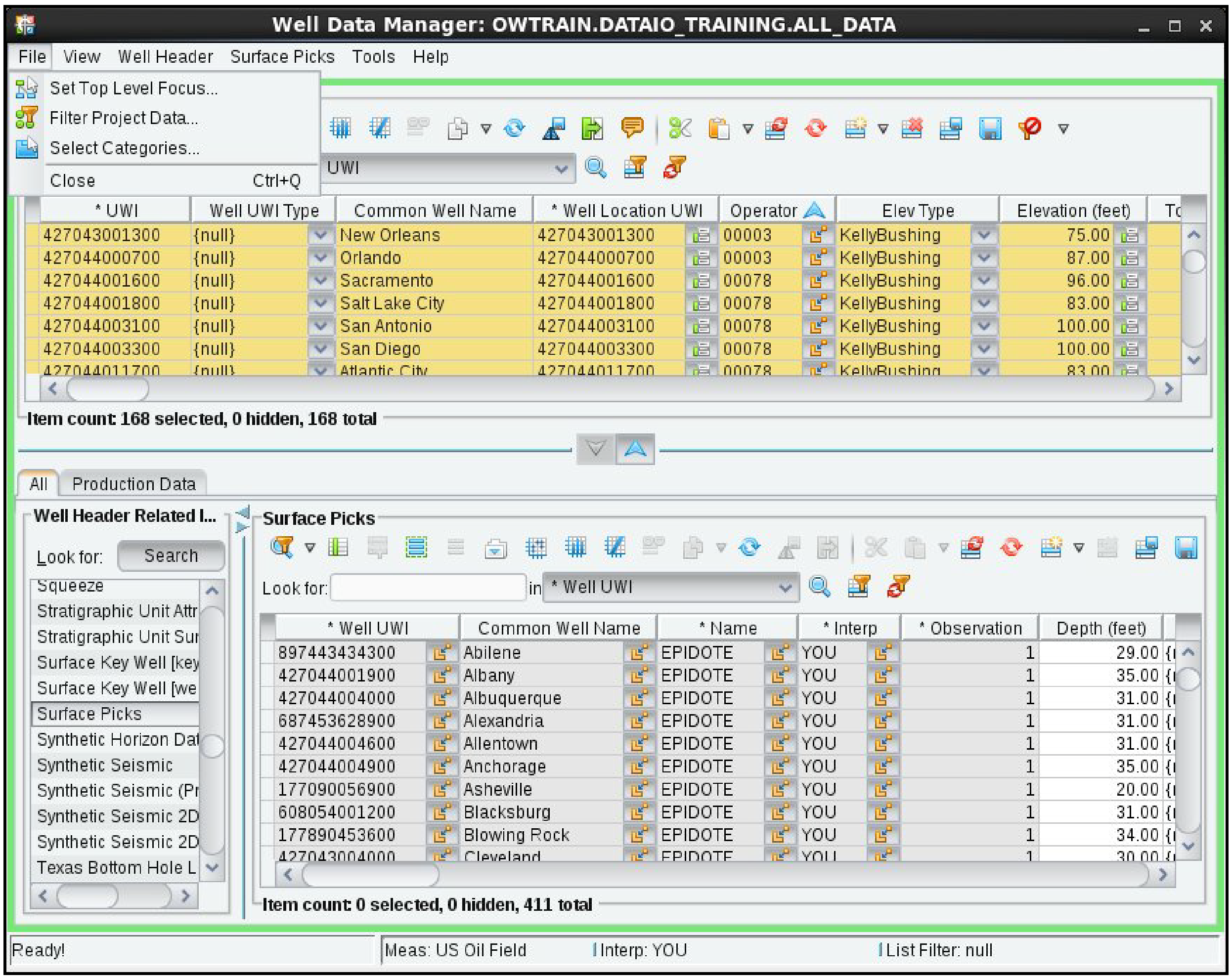
New Features in Well Data Manager

New features include:

- Ability to set top level focus based on logical groupings of data categories (well, lease, basin, and so on)
- Ability to sort, multicolumn sort, move, hide columns for display
- Individual preferences for each user can be saved and recognized at startup of the application Group data by workflow in separate tabs
- Copy, paste functionality
- Edit reference data in context
- Export table data in multiple formats: pdf, excel, html, txt
- Save data directly to well list
- Run custom queries against database
- Multi-level filter options to search and filter data

Select Multiple Top Level and Child Data Types at Once

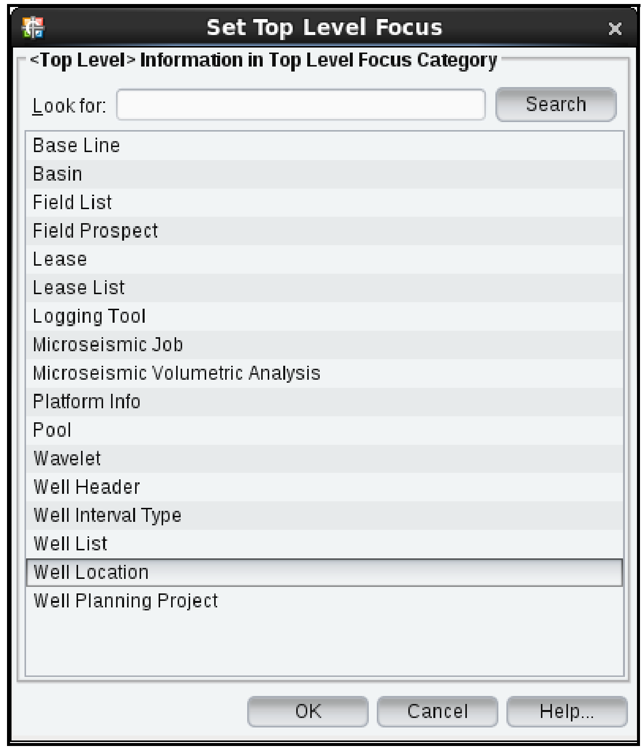
You can select one or multiple records in the upper pane, and then select one of the Well Related Information items in the lower pane, and the data will be displayed in the lower pane for all wells that have been selected.



Set a Different Top Level Focus

By default Top Level Focus is Well Header, but is changeable by selecting **File -> Set Top Level Focus**.

A window like this will open:



Available Related Tables

Well Data Manager allows you to display data for the following data groups selected in the upper pane of Well Data Manager. The information from the related tables can be displayed in the lower pane of the Well Data Manager window.

To see the columns or fields that compose a table, and for other information about the table, see the OpenWorks Data Model.

- **Base Line (Base_Line and Base_Line_All tables)**: Information about line of section in a cross-section, usually between two wells. The related OpenWorks tables are *Fault_Profile_All, Line_Segment_All, Surface_Profile_All,* and *X_Sec_All*.

- **Basin (Basin table)**: Basin names and information.The related OpenWorks tables are *Basin, Basin_Boundary, Country_Basin, Field_Prospect, Lease_Master, Well_Location, Well_Location_Alt,* and *Well_Master*.

- **Field List (Field_List_Header and Field_List_Member)**: Information for a working set (or list) of fields.

- **Field Prospect (Field_Prospect table)**: Information identifying a producing field or prospect. The related OpenWorks tables are *Field_Boundary, Field_List_Member, Field_Prospect, Field_Prospect_Interest, Interpretation_Set_All, Lease_Field_Prospect, Pool, Producing_Facility, Well_Master, Well_Master_Alt, Well_Pressure, Well_Pressure_Bh, Well_Prod_Zone,* and *Well_Test*.

- **Lease (Lease_Master table)**: Information about an exploration and production lease, contract, or contract stage.The related OpenWorks tables are *Lease_Commitment, Lease_Field_Prospect, Lease_Interest_Scale, Lease_List_Member, Lease_Narrative, Lessee, Lessor, Pool_Volume, Well_Location, Well_Location_Alt* and *Well_Master*.

- **Lease List (Lease_List_Header and Lease_List_Member)**: Information for a working set, or list, of leases.

- **Logging Tool (Logging_Tool table)**: Information about a logging tool. The related OpenWorks tables are *Logging_Tool_Config, Logging_Tool_Service,* and *Mwd_Run*.

- **Microseismic Job (Microseismic_Job)**: Identifies the fracture job that was used in this well Stimulation. The related OpenWorks tables are: *Fracture_Job_Frac_Well, Microseismic_Monitor_Well,* and *Microseismic_Stage*.

- **Microseismic Volumetric Analysis (Microseismic_Volumetric_Alys)**: The related OpenWorks tables are *Microseismic_Vol_Alys_Parm* and *Microseismic_Vol_Alys_Stage*.

- **Platform Info (Platform_Info)**: The related OpenWorks tables are *Platform_Slot, Well_Location, Well_Location_Alt, Well_Master (Well_Header view), Well_Plan,* and *Well_Plan_All*.

- **Pool (Pool table)**: Information about a connected accumulation of hydrocarbons within a rock unit. The related OpenWorks tables are: *Pool_Fluid_Contact, Pool_Volume, Pool_Volume_Alys, Producing_Facility, Strat_Unit_Summary, Well_Pressure, Well_Pressure_Bh, Well_Prod_Zone,* and *Well_Test*.

- **Wavelet (Wavelet_Hdr table)**: Information about wavelet data extracted from processing a seismic section or the filter applied to seismic data.The related OpenWorks tables are *Synthetic_Seismic, Synthetic_Seismic_2d,* and *Wavefilt_X*.

- **Well Header (Well_Master and Well_Master_Alt tables)**: Information about wells. The related OpenWorks tables are *Bit_Record, Blow_Out, Carter_Bh_Loc, Casing, Computed_Lithology_Crv, Computed_Lithology_Hdr, Congress_Bh_Loc, Core_Property_Alys, Core_Property_Alys_Detail, Cost, Curve_Hist_Rmk, Daily_Activity, Daily_Summary, Dipmeter, Dir_Survey_Hdr, Dir_Survey_Pt, Dls_Bh_Loc, Drilg_Log, Drilling_Objective, Dril_Pump, Dst_Job_Hdr, Dst_Rft_Cush, Dst_Rft_Fluid, Dst_Rft_Gen, Dst_Rft_Mat_Surf, Dst_Rft_Press, Dst_Rft_Summary, Elev_Info, Field_Prospect, Fps_Bh_Loc, Geodetic_Bh_Loc, Intrp_Drilg_Show, Liner, Logging_Job, Logging_Mud_Test, Logging_Sensor_Parm, Logging_Toolstring_Descent, Logging_Tool_Calibration, Logging_Tool_Config, Logging_Tool_Equipment, Logging_Tool_Parm, Logging_Tool_Pass, Log_Curve_Header, Log_Curve_Qualifier, Log_Sample_Framework, Lost_Circ, Mudlog_Description, Mudlog_Hdr, Mud_Report, Mwd_Run, Ne_Bh_Loc, North_Sea_Bh_Loc, Nts_Bh_Loc, Ocs_Bh_Loc, Ohio_Bh_Loc, Packer, Paleo, Paleo_Sample_Alys, Paleo_Sample_Alys_Detail, Petrophysical_Parm_Value, Pick, Plugging, Positional_Log_Hdr, Rft_Run_Hdr, Rig_Info, Segment, Squeeze_Info, Strat_Unit_Intrp, Strat_Unit_Summary, Surf_Key_Well, Synthetic_Seismic, Synthetic_Seismic_2d, Td_Info, Tex_Bh_Loc, Time_Depth_Curve, Tubing, Tubing_Equipment, Well_Afe, Well_Bh_Alt_Loc, Well_Date, Well_Fault_Obsv, Well_Fluid_Contact, Well_Image*, *Well_Interval, Well_Interval_Value, Well_Mineral_Alys, Well_Mineral_Perc, Well_Name_Alt, Well_Name_Hist, Well_Note_Pad, Well_Operator, Well_Perforation, Well_Plan_All, Well_Pressure, Well_Pressure_Aof, Well_Pressure_Aof_4pt, Well_Pressure_Bh, Well_Prod_Zone, Well_Remark, Well_Sieve_Anal, Well_Sieve_Screen, Well_Status_Hist, Well_Study, Well_Survey, Well_Test, Well_Test_Analysis, Well_Test_Comput_Anal, Well_Test_Contaminant, Well_Test_Cushion,* *Well_Test_Equipment, Well_Test_Flow, Well_Test_Flow_Meas, Well_Test_Mud, Well_Test_Period, Well_Test_Pressure, Well_Test_Press_Meas, Well_Test_Recorder, Well_Test_Recovery, Well_Test_Remark, Well_Test_Shutoff, Well_Treatment, Well_Work_Over,* and *X_Sec_Well_List_All*.

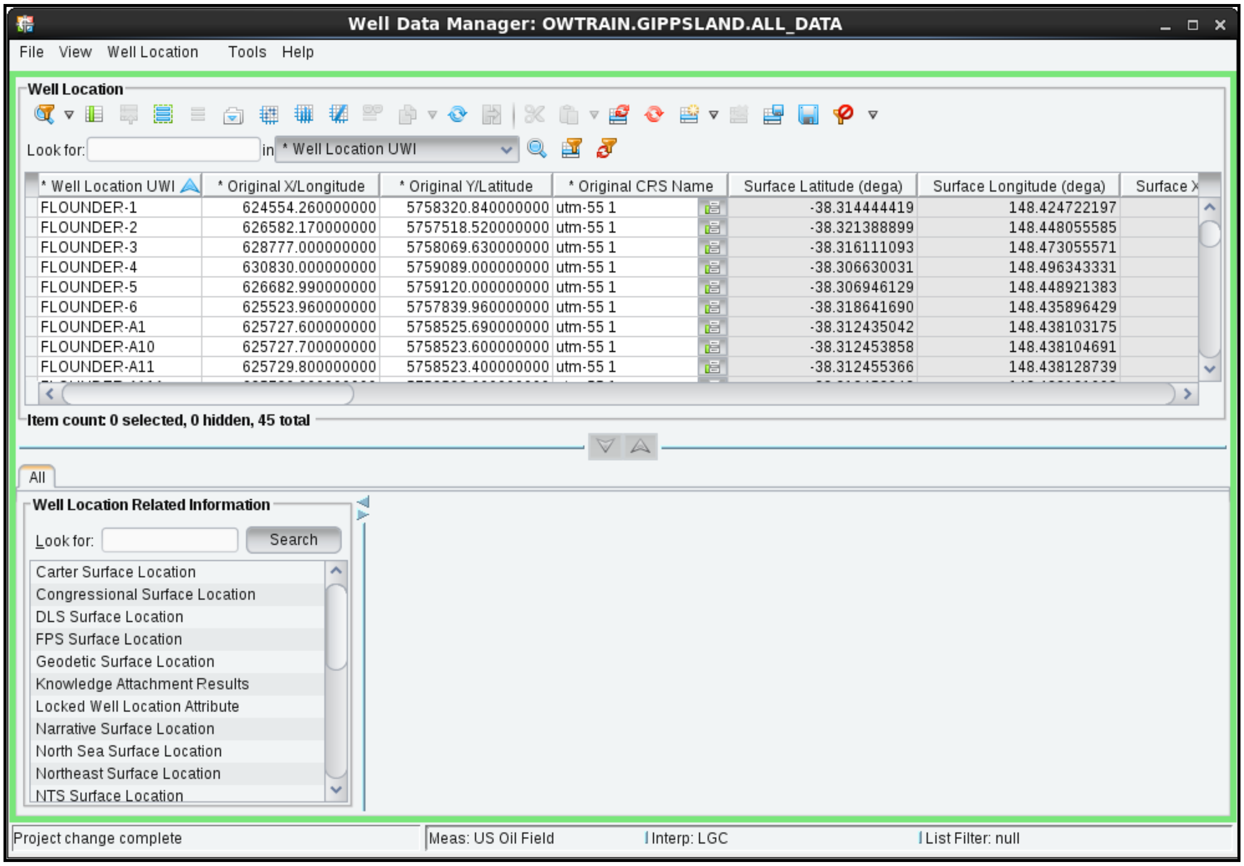
- **Well Interval Type (VC_Interval_Type table)**: The related OpenWorks tables are *Well_Interval, Well_Interval_Display,* and *Well_Interval_Value*.

- **Well List (a view)**: The related OpenWorks tables are *Geologic_Area, Interpretation_Study, IP_Well_List, OW_Interpretation_Prj, Petrophysical_Parm_Value, Sec_Well_List, Sec_Well_List_All,* and *Stratigraphic_Column*.

- **Well Location (Well_Location and Well_Location_Alt tables)**: Information about a well, especially its location and legal data. The related OpenWorks tables are *Carter_Surf_Loc, Congress_Surf_Loc, Dls_Surf_Loc, Fps_Surf_Loc, Geodetic_Surf_Loc, Narr_Surf_Loc, Ne_Surf_Loc, North_Sea_Surf_Loc, Nts_Surf_Loc, Ocs_Surf_Loc, Ohio_Surf_Loc, Tex_Surf_Loc, Well_Interest, Well_Location_Alt, Well_Loc_Name_Alt, Well_Loc_Name_Hist, Well_Loc_Remark, Well_Loc_Uwi_Alt, Well_Master,* and *Well_Surf_Alt_Loc*.

- **Well Planning Project (Well_Planning_Project_All table)**: Information about planning the exploitation of a well. The related OpenWorks tables are *Irregular_Geometry_All, Irregular_Points_All, Plan_Opt_Parm_All, Regular_Geometry_All, Target_All, Target_Estimator_All, Target_Opt_Parm_All, Turn_Point_All, Well_Plan_All, Well_Plan_Interval_All, Well_Plan_Target_All,* and *Wp_Project_Opt_Parm*.

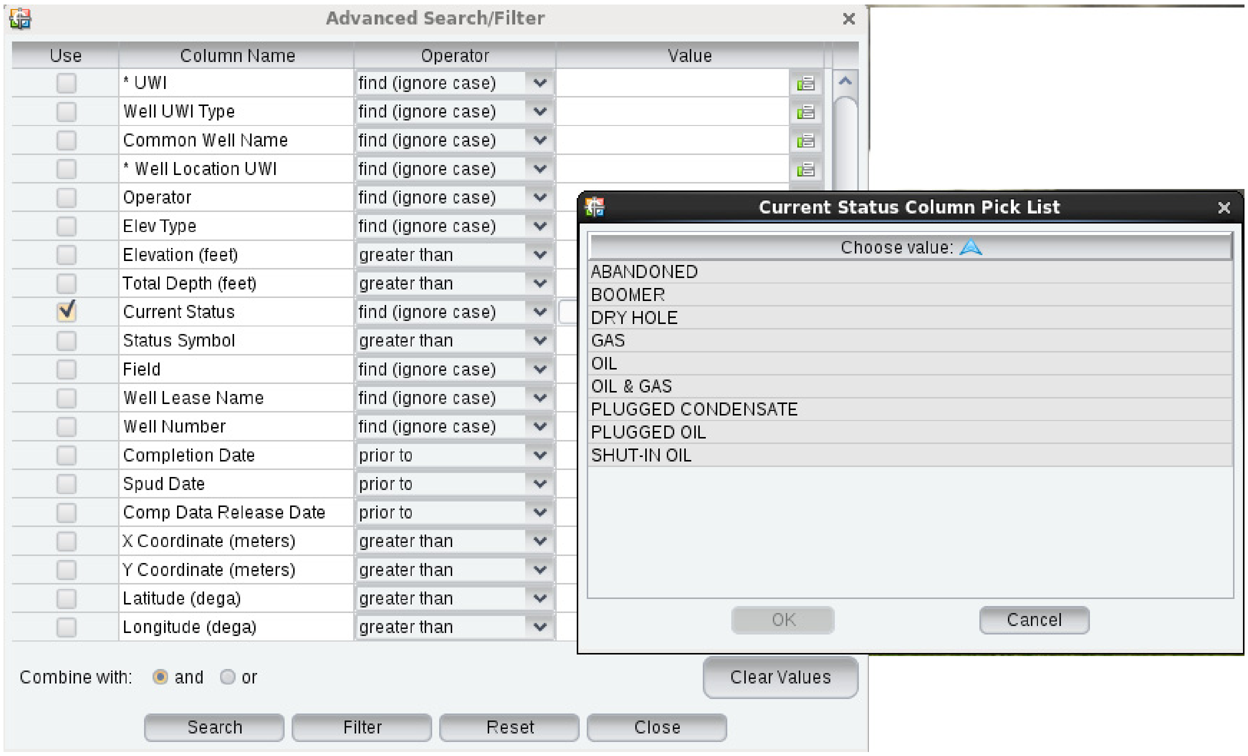
You can select from one of these categories to set the top level focus. For example, Well Location.



The lower panel windows have changed to Well Location Related Information.

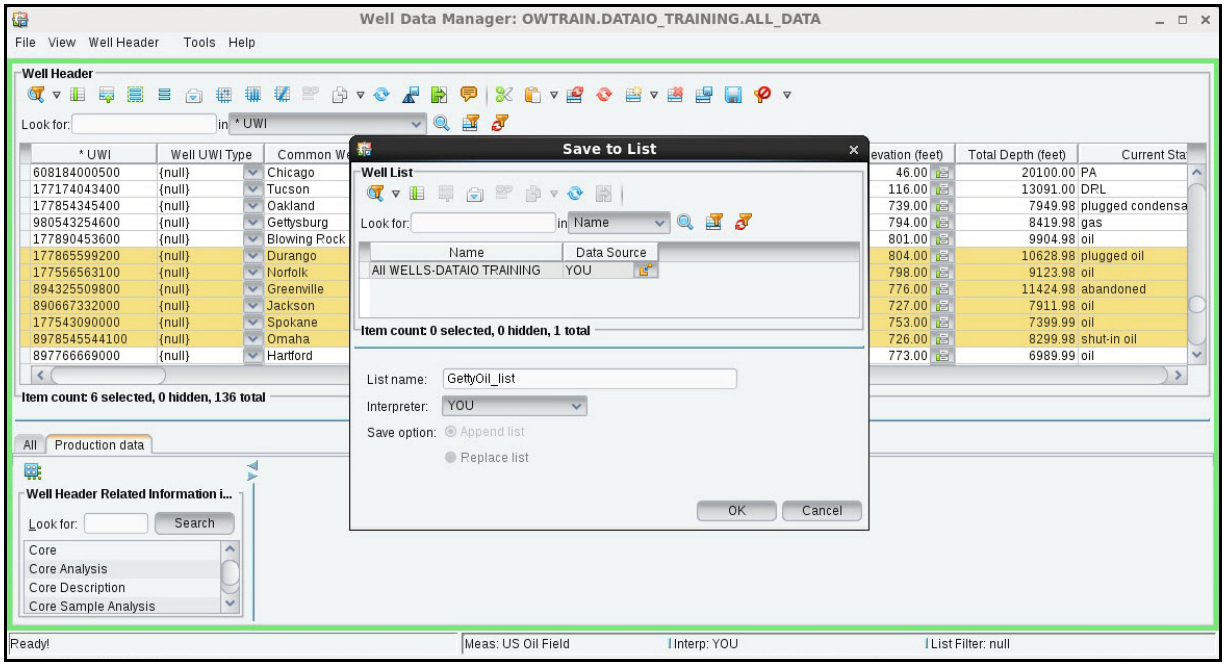
Advanced Search/Filter Capabilities

Click the **advanced search** icon to use the advanced search filter capabilities to filter the information displayed in the panels.



List Creation Capabilities

You can now create well lists from Well Data Manager, by selecting the wells and clicking on the icon.



Data Forms

As you change the top level focus in the upper pane of Well Data Manager, data forms available in the lower pane will also change. Here is a description of the data forms available when focus area in upper panel is set to all the different choices.

Top Level Focus: Well Header: The Well related information window consists of 182 available data forms which you can select and see the data that has been loaded for wells selected. The table below lists all 163 available data forms.

Alternate Well Identifier	Log Image Registered Log Section	Tubing
Bit Record	Log Image Unregistered Image	Tubing Equipment
Blow Out	Log Sample Framework	VSP Geometry
Carter Bottom Hole Location	Logging Job	Well AFE
Casing	Logging Mud Test	Well Bottom Hole Alternate Location
Completion	Logging Sensor Parameter	Well Date

Computed Lithology	Logging Tool Calibration	Well Fault
Computed Lithology Header	Logging Tool Configuration	Well Fluid Contact
Congressional Bottom Hole Location	Logging Tool Equipment	Well Fracture Summary
Core	Logging Tool Parameter	Well Header
Core Analysis	Logging Tool Pass	Well Header [ParentWellpathId]
Core Analysis Method	Logging Tool String Descent	Well Header Alternate
Core Analysis Remark	Lost Circulation	Well Image
Core Description	Microseismic Monitor Well	Well Interval
Core Formation	Microseismic Stage	Well Interval Value
Core Property Analysis	Mud Log Description	Well List Member
Core Property Analysis Detail	Mud Log Header	Well Mineral Analysis
Core Remark	Mud Report	Well Mineral Percentage
Core Sample Analysis	MWD Run	Well Name Alternative
Core Sample Description	Natural Fracture Pick	Well Name History
Core Sample Property	North Sea Bottom Hole Location	Well Note Pad
Core Sample Remark	Northeast Bottom Hole Location	Well Operator
Core Shift	NTS Bottom Hole Location	Well Perforation
Cost	OCS Bottom Hole Location	Well Plan[currentWellId]
Curve Hist Remark	Ohio Bottom Hole Location	Well Plan [sidetrackWellId]
Daily Activity	Packer	Well Pressure
Daily Drilling Summary	Paleo	Well Pressure AOF
Definitive Survey History [defn Wellid]	Paleo Sample Analysis	Well Pressure AOF 4 Pt
Definitive Survey History [source Wellid]	Paleo Sample Analysis Detail	Well Pressure Bottom Hole
Dipmeter	Petrophysical Parameter Value	Well Prod Cumulatives
Directional Survey	Plugging	Well Prod Daily Injection

DLS Bottom Hole Location	Principal Component Analysis	Well Prod Daily Production
Drilling Log	Regression Input Data	Well Production Water Analysis Detail
Drilling Objective	RFT Run Headers	Well Remark
Drilling Pump	Rig Information	Well Sieve Analysis
Drilling Summary [option Wellid]	Segment [wellId1]	Well Sieve Screen
Drilling Summary [wellid]	Segment [wellId2]	Well Status History
DST Job Header	Squeeze	Well Study
DST/RFT Cushion	Stratigraphic Unit Attribute	Well Survey
DST/RFT Fluid	Stratigraphic Unit Summary	Well Test
DST/RFT General	Surface Key Well [key WellId]	Well Test Analysis
DST/RFT Material Surface	Surface Key Well [wellId]	Well Test Computed Analysis
DST/RFT Pressure	Surface Picks	Well Test Contaminant
DST/RFT Summary	Synthetic Horizon Data	Well Test Cushion
Elevation Information	Synthetic Seismic	Well Test Equipment
Fault Key Well [key Wellid]	Synthetic Seismic (Preferred)	Well Test Flow
Fault Key Well [wellid]	Synthetic Seismic 2D	Well Test Flow Measurement
FPS Bottom Hole Location	Synthetic Seismic 2D (Preferred)	Well Test Mud
Fracture Job Frac Well	Texas Bottom Hole Location	Well Test Period
Fracture Treatment Formation	Time Depth Curve	Well Test Pressure
Fracture Well Property	Time Depth Curve (Preferred)	Well Test Pressure Measurement
Geodetic Bottom Hole Location	Total Depth Information	Well Test Recorder
GGX Curve Cmd	Well Prod Economic Detail	Well Test Recovery
GGX Curve Set	Well Prod Economic Monthly	Well Test Remark
GGX Curve Set Cmd	Well Prod Economic One line	Well Test Shutoff

GGX Well Log Annotation	Well Prod Facility Group	Well Treatment
HWC Interpretation	Well Prod Group Allocation	Well Work Over
HWC Interpretation Preference	Well Prod Monthly Injection	Well Z Conversion
HWC Interpretation Type Log Setting	Well Prod Monthly Production	Well Z Conversion (Preferred)
Interpreted Drilling Show	Well Producing Zone	Xs Well
Knowledge Attachment Results	Well Production Gas Analysis	
Liner	Well Production Gas Analysis Detail	
Locked Well Attribute	Well Production Interest	
Locked Well Category	Well Production Oil Analysis	
Log Curve	Well Production Oil Analysis Detail	
Log Curve Qualifier	Well Production Oil Viscosity	
Position Log	Well Production Water Analysis	

Top Level Focus: Base Line: The Base Line related information window consists of four available data forms:

- Cross Section
- Fault Profile
- Line Segment
- Surface Profile

Top Level Focus: Basin: The Basin related information window consists of eleven available data forms:

- Basin
- Basin Boundary
- Country Basin
- Exploration Play
- Field Prospect
- Geo Shape Set
- Interpretation Study
- Lease

- Well Header
- Well Location
- Well Location Alternate

Top Level Focus: Field Prospect: The Field Prospect related information window consists of 32 available data forms, as shown in the following table.

Field Boundary	Production Facility
Field List Member	Production Facility Group
Field Prospect [nearestDiscovery]	Production Gas Analysis
Field Prospect Interest	Production Gas Analysis Detail
Geo Shape Set	Production Monthly Injection
Interpretation Set	Production Monthly Production
Interpretation Study	Production Oil Analysis
Lease Field Prospect	Production Oil Analysis Detail
Microseismic Job	Production Water Analysis
Pool	Production Water Analysis Detail
Production Cumulatives	Well
Production Daily Injection	Well Pressure
Production Daily Production	Well Pressure Bottom Hole
Production Economic Detail	Well Producing Zone
Production Economic Monthly	Well Test
Production Economic One Line	

Top Level Focus: Lease: Lease related information consists of 27 available data forms:

Interpretation Set	Production Economic One Line
Lease Commitment	Production Facility Group
Lease Field Prospect	Production Gas Analysis
Lease Interest Scale	Production Gas Analysis Detail

Lease List Member	Production Monthly Injection
Lease Narrative	Production Monthly Production
Lessee	Production Oil Analysis
Lessor	Production Oil Analysis Detail
Pool Volume	Production Water Analysis
Production Cumulatives	Production Water Analysis Detail
Production Daily Injection	Well Header
Production Daily Production	Well Location
Production Economic Detail	Well Location Alternate
Production Economic Monthly	

Top Level Focus: Lease List: Lease List related information consists of one available data form, which is “Lease List Member.”

Top Level Focus: Logging Tool: Logging Tool related information consists of three available data forms:

- Logging Tool Configuration
- Logging Tool Service
- MWD Run

Top Level Focus: Microseismic Job: Microseismic Job related information consists of three available data forms:

- Fracture Job Frac Well
- Microseismic Monitor Well
- Microseismic Stage

Top Level Focus: Microseismic Volumetric Analysis: Microseismic Volumetric Analysis related information consists of two available data forms:

- Microseismic Volumetric Analysis Parameter
- Microseismic Volumetric Analysis Stage

Top Level Focus: Platform Info: Platform related information consists of six available data forms:

- Platform Slot

- Well
- Well Header
- Well Location
- Well Location Alternate
- Well Plan

Top Level Focus: Pool: Pool information consists of eleven available data forms:

Geo Shape Set	Production Facility	Well Pressure Bottom Hole
Pool Fluid Contact	Stratigraphic Unit Summary	Well Producing Zone
Pool Volume	Volumetric Analysis	Well Test
Pool Volume Analysis	Well Pressure	

Top Level Focus: Wavelet: Wavelet related information window consists of three available data forms:

- Synthetic Seismic
- Synthetic Seismic 2D
- Wavelet Filter X

Top Level Focus: Well Interval Type: Well Interval Type related information window consists of three available data forms:

- Well Interval
- Well Interval Display
- Well Interval Value

Top Level Focus: Well List: Well List related information consists of six available data forms:

- Geological Area
- Interpretation Project
- Petrophysical Parameter Value
- Principal Component Analysis Input Data
- Regression Input Data
- Well List Member

Top Level Focus: Well Location: Well Location related information consists of 24 available data forms:

Carter Surface Location	Ohio Surface Location
Congressional Surface Location	Texas Surface Location
DLS Surface Location	Well Header
FPS Surface Location	Well Interest
Geodetic Surface Location	Well Interest Scale
Knowledge Attachment Results	Well Location Alternate
Locked Well Location Attribute	Well Location Name Alternate
Narrative Surface Location	Well Location Name History
North Sea Surface Location	Well Location Remark
Northeast Surface Location	Well Location UWI Alternate
NTS Surface Location	Well Production Interest
OCS Surface Location	Well Surface Alternate Location

Top Level Focus: Well Planning Project: Well Planning Project related information consists of 13 available data forms:

Irregular Geometry	Target Opt Param
Irregular Geometry Points	Turn Point
Knowledge Attachment Results	Well Plan
Plan Opt Param	Well Plan Interval
Regular Geometry	Well Plan Project Opt Parameter
Target	Well Plan Target
Target Estimator	

As you complete the next exercise, you will become familiar with the basic functions of the Well Data Manager.

Exercise 3-1. Load Well Data – One Line Per Record

This exercise shows how to load data with one line per record. The information for each well consists of a single line. In this case, lines per well and lines per record are the same, and the set number of lines per well is one.

1. Check your OpenWorks Command Menu to ensure that the project and interpreter you created in Chapter 2 are attached. If they are not, use **Project > Project Status** to make them so.

2. Before you import the file, examine it in WOW software, (you could also use any text editor to view this file).

   - Open your internet browser and type your machine name into the address line: `http://<your machine name here>/`

   - Click **Other Data** in the left pane, and then **GDM_DATA**.

   - Click **well_oneline.dat**.

   - Examine the file. The chart below explains items in the file:

Start Position	Length	Item Alias
1	12	UWI
14	14	Well Name
33	8	Well Name Suffix
41	5	Operator Number
46	8	Bottom Field Code Name
54	8	Spud Date (YYYYMMDD)
62	10	Bottom Lease Number
72	5	RKB Elevation
77	5	Borehole Total Measured Depth
82	5	True Vertical
87	5	Surface N/S Distance
92	1	Surface N/S Code
93	5	Surface E/W Distance

Start Position	Length	Item Alias
98	1	Surface E/W Code
99	2	Surface Area
101	6	Surface Block
107	5	Bottom N/S Distance
112	1	Bottom N/S Code
113	5	Bottom E/W Distance
118	1	Bottom E/W Code
119	2	Bottom Area Code
121	6	Bottom Block Number
127	8	Total Depth Date (YYYYMMDD)
135	8	Status Date (YYYYMMDD)
143	1	Type Code
144	2	District Code
146	3	Status Code
149	5	Water Depth
154	16	Surface Longitude
170	16	Surface Latitude
186	16	Bottom Longitude
202	16	Bottom Latitude

3. Select **Data > Import > Well Import (Classic)** from the OpenWorks Command menu.

   If the session measurement system has not already been set, a Select Measurement Systems dialog box displays. Select **US Oil Field** from the list of available systems.

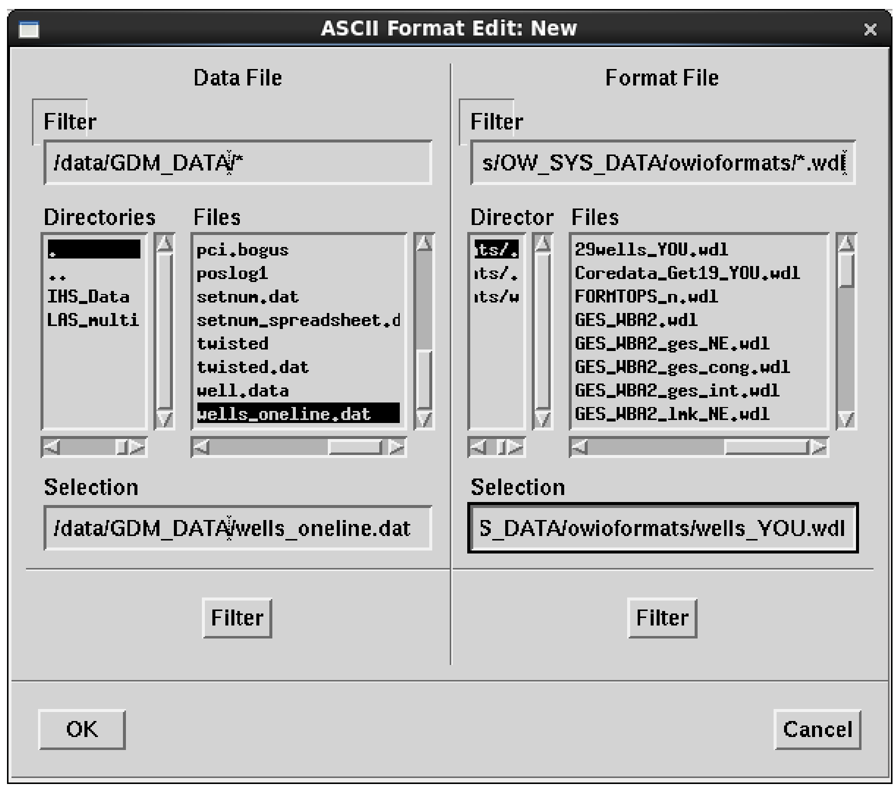
4. From the ASCII Loader window, select **Edit > Format**. The ASCII Format Edit window displays.

5. Select **Format > New** from the Format Edit window.

   The ASCII Format Edit: New dialog box displays.

6. The Data File name for this exercise is `wells_oneline.dat`. Your instructor will tell you where this file is located. Make sure this data file is selected from the left side of the dialog box.

7. Name the Format File ***`wells_your initials`*****`.wdl`**, and write it to the default directory.

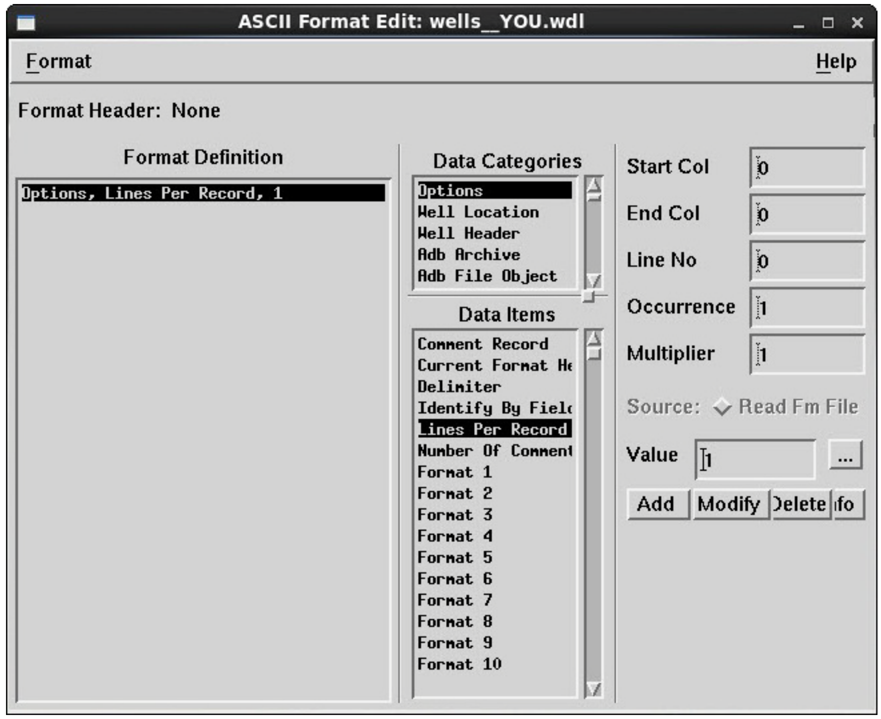


8. Click **OK**, and the Data Previewer window displays.

9. Use the scroll bars in the *Data Previewer* window and/or the FilePosition option to examine the loaded data file. Look for patterns to the data structure that are consistent for each well. Do not close the *Data Previewer* window.

10. Select **Options** from Data Categories and **Lines Per Record** from Data Items.

11. Toggle Constant **ON** and type `1` in the Value field. Click **Add** to add this to your Format Definition.



12. The following table shows the positions of the Data Items in the Well Header Category. You can use the **FilePosition > Show Position** option in the Data Previewer to move to the specific positions indicated. (For example, to find the beginning of the Y Coordinate, set Show Position to Line 1, Column 176.)

Data Category	Data Items	Start Column	End Column	Line Number
Well Header	UWI, R	1	12	1
	Common Well Name	14	28	1
	Well Operator	41	45	1
	Elevation	72	76	1
	Total Depth	77	81	1
	Current Status	146	148	1
	Orig X or Lon Sf	159	168	1
	Orig Y or Lat Sf	176	184	1

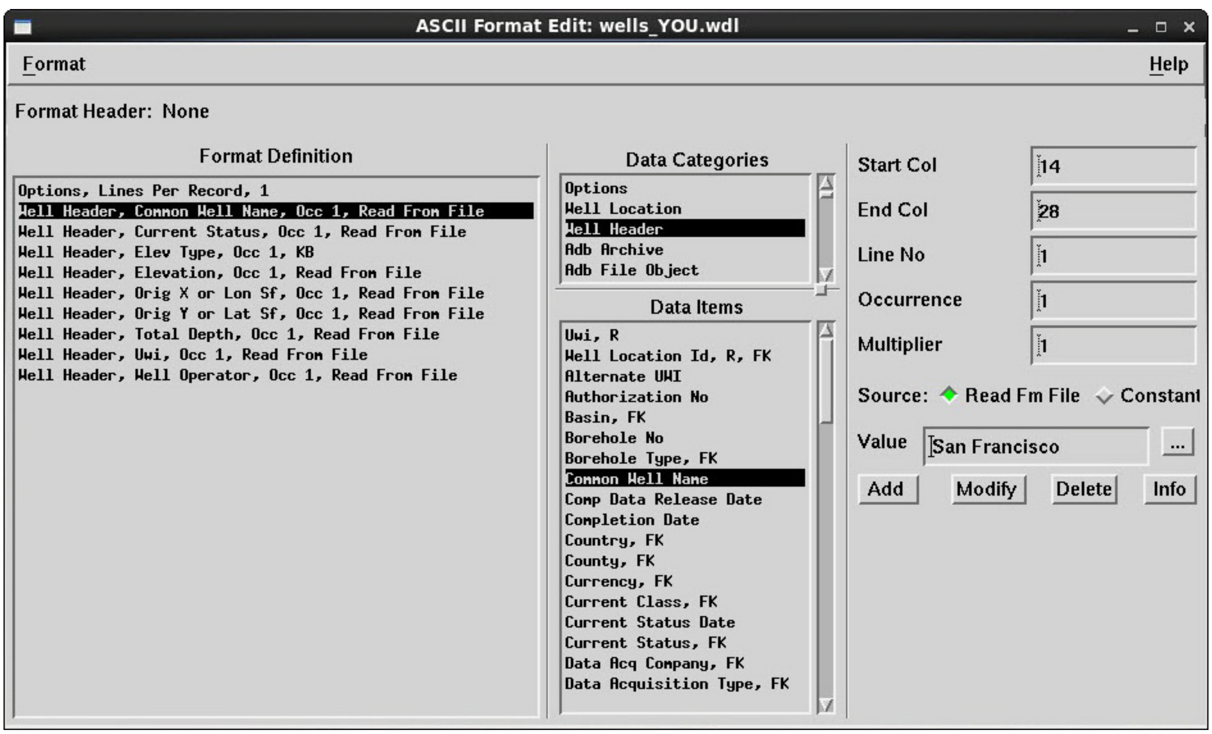
Note

The data item Orig X Lon refers to either an x or longitude value. The data item Orig Y Lat refers to either a y or latitude value. You enter the appropriate X/Longitude or Y/Latitude values, as required by the CRS.

13. Select **Well Header** from the Data Categories list and **Elev Type** from the Data Items list. Then set the Source value to **Constant**, click the **Valid Values** (...) button, and select **KB** from the list.
14. Click **Add** to add the entry.

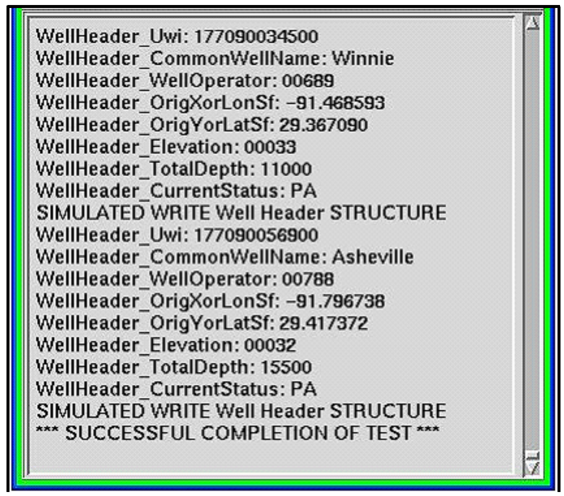
    Continue making appropriate selections to reflect the choices in the ASCII Format Edit window, as shown in the following illustration.

    Use Source: Read from File in every case. For example, to identify the file position of the Current Status code, use **FilePosition > Show Position** in the Data Previewer to go to Line 1, Column 146 (per table on previous page) and drag the mouse to highlight the correct range of columns (146-148). This places the correct values (146, 148, and TA, respectively) in the Start Col, End Col, and Value fields in the ASCII Format Editor window. Then select **Well Header** under Data Categories and **Current Status** in the Data Items list, and click **Add**.



15. When finished identifying all the fields in the well data file, select **Format > Save** (needed) in the ASCII Format Edit window and select **Yes** to save your completed format definition.

16. Select **Format > Test** in the ASCII Format Edit window to make sure the data will load correctly. Select **Start** from the Test menu to begin the test. After the test, click **Stop** and then **Close**.

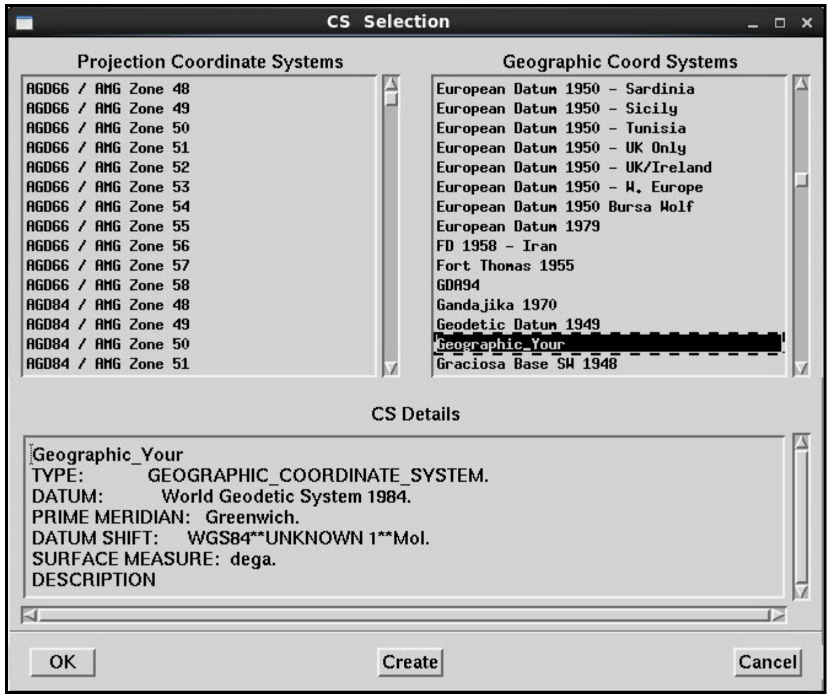


17. In the ASCII Loader window, make sure the correct Input File and Format inputs are selected. Set Measurement System to **US Oil Field**. Set the Depth Units to **Feet**, and the Depth Mode to **MD**.

18. Since the original units of the data are latitude/longitude, you must select the appropriate geographic coordinate system to use when loading the data. Upon import, the data will be converted to the project CRS (`STexas_Your`).

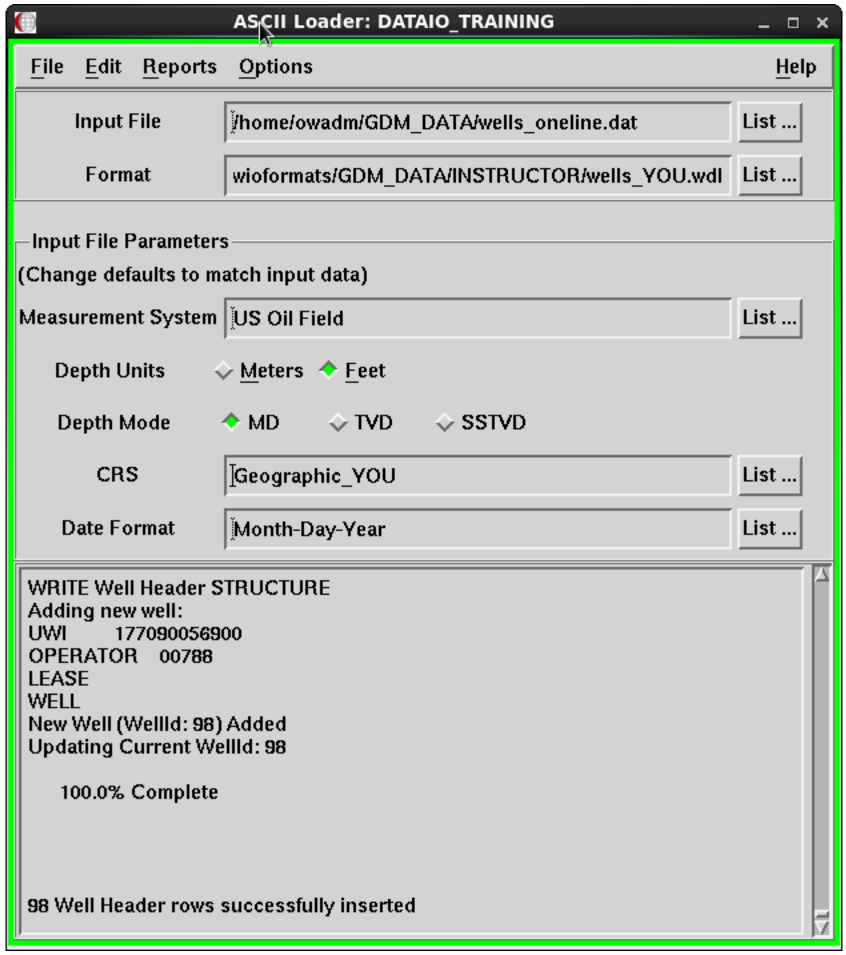
    - Select the **List** button beside CRS.

- When the CS Selection dialog box displays, select the Geographic Coordinate System **Geographic_*your initials***.



- Click **OK**.

19. Select **File > Load** from the ASCII Loader window and, when prompted, click **OK** to load the data.

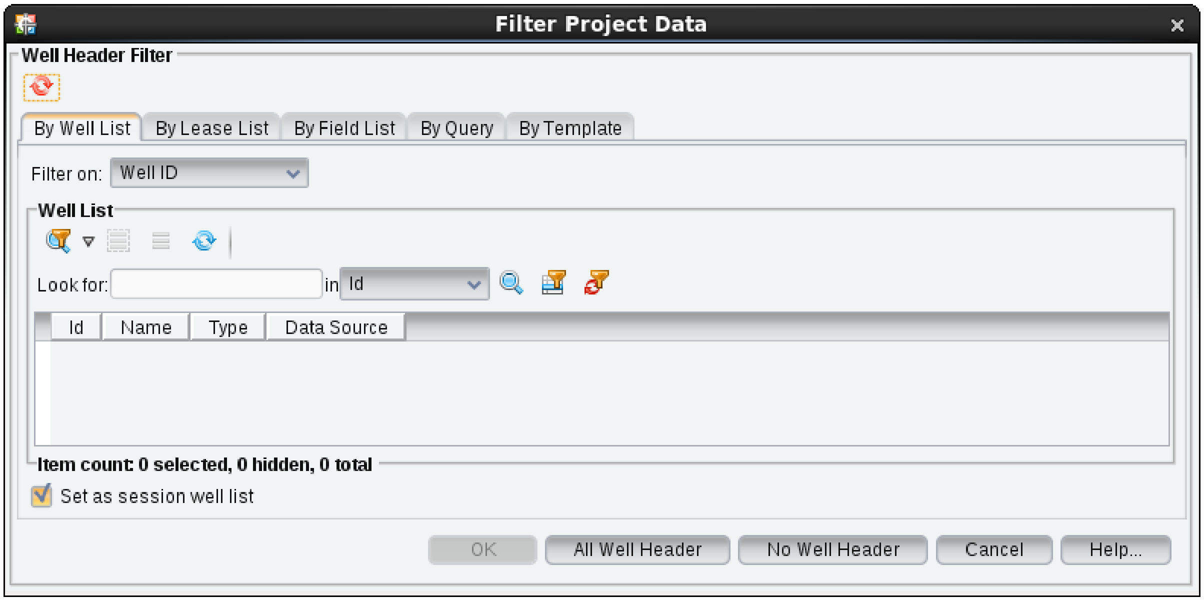


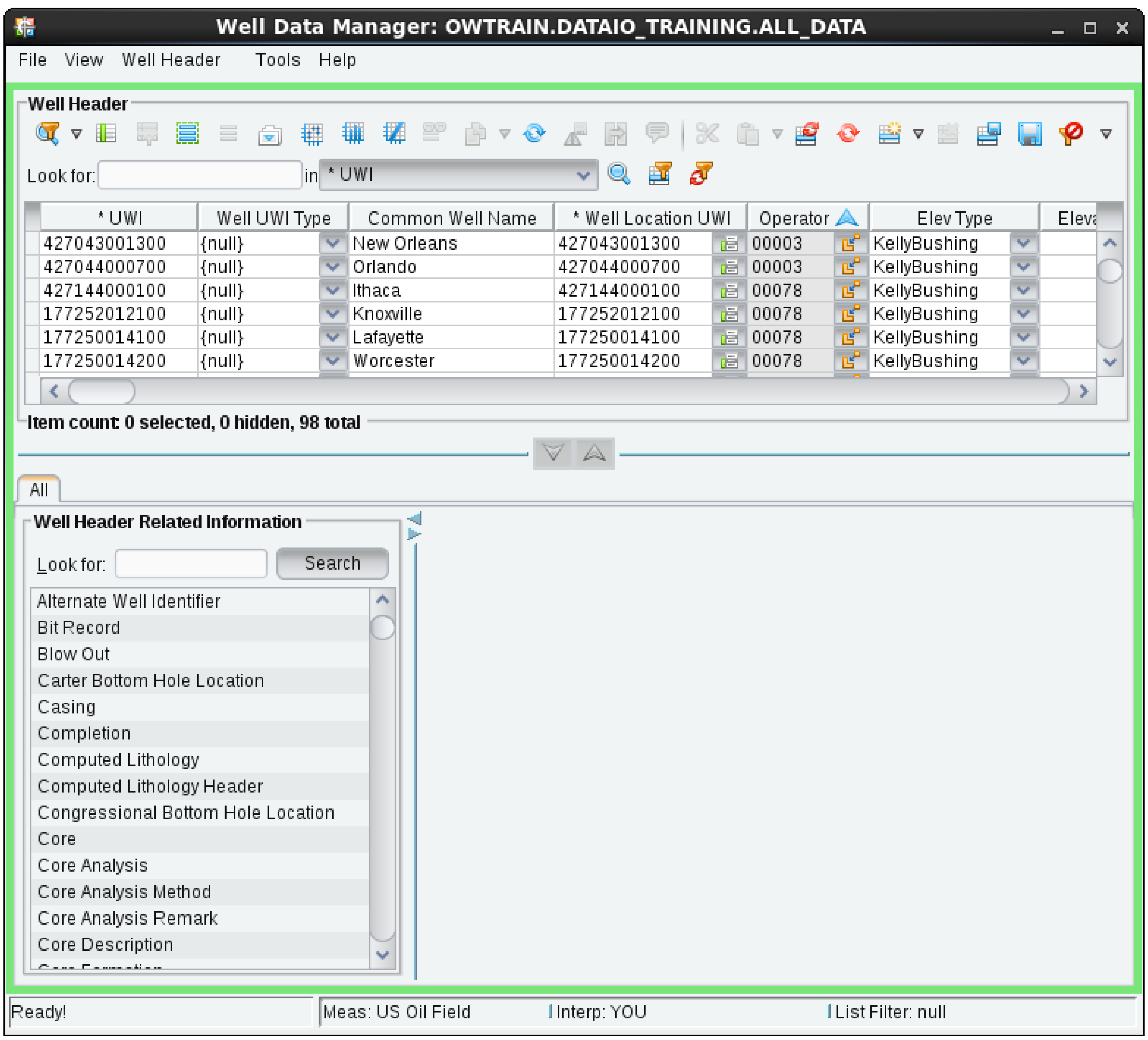
Note that the information in the Status Area of the ASCII Loader dialog box shows all the fields for the loaded wells.

Recall that the New Well ID is a computer-generated number used for internal reference only. It is not related to UWI.

20. Verify that your wells were loaded correctly using both Well Data Manager and WOW software:

    - Open Well Data Manager (**Data > Management > Well Data Manager**). On the filter window select **All Well Header**.


Filter Project Data
Well Header Filter
By Well List
By Lease List
By Field List
By Query
By Template
Filter on: Well ID
Well List
Look for:
in Id
Id
Name
Type
Data Source
Item count: 0 selected, 0 hidden, 0 total
Set as session well list
OK
All Well Header
No Well Header
Cancel
Help...

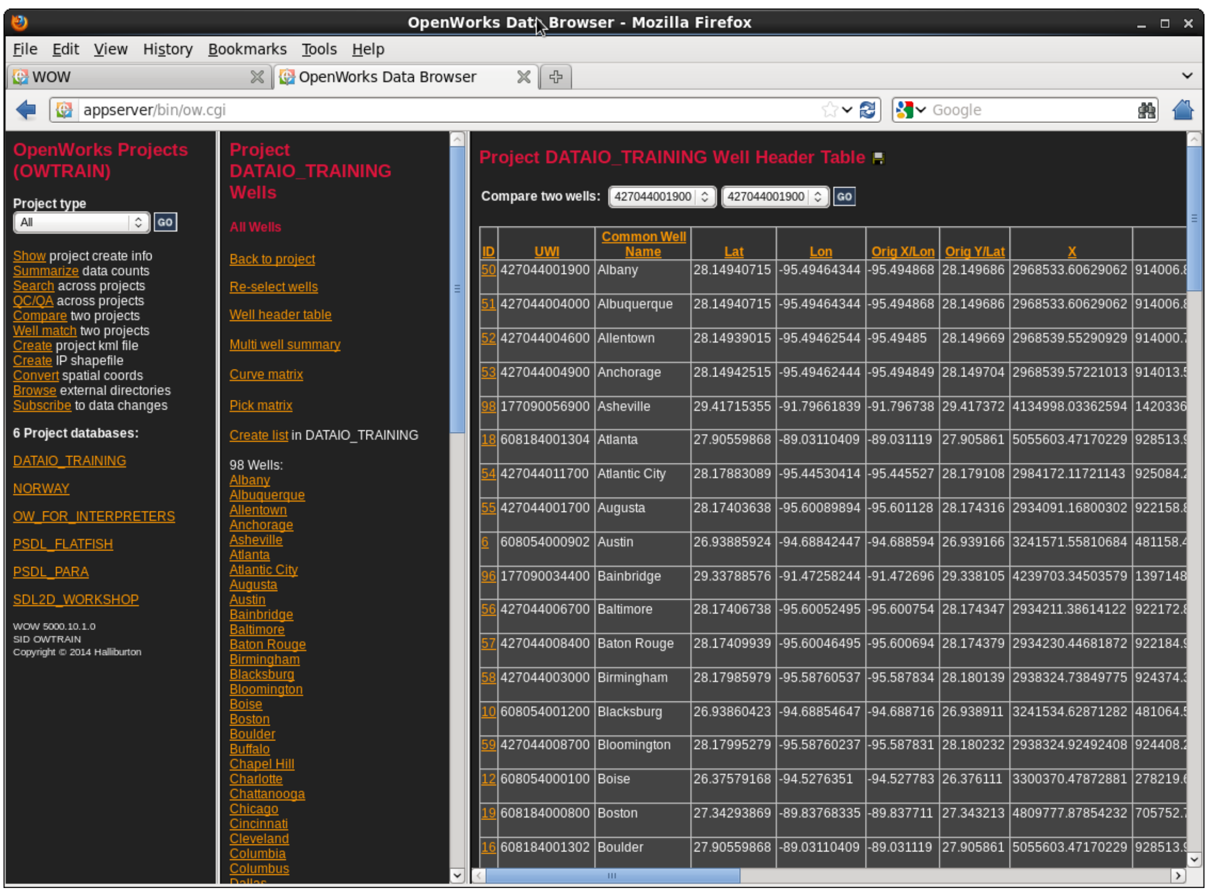

Well Data Manager: OWTRAIN.DATAIO_TRAINING.ALL_DATA
File
View
Well Header
Tools
Help
Well Header
Look for:
in * UWI
* UWI
Well UWI Type
Common Well Name
* Well Location UWI
Operator
Elev Type
427043001300 {null} New Orleans 427043001300 00003 KellyBushing
427044000700 {null} Orlando 427044000700 00003 KellyBushing
427144000100 {null} Ithaca 427144000100 00078 KellyBushing
177252012100 {null} Knoxville 177252012100 00078 KellyBushing
177250014100 {null} Lafayette 177250014100 00078 KellyBushing
177250014200 {null} Worcester 177250014200 00078 KellyBushing
Item count: 0 selected, 0 hidden, 98 total
All
Well Header Related Information
Look for:
Search
Alternate Well Identifier
Bit Record
Blow Out
Carter Bottom Hole Location
Casing
Completion
Computed Lithology
Computed Lithology Header
Congressional Bottom Hole Location
Core
Core Analysis
Core Analysis Method
Core Analysis Remark
Core Description
Ready!
Meas: US Oil Field
Interp: YOU
List Filter: null

Notice that the latitude/longitude coordinates have been converted to x/y coordinates for use with this OpenWorks project.

- Select **File > Exit** to close the Well Data Manager.

For WOW software, enter `http://<your machine name here>/` in your browser window.

- Click **OpenWorks** in the left pane of the WOW software main menu.
- Click **DATAIO_TRAINING** in the middle pane of the WOW software main window.
- In the Main Data table, next to Wells, click **98**.
- In the `DATAIO_TRAINING` Wells list, click **Well Header Table**.

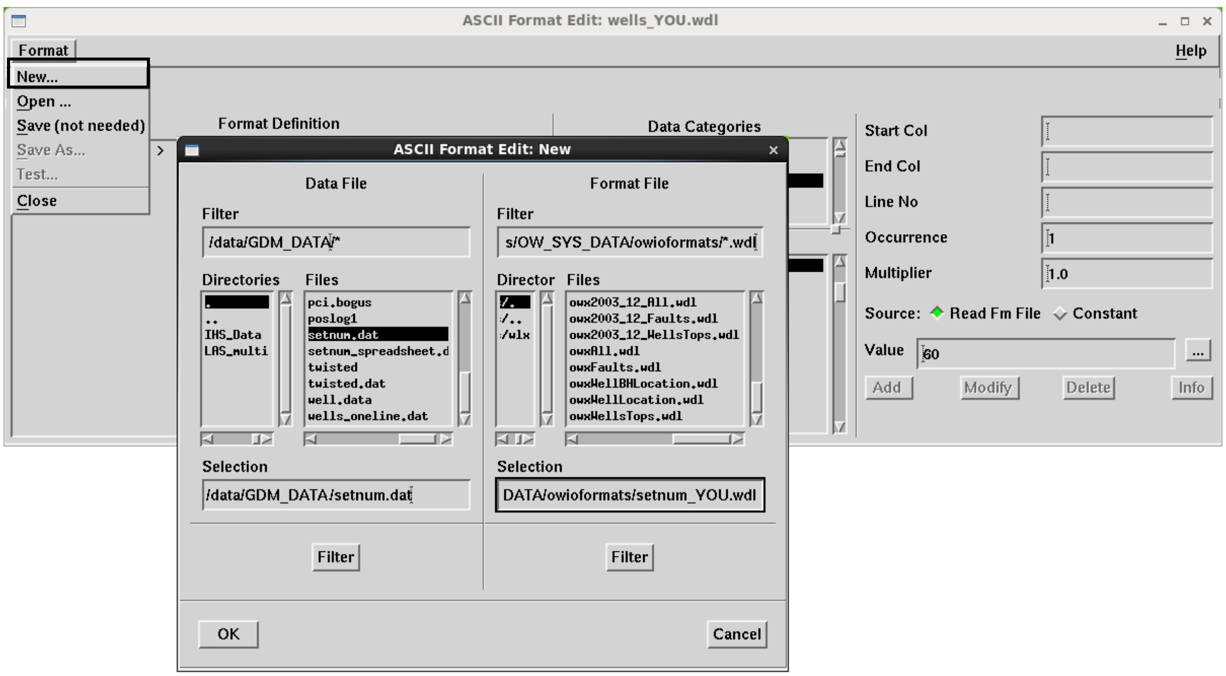


Exercise 3-2. Load Well Data - Set Number Lines/ Well

This exercise shows how to load a well data file with a set number of lines per record or well. The process is very similar to the previous exercise where you loaded data with one line per record. Your instructor will tell you where the files are located.

1. Select **Format > New** from the *Format Edit* window.

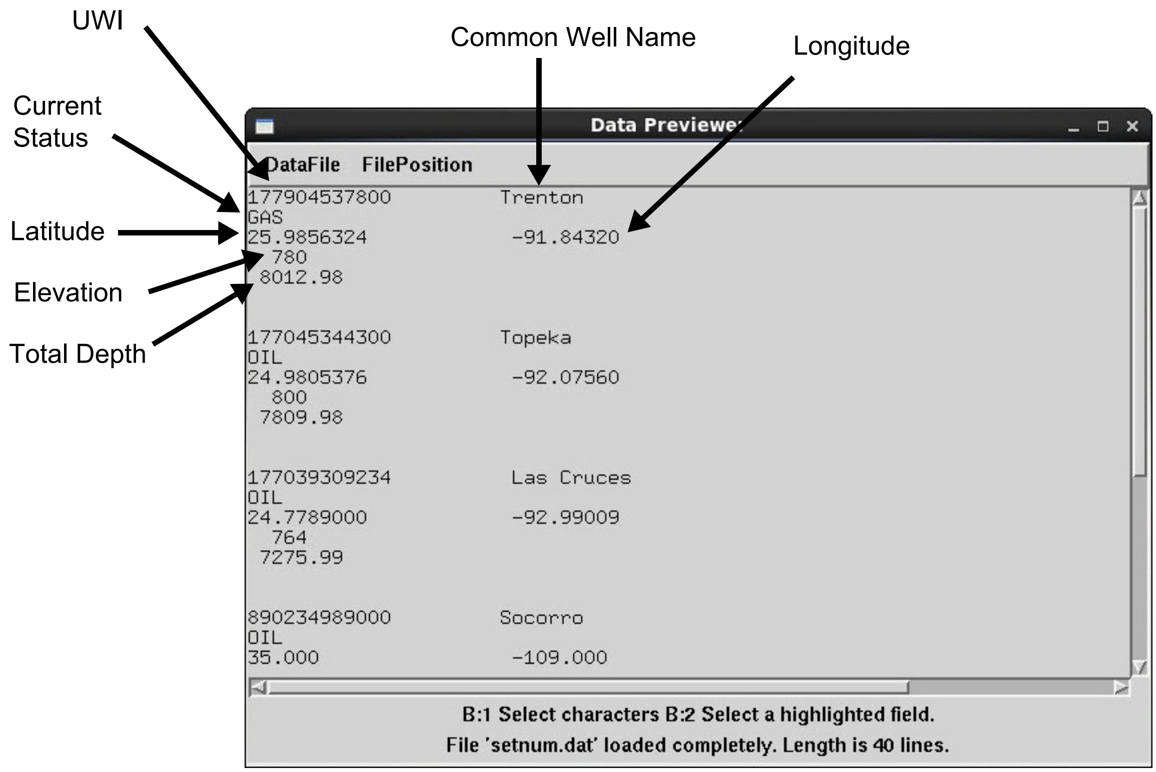
   The *ASCII Format Edit:New* dialog box displays.



2. The Data File name for this exercise is `setnum.dat`. Your instructor will tell you where this file is located. Make sure this data file is selected from the left side of the dialog box.

   Name the Format File `setnum_your initials.wdl`, and write it to the default directory.

3. Click **OK**, and the Data Previewer window displays.



To view this data file in WOW software:

- Enter `http://<your machine name here>/` in your browser window.
- Click **Other Data** in the left pane of the WOW software main window.
- Click **/data** and then load in the middle pane.
- Click **setnum.dat**.

4. Use the scroll bars in the Data Previewer window and/or the FilePosition option to examine the loaded data file. Look for patterns to the data structure that are consistent for each well.

5. To describe your data and build your format file, follow the steps shown in the previous exercise. (Refer to section titled "Load Well Data – One Line Per Record" on page 3-45.)

The first step is to use the Options Data Category to indicate that this file contains a constant five lines per well.

The table below shows the positions of the Data Items in the Well Header Category. You can use the **FilePosition > Show Position** option to move to the specific positions indicated.

Highlight each example of data in the Data Previewer window based on the column/line specifications in the following table, then Add it to the Format Definition list in the ASCII Format Edit window.

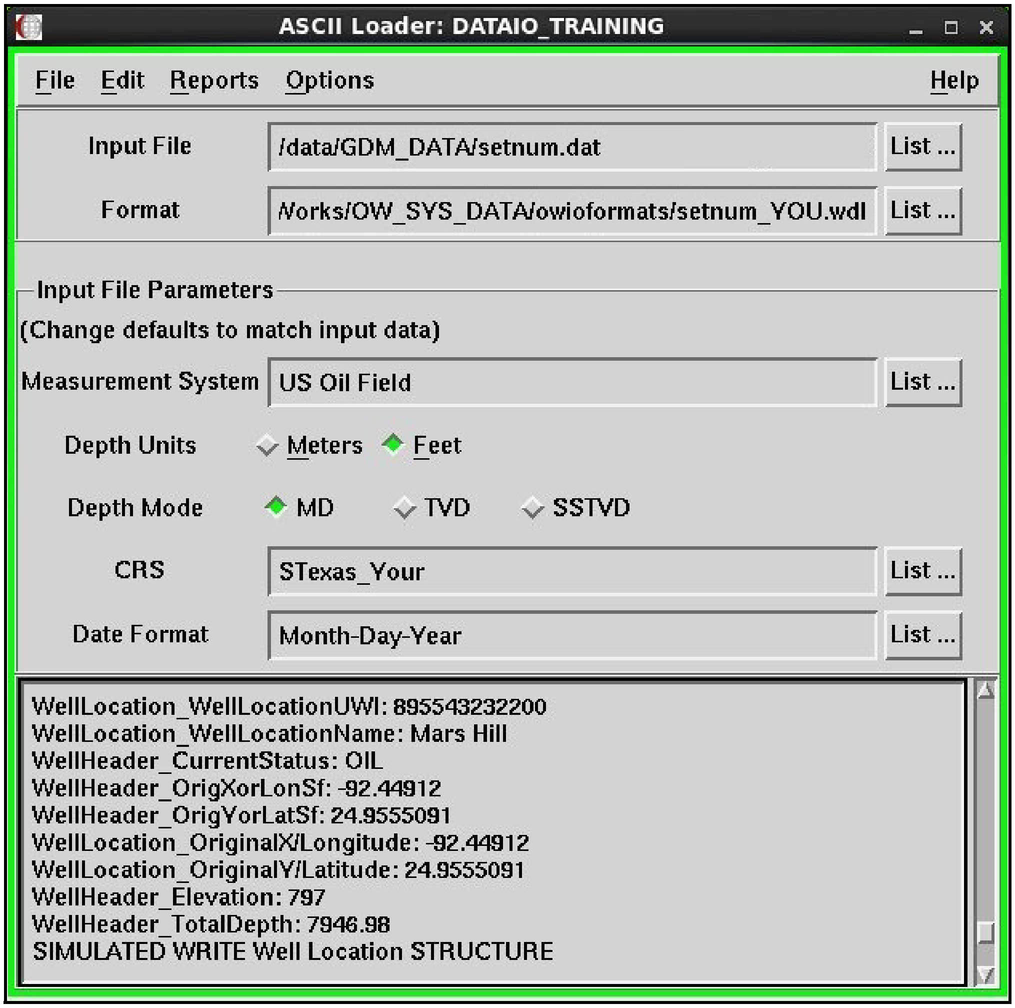
Data Categories	Data Items	Line Number	Start Column	End Column
Well Header	UWI, R	1	1	12
	Common Well Name	1	22	41
	Current Status	2	1	4
	Elev Type	Set Constant Value to “KB”		
	Elevation	4	2	5
	Orig Y or Lat Sf	3	1	10
	Orig X or Lon Sf	3	22	31
	Well Operator	Set Constant Value to “Landmark Graphics”		
	Total Depth	5	1	8
Well Location	Well Location Name	1	22	41
	Well Location UWI, R	1	1	12
	Original Y/Latitude	3	1	10
	Original X/Longitude	3	22	31
	Well UWI Type	Set Constant Value to “API”		

In cases where there is a constant value to be entered, you can select from a list of acceptable options by clicking on the Valid Values button (**...**). This method works for Elev Type in the example above, but you may need to key in the Well Operator if the value you want to use does not exist in the list.

6. Select **Format > Save** (needed) in the ASCII Format Edit window to save your completed format definition. Click **Yes** to save changes to the format.

7. Select **Format > Test** in the ASCII Format Edit window to make sure the data will load correctly. Select **Start** from the Test menu to begin the test. After the test, click **Stop** and then **Close**.

   Check the information in the Status Area at the bottom of the ASCII Loader window.



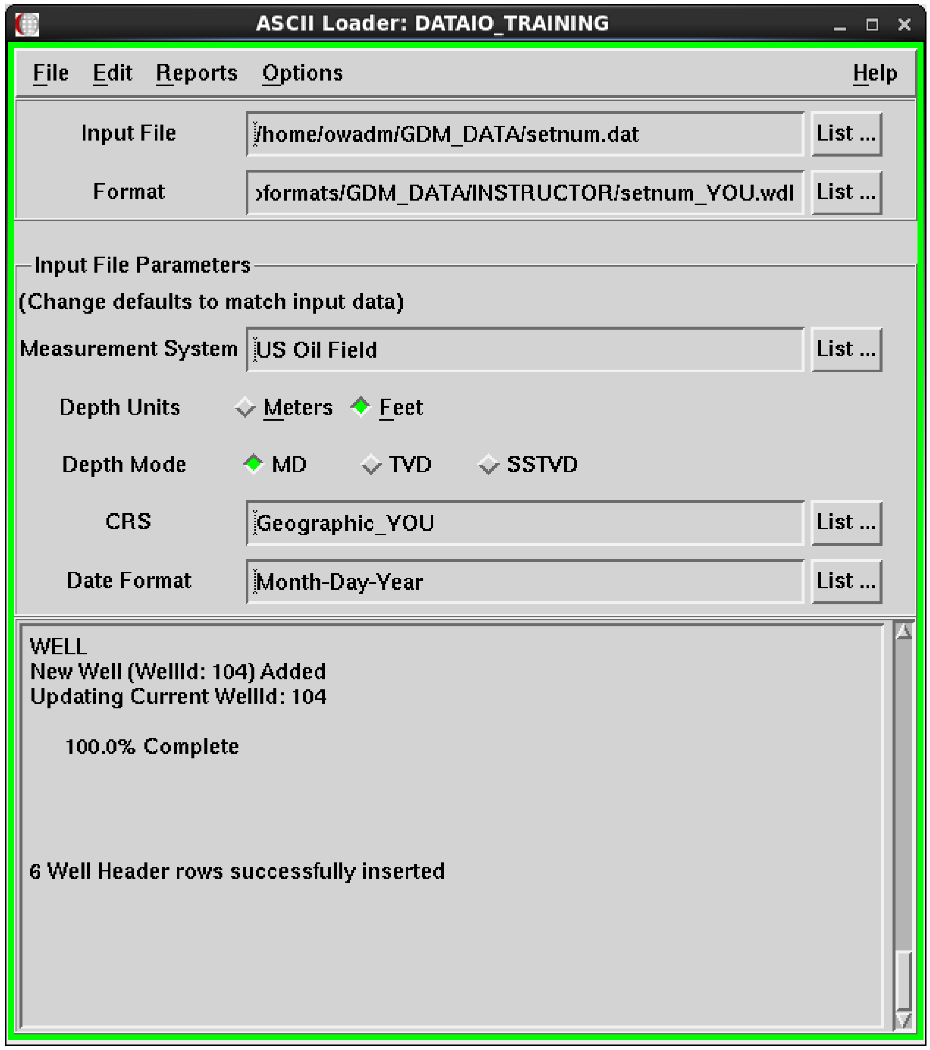
8. Make sure the correct Input File and Format inputs are selected.

9. Set the Depth Units to **Feet**, and the Depth Mode to **MD**.

10. Set the CRS to Geographic*_your initials*.

11. Accept the default US Oil Field Measurement System.

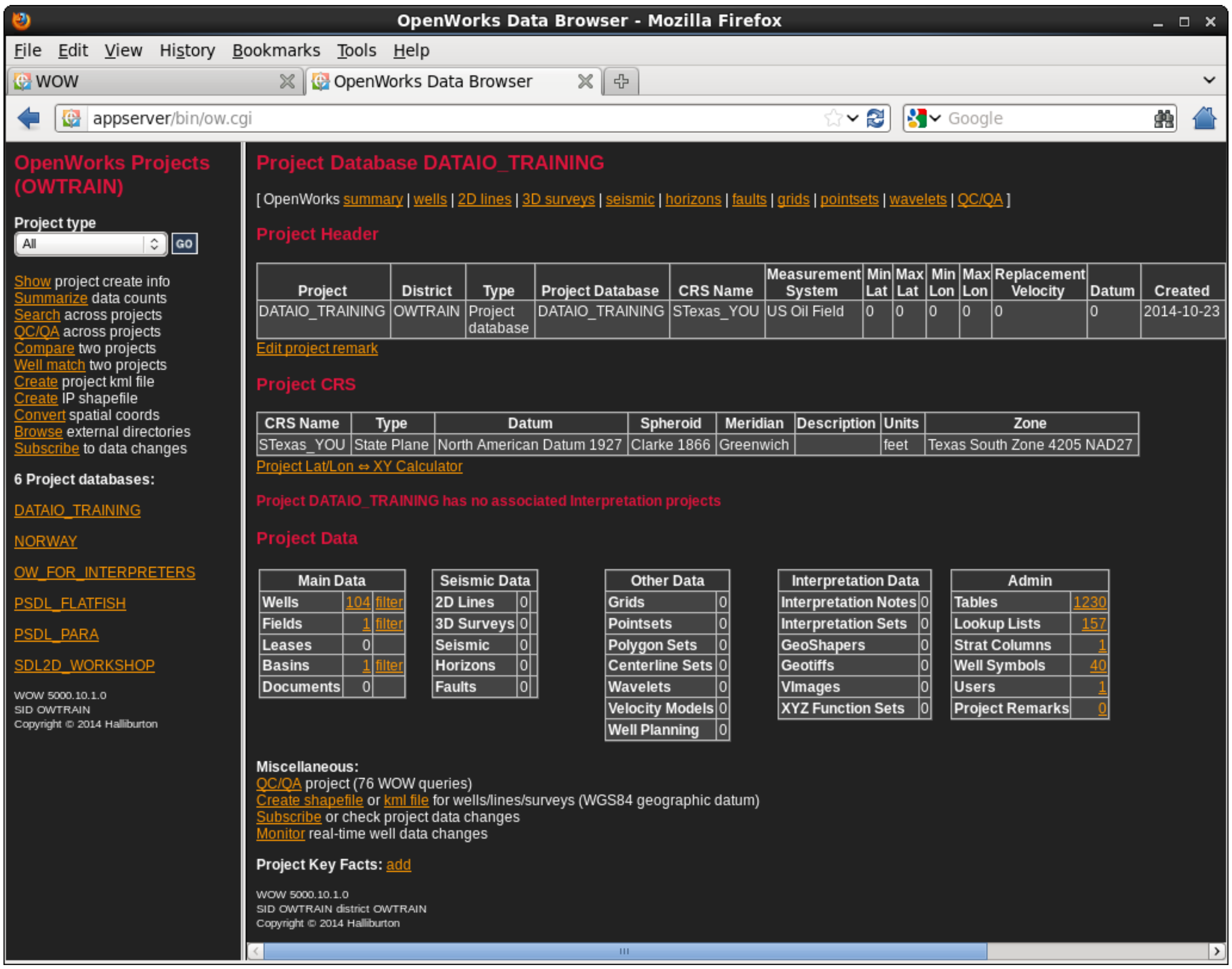
12. Select **File > Load** from the ASCII Loader window and, when prompted, click **OK** to begin loading the data into the OpenWorks database.



Note that the information in the Status Area of the ASCII Loader dialog box shows all the fields for the loaded wells. Wellid is a computer generated number used for internal reference only. It is not related to UWI.

13. Open WOW software and confirm that the number of wells for `DATAIO_TRAINING` increased from 98 to 104:

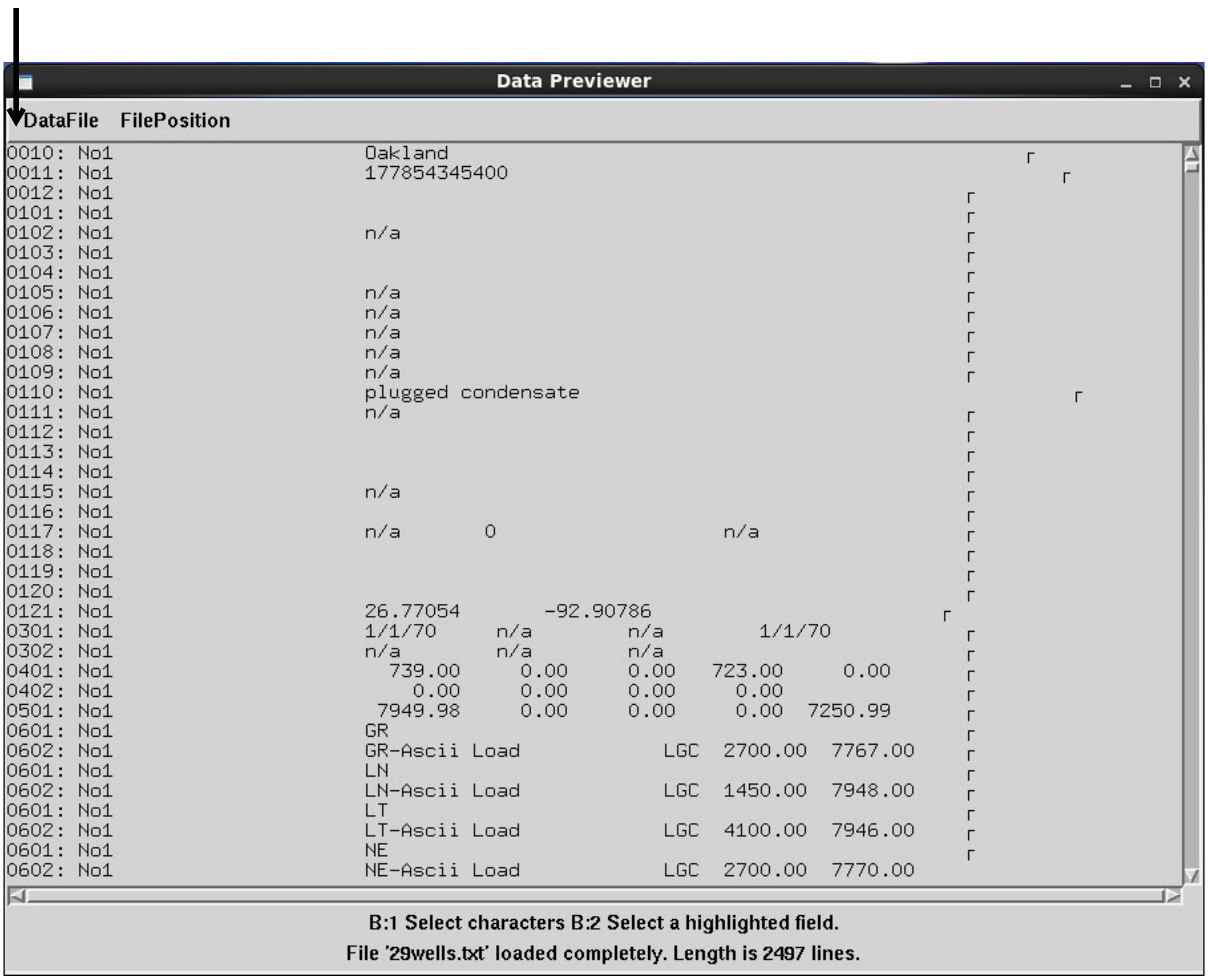
    - Enter `http://<your machine name here>/` in your browser window.
    - Click **OpenWorks** in the left pane of the WOW software main window.
    - Click **DATAIO_TRAINING** in the middle pane.



Loading Data with Variable Lines per Well

This section describes procedures for creating a format and loading a data file that has a variable number of lines per well. In this format, the loader treats each line as a record, so you use format flags to identify where each piece of information about a well begins and ends.

Format Flags/Tags



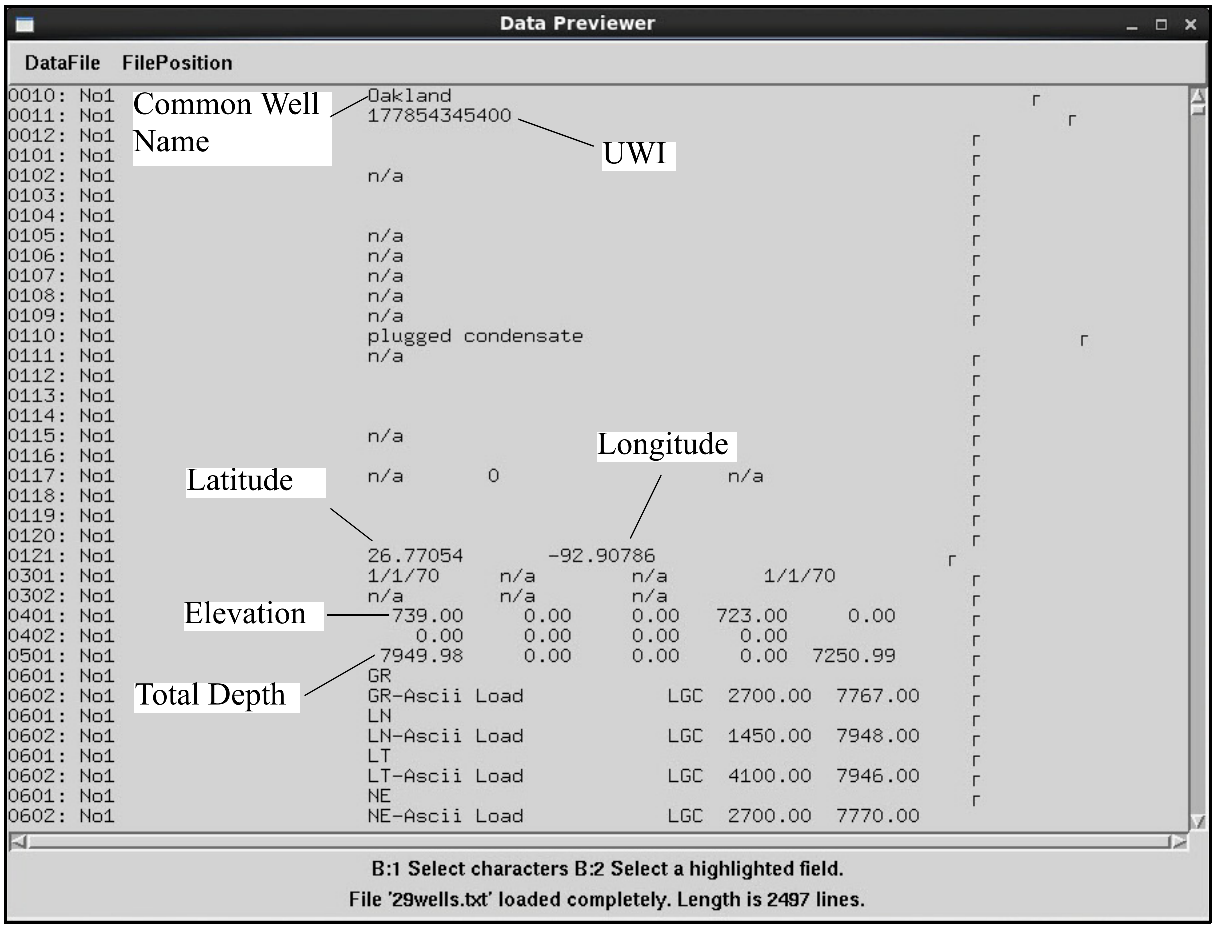
Overview of Procedure

To load a data file with a variable number of lines per well:

- Set the input parameters (Data File and Format File) just as you did for data with a set number of lines per well.
- Assign format flags to the data by working interactively between the ASCII Format Edit window and the Data Previewer.
- Build your format by describing the data, just as you did for data with a set number of lines per well.
- Test your format, and load the data.

Describing the Data

Data with a variable number of lines per well need format flags to identify the beginning and end of a well and variations in the data format. In the following example, data items such as UWI, Common Well Name, Latitude, Longitude, Elevation, and Total Depth identified by flags 0010, 0011, 0121, 0401, and 0501 respectively.



The above data file contains multiple format flags.

Regardless how many flags exist in your data file, you need only identify those flags on lines containing information you want to load.

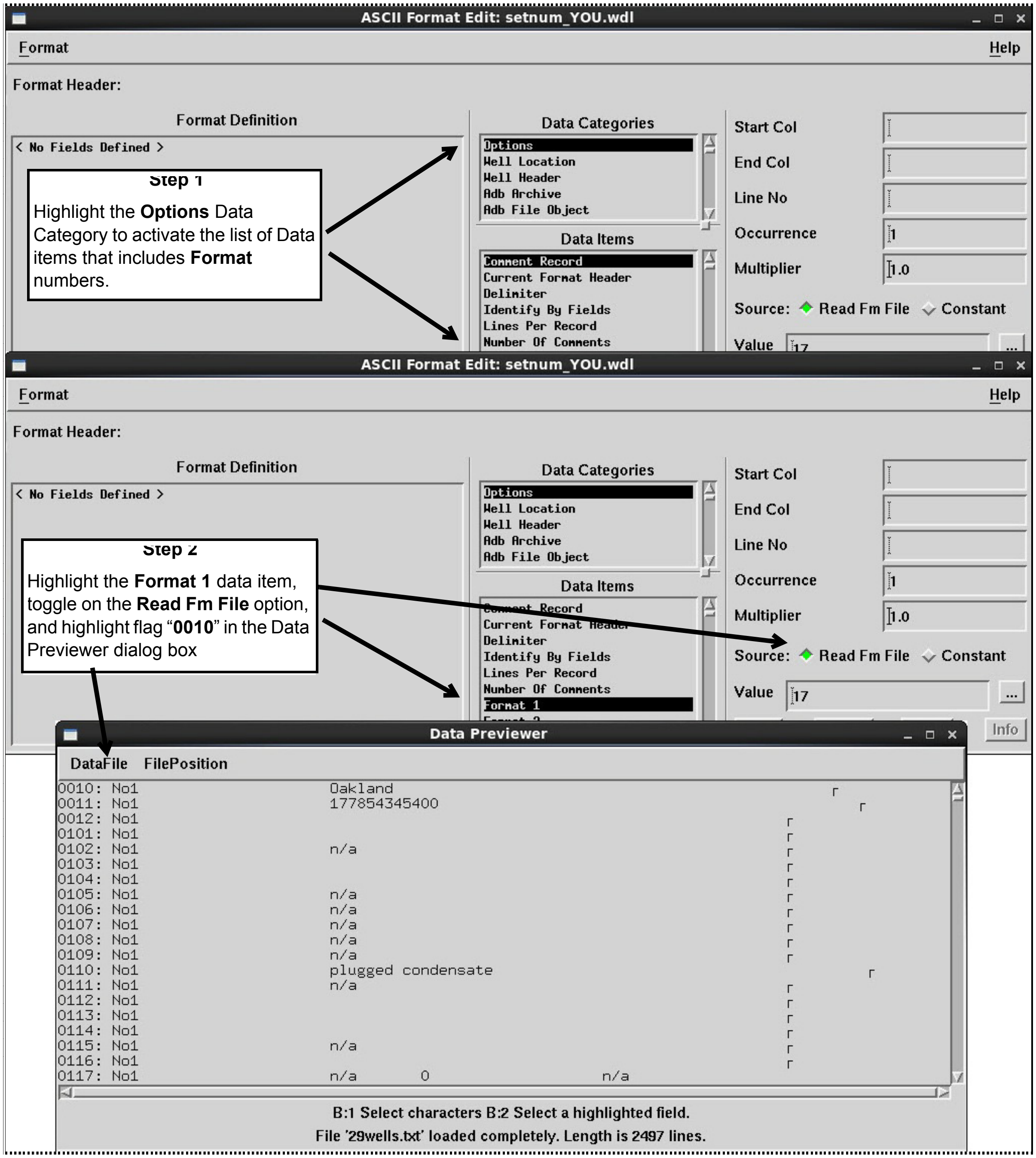
For example, to load the data labeled above, you would only need to identify format flags 0010, 0011, 0121, 0401, and 0501.

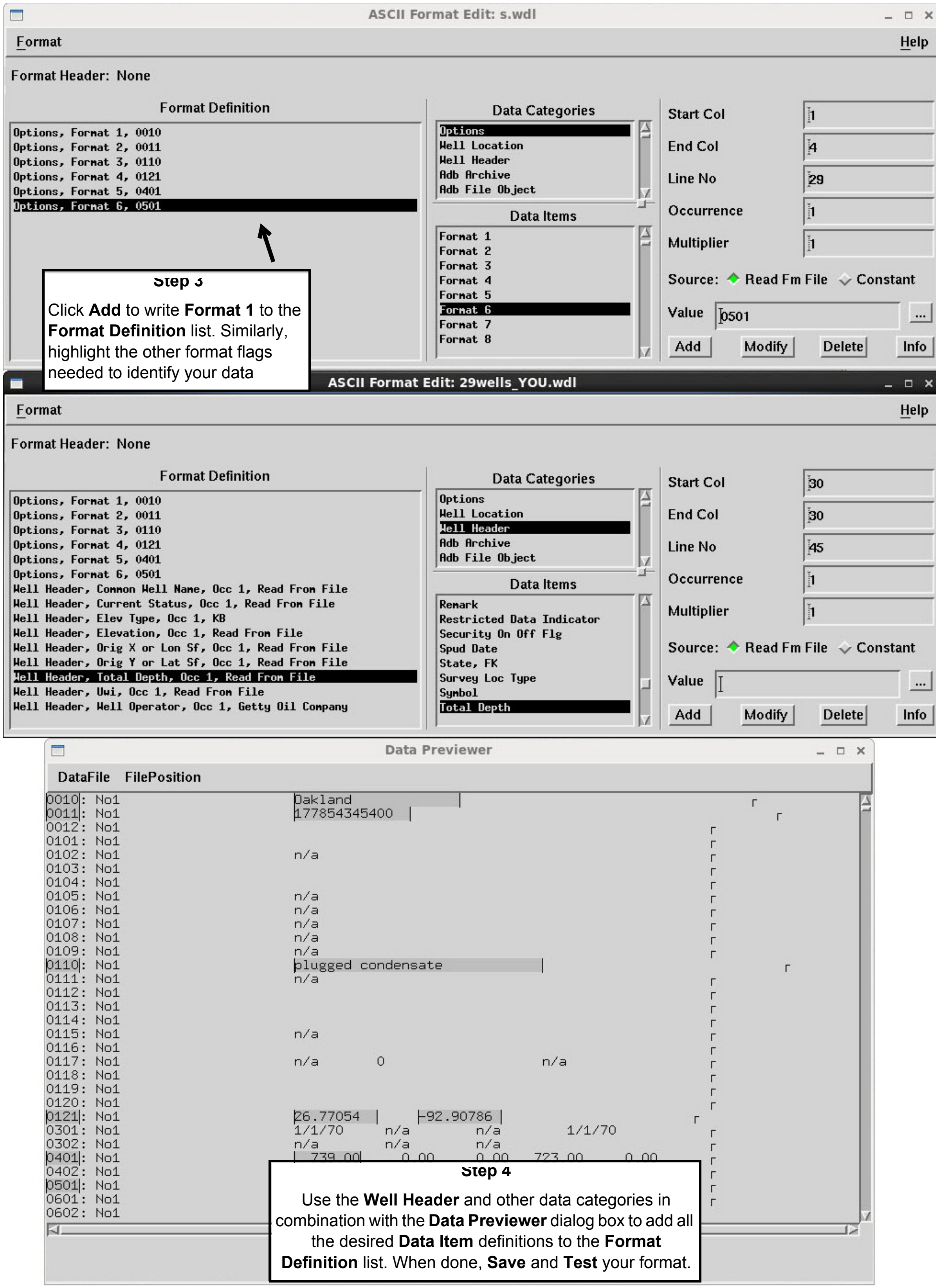
To start describing this, or any file, you would use the scroll bars or the FilePosition option in the Data Previewer window to examine the file and look for consistent patterns in the data or changes in field widths.

To indicate that this file contains a variable number of lines per well, you would use the Options Data Category, as shown in the following example. Then you would use the other Data Categories to describe the fields you want to load.

> **Note**
>
> The following diagrams are an example, not an exercise. The exercise for this section begins on page 3-67.

Example:


ASCII Format Edit: setnum_YOU.wdl
Format
Help
Format Header:
Format Definition
< No Fields Defined >
Step 1
Highlight the **Options** Data Category to activate the list of Data items that includes **Format** numbers.
Data Categories
Options
Well Location
Well Header
Adb Archive
Adb File Object
Data Items
Comment Record
Current Format Header
Delimiter
Identify By Fields
Lines Per Record
Number Of Comments
Start Col
End Col
Line No
Occurrence
1
Multiplier
1.0
Source: Read Fm File Constant
Value
17
ASCII Format Edit: setnum_YOU.wdl
Step 2
Highlight the **Format 1** data item, toggle on the **Read Fm File** option, and highlight flag "**0010**" in the Data Previewer dialog box
Format 1
Info
Data Previewer
DataFile FilePosition
0010: No1 Oakland
0011: No1 177854345400
0012: No1
0101: No1
0102: No1 n/a
0103: No1
0104: No1
0105: No1 n/a
0106: No1 n/a
0107: No1 n/a
0108: No1 n/a
0109: No1 n/a
0110: No1 plugged condensate
0111: No1 n/a
0112: No1
0113: No1
0114: No1
0115: No1 n/a
0116: No1
0117: No1 n/a 0 n/a
B:1 Select characters B:2 Select a highlighted field.
File '29wells.txt' loaded completely. Length is 2497 lines.


ASCII Format Edit: s.wdl
Step 3
Click **Add** to write **Format 1** to the **Format Definition** list. Similarly, highlight the other format flags needed to identify your data
ASCII Format Edit: 29wells_YOU.wdl
Data Previewer
Step 4
Use the **Well Header** and other data categories in combination with the **Data Previewer** dialog box to add all the desired **Data Item** definitions to the **Format Definition** list. When done, **Save** and **Test** your format.

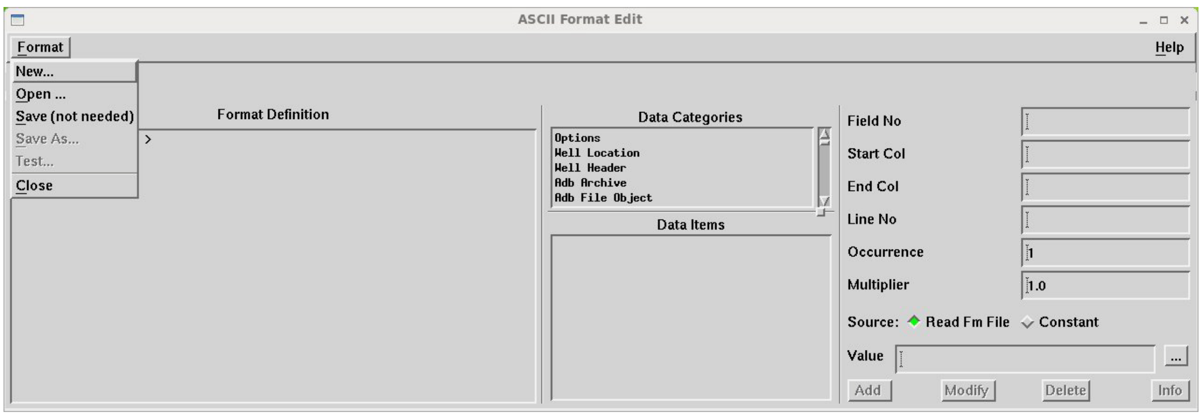
Exercise 3-3. Loading Data with Variable Lines per Well

In this exercise, you will use the same procedures explained on the previous pages to add wells to your project. The data file contains a variable number of lines per well, so you will need to use format flags.

You will use six format flags to import 11 data items.

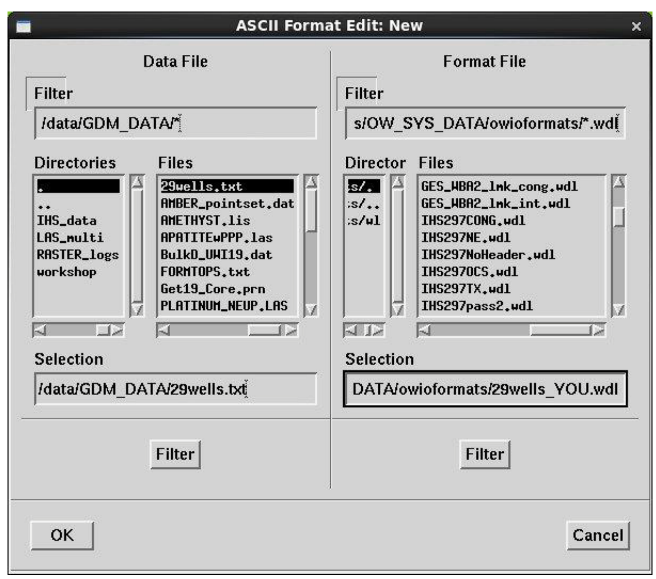
1. Select **Format > New** from the Format Edit window.

   The ASCII Format Edit:New dialog box displays.



2. The Data File name for this exercise is `29wells.txt`. Your instructor will tell you where this file is located. Make sure this data file is selected from the left side of the dialog box.

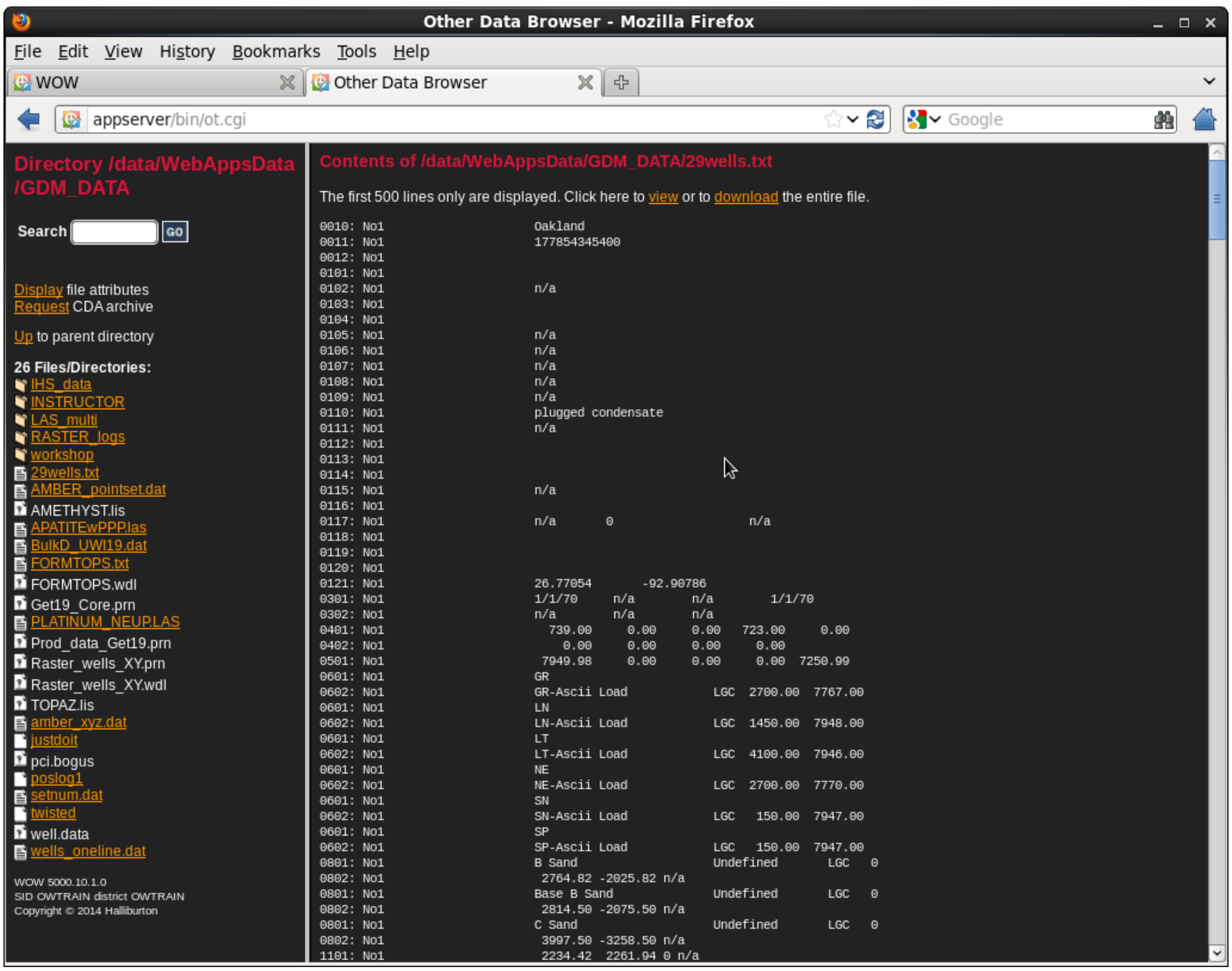
   Name the Format File `29wells_`*`your initials`*`.wdl` and write it to the default directory.



3. Click **OK** and the Data Previewer window displays.

   To view this data in WOW software:

   - Enter `http://<your machine name here>/` in your browser window.
   - Click **Other Data** in the left pane of the WOW software main window.
   - Click **GDM_Data** and then load in the middle pane.
   - Click **29wells.txt** in the middle pane.

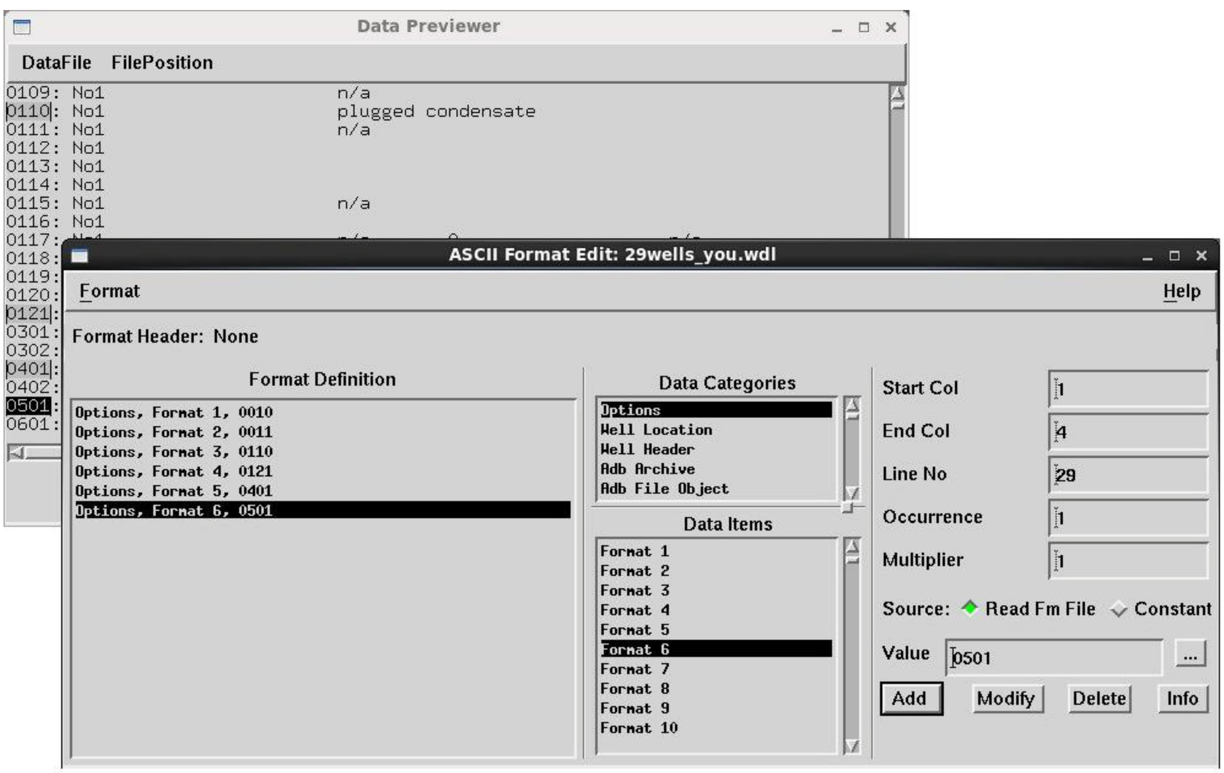


4. Use the scroll bars in the Data Previewer window and/or the FilePosition option to examine the loaded data file. Look for patterns to the data structure that are consistent for each well.

5. Select Options from Data Category list in the ASCII Format Edit window. Assign the six format flags indicated in the table below.

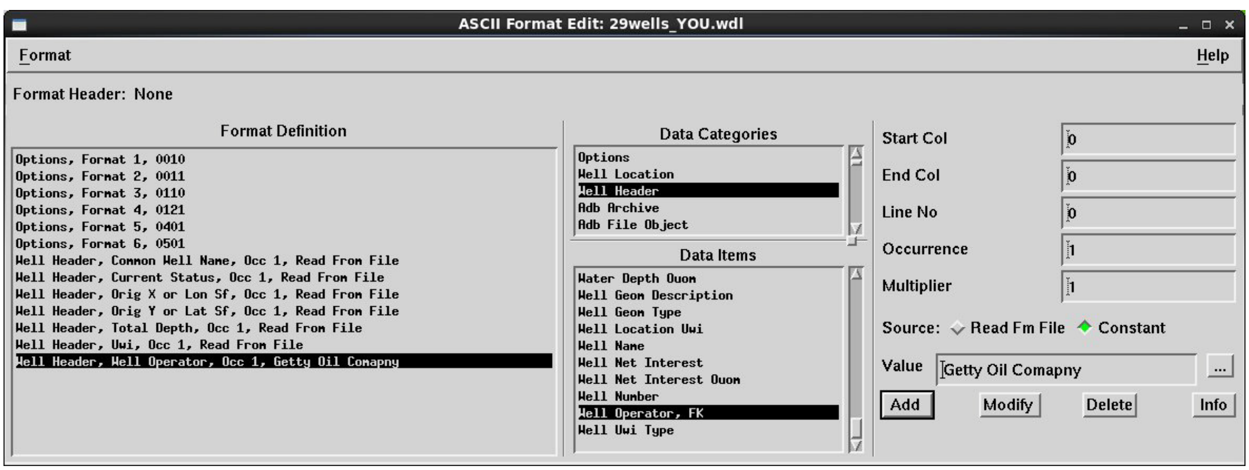
Data Category/Date Item	Format Flag
Options / Format 1	0010
Options / Format 2	0011
Options / Format 3	0110
Options / Format 4	0121
Options / Format 5	0401
Options / Format 6	0501

When done, your Data Previewer and ASCII Format Edit window should look much like this.



6. Use the Well Header Data Category to format the fields shown in the table below. You may find it helpful to use **FilePosition > Show Position** in the Data Previewer window to move to the specified positions.

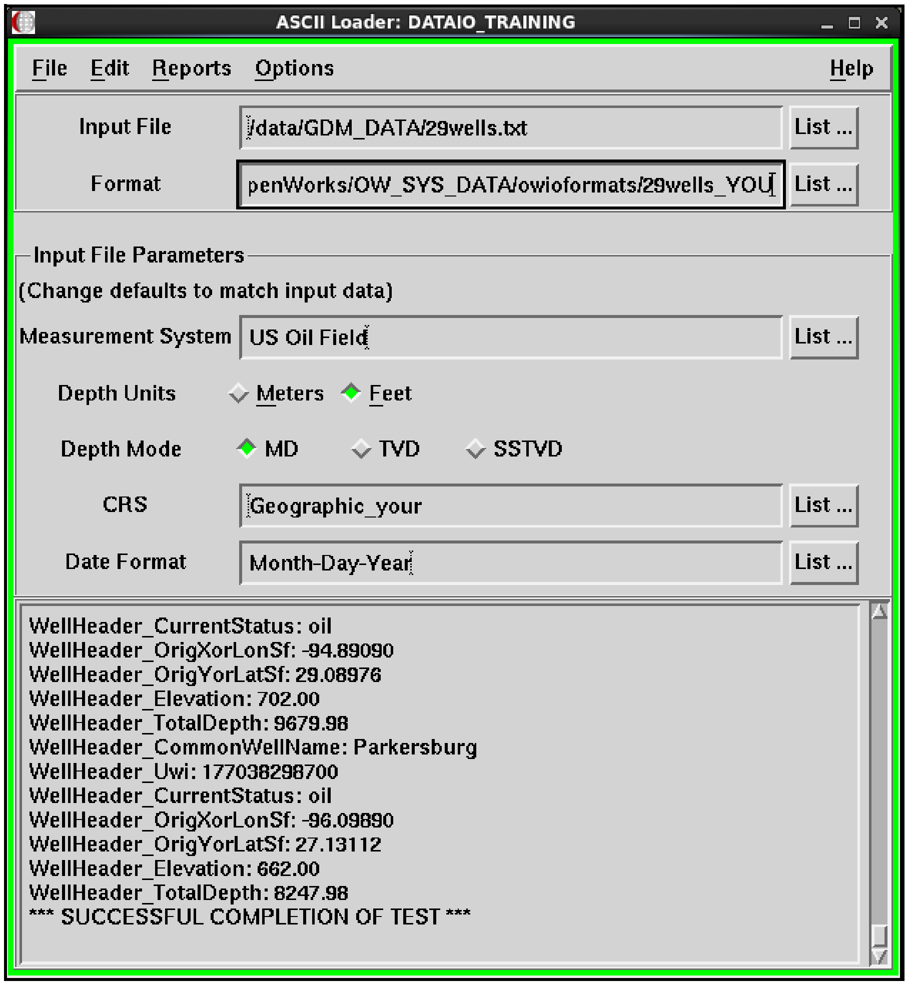
Format Flag	Data Item	Start Col	End Col	Line No
0010	Common Well Name	31	50	1
0011	UWI, R	31	44	2
0110	Current Status	31	60	13
0121	Orig Y or Lat Sf	31	40	24
0121	Orig X or Lon Sf	46	55	24
0401	Elevation	31	38	27
0501	Total Depth	31	38	29
	Elev Type	Constant Value = “KB”		
	Well Operator	Constant Value = “Getty Oil Company”		



7. Select **Format > Save** (needed) in the ASCII Format Edit window to save your completed format definition. Select **Yes** to save changes to the format.

8. Select **Format > Test** in the ASCII Format Edit window to make sure the data will load correctly. Select **Start** from the Test menu to begin the test. After the test, click **Stop**, and then click **Close**.

   Check the information in the Status Area at the bottom of the ASCII Loader window.



9. Make sure the correct File and Format inputs are selected, and that Measurement System is set to **US Oil Field**.

10. Set the Depth Units to **Feet**, and the Depth Mode to **MD**.

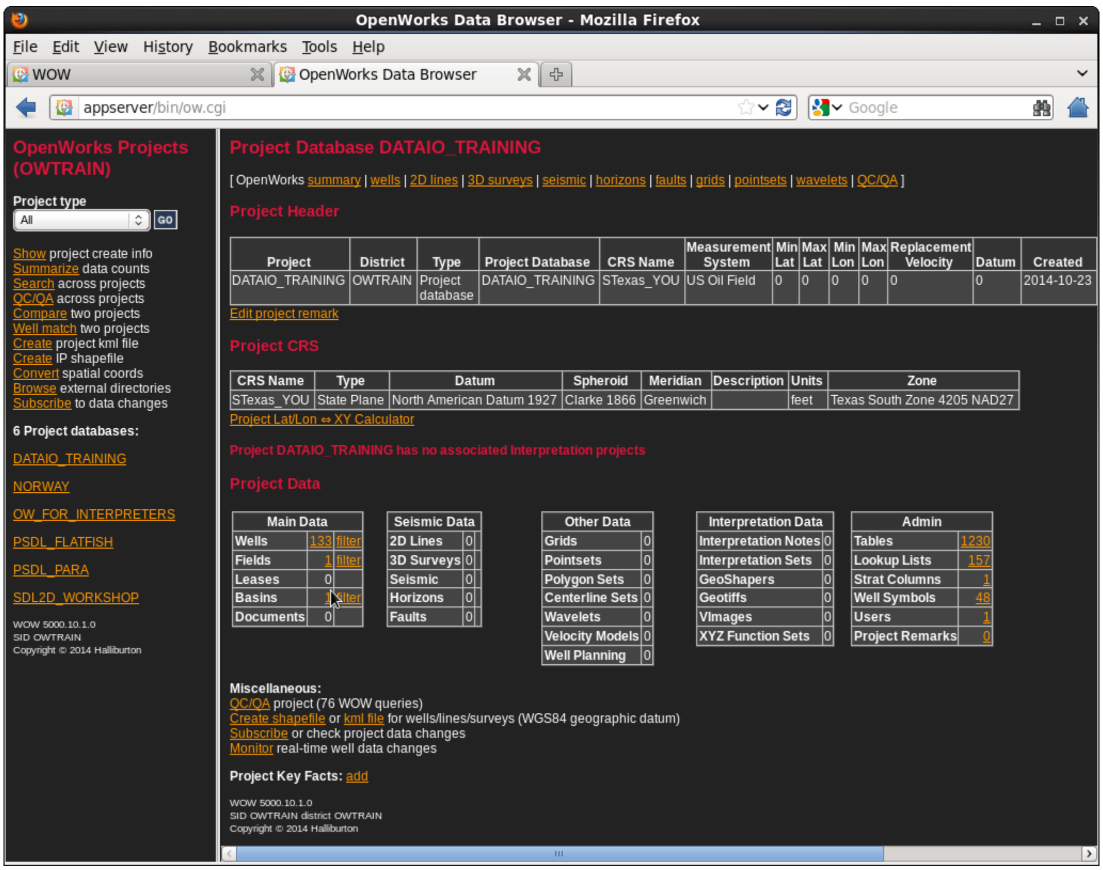
11. Set the CRS to **Geographic_*your initials***.

12. Select **File > Load** from the ASCII Loader window and when prompted, click **OK** to begin loading the data into the OpenWorks database.

13. Close the ASCII Format Edit and Data Previewer windows.

To open WOW software and confirm that the total number of wells increased from 104 to 133:

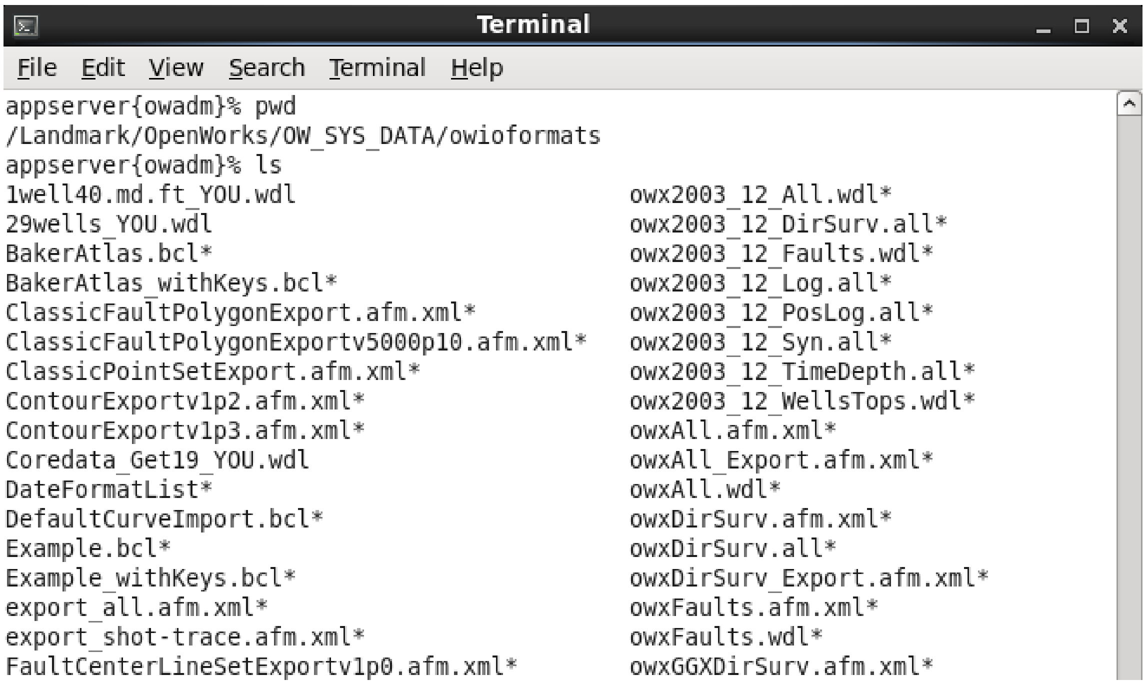
- Enter `http://<your machine name here>/` in your browser window.
- Click **OpenWorks** in the left pane of the main WOW software window.
- Click **DATAIO_TRAINING** in the middle pane.
- Verify the number of wells in the Main Data table.



14. For training purposes, examine the format file after loading the data. Understanding the file structure will help you to troubleshoot any future data-loading problems. Open an xterm or Unix shell window, then type **`cd`** and the full pathname of the directory where your format file was saved. Check the value of the `OW_SYSDATA_DIR` variable to see where the `OW_SYS_DATA` directory is located. Once you have located the `OW_SYS_DATA` directory, **cd** to the directory where the format file is located. For example: **`cd directory_path/OW_SYS_DATA owioformats`**

15. Type **`pwd`** to confirm that you are in the proper directory.

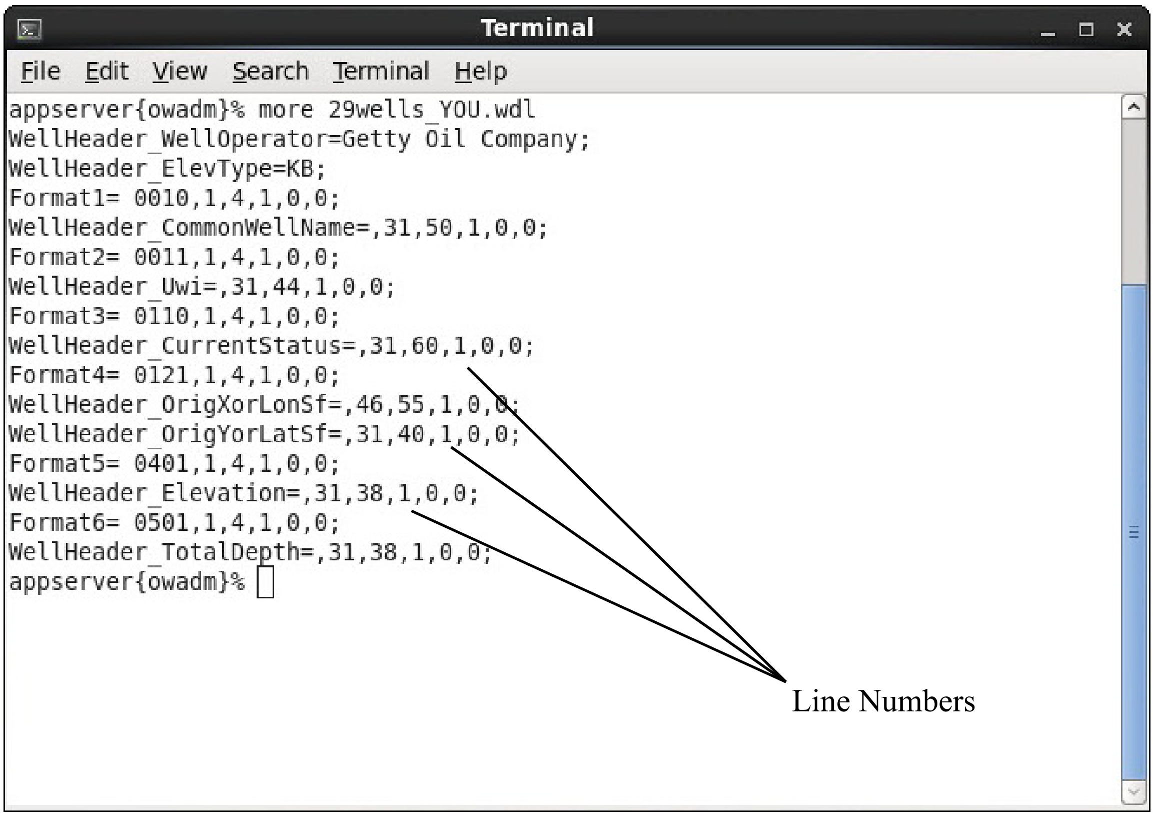
    - Type **`ls`** to list all the files in that directory.
    - Then type **`more`** <***file name***>. The result should look like what is shown here.



```
Terminal
File  Edit  View  Search  Terminal  Help
appserver{owadm}% pwd
/Landmark/OpenWorks/OW_SYS_DATA/owioformats
appserver{owadm}% ls
1well40.md.ft_YOU.wdl                          owx2003_12_All.wdl*
29wells_YOU.wdl                                owx2003_12_DirSurv.all*
BakerAtlas.bcl*                                owx2003_12_Faults.wdl*
BakerAtlas_withKeys.bcl*                       owx2003_12_Log.all*
ClassicFaultPolygonExport.afm.xml*             owx2003_12_PosLog.all*
ClassicFaultPolygonExportv5000p10.afm.xml*     owx2003_12_Syn.all*
ClassicPointSetExport.afm.xml*                 owx2003_12_TimeDepth.all*
ContourExportv1p2.afm.xml*                     owx2003_12_WellsTops.wdl*
ContourExportv1p3.afm.xml*                     owxAll.afm.xml*
Coredata_Get19_YOU.wdl                         owxAll_Export.afm.xml*
DateFormatList*                                owxAll.wdl*
DefaultCurveImport.bcl*                        owxDirSurv.afm.xml*
Example.bcl*                                   owxDirSurv.all*
Example_withKeys.bcl*                          owxDirSurv_Export.afm.xml*
export_all.afm.xml*                            owxFaults.afm.xml*
export_shot-trace.afm.xml*                     owxFaults.wdl*
FaultCenterLineSetExportv1p0.afm.xml*          owxGGXDirSurv.afm.xml*
```

16. Study the format file to understand how it is related to the input file. For example, the first three numbers listed after each format flag reflect starting column, ending column, and line number within a record. In a data file such as this, with a variable number of lines per well, each line is considered a complete record, so the line number is always 1.

17. Now bring up the format file from the previous exercise. It was loaded as a set number of lines per record. Note the difference. In a data file with a set number of lines per record, each well is considered a single record with one or more lines within that record. Therefore, the line numbers change to reflect which line had data formatted on it.



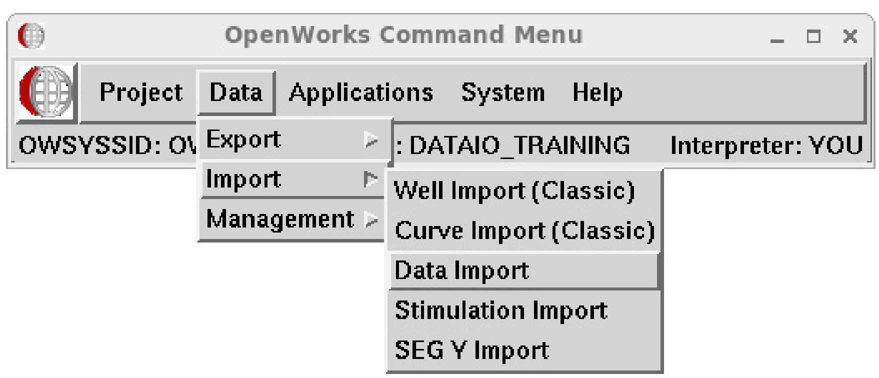
Data Import Tool Overview

The Data Import tool allows you to import data into the OpenWorks project currently selected in your OpenWorks or DecisionSpace Geosciences session.

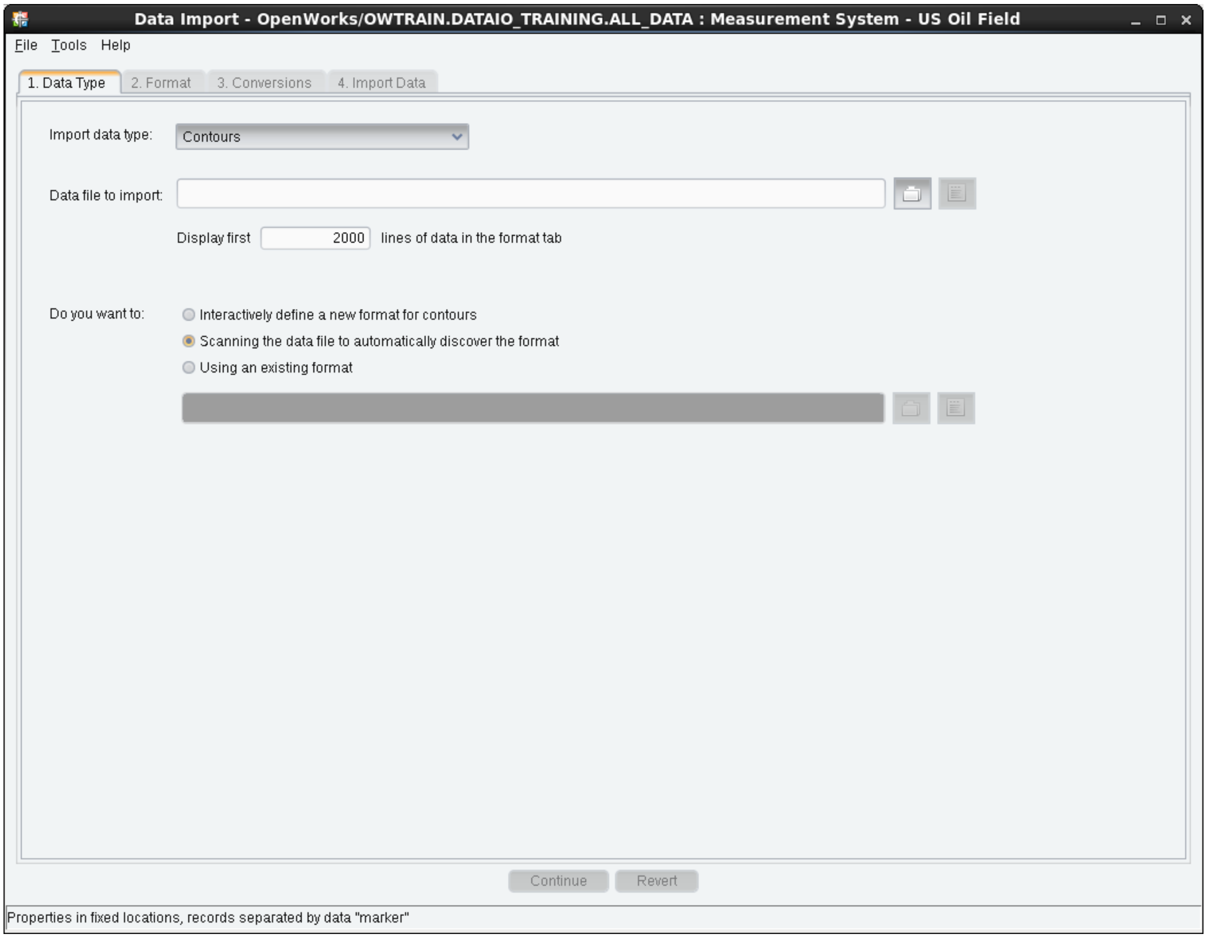
Workflow

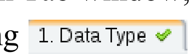
- **Data Type**: Select the data type and the data file to import.
- **Format**: Set the format of the file to which the data is import. Here you can define the format file using the Generic Editor or a Spreadsheet Editor in order to define the format from the data file to import.
- **Other** Data types have other tabs that may need to be addressed:
  - **Horizons**: 3D Survey Mapping Tab, Horizon Mapping Tab, and Load Options Tab.
  - **Log Curves**: Load Options Tab and Select Data Tab. The appearance of these tabs depends on selections on the Data Type tab.
  - **Faults**: 2D Snap Tab
  - **Wells**: Well Options Tab and Well Mapping Tab
- **Conversions**: Set the cartographic reference system, measurement system, and depth conversion parameters.
- **Import Data**: Import the data into the current OpenWorks project.

To start the Data Import tool from the OpenWorks command menu, Select **Data > Import > Data Import**.



The Data Import tool launches. Data Import comprises of four tabs that correspond to four categories of parameters that must be selected for data loading to occur.



It is best to **proceed sequentially from Tab to Tab** to set the parameters. Unexpected results may occur if you do otherwise! Be sure to check the status bar at the bottom of each window for file status. As the minimum requirements are fulfilled in each Tab window, a green check mark will appear next to the Tab heading 

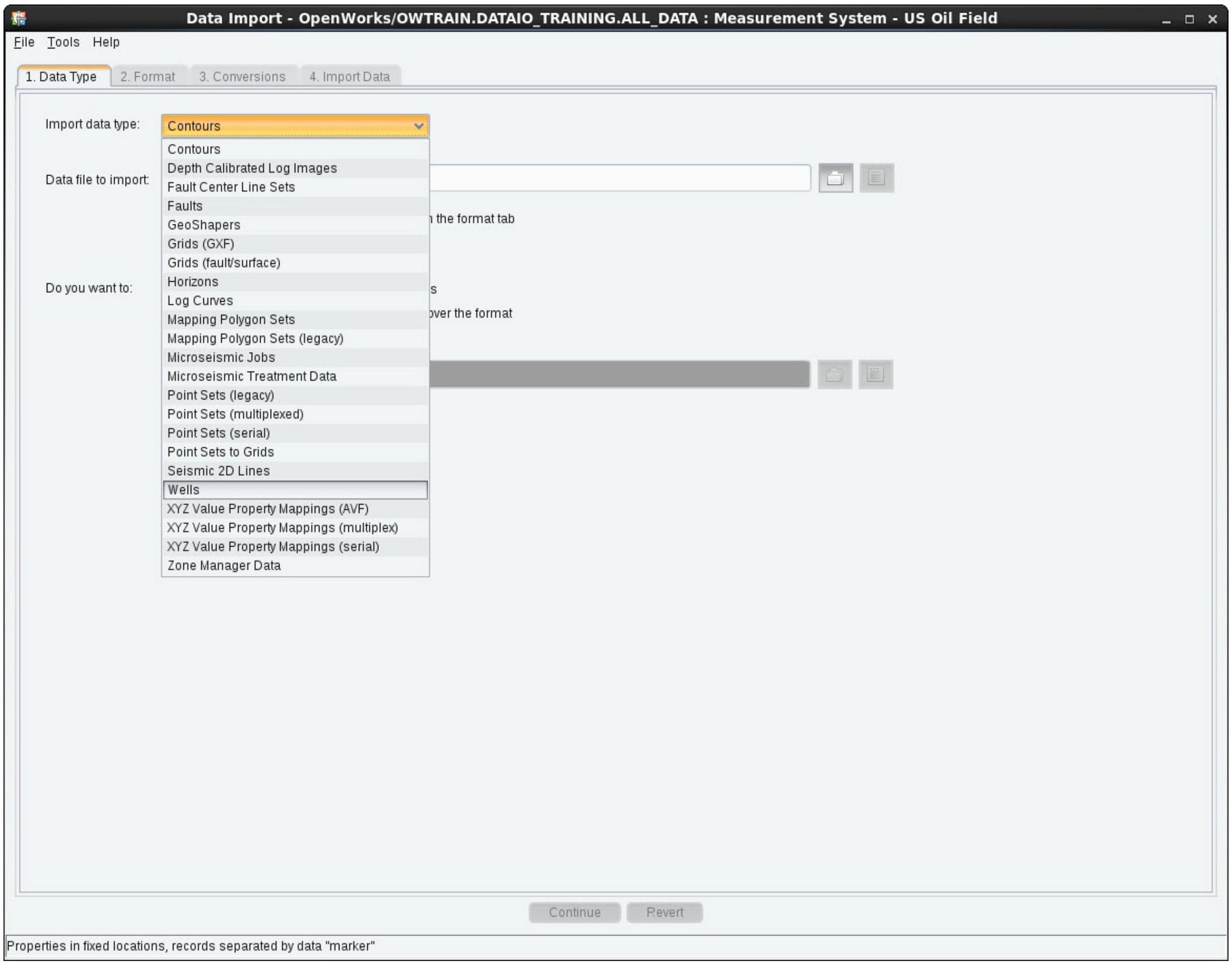
.

There are two types of input files involved in loading ASCII well data: a data file, which is an ASCII file or a file that contains your data; and a format file, which is a file that describes the structure of the data and instructs the program where to find different items in the data file.

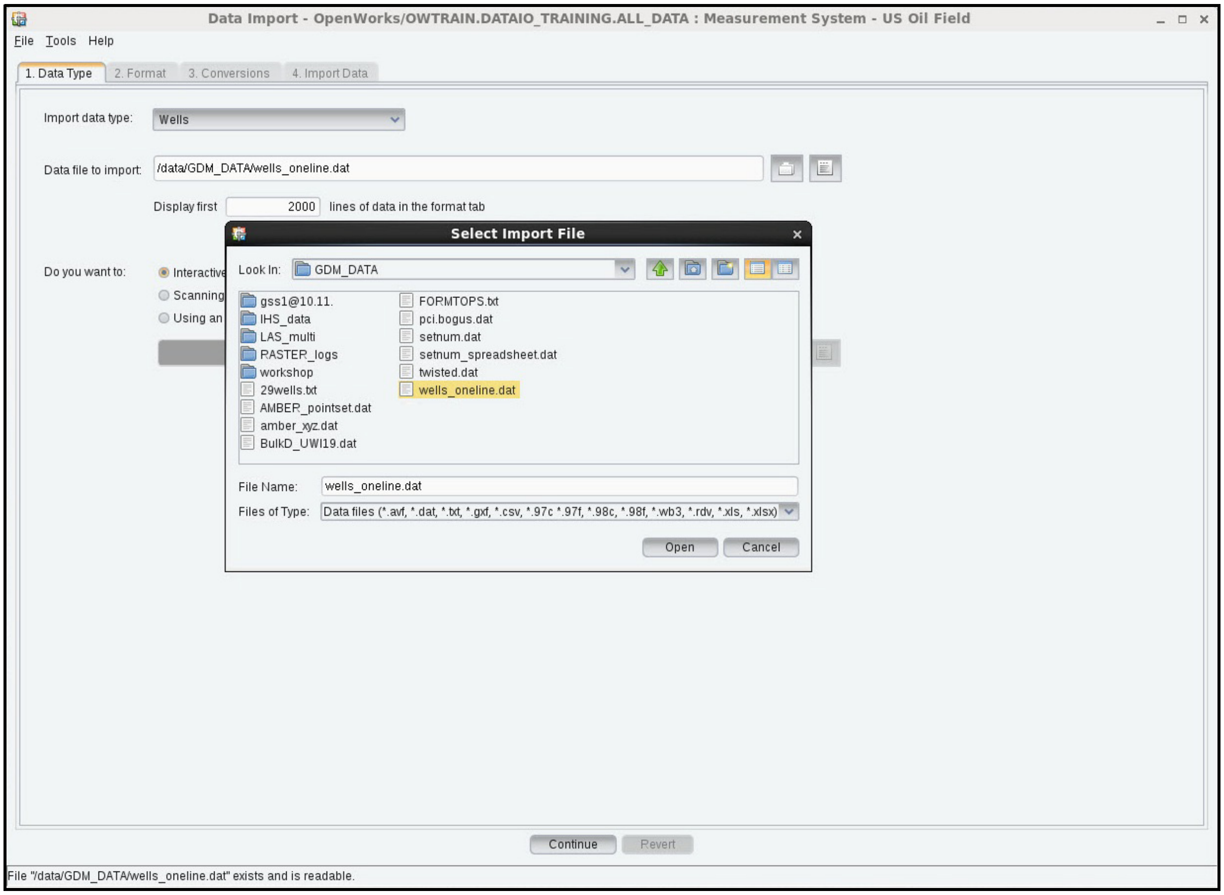
Setting the Input Parameters

The first step in loading data is to identify the input files.

1. In the first tab **Data Type**, select **Wells** from the drop-down list for the import data type.



2. Use the File Select button  to find and select the data file to import.



There are over 60 Landmark-provided well data loading format files in the OW_SYS_DATA/owioformats directory. They are designed to accommodate many common ASCII well data loading situations. You may select a pre-defined format from the default directory, or create a new Format File.

To use a pre-existing format, toggle on one of two options for selecting the format file then click **Continue** at the bottom of the window:

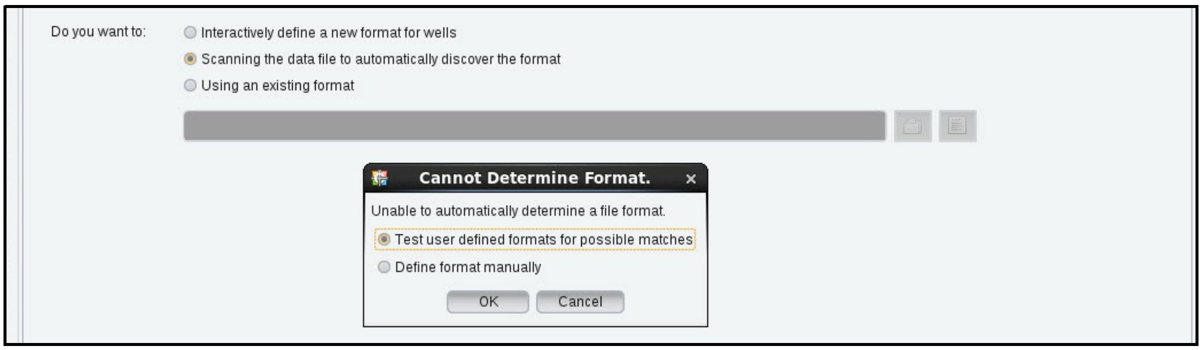
- Scanning the data file to automatically discover the format, or
- Using an existing format

If the first option is toggled on, the Data Import will search the default OW_SYS_DATA/owioformats directory, and attempt to determine whether the structure of the data file conforms to one of Landmark’s standard export formats. If there is a match, this indicates that the data file was created by exporting data from an existing OW project using a

Landmark standard export format. Data loading of this well file can be accomplished by using a corresponding import format with the same file structure; Data Import will automatically select the import format file from the default directory.

If Data Import cannot determine the format automatically, two options are offered:

- Test a user defined format file for possible matches, or
- Define the format manually

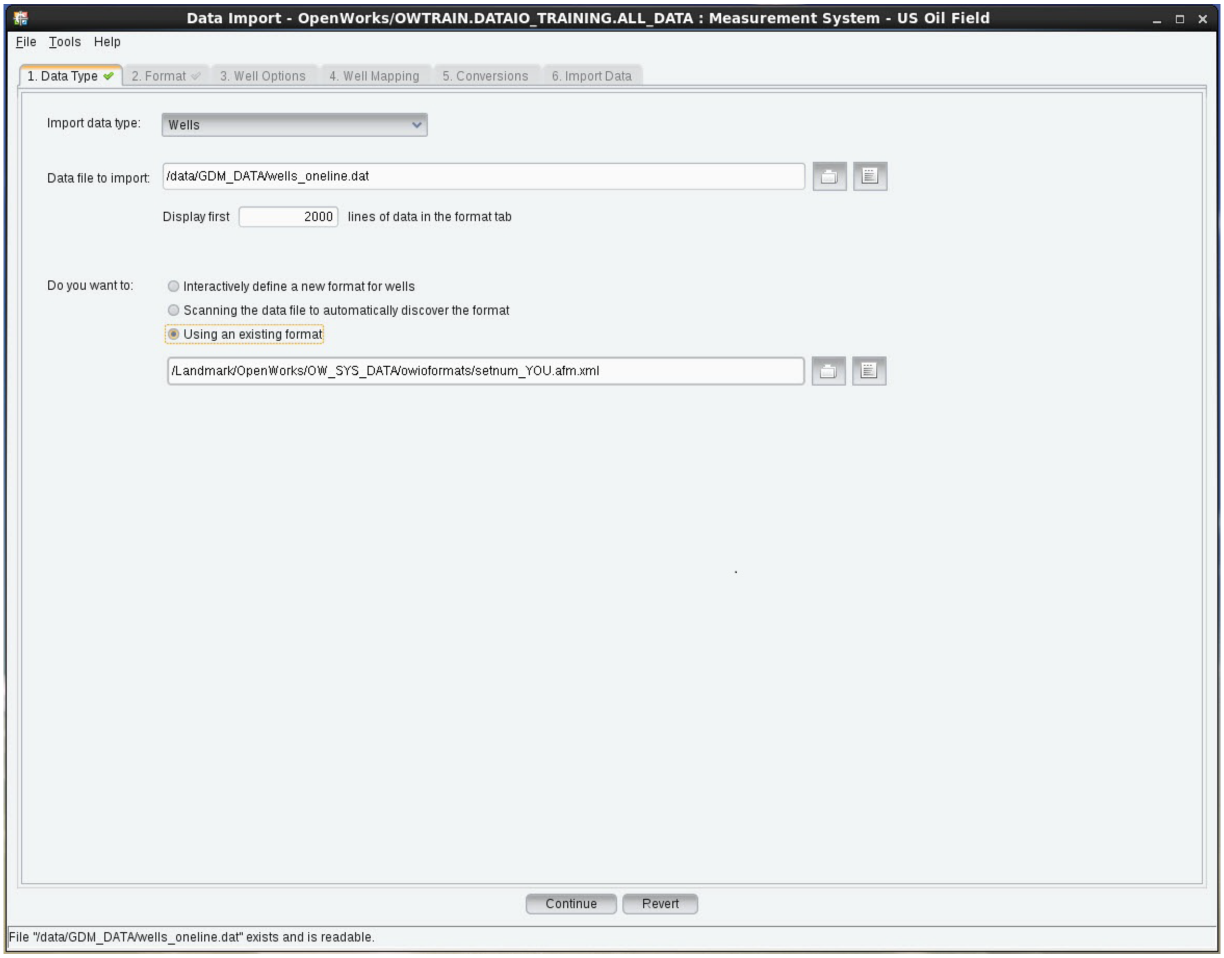


To test a user defined format file for possible matches:

When the **Test user defined formats** option is selected, a dialog box will appear which offers a listing of Possible Format Files that are available to test against your input data. You can select one of these possible formats, then check the Status and the Warnings box for obvious data/format mismatches. Further information for the format can be obtained by clicking one of the buttons along the bottom of the Check formats window:

Refer to the above picture. By clicking the **View Format** button, an information box will display the format definition of the selected format file. You can redirect the Data Import tool to search for format files in another directory of your choice, by clicking the **Change Directory** button. To view the application of the format file to the input data file, click **Open Format File**. The Data Import will open the **Format** tab and highlight the defined data fields in the data previewer pane.

If you toggle on **Using an existing format** in the **Data Type** tab, you must specify a format file from the default OW_SYS_DATA/ owioformats directory. Check the status bar at the bottom of the window for data file name and readability status, then click **Continue**.



> **Note**
>
> The **Continue** button confirms your file selection, and moves the process forward to the next tab window.

The option to *Define the format manually* is equivalent to the option *Interactively define a new format for wells* in the **Data Type** tab. Toggle on this option, then click **OK**. The Data Import tool will advance to the format-building process in the next tab window, **Format**.

Specifying Data Items to Load

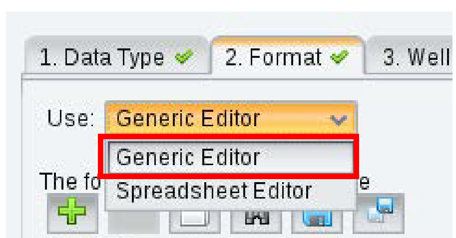
The Data Import tool allows you to define and load ASCII data stored in a wide range of formats to the OW projects database. Each data category contains many standard fields recognized by the OpenWorks software. Your format file is the blueprint by which the Data Import tool knows how to read the data in the input file. You instruct the Data Import tool to read the data by specifying which columns in the input file contain the data category/data item combinations you wish to load to the OW project. Each data category/data item combination corresponds to a data field in the OpenWorks table. You can also set a data item to a constant value if that item is the same value for all of the wells in the input file.

The **Format** tab window is the format editor of the Data Import tool.The features in the **Format** tab allow you to open an existing format file or create a new format file.

When you define the format file you can use the Generic Editor or a Spreadsheet Editor in order to define the format from the data file to import.

If You Select Generic Editor:

1. Select the editor type.

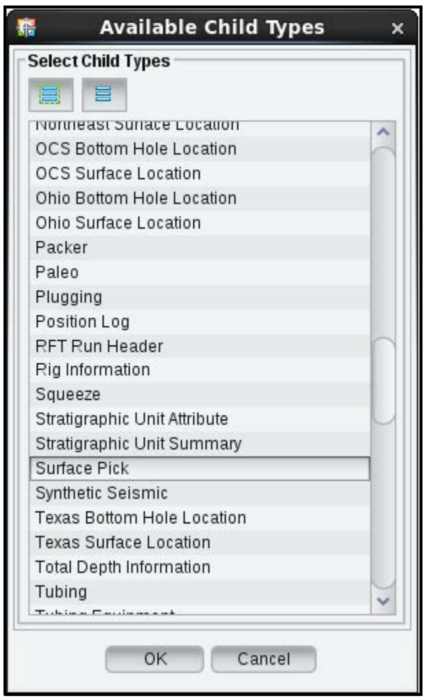


2. Click **Well Header** in the Data Categories box.

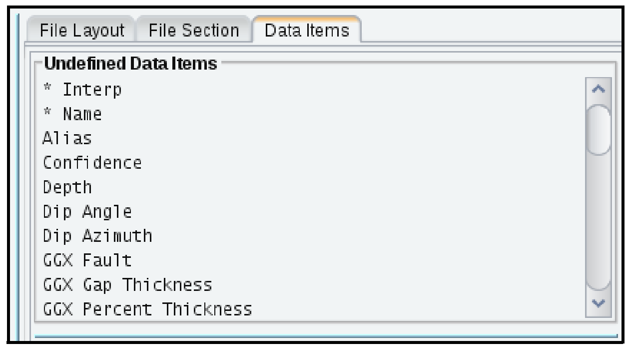
   The window updates to display data items associated with Well Header in the Undefined Data Items box.

3. Add data categories to the Data Categories box by clicking the **Add** icon .

   By adding and highlighting new data categories, you can see the fields associated with each category. For example, if you select Surface Pick, the following data items will display:



Select the category

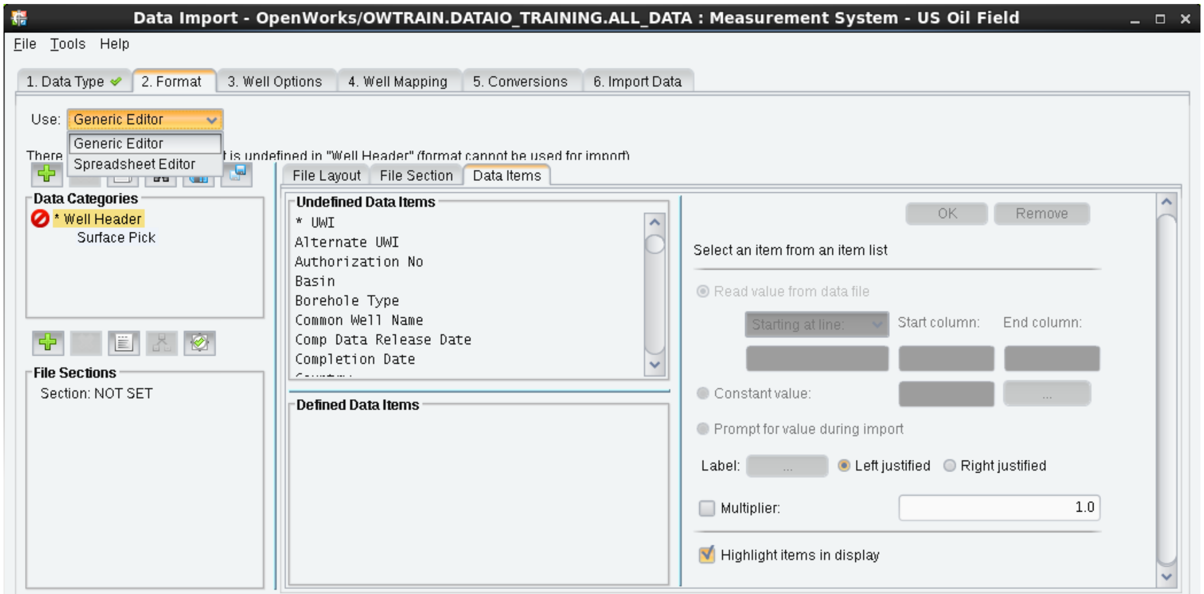


Select all items associated with the category

4. Select all items associated with the category.

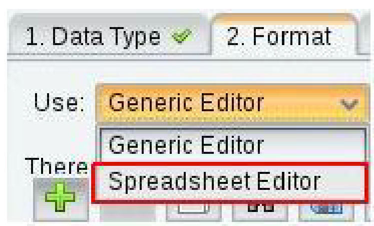
5. Use the scroll bar to see additional data items.

   Primary Key fields are marked with an asterisk (*). Primary Key fields belong to a set of fields where the combination of the values of those fields uniquely identifies a data instance (such as a well or a lease ID). Primary Key fields are always required; you must define values for these fields.

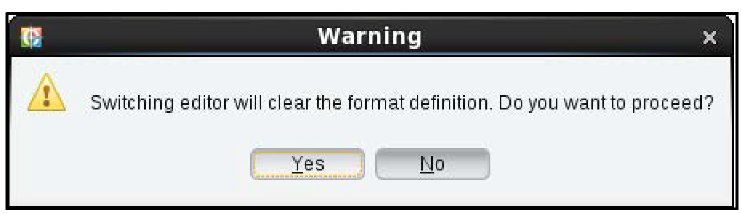


If You Select Spreadsheet Editor:

1. Select the editor type.

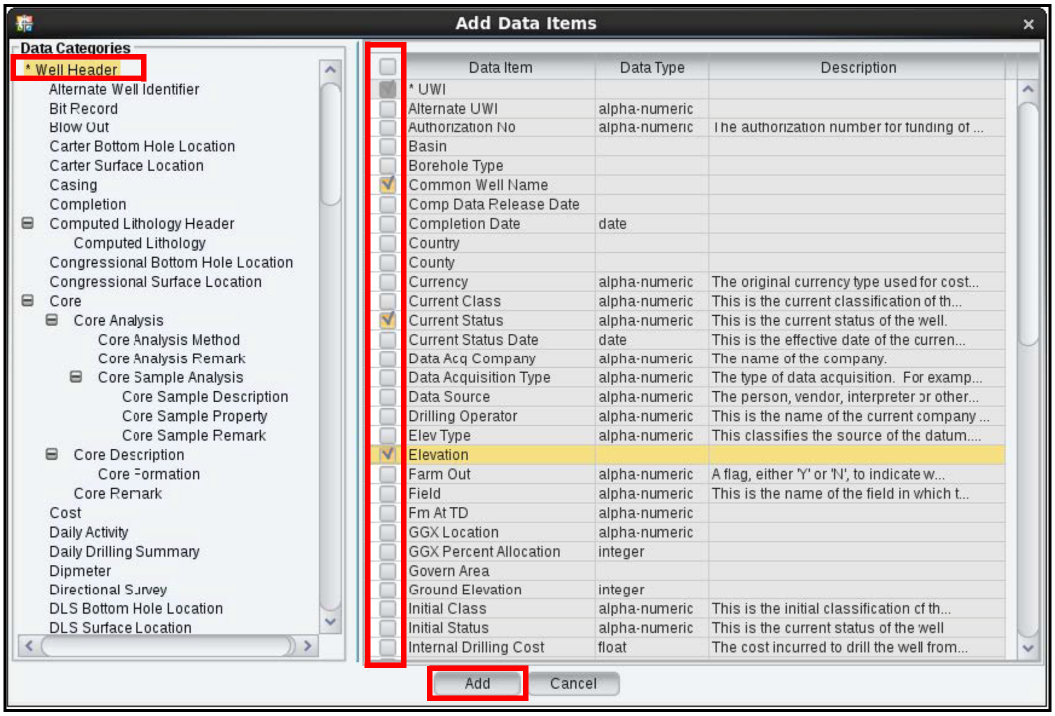


2. When you change the editor used, a message dispalys informing you that the previously format definition opened will clear.



3. Click the **Yes** button.

4. Click the **Add new data item**  icon in the Data Item section. The Data Items window opens. Here you can select the categories and the rows or Data Items that you need in each category. For example, if you select Well Header, the following data items will display:



Describing the Data Using the Generic Editor for the Format

The windows associated with three tabs in the **Format** dialog box are used in the format building process. These tabs are: **File Layout**, **File Selection** & **Data Items**.

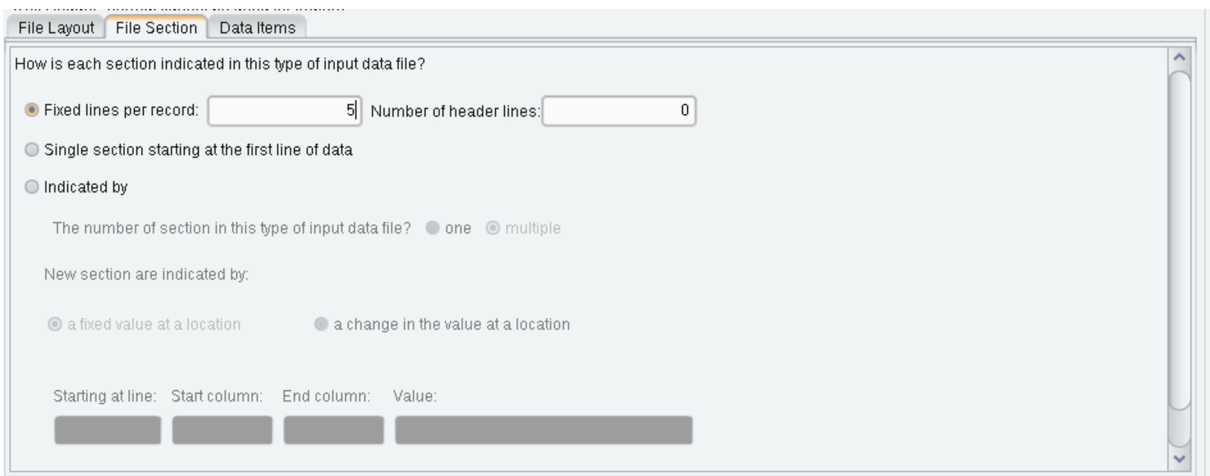
1. In the File Layout tab window, you can specify whether the fields in the input data file exist in fixed width format or delimited format. If the data fields are separated by delimiters, you must specify the delimiter type (comma, white space or other character).

2. For data with a set number of lines per well, the following example uses the data below.

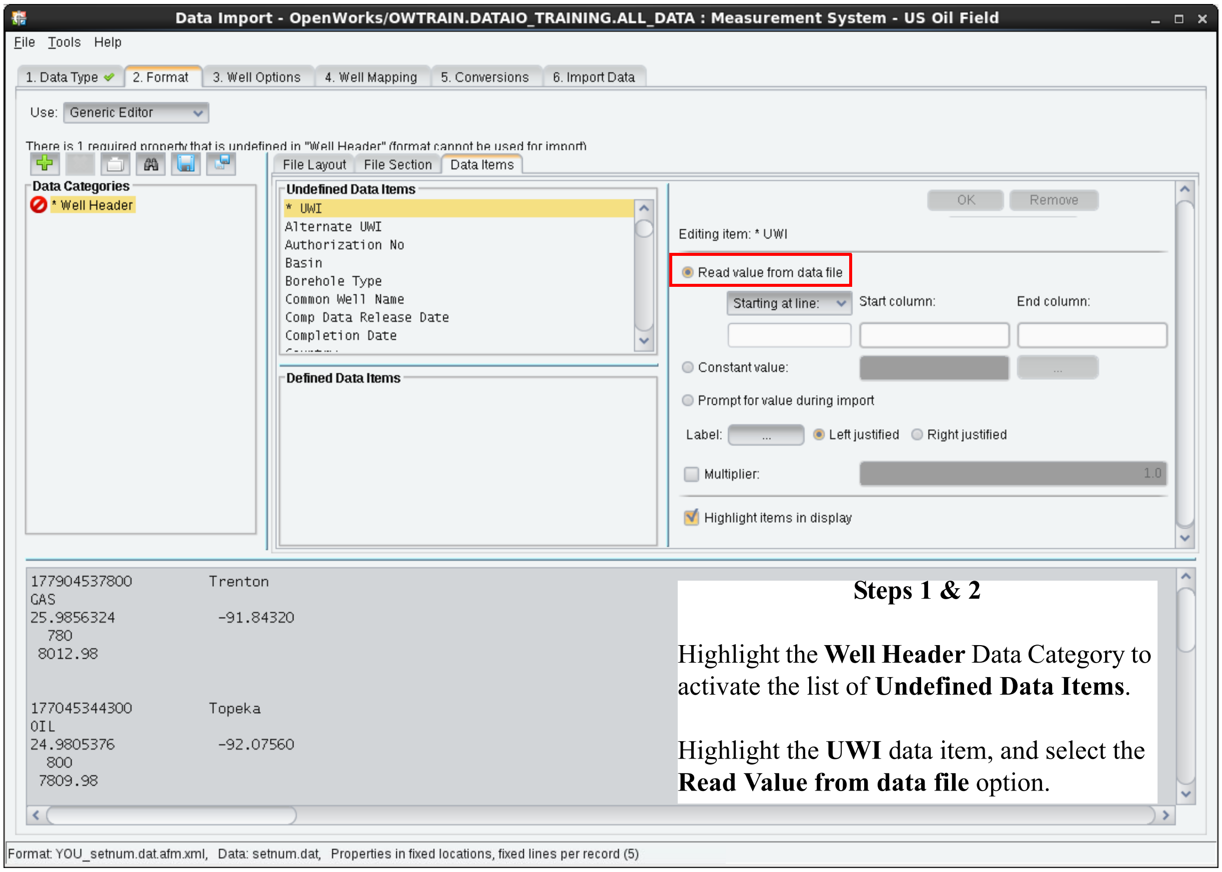
```
177904537800        Trenton
GAS
25.9856324           -91.84320
  780
 8012.98


177045344300        Topeka
OIL
24.9805376           -92.07560
  800
 7809.98


177039309234         Las Cruces
OIL
24.7789000           -92.99009
  764
 7275.99


890234989000        Socorro
OIL
35.000               -109.000
  767
10419.98


890004567200        Cary
OIL
25.1245602           -91.77782
  742
10184.98


895543232200        Mars Hill
OIL
24.9555091           -92.44912
  797
 7946.98
```

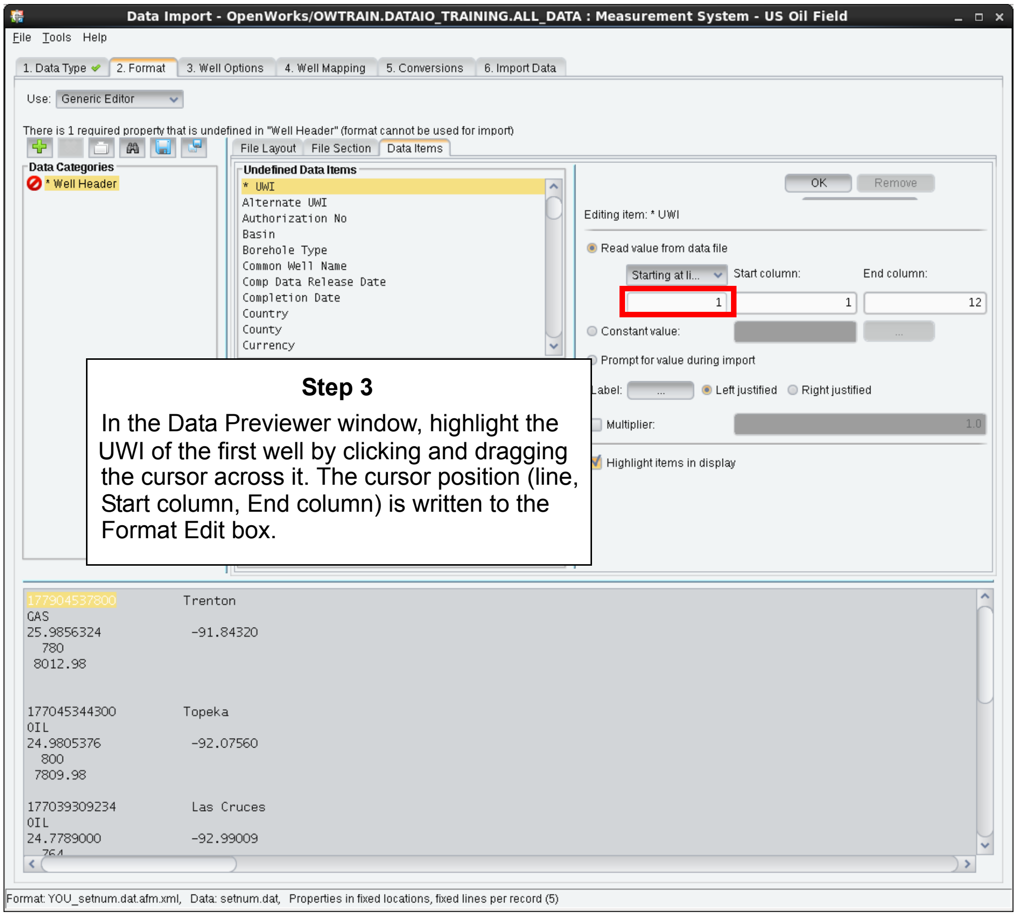
Before you begin describing this, or any file, use the scroll bars to examine the data file in the data previewer window. Looks for patterns to the data structure that are consistent for each well. The example data file shows five lines per well. Each well is separated by two blank lines.

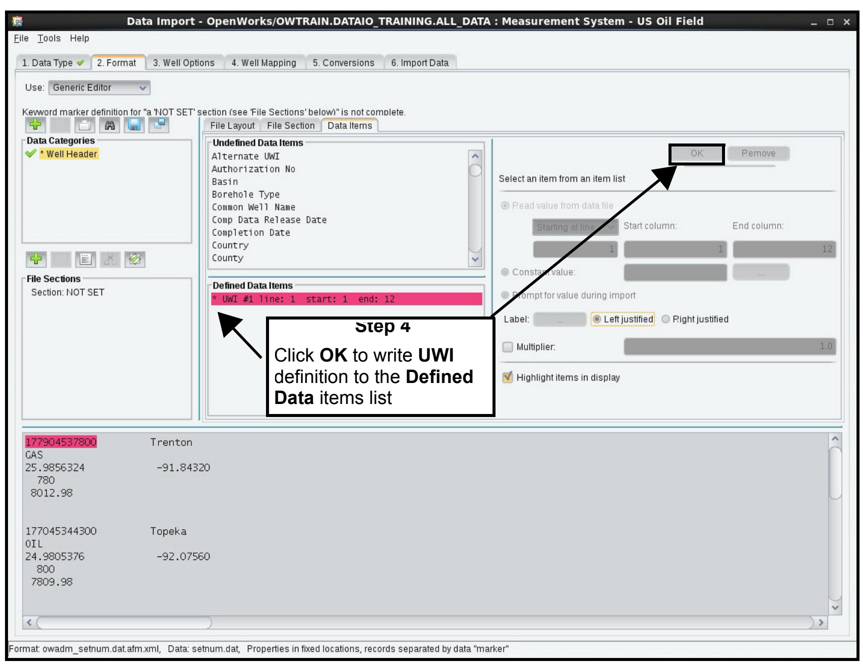
3. For data with a set number of lines per well, go to the **File Section** tab window. Toggle on *Fixed lines per record* and enter an integer value into the box; this value is the constant number of lines per well in your input data file. Remember that *lines per record* and *lines per well* are the same thing in this type of input file.



4. Now you are ready to begin describing your data fields. First select a Data category, then make a selection from the Undefined Data Items as shown below.



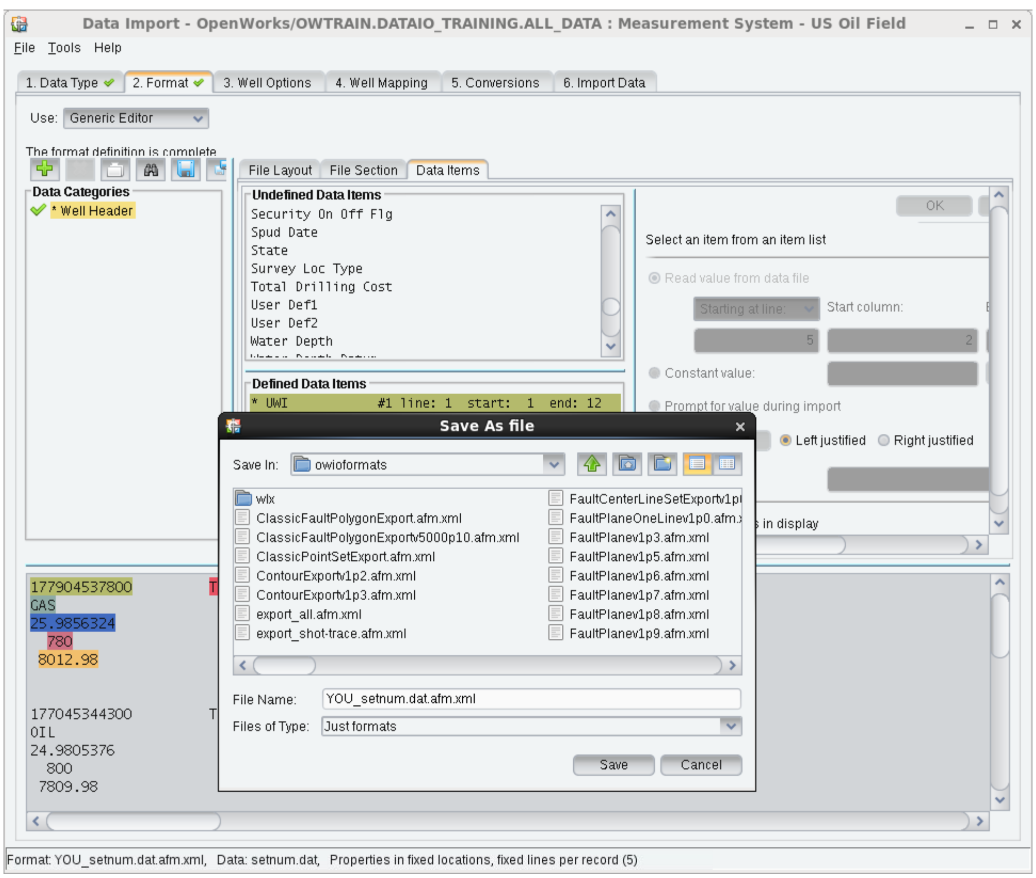

Data Import - OpenWorks/OWTRAIN.DATAIO_TRAINING.ALL_DATA : Measurement System - US Oil Field
File Tools Help
1. Data Type
2. Format
3. Well Options
4. Well Mapping
5. Conversions
6. Import Data
Use: Generic Editor
There is 1 required property that is undefined in "Well Header" (format cannot be used for import)
Data Categories
* Well Header
File Layout
File Section
Data Items
Undefined Data Items
* UWI
Alternate UWI
Authorization No
Basin
Borehole Type
Common Well Name
Comp Data Release Date
Completion Date
Country
County
Currency
OK
Remove
Editing item: * UWI
Read value from data file
Starting at li...
Start column:
End column:
1
1
12
Constant value:
Prompt for value during import
Label:
Left justified
Right justified
Multiplier:
1.0
Highlight items in display
Step 3
In the Data Previewer window, highlight the UWI of the first well by clicking and dragging the cursor across it. The cursor position (line, Start column, End column) is written to the Format Edit box.
177904537800 Trenton
CAS
25.9856324 -91.84320
780
8012.98
177045344300 Topeka
OIL
24.9805376 -92.07560
800
7809.98
177039309234 Las Cruces
OIL
24.7789000 -92.99009
Format: YOU_setnum.dat.afm.xml, Data: setnum.dat, Properties in fixed locations, fixed lines per record (5)


Data Import - OpenWorks/OWTRAIN.DATAIO_TRAINING.ALL_DATA : Measurement System - US Oil Field
File Tools Help
1. Data Type
2. Format
3. Well Options
4. Well Mapping
5. Conversions
6. Import Data
Use: Generic Editor
Keyword marker definition for "a 'NOT SET' section (see 'File Sections' below)" is not complete.
Data Categories
* Well Header
File Sections
Section: NOT SET
File Layout
File Section
Data Items
Undefined Data Items
Alternate UWI
Authorization No
Basin
Borehole Type
Common Well Name
Comp Data Release Date
Completion Date
Country
County
Defined Data Items
* UWI #1 line: 1 start: 1 end: 12
OK
Remove
Select an item from an item list
Step 4
Click OK to write UWI definition to the Defined Data items list
177904537800 Trenton
CAS
25.9856324 -91.84320
780
8012.98
177045344300 Topeka
OIL
24.9805376 -92.07560
800
7809.98
Format: owadm_setnum.dat.afm.xml, Data: setnum.dat, Properties in fixed locations, records separated by data "marker"

5. By clicking the **OK** button at the top of the Format Edit box, the field definition is moved from the **Undefined Data Items** box to the **Defined Data Items** box. Items in the **Defined Data Items** box comprise the format file you are building.
   Complete your format file by describing the remaining fields (Data Items) in the data set in the same manner as above.

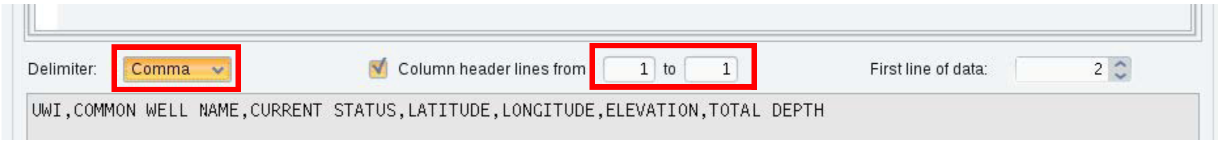
> **Note**
>
> To describe your data, remember to:
>
> - Highlight the appropriate Data Category/ Data Item.
> - Click and drag across the desired field in the Data Previewer.
> - Click **OK** to move the definition to the Defined Data Items list.

When the last field is formatted, save your format by clicking the **Save as**  icon and enter a unique format file name in the dialog box that appears. The newly created format file is saved to the default OW/SYS/DATA/owioformats directory.

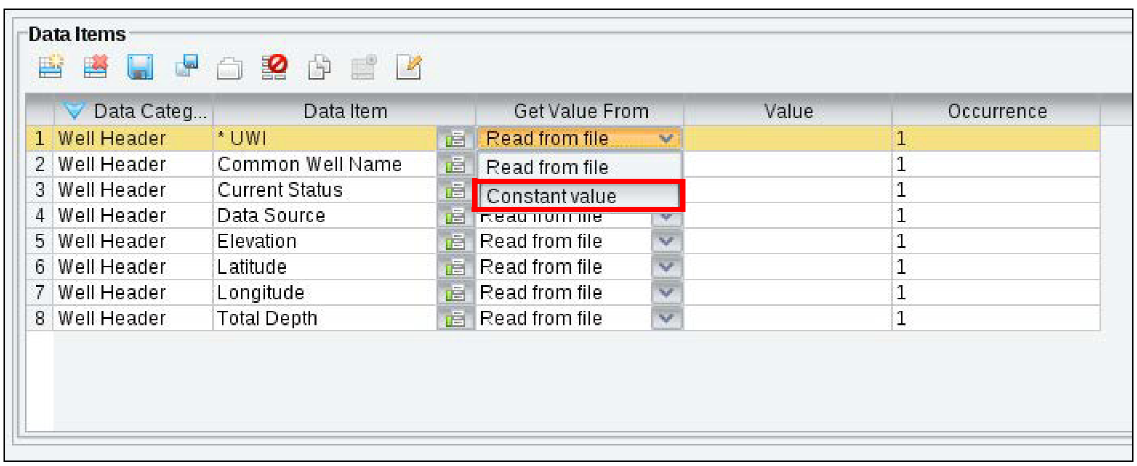


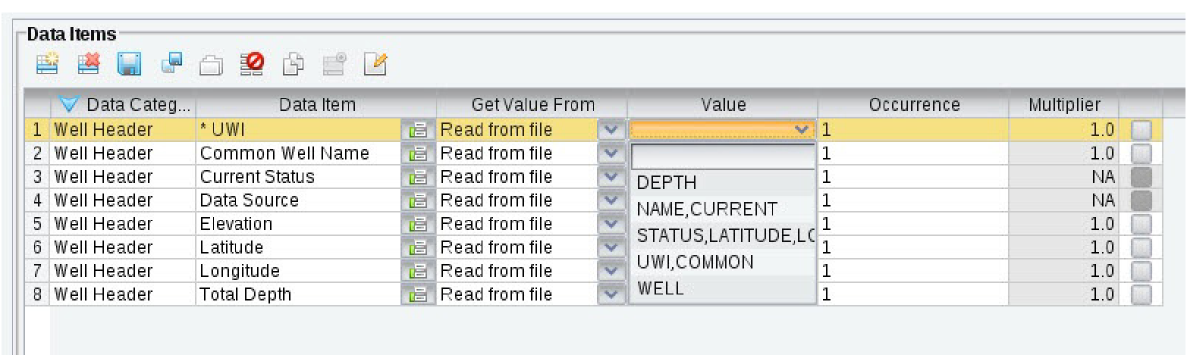
Describing the Data Using the Spreadsheet Editor for the Format

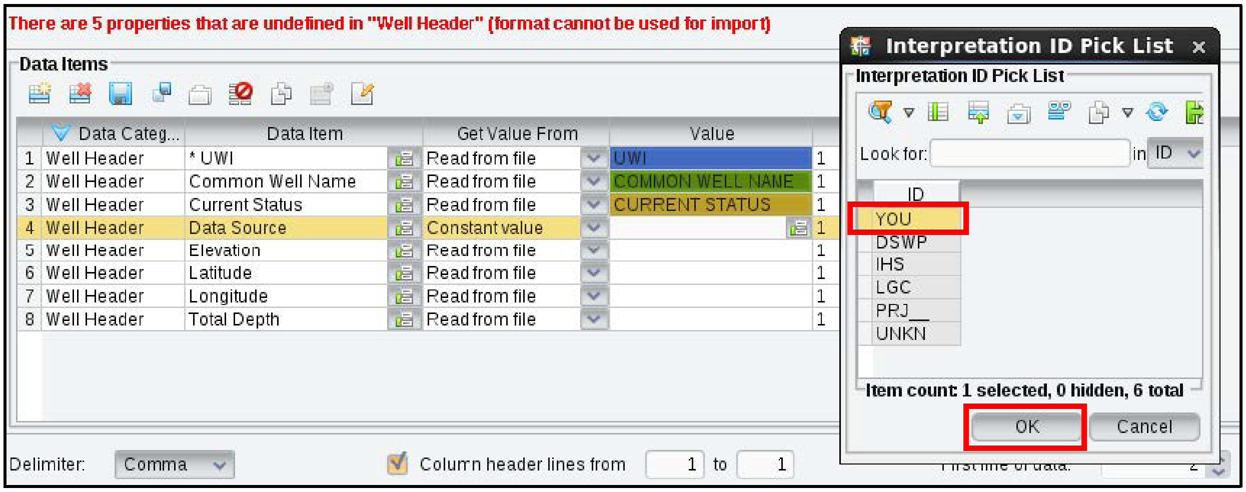
1. Select the Delimiter of the data file (Comma or Space). If the file has column header lines, you can set where the lines begin and end. All lines marked here will be taken as comment and will be skipped in the load.



2. Select each item and define whether **Get Value From** will be **Read from the file** or **constant value**. If you select Read from file, select the value appropriate for each item from the **Value** drop-down menu. If you selected **Constant value**, enter the value directly or select it from the **Value** drop-down menu.

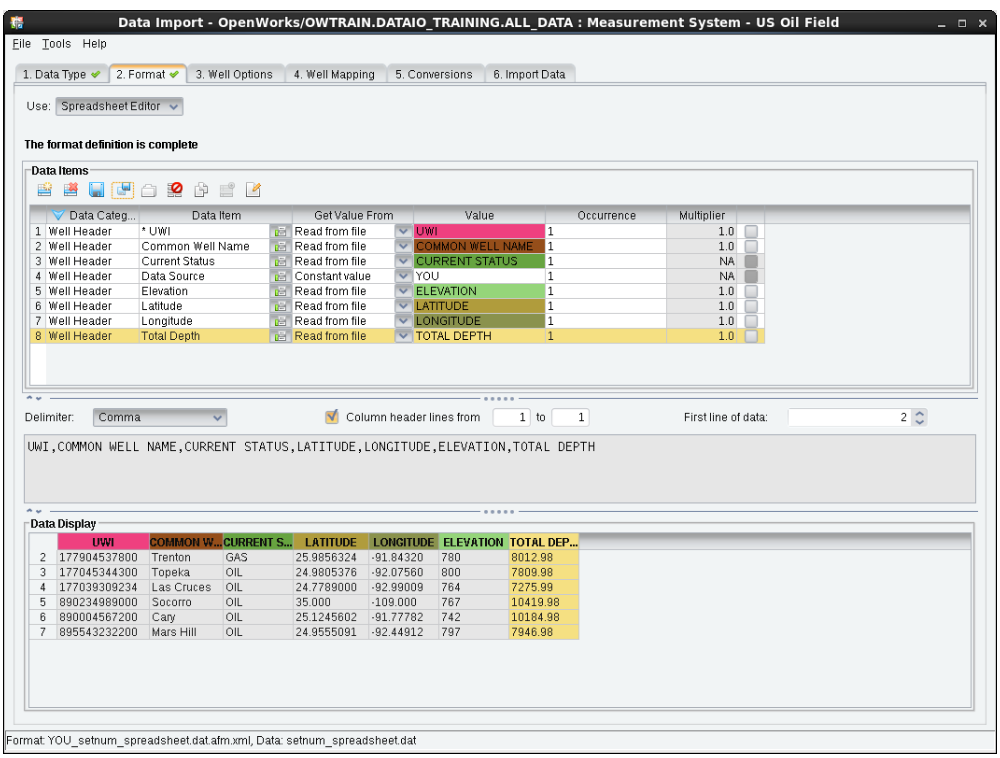






3. Complete your format file by describing the remaining fields (Data Items) in the data set in the same manner as above.

   If you have more than one **occurrence** for a data type, you can add the same data type again, but change the occurrence number. For example, if we have the same data type UWI in two columns (Column A and Column B), we need to add the same data type two times. The first one will be reading the value from Column A and the occurrence will be value 1, and the second will be reading the value from Column B and the occurrence will be value 2.

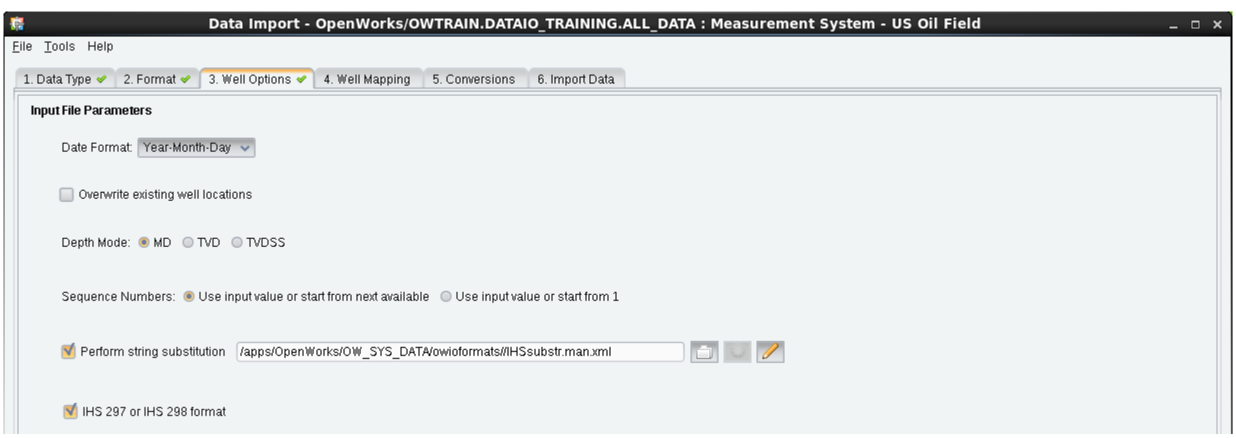


When the last field is formatted, save your format by clicking the **Save as**  icon and enter a unique format file name in the dialog box that appears. The newly created format file is saved to the default OW/SYS/DATA/owioformats directory.

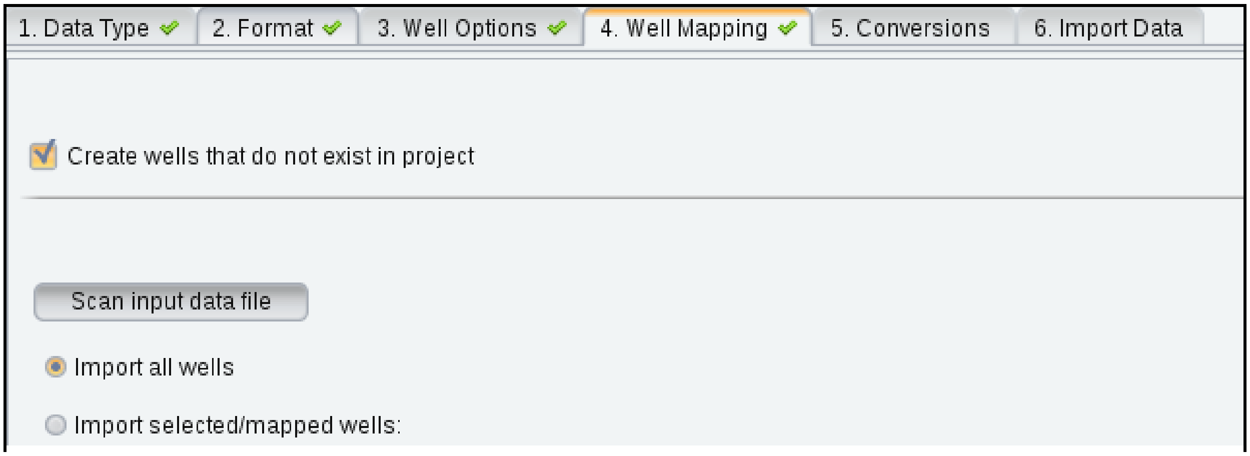
Once your format definition is complete, you will see a green check mark in the **Format**  tab. You can proceed to the **Well Options** tab to set the import file parameters.

4. In the Well Option tab you can accept the default or select settings for **Date Format** and **Depth Mode**.

If you're loading IHS data, the Data Import tool will automatically activate the **IHS 297** or **IHS 298** format option, and the **Perform string substitution** file will be selected by default.

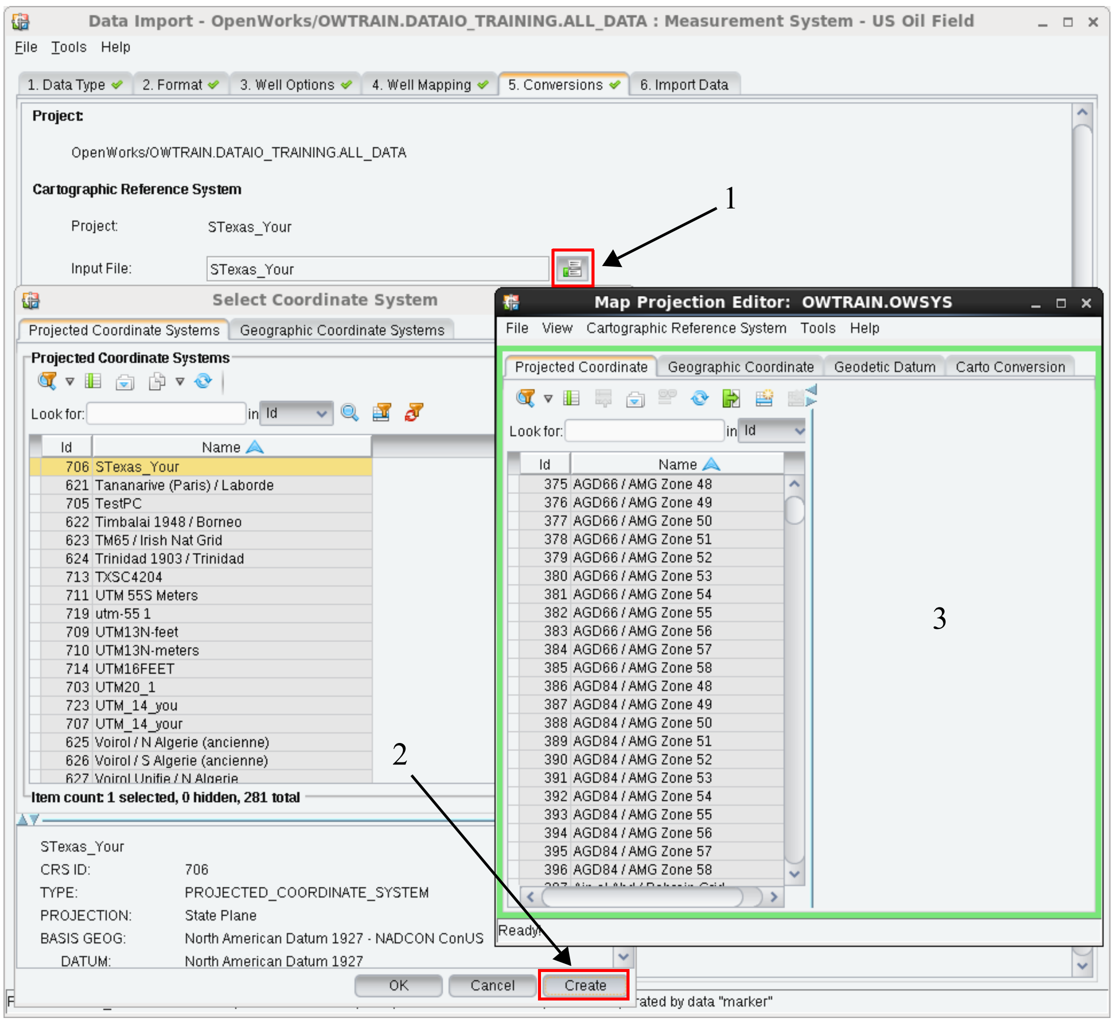


5. Proceed to the **Well Mapping** tab. The option to **Create wells that do not exist in project** is toggled on by default. If you deselect this option, new wells will not be loaded to the OW project.

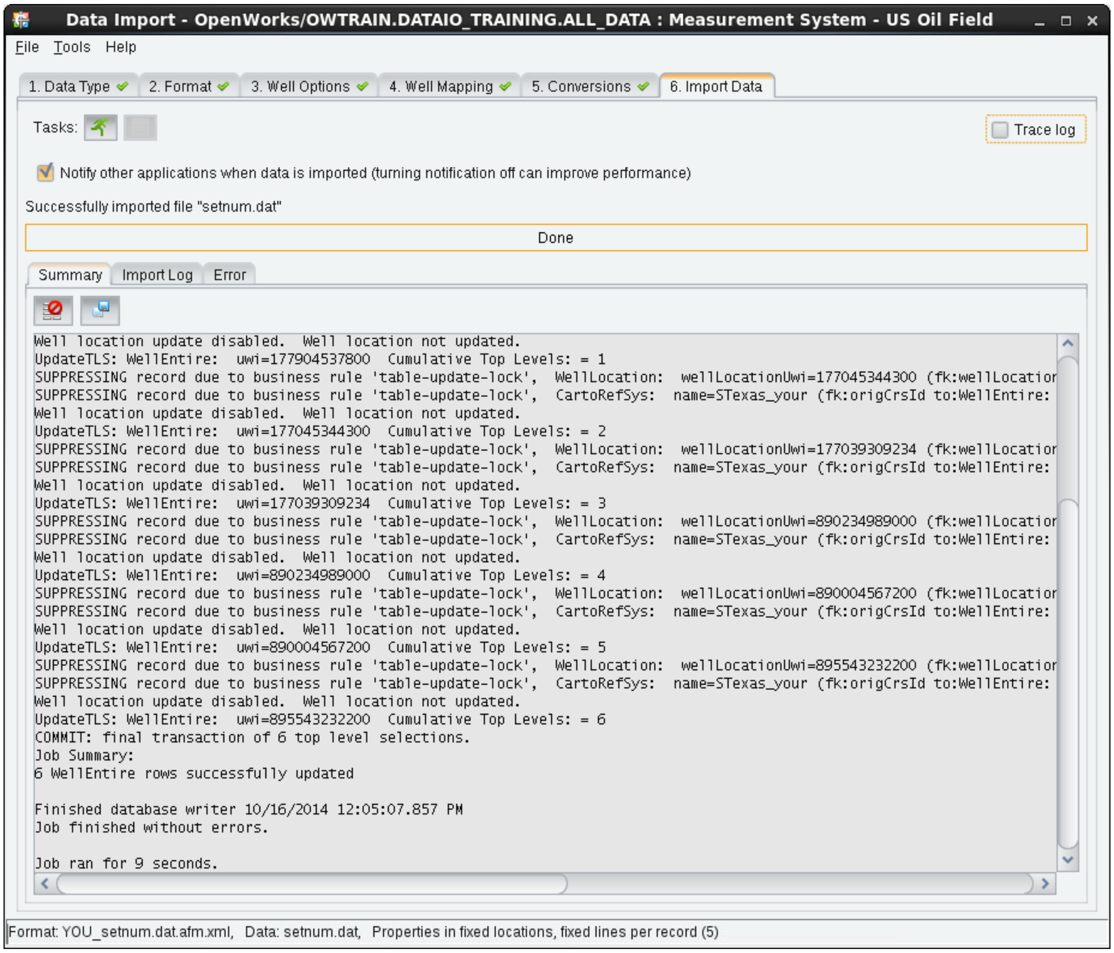


Click the **Scan input data** file to see the wells listed in the input data file. The Data Import tool will scan the file and display the status of the wells in the data file vis-à-vis existing wells in the OW project. Wells not in the OW project will be listed in red font; wells already in the OW project will be listed in blue font.

6. In the **Conversions** tab, select the Cartographic Reference System that applies to the input data file. Click the **Select CRS**  icon to choose from a list of existing CRSs. If the CRS of your data file does not exist in the database, you will need to create the CRS definition in the **Map Projection Editor** by first clicking **Create** in the **Select Coordinate System** box.



7. To finally load the data, go to the **Import Data** tab and click the **Run Import**  icon. A progress bar will appear below the "Job running..." status line.

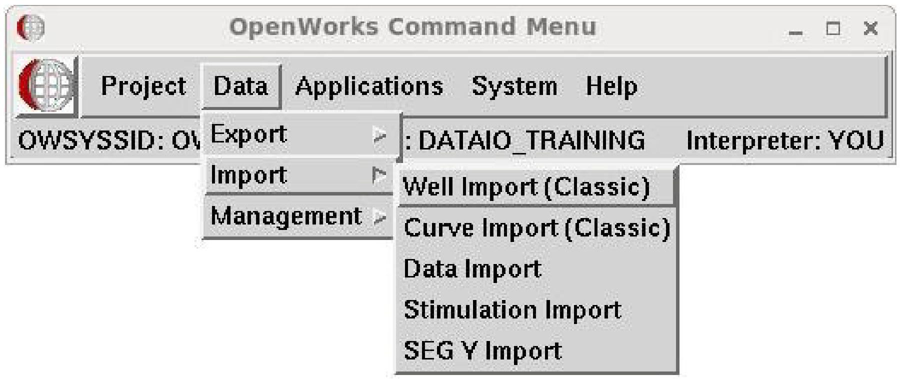


Data Import continues to write to the Import Log after the import has completed; watch for the status line to display "Successfully imported file", then check Summary, Import Log, and Error reports for data load information. Successful load job does not ensure that your data loaded completely.

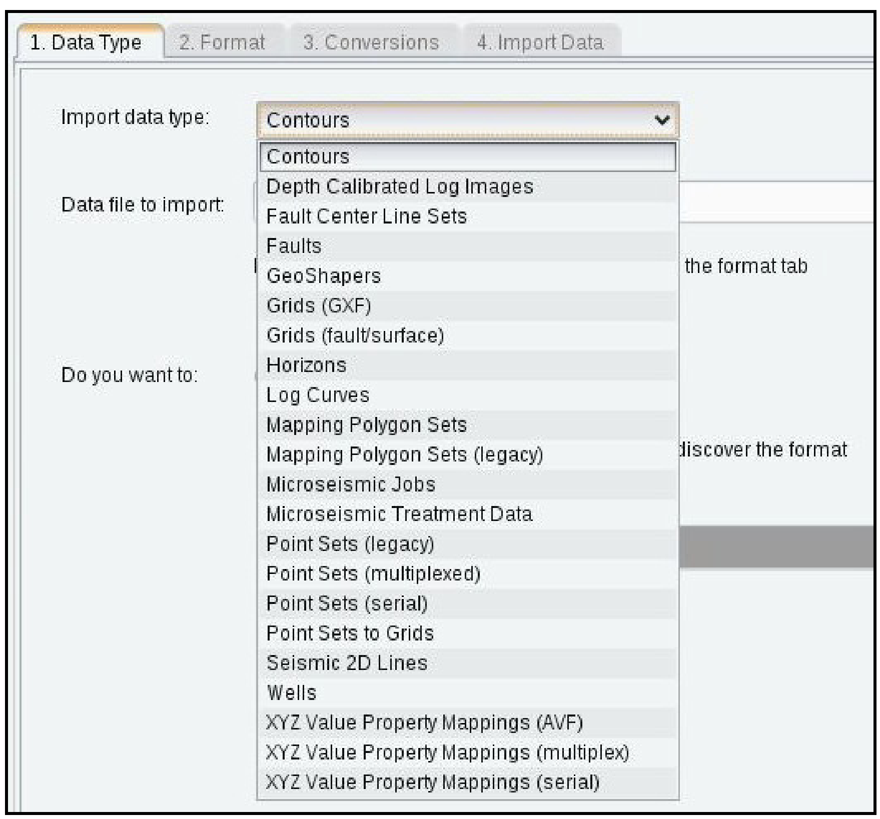
Exercise 3-4. Load Well Data - One Line Per Record

1. If you have not done so, Select **Project > Project Status** and set the OpenWorks project to `DATAIO_TRAINING`. Set the measurement system to `US Oil Field` and use your interpreter ID. If you have not created an interpreter for the project, Choose `LGC` and use **Project > Interpretation ID Manager** to create a new one.

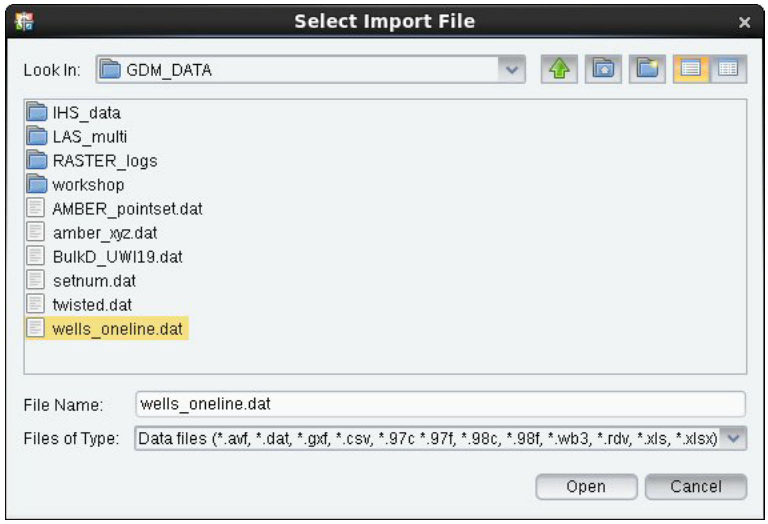
2. Select **Data > Import > Data Import** from the OpenWorks Command Menu.



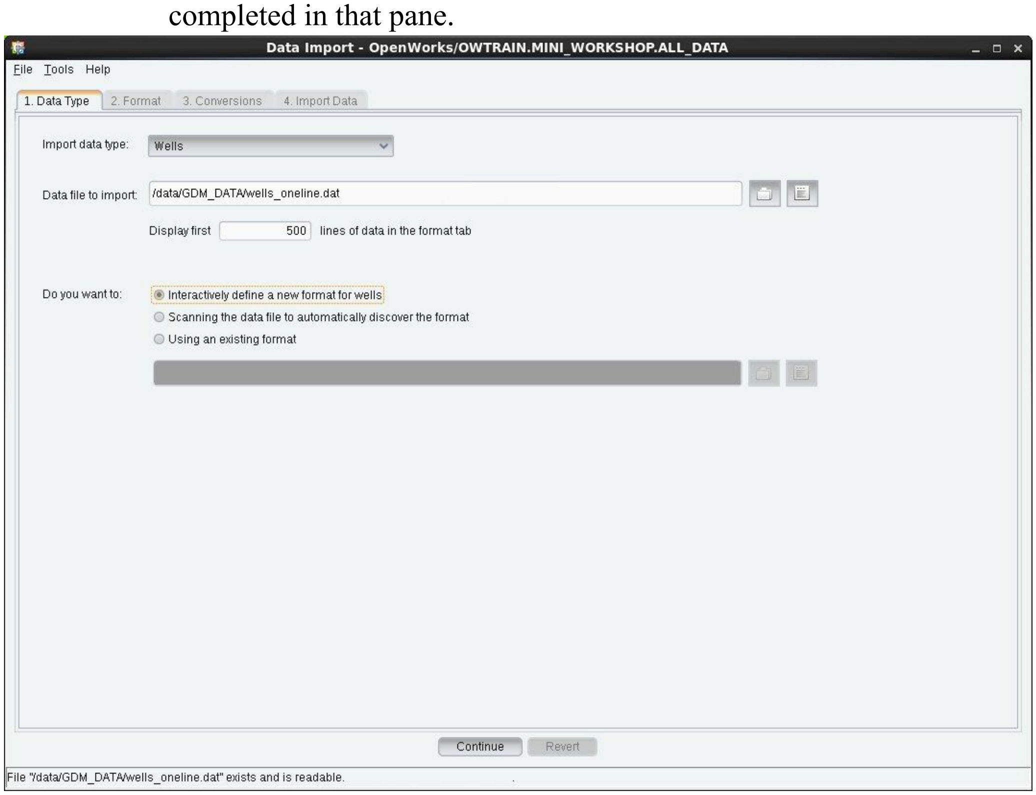
3. The Data Import window opens, and displays tab 1 (Data Type). For Import data type, choose **Wells** from the drop-down list.



4. For *Data file to import*, use the File Select button to select the input file `wells_oneline.dat`. Your instructor will tell you the directory path for this. Hint: Set "Files of Type" to "All Files" so that all data files in the directory will be displayed in the selection window.

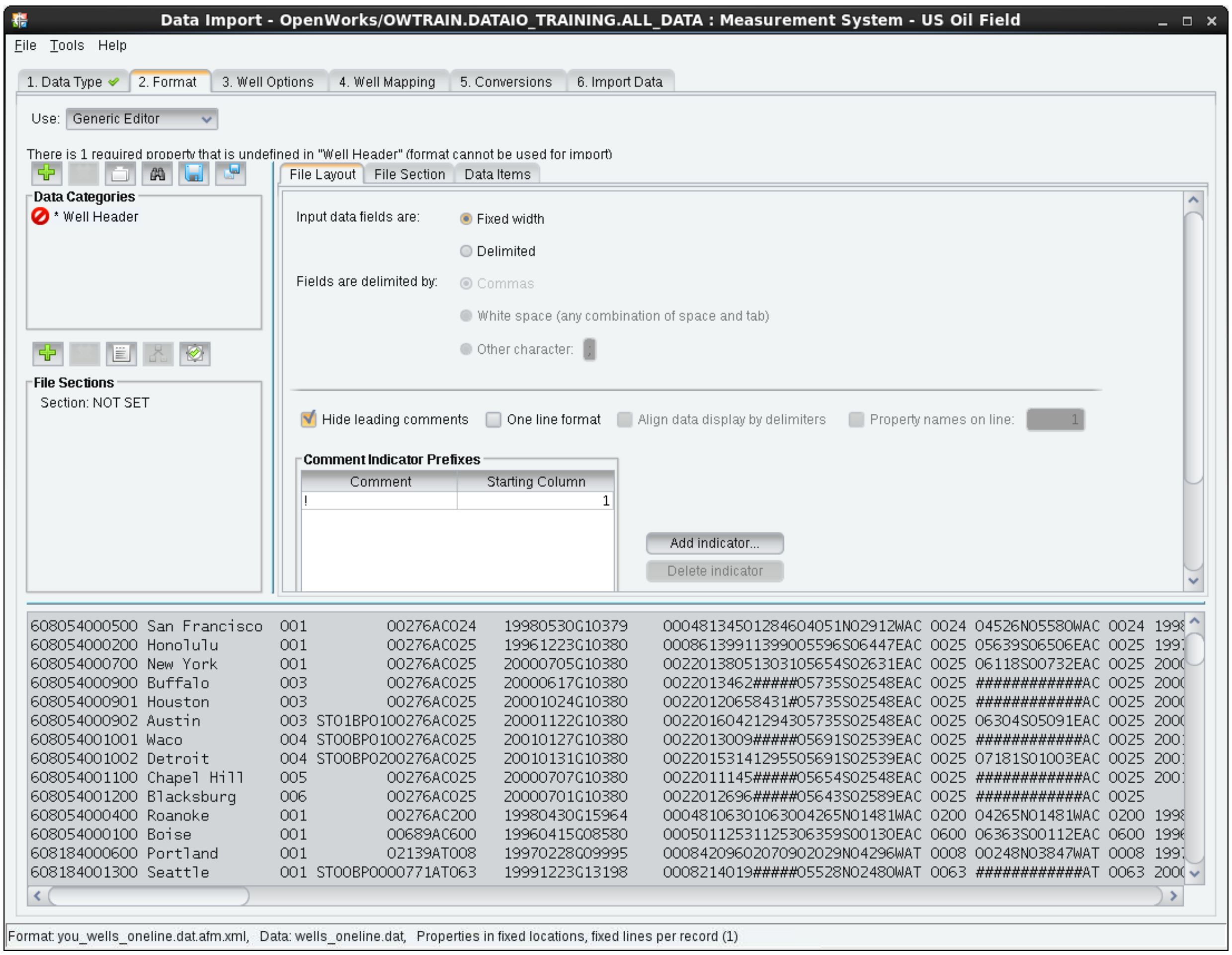


5. Toggle on "Interactively define a new format for wells". At the bottom of the pane, click the **Continue** button to finalize your file selection. The window will refresh; tab 2 (Format) is now displayed. Note that Tab 1 displays a green checkmark 1. Data Type ✓, indicating the minimum requirements have been completed in that pane.



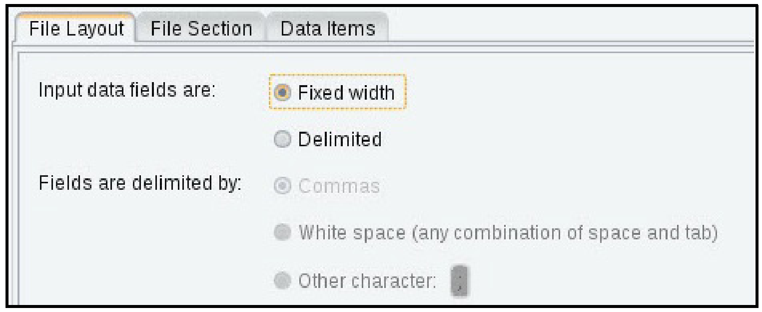
6. The **Format** tab window is the format editor of the Data Import tool. The features in the **Format** tab allow you to open an existing format file or create a new format file. The **Format** tab window consists of multiple panes where:

   - Data Categories and File Sections (analogous to format flags) may be managed
   - Three tabs pertain to the format building process
   - The bottom panel displays the input data file

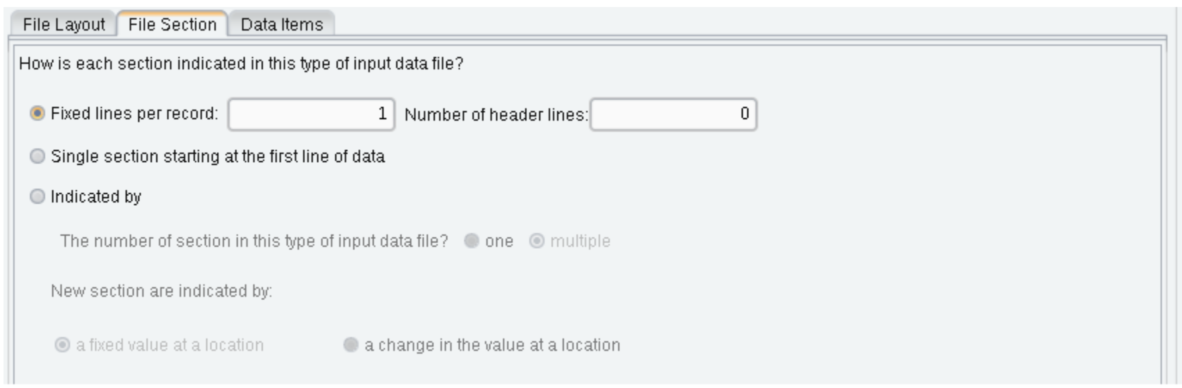


The following instructions pertain to the various panes and tabs in the Format tab window.

7. In the **File Layout** tab, toggle on **Fixed width** for Input data fields.

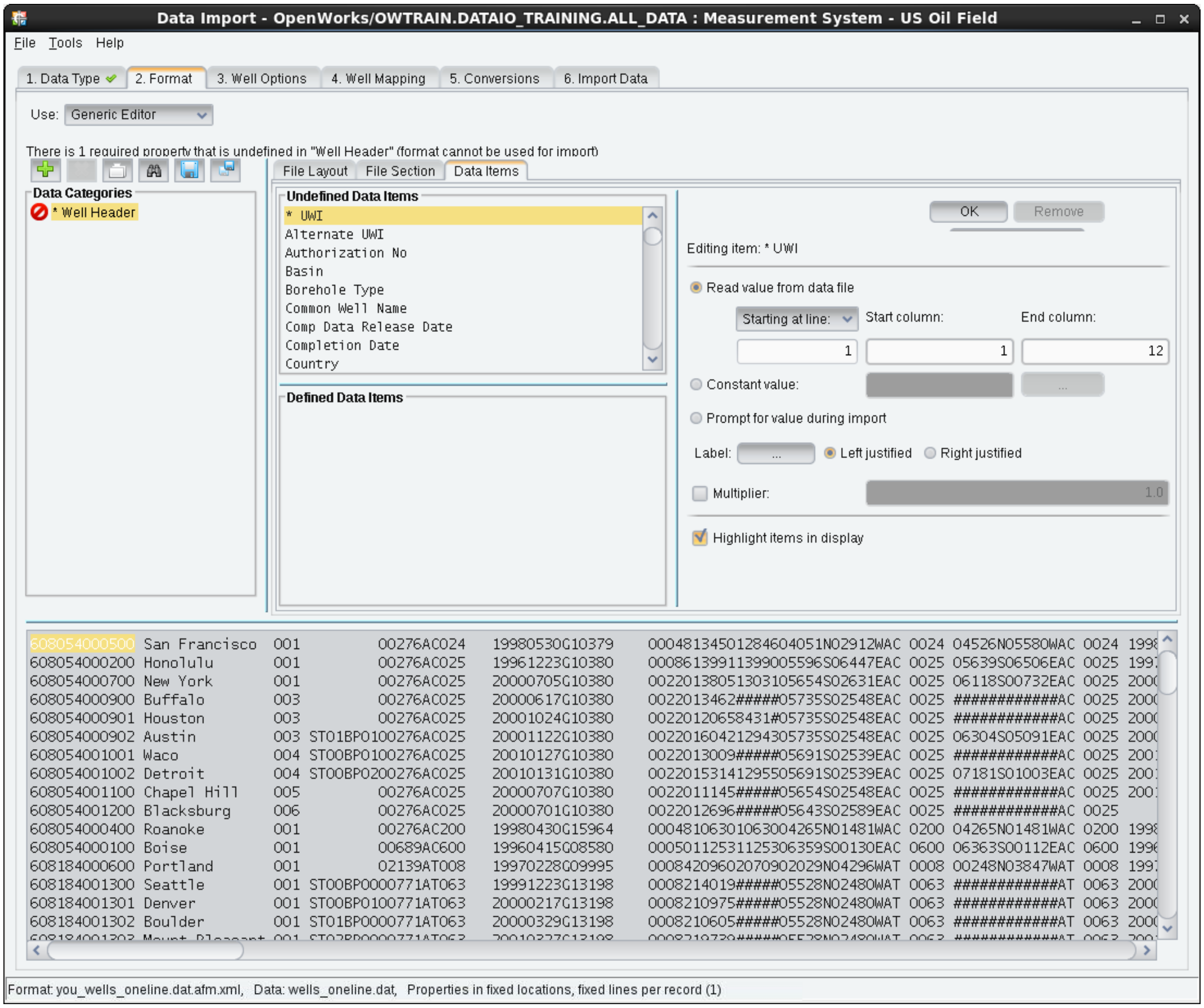


8. Go to the **File Section** tab. Toggle on **Fixed lines per record** and accept the default settings.



9. Go to the **Data Items** tab. Note that 'Well Header' in the Data Categories pane is now highlighted. This indicates the Data Items listed in the **Data Items** tab are all associated with the data category Well Header.

   Begin building a format file for the `wells_oneline.dat` input file by selecting an item from the Undefined Data Items box, then use MB1 in the data previewer (bottom pane) which displays the input file data to paint the range of columns or that item. When MB1 is released, the "Editing item" box (top right pane) shows the file positions of the highlighted data range (start line, start column, end column). For example, the format definition for UWI is shown below:

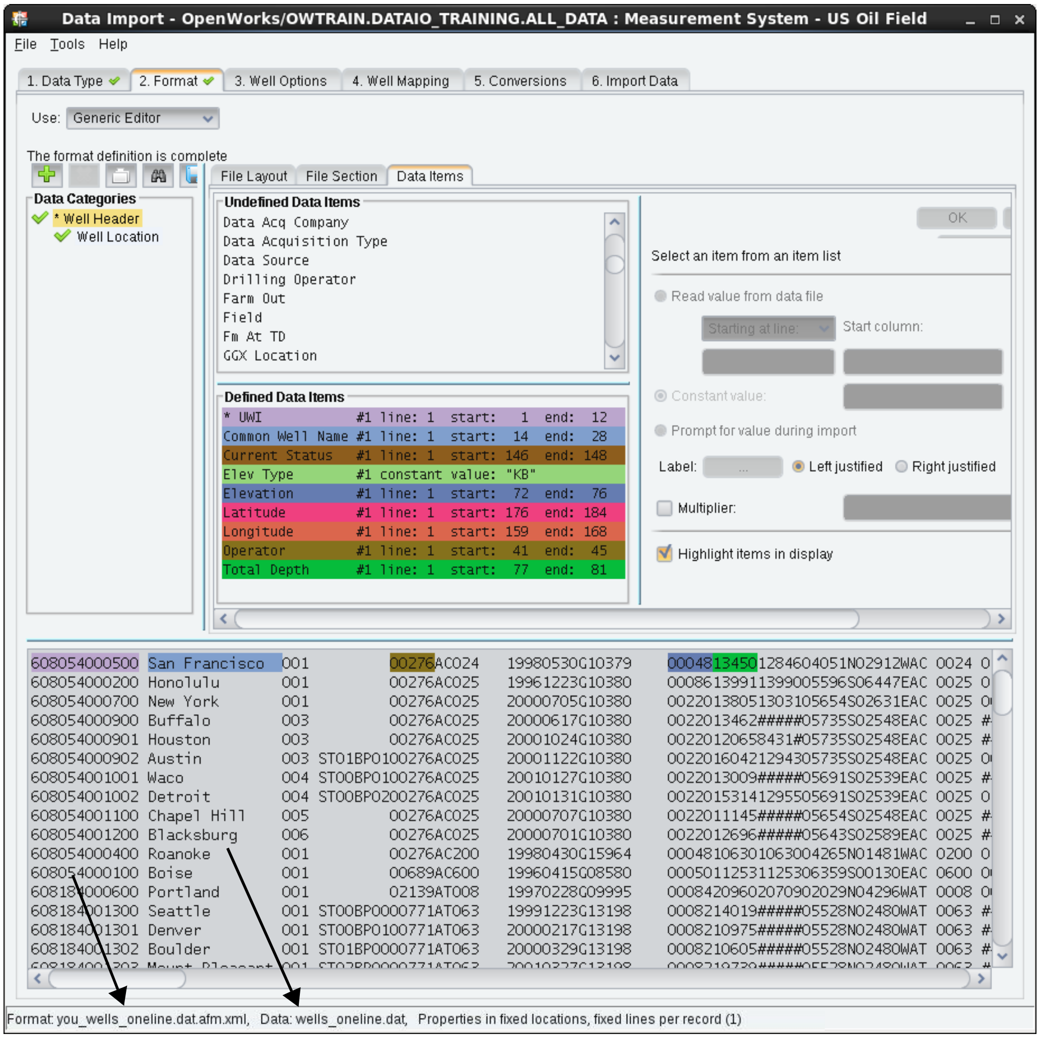


Complete the data item definition by clicking **OK** at the top of the Select Item pane.

The following table shows the positions of the Data Items you are to load from the input data file. Refer to the line, start column and end column values to either highlight the field in the data file box, or you may type in the line, start, end column values. Then click **OK** to add the entry to the Defined Data Items box. Additionally, select **Well Header** from the Data Categories list and **Elev Type** from the Undefined Data Items list. Then select **Constant value** and type **KB** in the field box, click **OK**.

Data Categories	**Data Items**	**Line Number**	**Start Column**	**End Column**
Well Header	* UWI	1	1	12
	Common Well Name	1	14	28
	Current Status	1	146	148
	Elevation	1	72	76
	Latitude	1	176	184
	Longitude	1	159	168
	Operator	1	41	45
	Total Depth	1	77	81
Well Location	* Well Location UWI	1	1	12

When you have finished identifying all the fields to be loaded, click the Save as  icon which, by default, stores the format file to the OW_SYS_DATA/owioformats directory. Name the format file `<your initials>_wells_oneline`. The Data Import tool will automatically append.*afm.xml* to the end of the filename. Notice the status bar at the bottom of the Data Import tool automatically updates to show the format and data filenames.

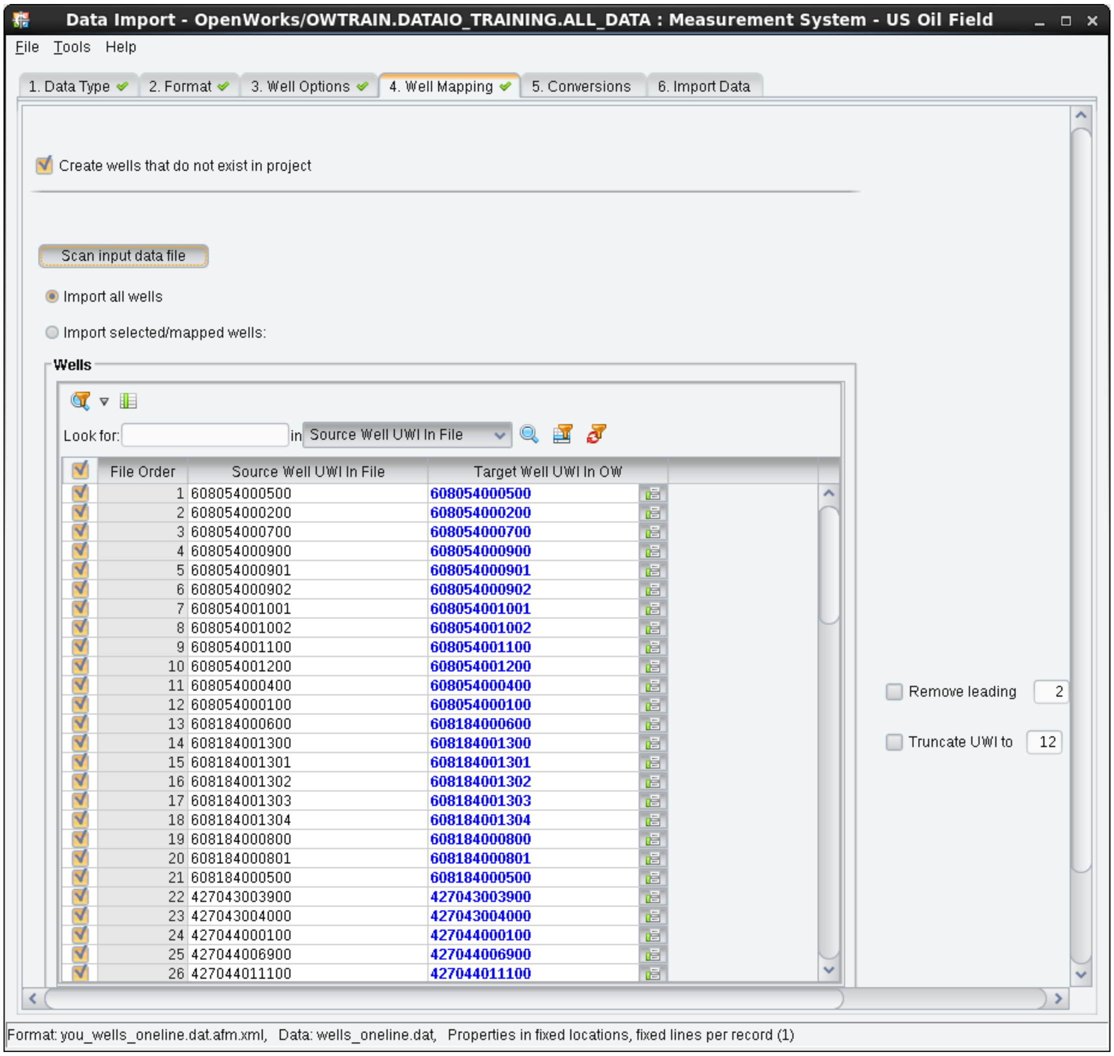


> **Note**
>
> Saving the format to a file allows you to use it for loading other data files having the same format. Always examine the data and format files together in the data previewer pane of the **Format** tab window to confirm good data field match.

10. Go to the **Well Options** tab. In this window, set the Depth Mode to MD, and keep the default settings.

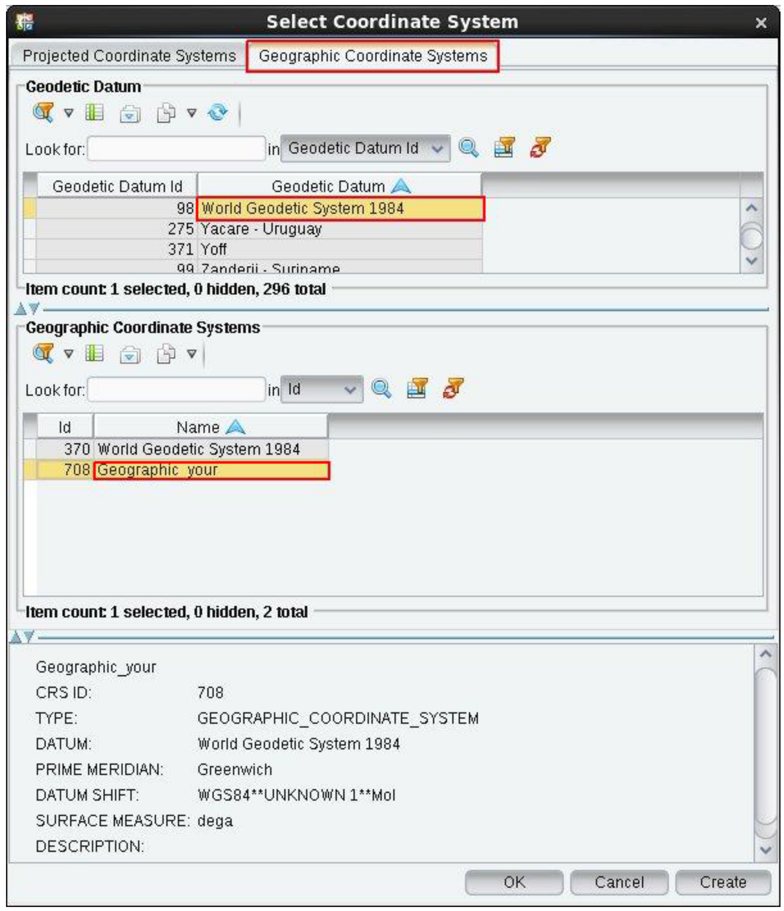
11. Go to the **Well Mapping** tab. Keep the default settings for "Create wells that do not exist in project." Click the **Scan input data file** button; the wells from the input data file (source wells) will be displayed in the Wells table. The font color of the wells in the

Target column will indicate whether the well already exists in the OW project database.



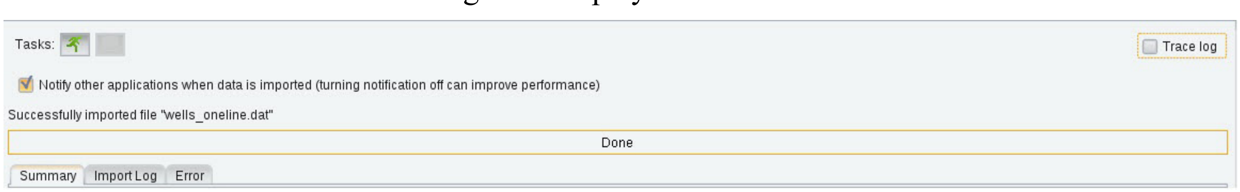
12. Go to the **Conversions** tab. Select the CRS of the input file by clicking the **Select** icon. When the Select Coordinate System dialog box displays, select the **Geographic Coordinate Systems** tab, then select the Geodetic Datum "World Geodetic System 1984." In the bottom half of the box, select the Geographic coordinate system **Geographic_your initials**.

    Click **OK** to finalize your selection.



13. Set Positive SSTVD values to **Above sea level**.

14. In the Import Data tab, click the **Run Import Job**  icon to load the data file. A progress bar appears and the status line 'Job running..." is displayed.

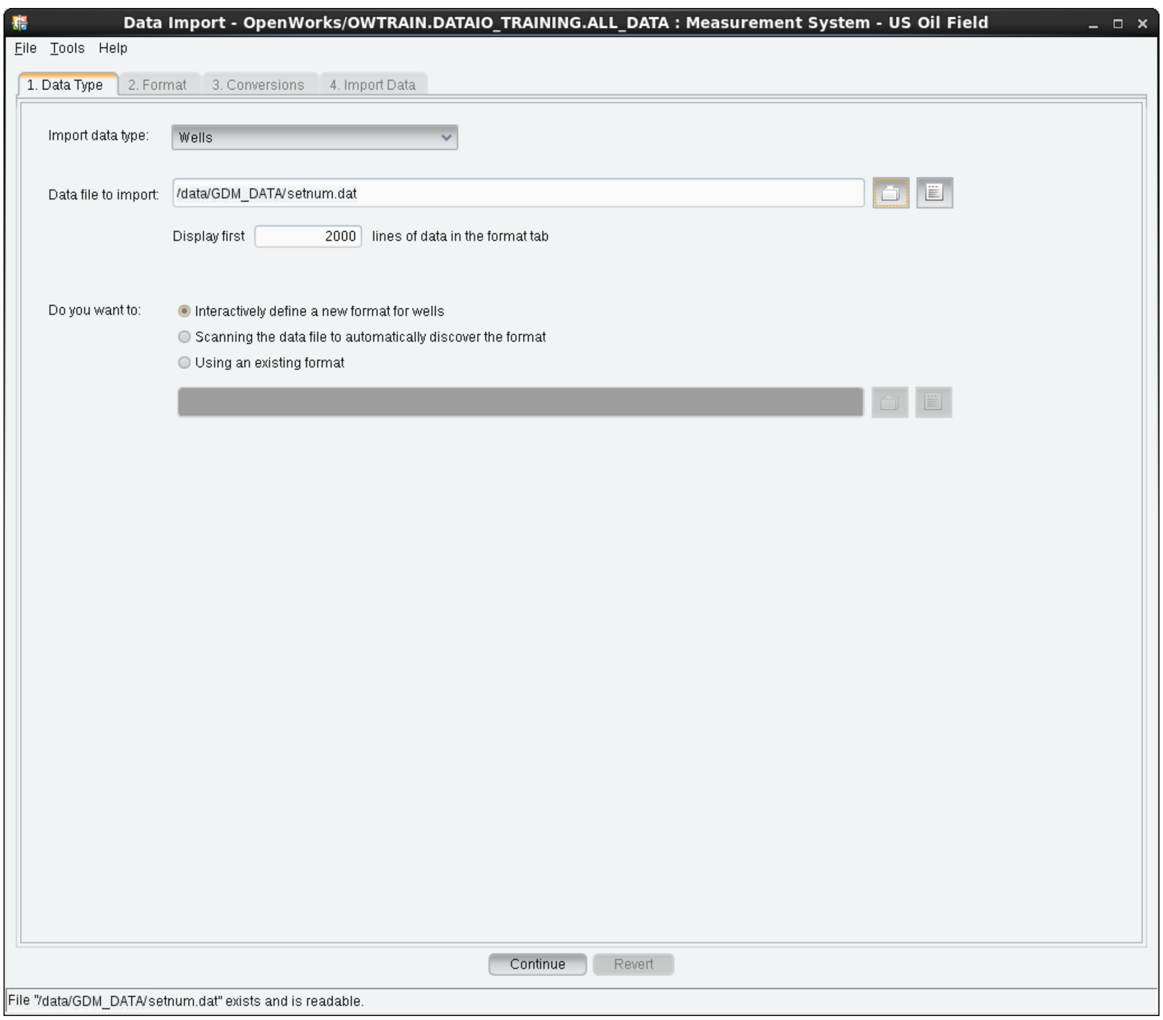


Data Import continues to write to the Import Log after the import has completed; watch for the status line to display “Successfully imported file”, then check **Summary and Import Log** for data load information.

Exercise 3-5. Load Well Data - Set Number Lines/ Well

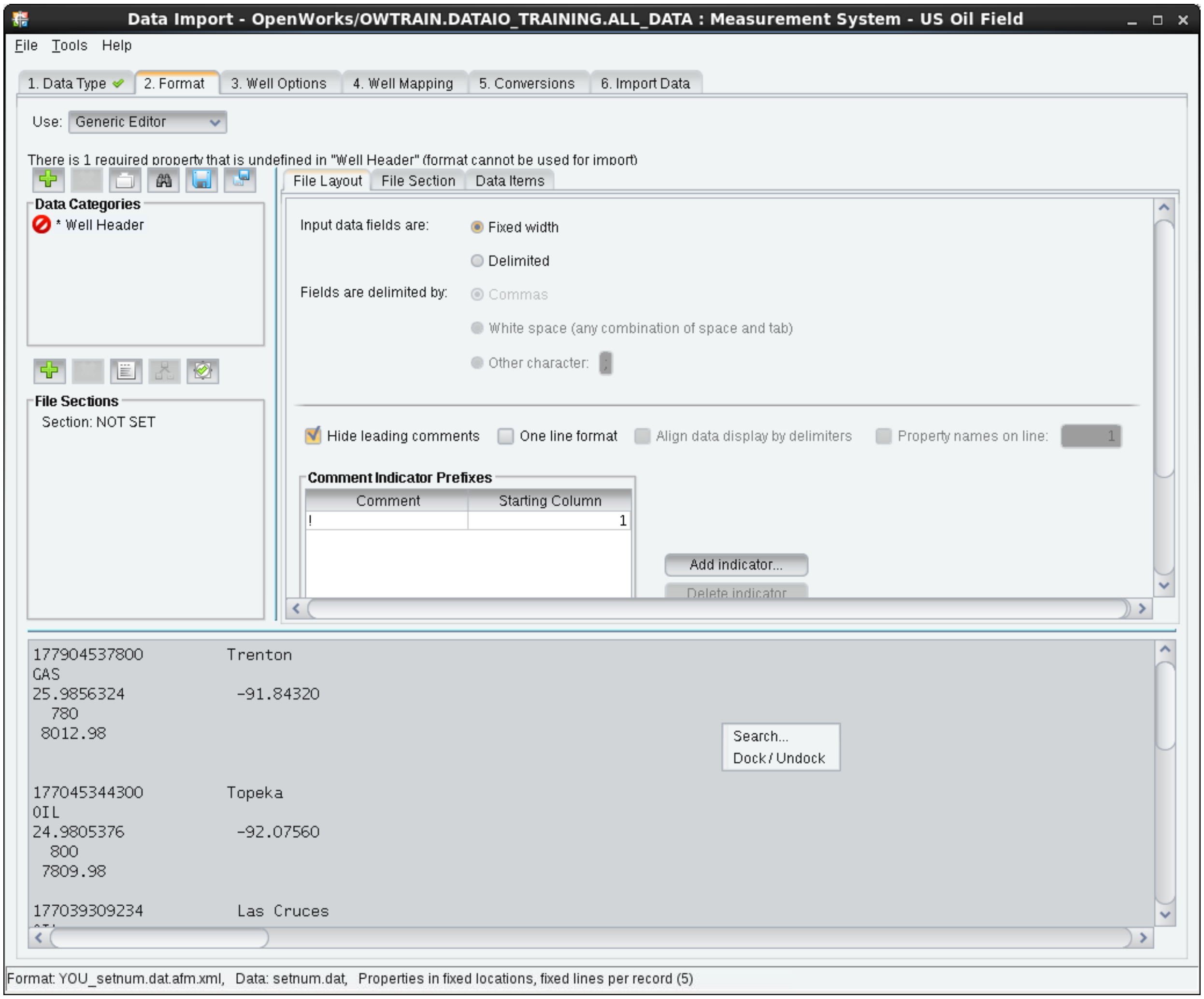
This exercise shows how to load a well data file with a set number of lines per record or well. The process is very similar to the previous exercise where you loaded data with one line per record. Your instructor will tell you where the files are located.

1. Return to the **Data Type** tab, or relaunch the Data Import tool (**Data > Import > Data Import**) if you closed it after the previous exercise.
2. Browse to the folder containing your data and select **setnum.dat**.
3. Choose **Interactively define a new format for wells** and click **Continue**.

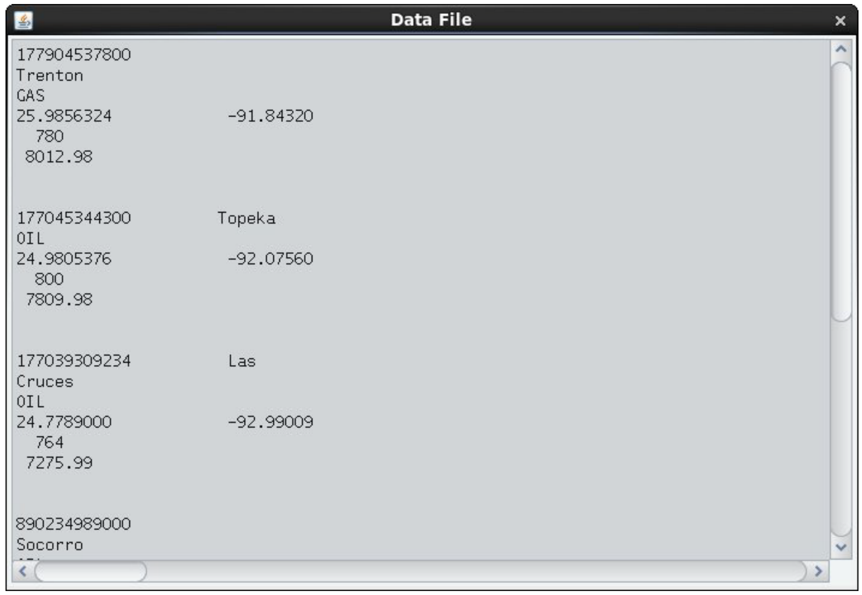


4. In the **Format** tab, Right-click on the lower panel and click **Dock / Undock**.

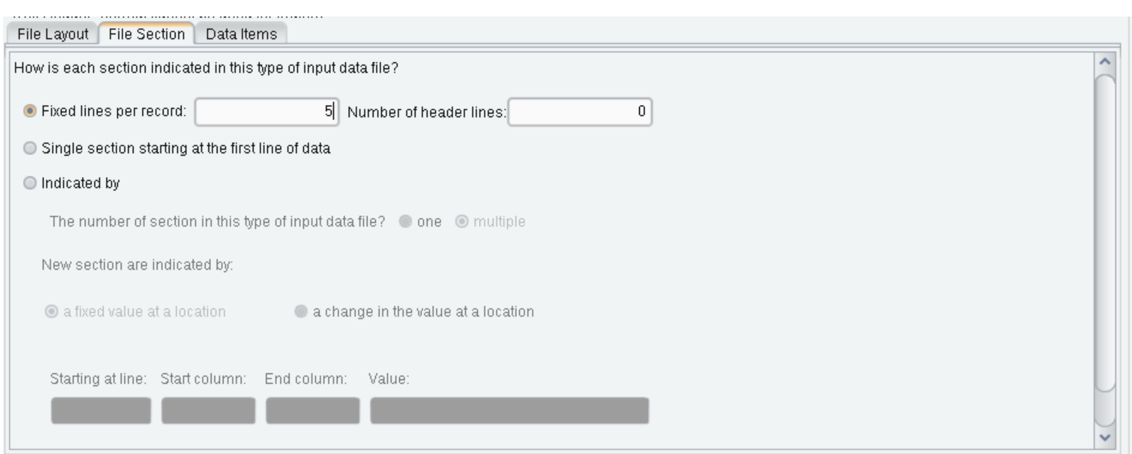
   This opens the data file in a separate window. You can reattach this to the main window by using **Right-click > Dock / Undock**.



5. Use the scroll bars in the Data Previewer window to examine the loaded data file. Look for patterns to the data structure that are consistent for each well.



6. Click on the **File Section** tab and choose **Fixed lines per record**. Set the number of lines to **5**. In this example, there are no header lines.



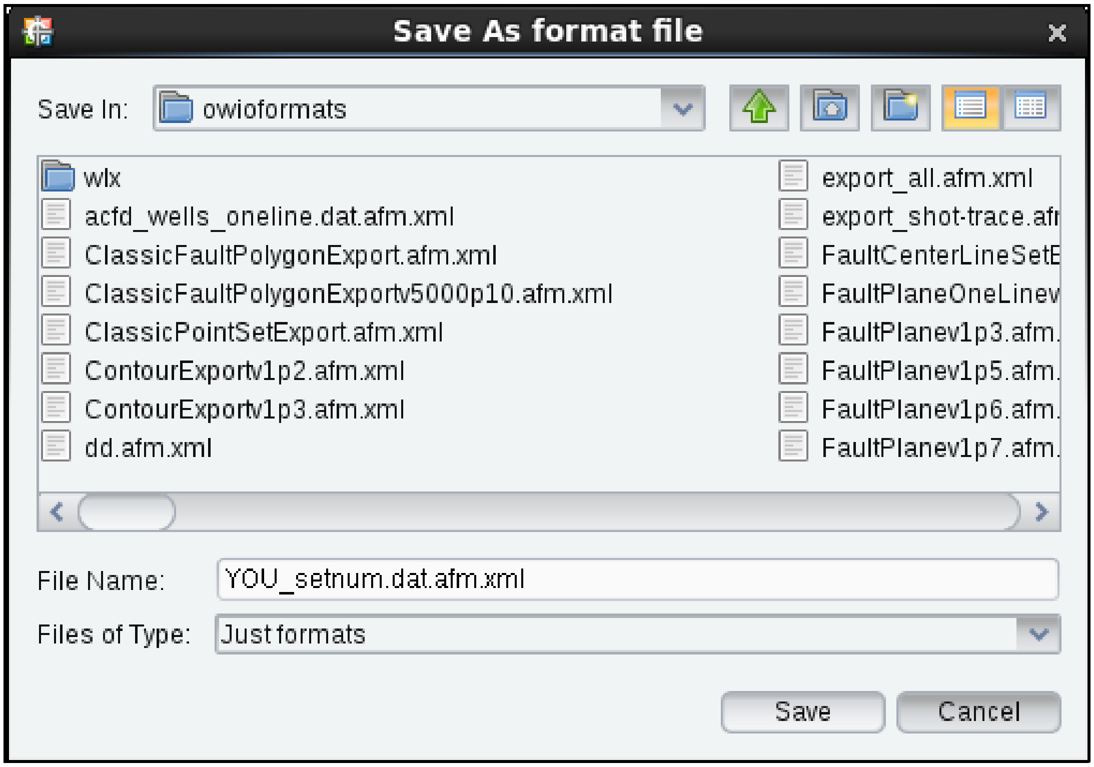
7. To describe your data and build your format file, follow the steps shown in the exercise titled “Load Well Data - One Line Per Record” on page 3-96.

   The Table below shows the positions of the Data Items in the Well Header and Well Location categories. Highlight each example of data in the Data Previewer window based on the column/line specifications in the following table, then add them to the Defined Data Items list.

Data Categories	Data Items	Line Number	Start Column	End Column
Well Header	* UWI	1	1	12
	Common Well Name	1	22	41
	Current Status	2	1	4
	Elev Type	Set Constant Value to “KB”		
	Elevation	4	2	5
	Latitude	3	1	10
	Longitude	3	22	31
	Operator	Set Constant Value to “Landmark Graphics”		
	Total Depth	5	1	8
Well Location	Well Location UWI	1	1	12

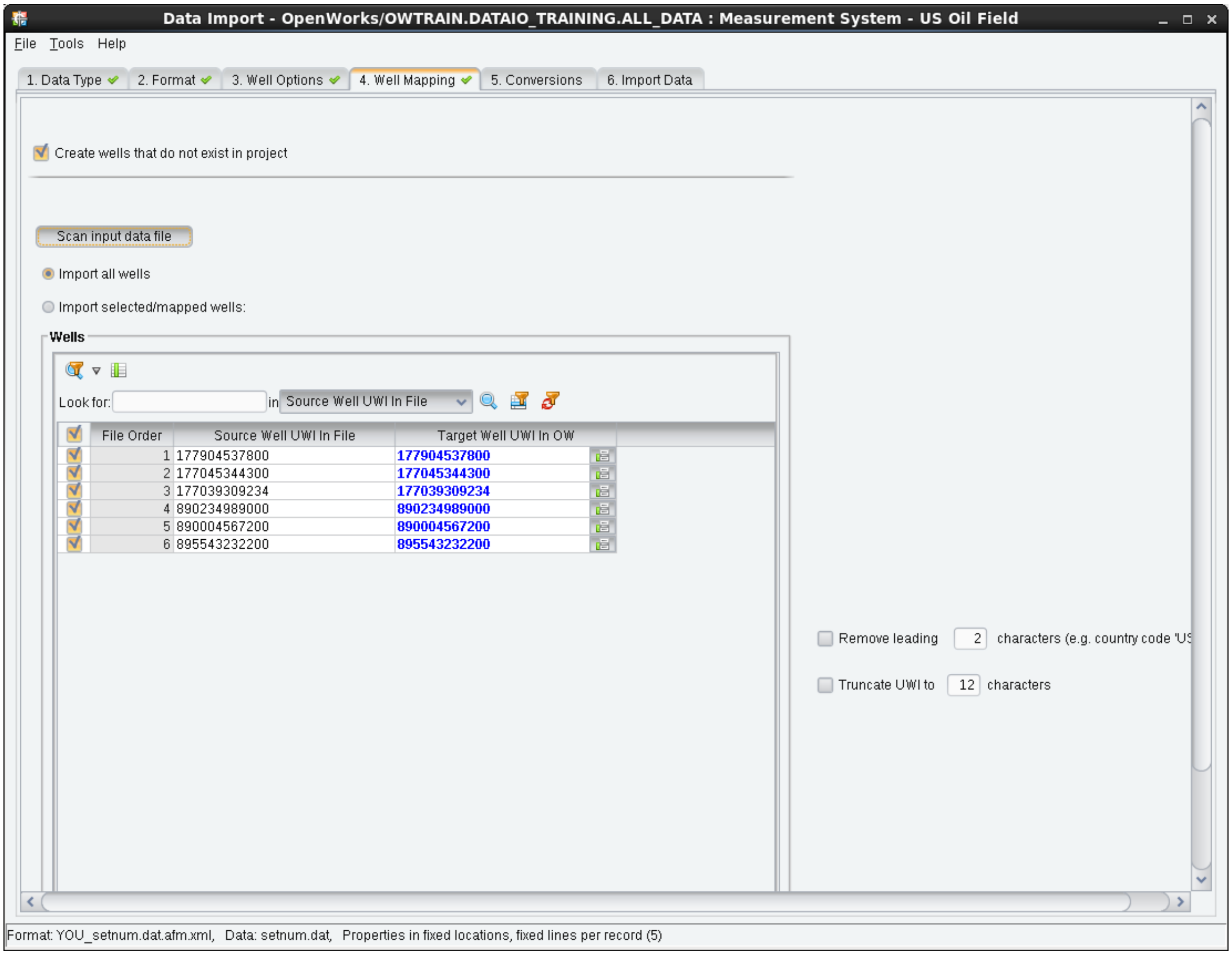
In cases where there is a constant value to be entered, you can select from a list of acceptable options by clicking the **Valid Values** button (**…**). This method works for **Elev Type** in the example above, but you may need to key in the **Operator** if the value you want to use does not exist in the list.

8. Click the Save as  icon and name the file **setnum_*<your initials>>*_setnum.afm.xml**.

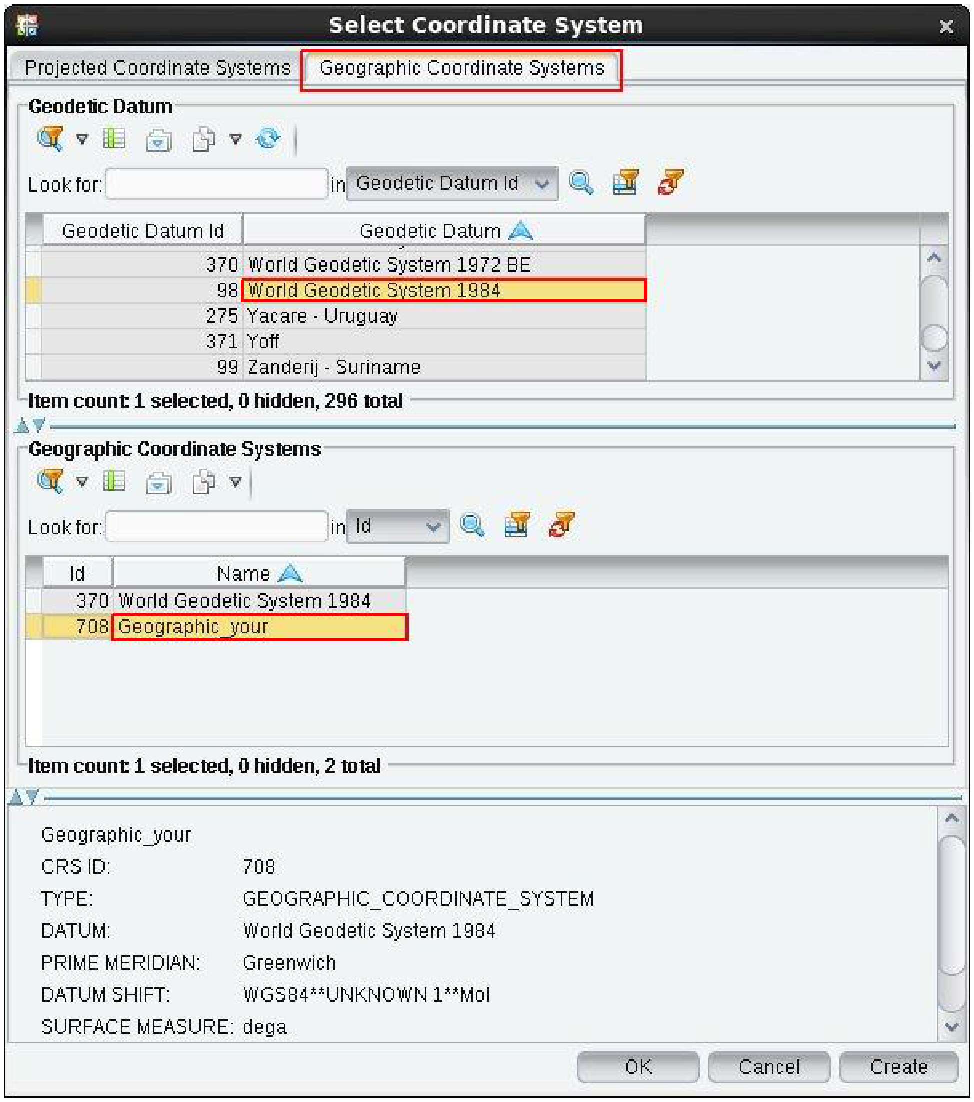


9. Click the **Well Options** tab. The default settings are good.

10. Click the **Well Mapping** tab. Verify that **Create wells that do not exist in project** is checked. Click the **Scan input data file** button. Verify that the Import Tool recognizes the six wells in the file.



11. In the **Conversions** tab, set the CRS to **Geographic_*your initials***. The rest of the settings should be correct by default.



12. Click on the **Import Data** tab. Click the **Run** icon. Use the Summary log to verify that the wells were loaded.

Exercise 3-6. Loading Data with Variable Lines per Well

1. In the Data Import tool, click on the first tab and set the Import data types to **Wells**.

2. Select the Import data file: **`29wells.txt`**

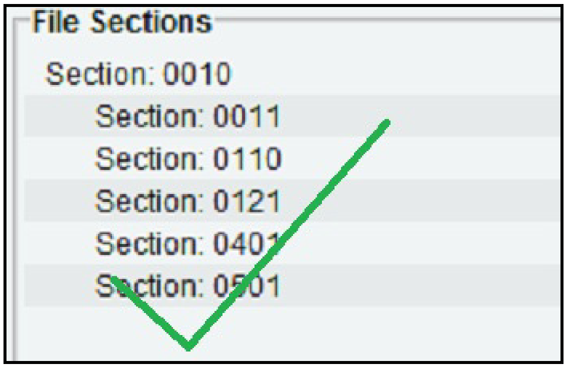
3. Toggle on **Interactively define a new format for wells** and click **Continue**.

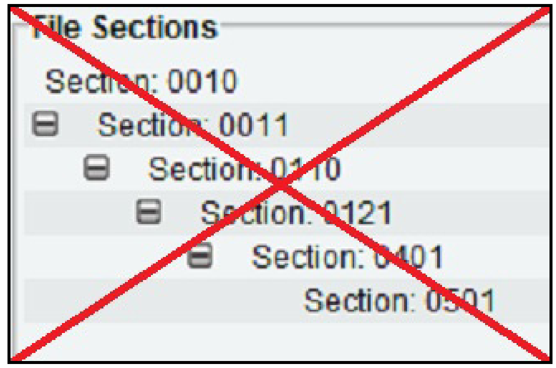
4. In the **File Layout** tab, toggle on **Fixed width** for input data fields.

5. Go to the **File Section** tab. Toggle on **indicated by** and use the **a fixed value at a location** option.

6. Begin defining the File Sections by highlighting **0010** in the first row. Click the **Add new file section** icon to add an additional section. Define the remaining File Sections. (Be sure to click back on the first section each time you add a new section so that 0010 is the parent to all of the other sections)

File Selection
0010
0011
0110
0121
0401
0501

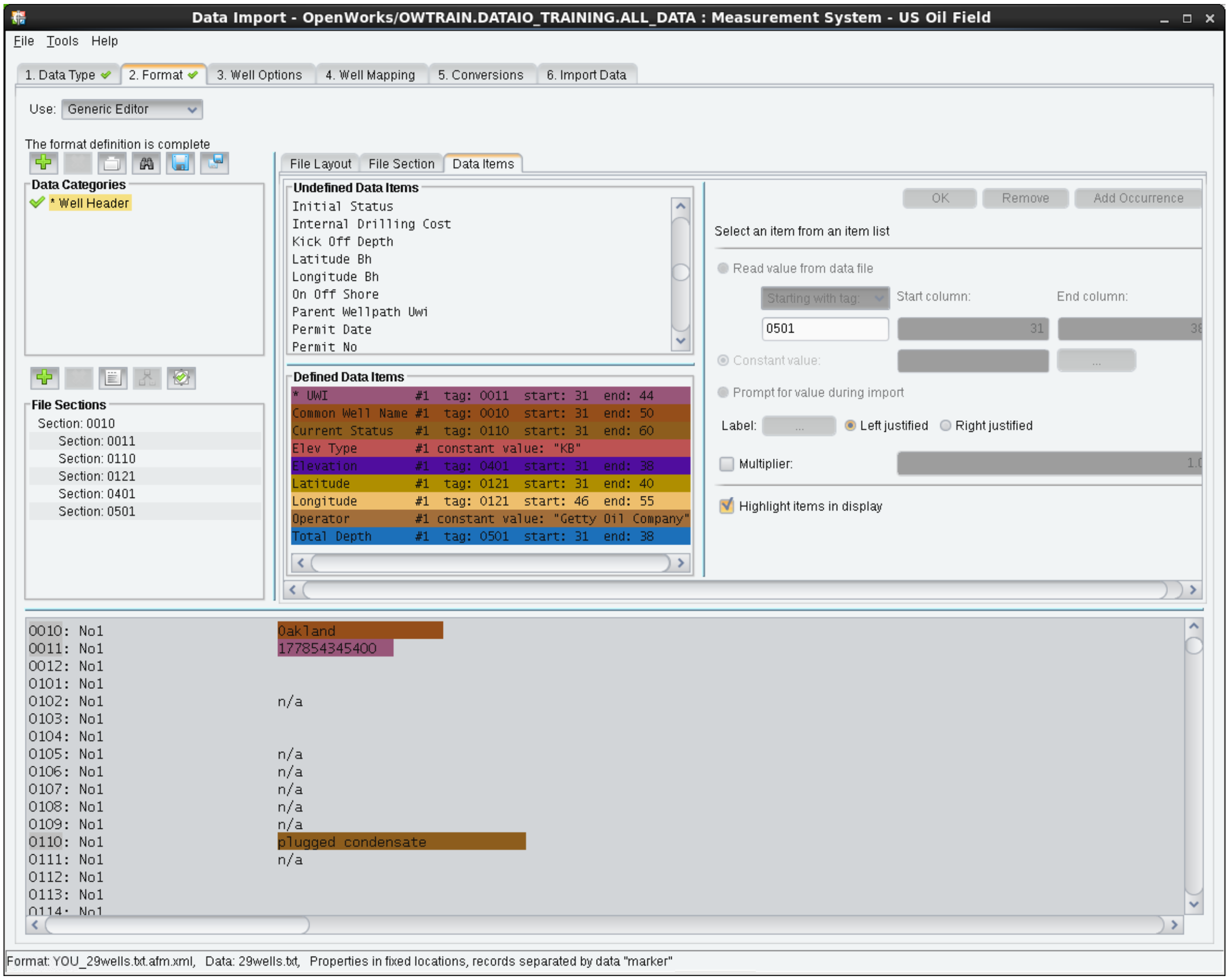




7. Click the **Data Items** tab.

8. Begin building the format file using the following data items.

Data Items	Starting with tag	Start Col	End Col
Common Well Name	0010	31	50
UWI	0011	31	44
Current Status	0110	31	60
Latitude	0121	31	40
Longitude	0121	46	55
Elevation	0401	31	38
Total Depth	0501	31	38
Elev Type	Constant Value = “KB”		
Operator	Constant Value = “Getty Oil Company”		

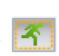


9. When you have finished identifying all the fields to be loaded, click the **Save as** icon. Name the format file **`<your initials>29wells.txt.afm.xml`**.

10. Go to the **Well Options** tab. In this window, set the **Depth Mode** to **MD**.

11. Go to the **Well Mapping** tab, verify that the **Create wells that do not exist in the project** check box is selected, and click the **Scan input data file** button.

12. Go to the **Conversions** tab. Set the CRS to Geographic_<your initials>. Leave the rest as default.

In the **Import Data** tab, click the **Run Import Job**  icon to load the data file. A progress bar appears and the status line “Job running…” is displayed.

Exercise 3-7. Load Well Data Using the Spreadsheet Editor to Create the Format File

The purpose of this exercise is to update 6 wells loaded previously under the same DATAIO_TRAINING project using the same Data Import tool but this time is using the Spreadsheet Editor in order to create the format file.

The well data in this exercise is formatted with a set number of lines per record. Commas are used as delimiters. The data file in this exercise was exported from Microsoft Excel in a comma delimited format (csv).

1. To view the data file in WOW software:

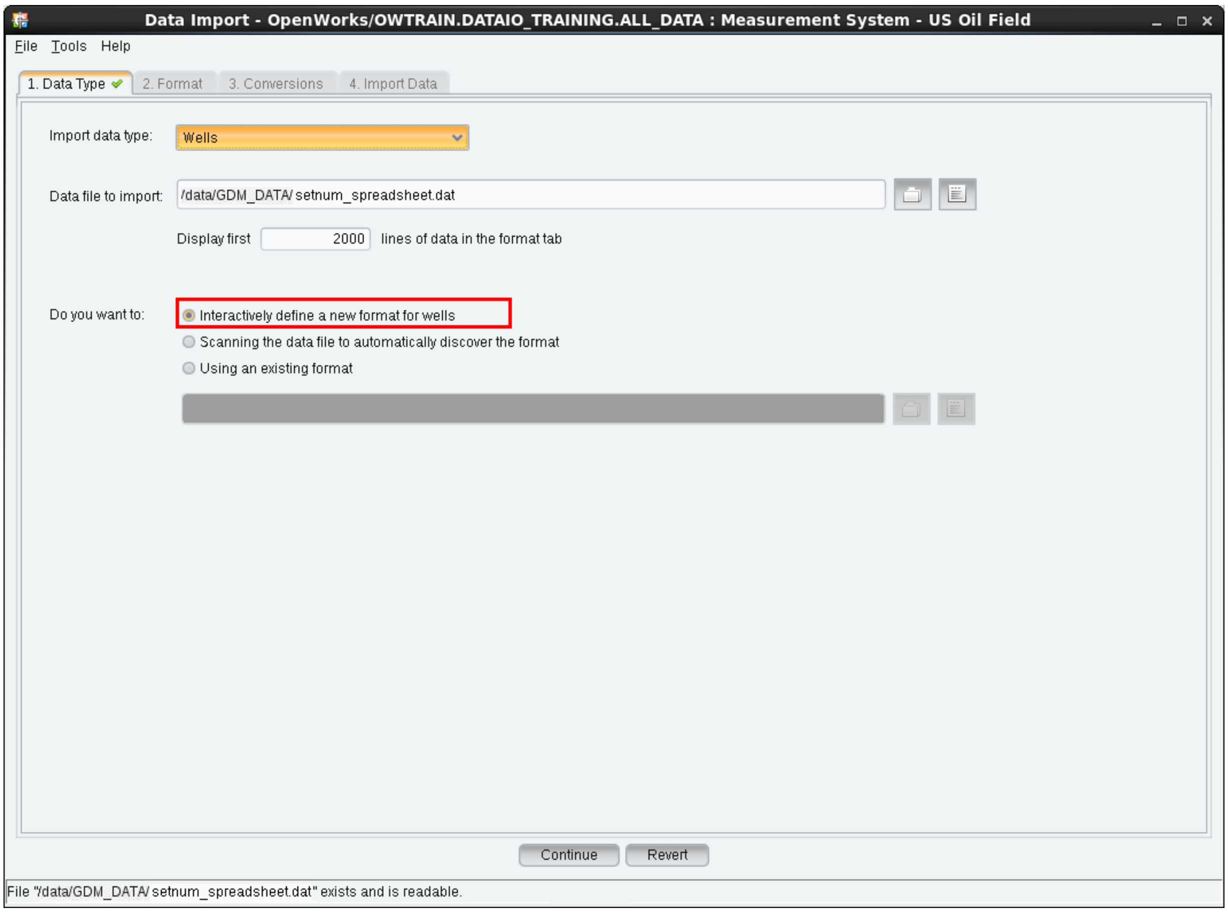
    - Type `http://<your machine name here>/` into your browser window's address field.
    - Click **Other Data** in the left pane of the WOW software main menu.
    - Click /**GDM_DATA** and then load.
    - Click **setnum_spreadsheet.dat** in the middle pane.

2. Select **Data** > **Import** > **Data Import** from the OpenWorks command menu.

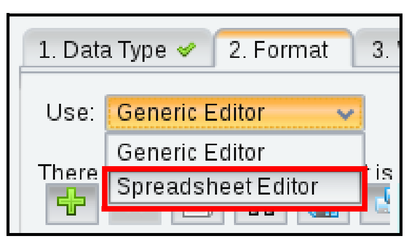
3. The Data Import window opens, and displays tab 1 (**Data Type**). For Import data type, choose **Wells** from the drop-down list. For **Data file to import**, use the File Select button  to select the input file named **setnum_spreadsheet.dat**.

4. Toggle on **interactively define a new format for wells**. At the bottom of the pane, click the **Continue** button to finalize your file selection.

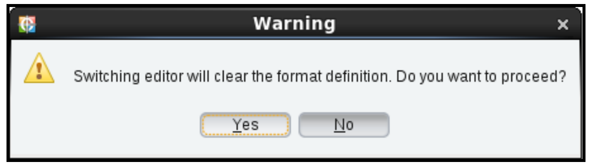
   The window will refresh. Tab 2 (Format) is now displayed. Note that Tab 1 displays a green checkmark  , indicating the minimum requirements have been completed in that pane.



5. The Format tab window is the format editor of the Data Import tool, select **Spreadsheet Editor** from the option **Use**.



6. When you change the editor used, you will receive the following message informing that the previously format definition opened will clear: Press **Yes**.



7. Click the **Add new data item**  icon on the Data Item sections. The Data Items window will open, and you can select the categories and select the rows or data items you need in each category according the below table. You can add items for a category at a time. When you have finished selected all the fields for the **Well Header** category click the **Add** button.

   The following table shows the positions of the Data Items you are to load from the input data file:

Data Categories	Data Items	Value	Occurrence
Well Header	*UWI	Column 1	1
	Common Well Name	Column 2	1
	Current Status	Column 3	1
	Elev Type	Set Constant Value to "KB’	"1
	Elevation	Column 6	1
	Latitude	Column 4	1
	Longitude	Column 5	1
	Operator	Set Constant Value to "Landmark Graphics”	"1
	Total Depth	Column 7	1
Well Location	Well Location UWI	Column 1	1
	Data Source	Set Constant Value to “YOU”	1
	Well Location Name	Column 2	1
	Surface Latitude	Column 4	1

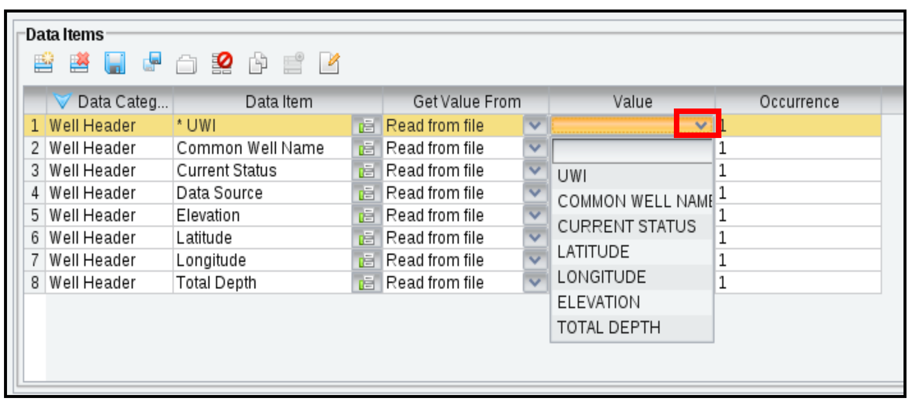
Data Categories	Data Items	Value	Occurrence
	Surface Longitude	Column 5	1
	Well UWI Type	Set Constant Value to "API”	1

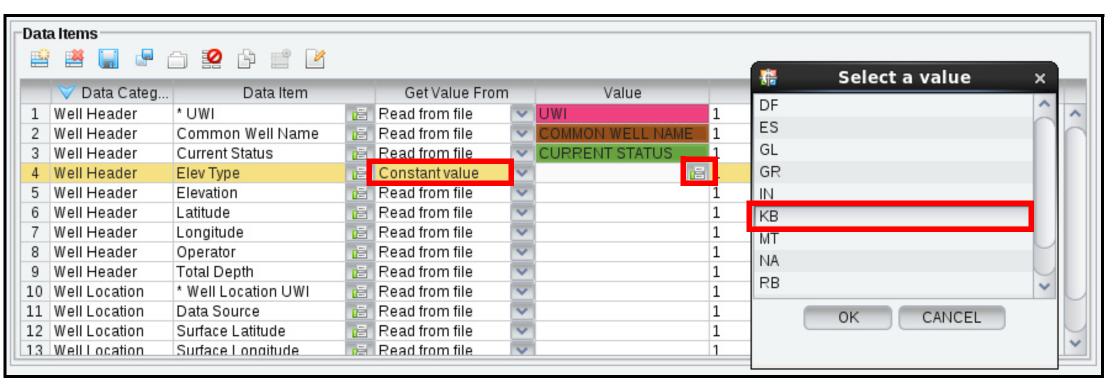
8. Repeat the above procedure in order to add the fields for **Well Location** category, clicking **Add new data item** icon again in the Data Item sections.

Note

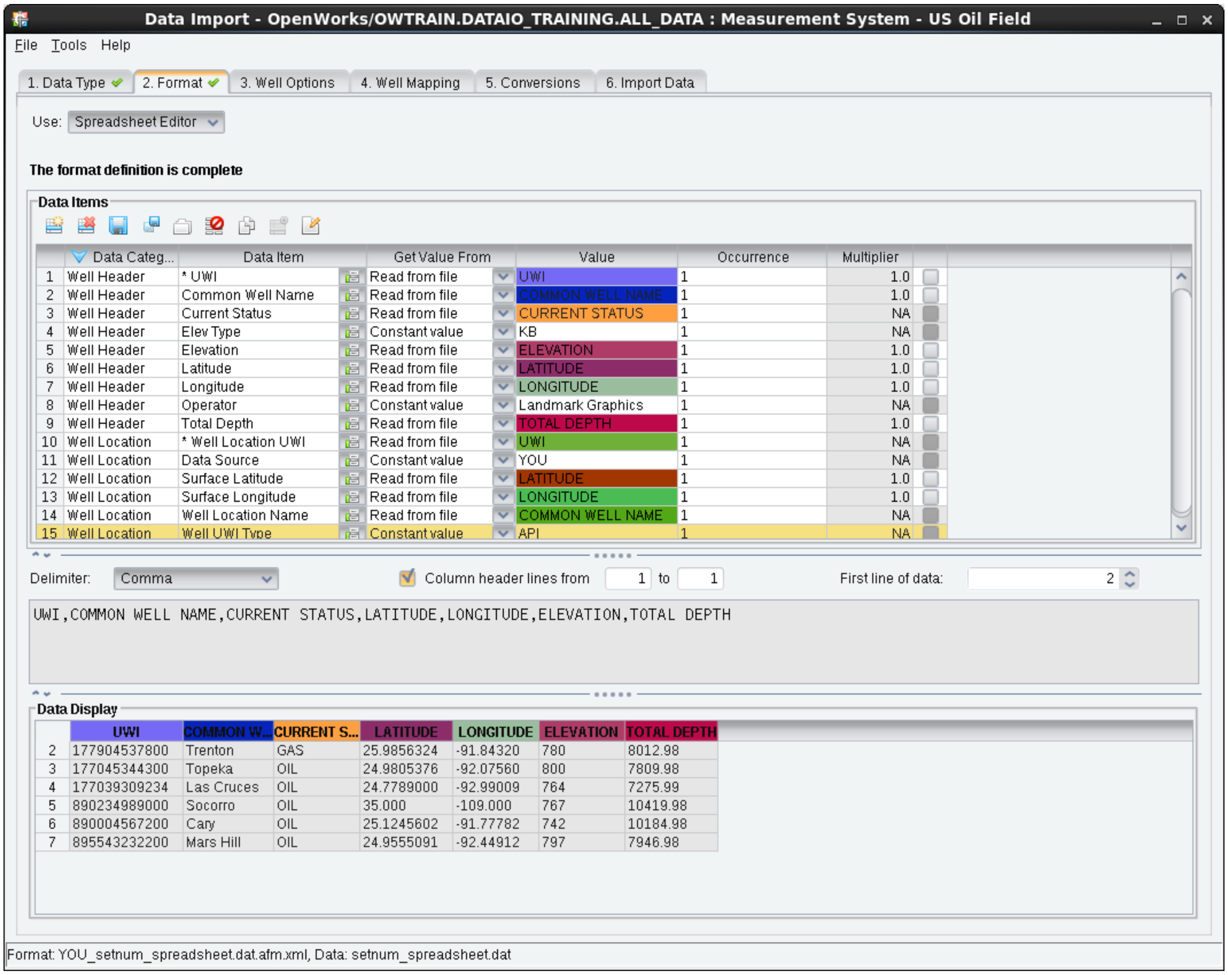
If the Well location is not specified when you load the well, the well location row will be created automatically with the basic data.

9. Associate each value with each field by clicking the down arrow in the **Value** column. If the value is a constant value, select first from the **Get Value from** the **Constant Value** column, and then click the **Value** field (or select the list from the same field value).





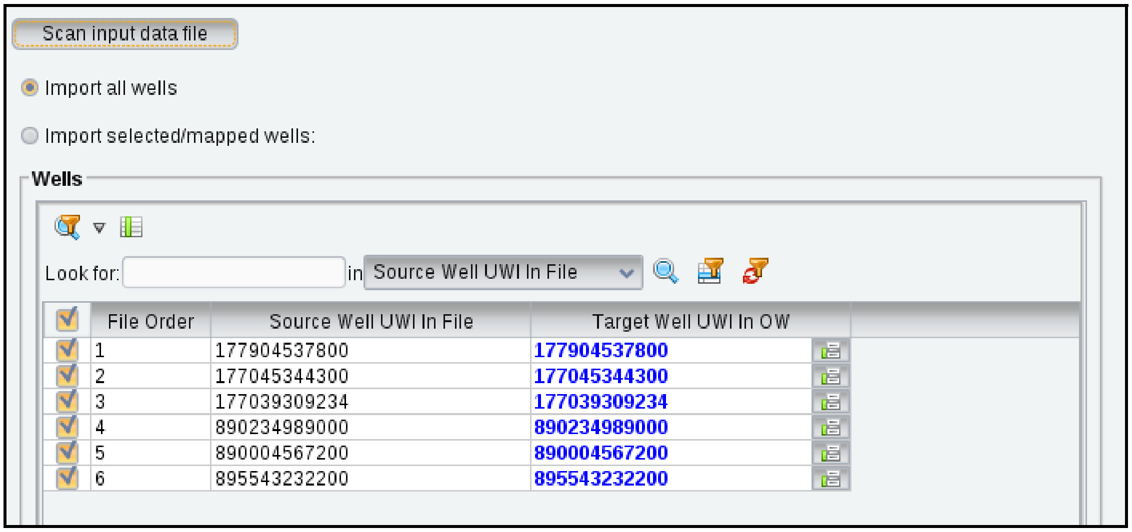
10. Complete your format file by describing the remaining fields in the data set in the same manner as described above.



11. When the last field is formatted, save your format by clicking the **Save as**  icon in the Data Categories box and enter a unique format file name in the dialog box that appears. The newly created format file is saved to the default OW/SYS/DATA/owioformats directory.

12. Continue with the following tab, and click on **Well Options** and Keep the default settings.

13. Click the **Well Mapping** tab. Click the **Scan input data file** button. Verify that the Import Tool recognizes the six wells in the file loaded in the previously exercise. The UWIs in the right column should appear in blue.



14. Click the **Conversions** tab. Set the CRS to **Geographic_*your initials*** under Word Geodetic System 1984 Geodetic datum. Then select **Above sea level** option for the SSTVD direction. The rest of the settings should be correct by default.

15. Click the **Import Data** tab. Click the **Run**  icon. Use the Summary log to verify that the wells were updated.

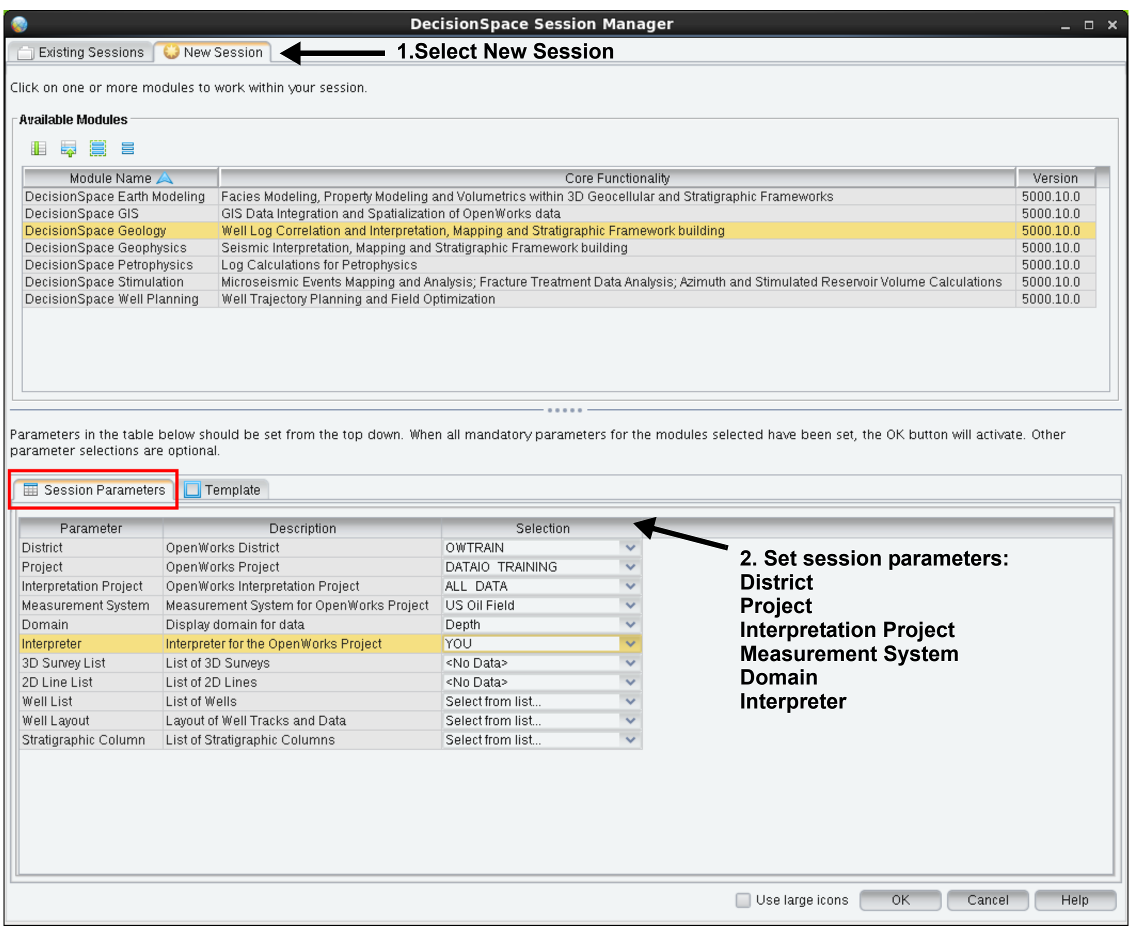
Exercise 3-8. Displaying and Verifying Well Data

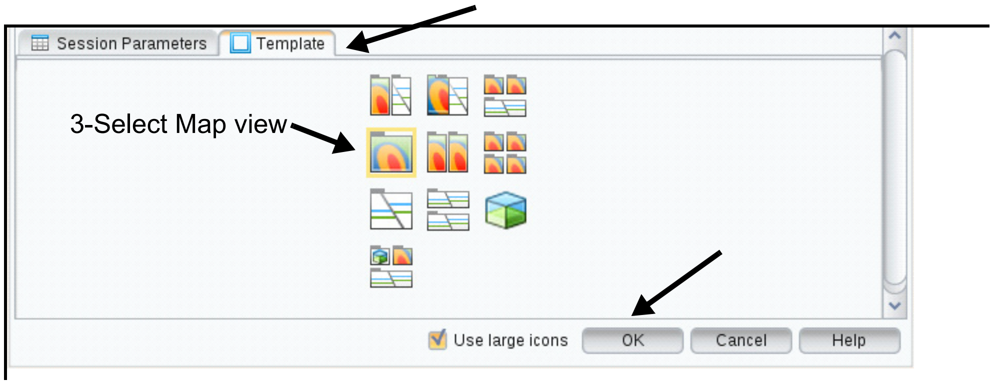
In this exercise, you use the DecisionSpace Geosciences software to display a base map showing the wells you loaded with the ASCII Loader. In addition, you can use the Well Data Manager to correct some data errors.

The DecisionSpace Geosciences software is only briefly introduced here. It is thoroughly covered in the DecisionSpace Geosciences training classes.

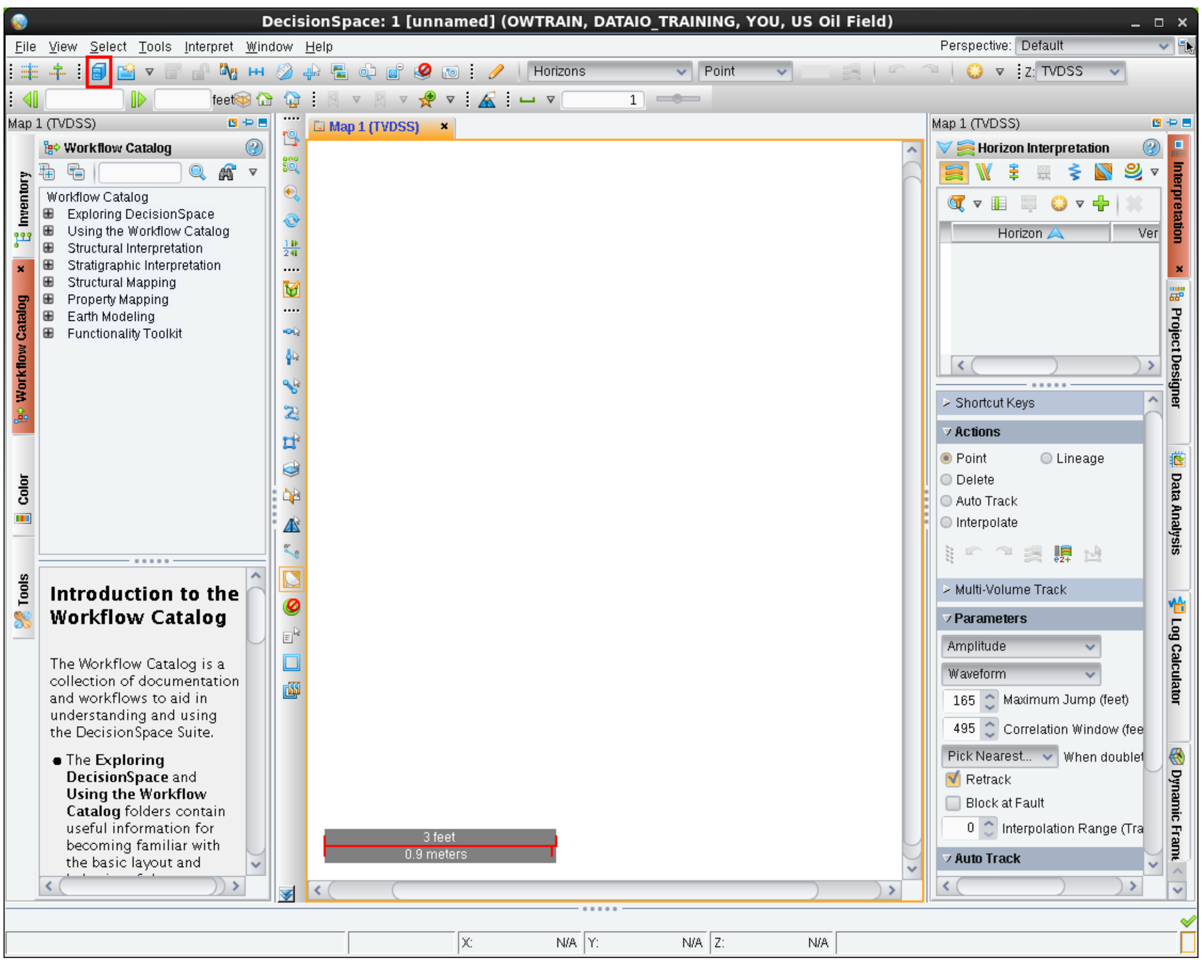
1. Start the DecisionSpace Geosciences software by selecting **Applications > DecisionSpace Geosciences** from the OpenWorks Command menu.

   When the DSGeosciences window opens, go to the **New Session** tab, and set the values for the session.



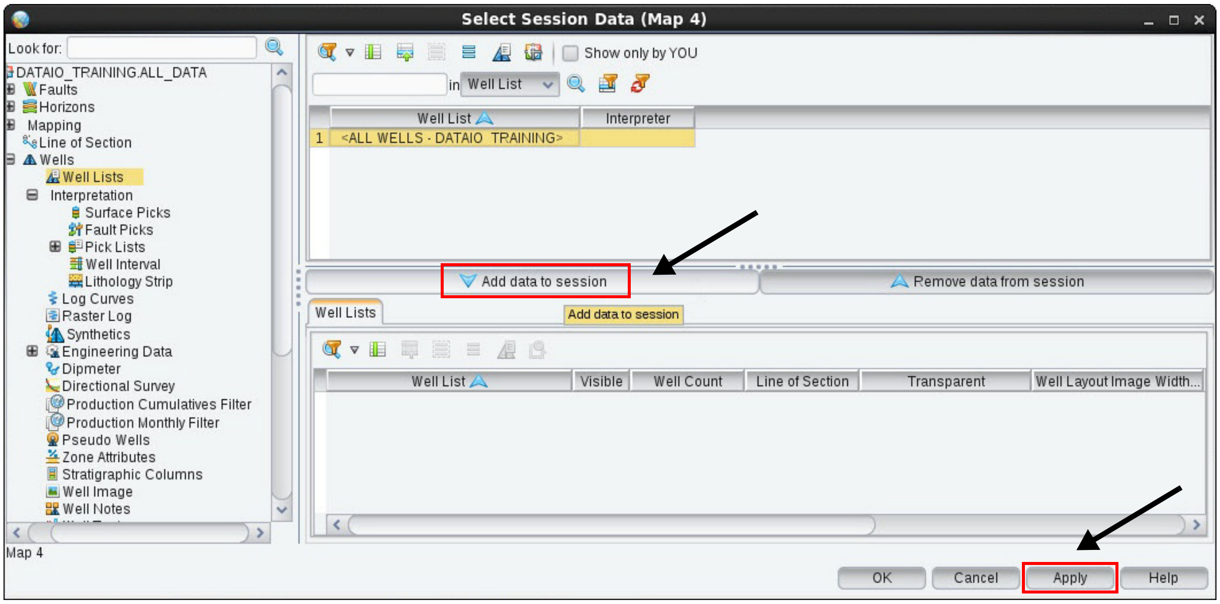


2. The DecisionSpace Geosciences software opens the Map view window. Click the **Select Session Data** icon ( ).



3. In the **Select Session Data** window, go to **Wells** and click the existing well list **<ALL WELLS – DATAIO TRAINING>**.

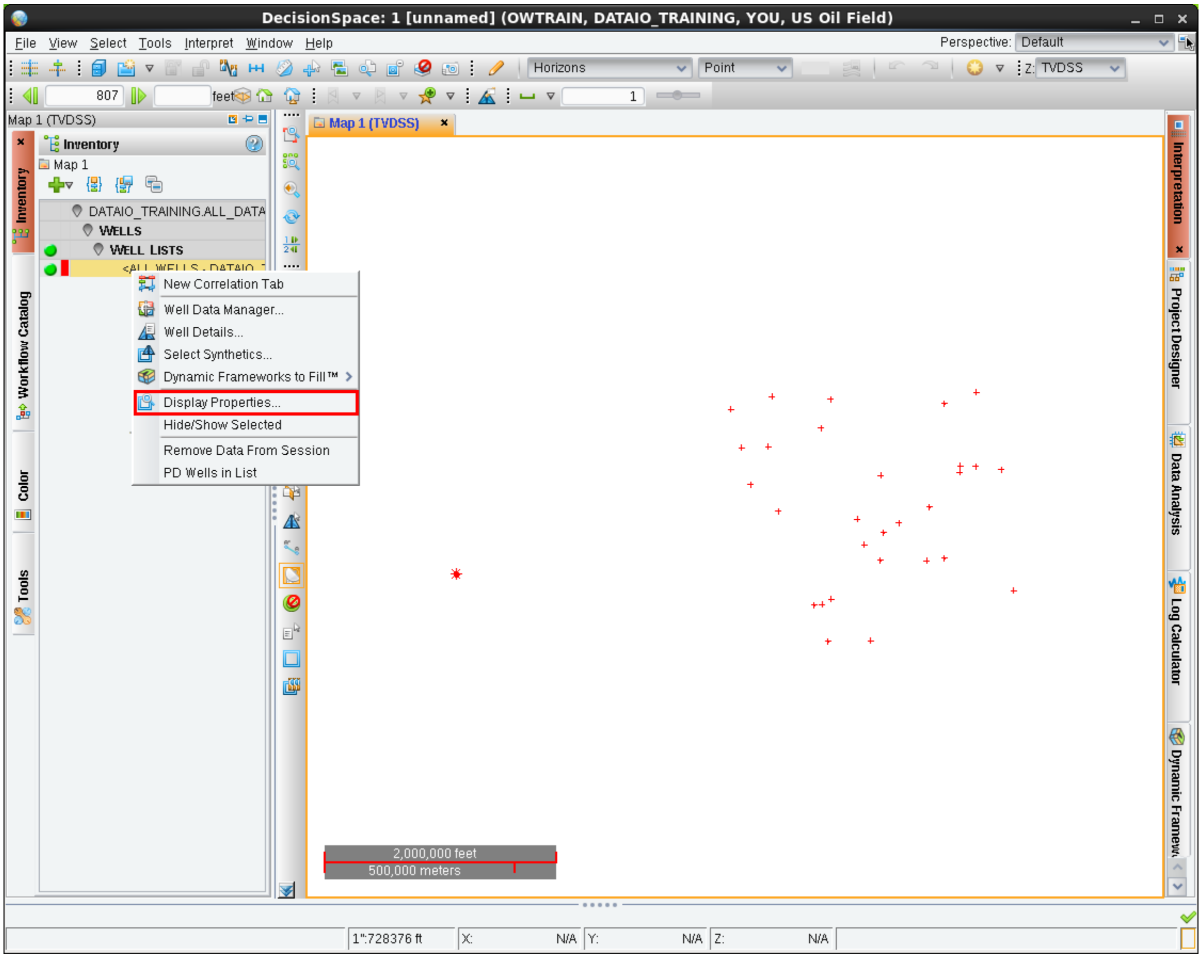
4. Click the **Add data to session** button to add the well list to the map and click the **Apply** button.



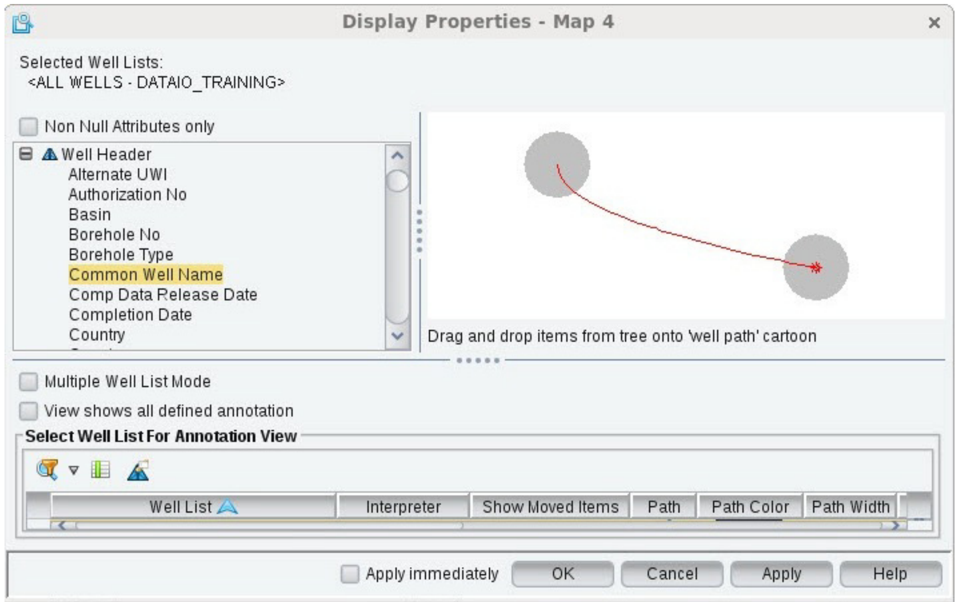
5. Change symbol sizes and add names to the wells, as follows:

   You can change the way your wells are going to be displayed now, or you can change it later.

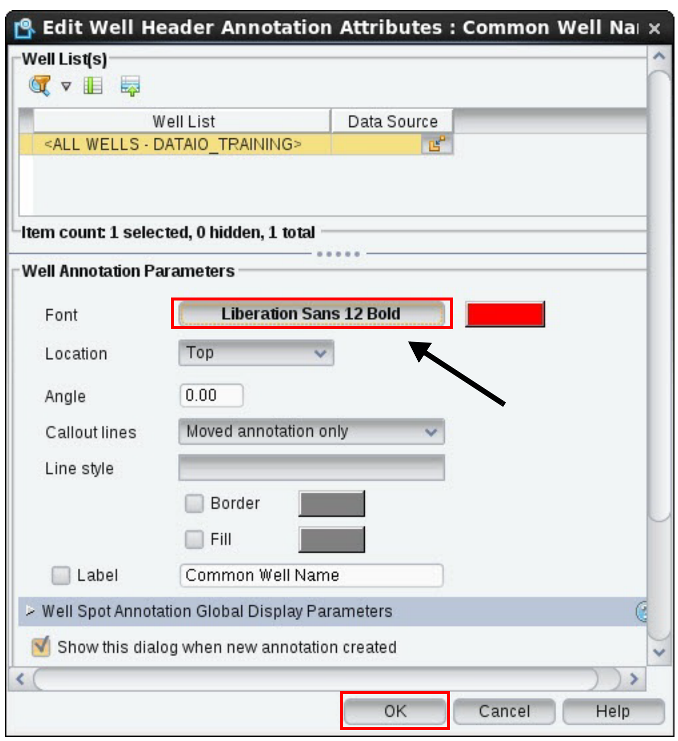
Right-click the Well list and select the **Display Properties** option to open a dialog where you can edit well annotation or symbol display parameters.



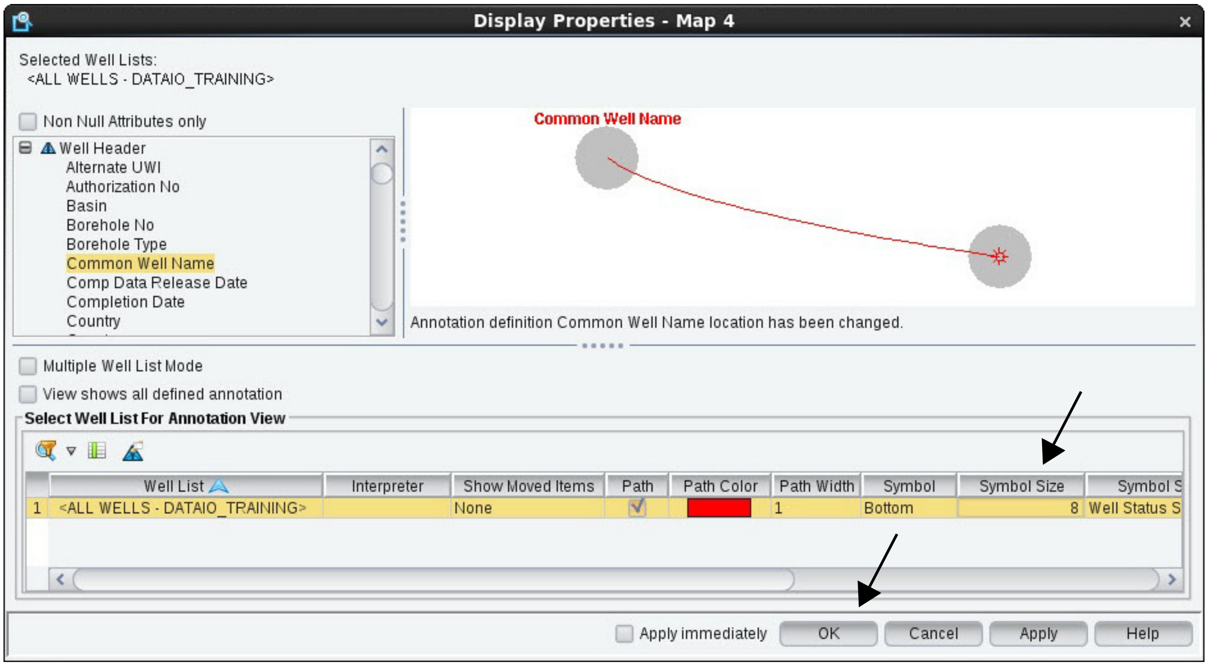
Highlight **Common Well Name** and using MB1, drag it to the graphic area where you want the annotation to display (i.e., above, below, right, or left of the well symbol). When you release MB1, the **Edit Well Header Annotation Attributes** dialog will open.



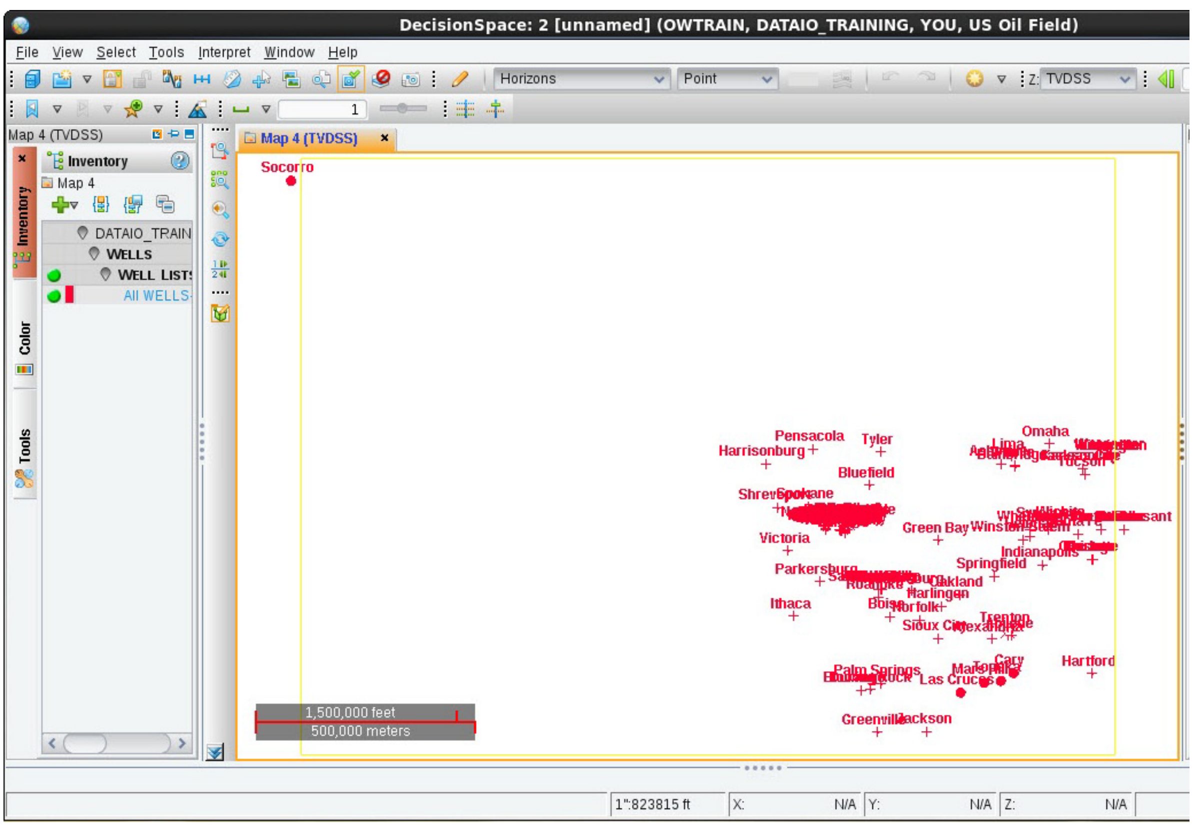
Select a bold font for the well annotation as shown in the picture below, and click **OK**.



Modify the symbol display parameters by making display selections in the **Display Properties** dialog box; change the **Symbol Size** to **8**. Click **OK** to see the data on the map.

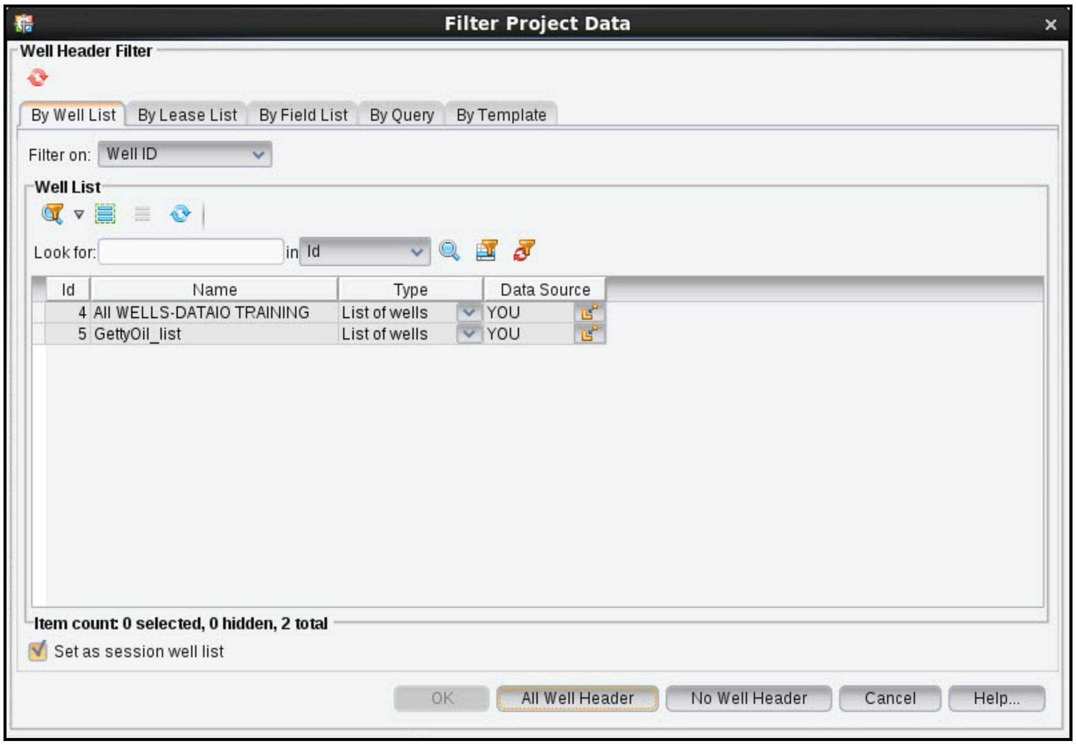


This is your new data displayed on a map.

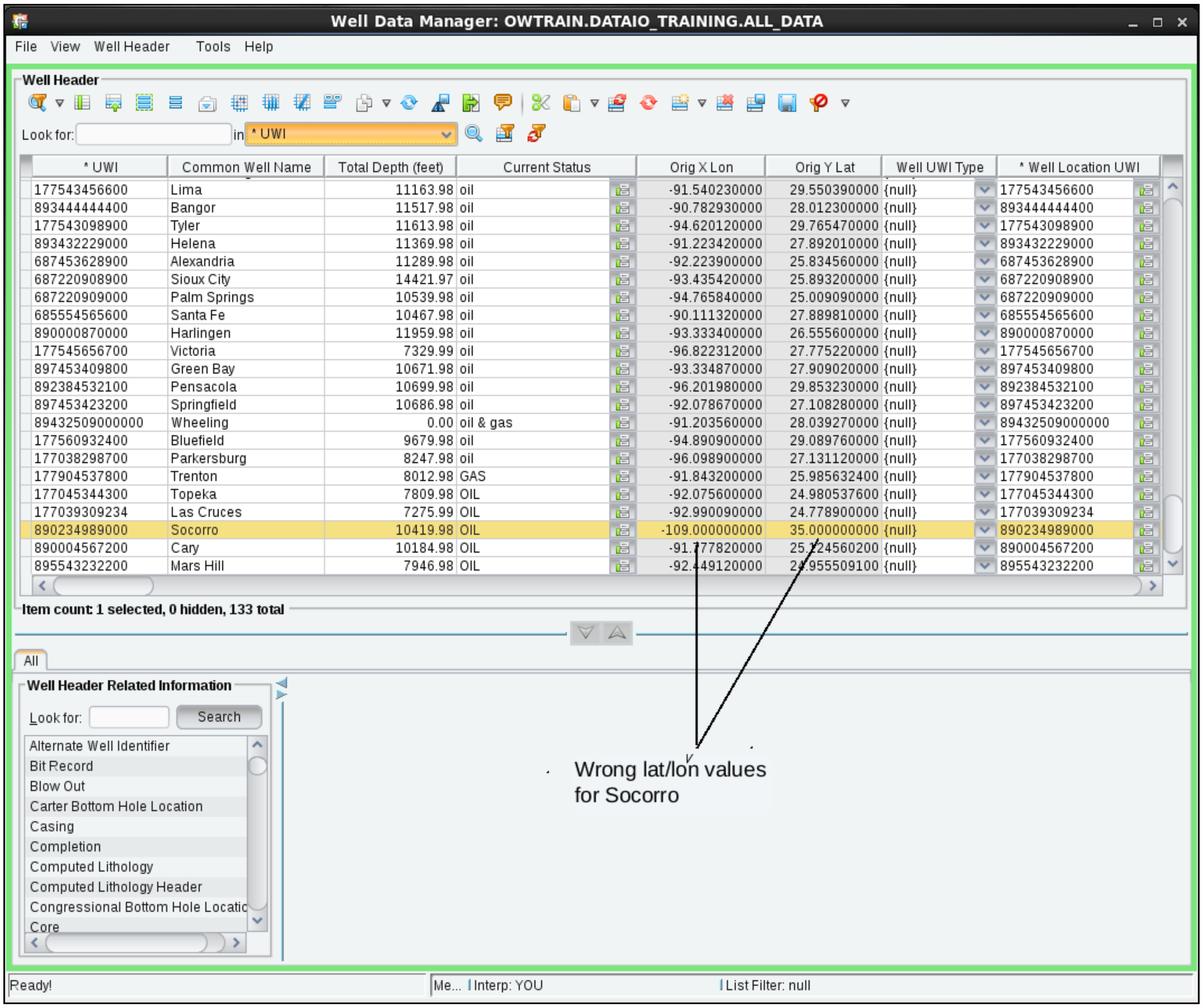


In this map we can easily see the Socorro well is very far from the others, so we are going to check coordinates for this well and make sure they are correct.

6. Select **Data > Management > Well Data Manager** from the OpenWorks Command Menu. In the filter project data window, select **All Well Header**.

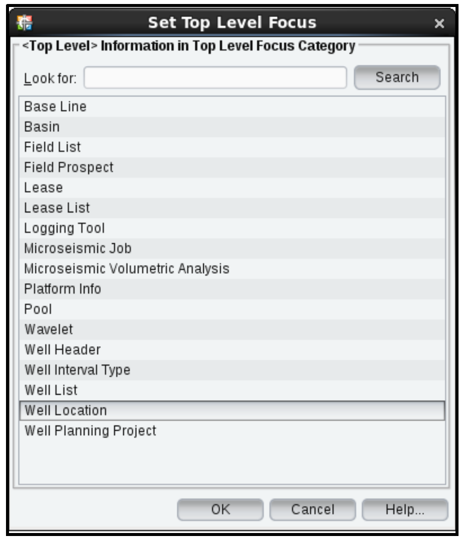


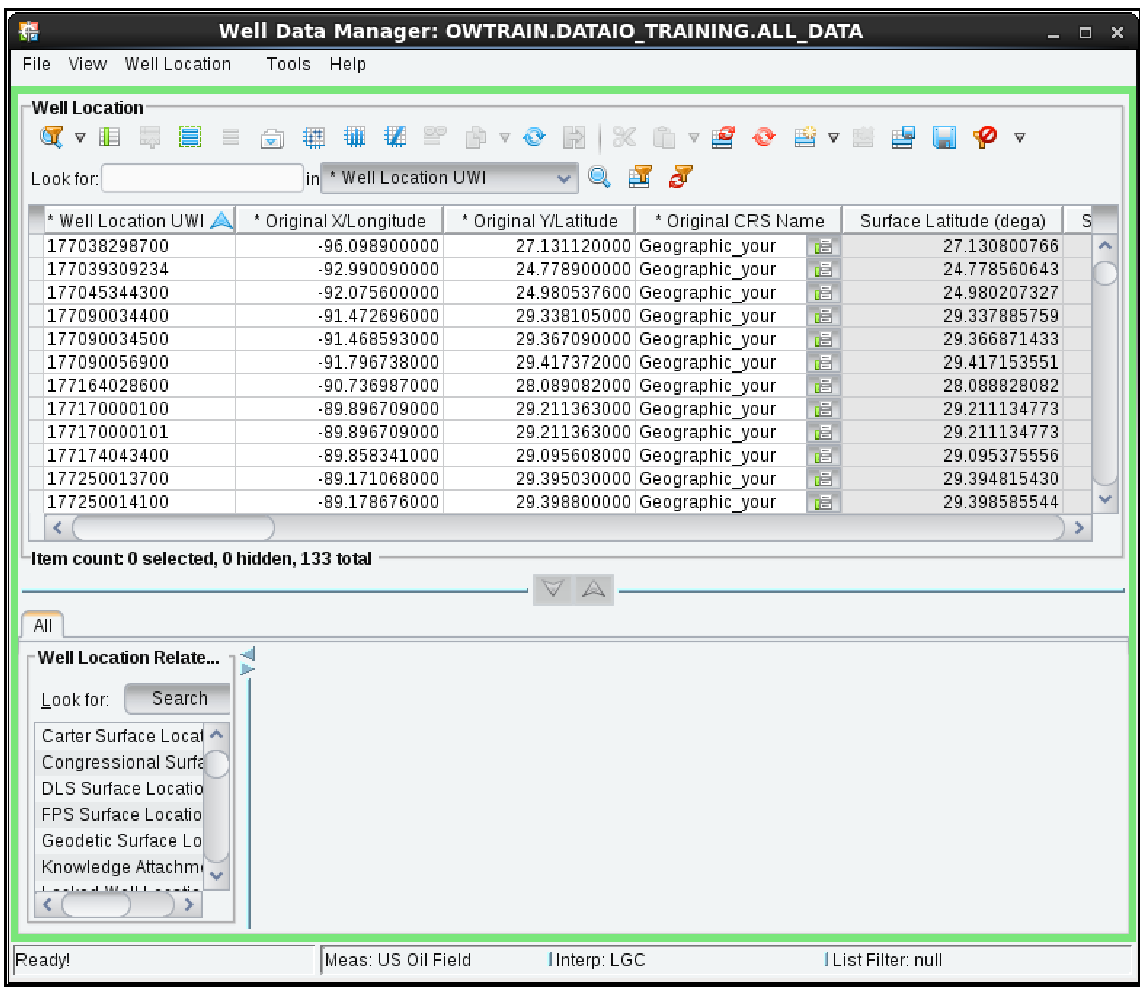
7. Alphabetically order the list of wells by clicking in the common well name column. Go to Socorro well and verify that Latitude and Longitude values are wrong.



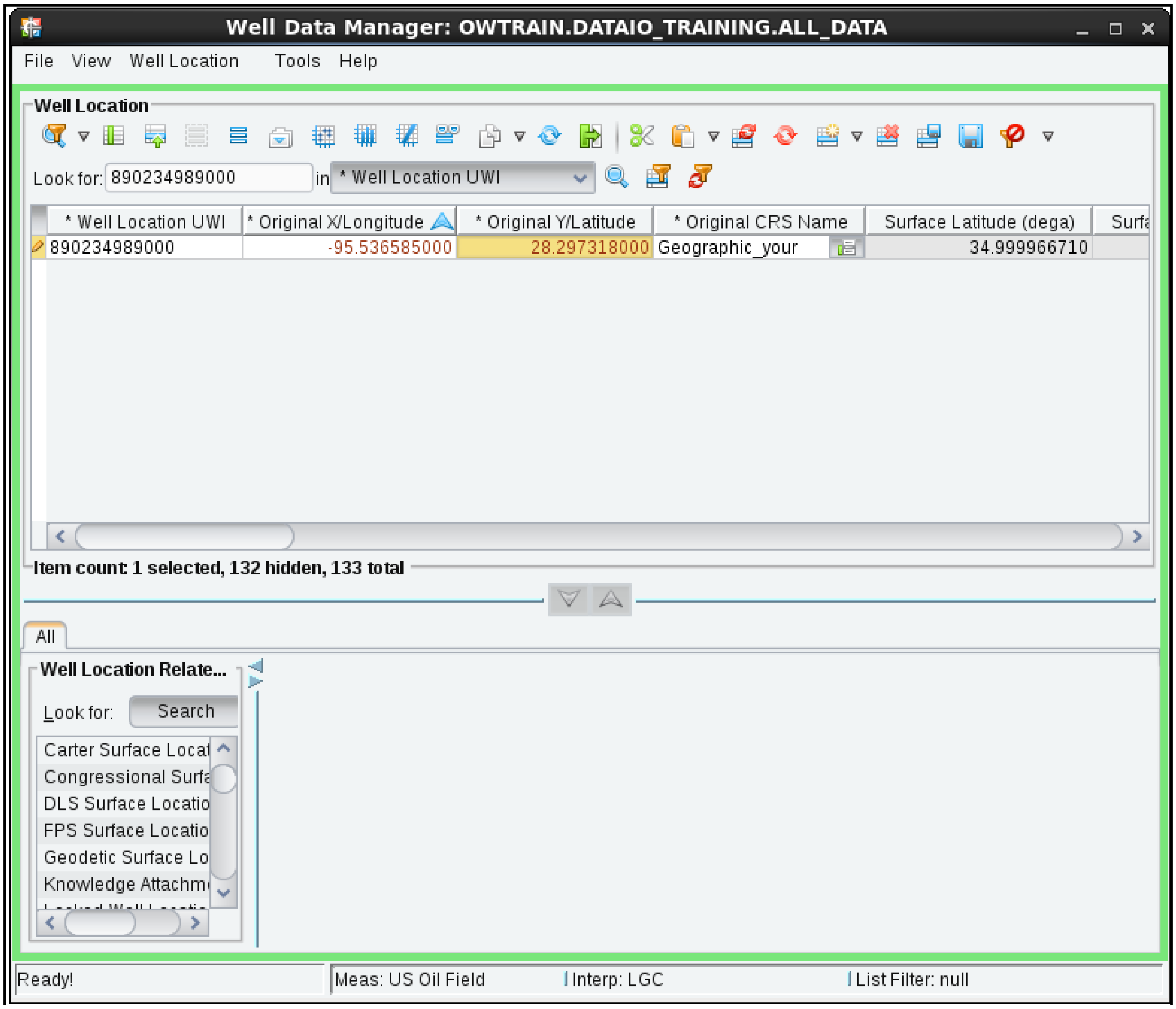
In this case, incorrect latitude and longitude values were recorded for this well. You must correct this in order for the well to be placed correctly.

8. To correct these values we will modify the original lat/long values for the Well Location table. Click the **Set Top Level Focus** button, and select **Well Location**.





9. Find your Well location UWI and edit the Original X Longitude and Original Y Latitude to correct the values.

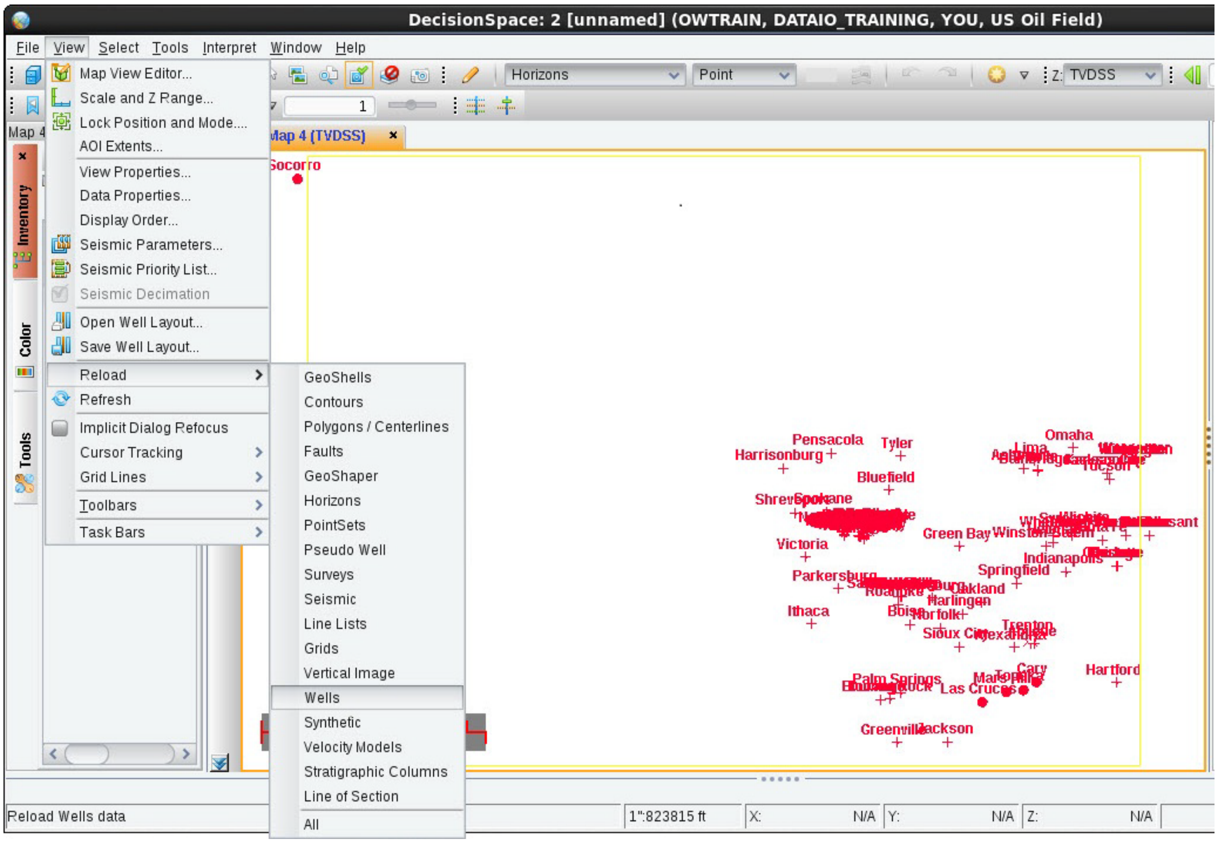


10. Select the Orig X Lon value and enter **-95.536585**. Click the menu, and the color of the numbers will change to red, indicating that they have been modified.

11. Select the Orig Y Lat value and enter **28.297318**. Click the menu, and the color of the numbers will change to red, indicating that they have been modified.

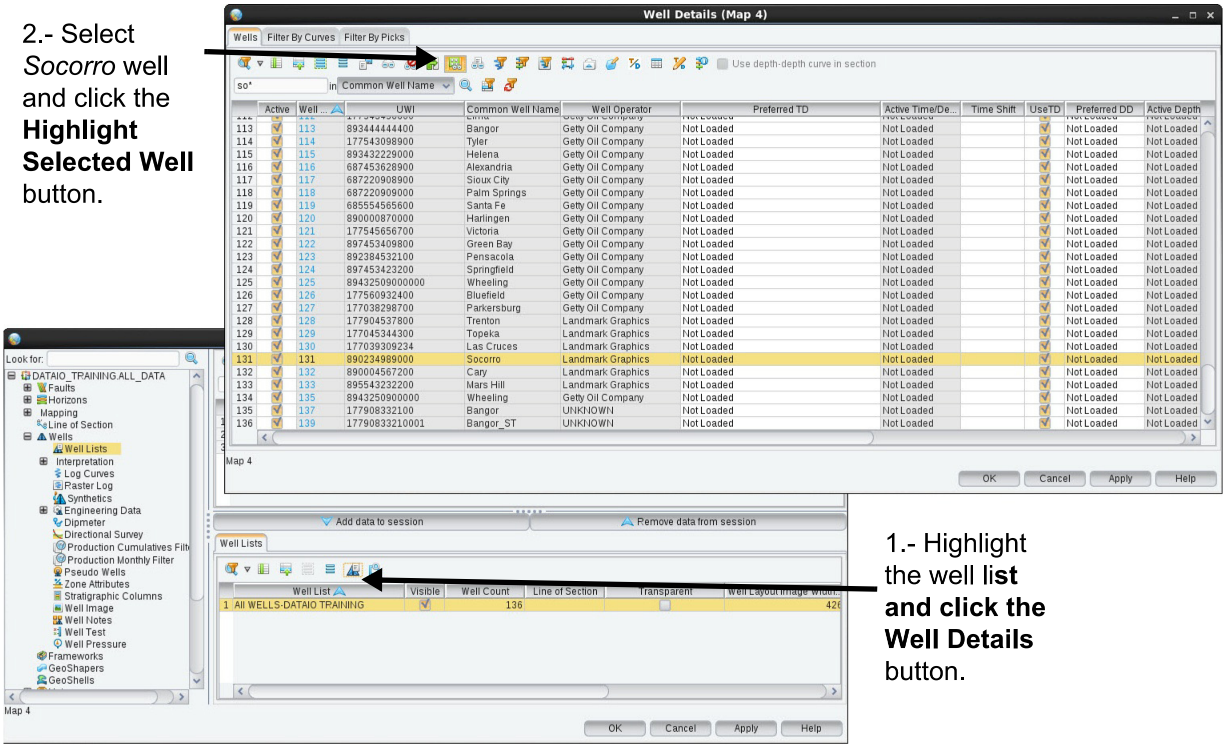
12. Click the **Save** button to save changes.

13. In the DSGeosciences Map view window, select **View** > **Reload** > **Wells** to see the lat/long modification you made in Well Data Manager.



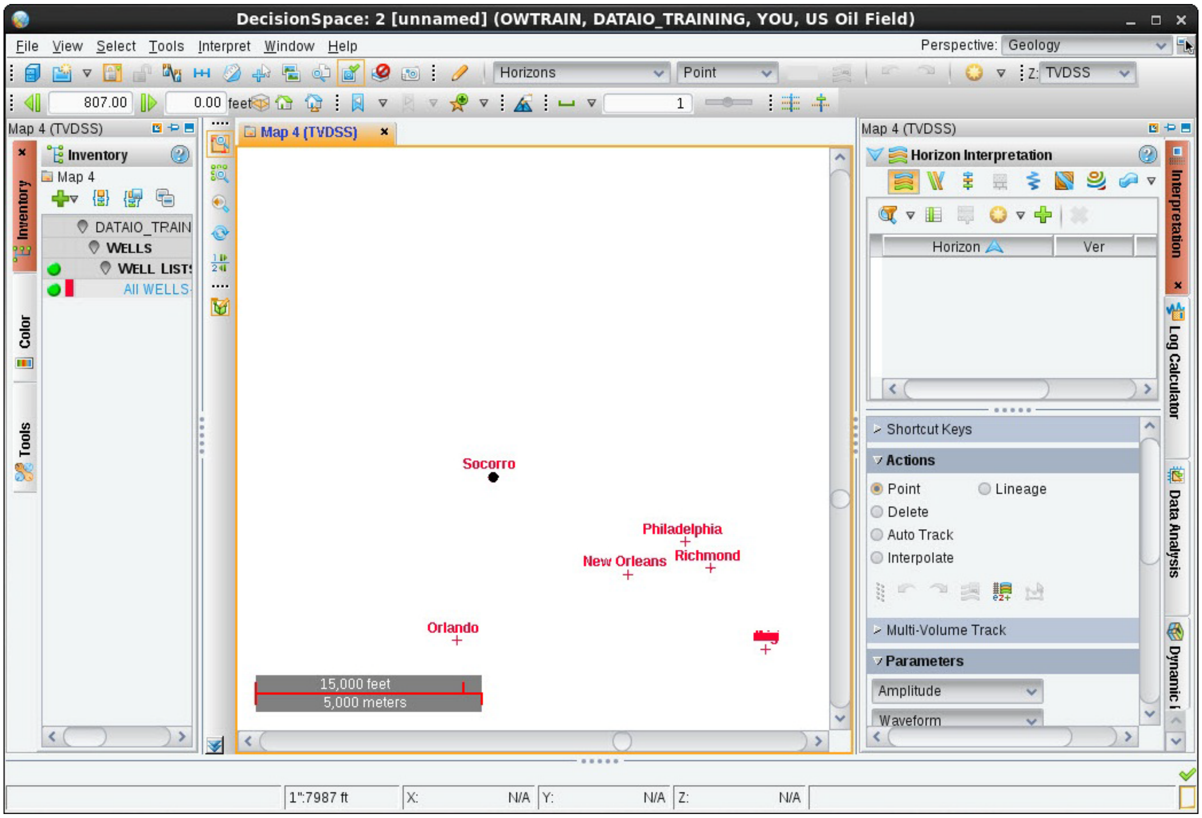
If you cannot identify where *Socorro* well is now, go to **File** > **Select Session Data** and highlight the Socorro Well.

2.- Select *Socorro* well and click the **Highlight Selected Well** button.



1.- Highlight the well list and click the **Well Details** button.

Now you can see *Socorro* well is updated with the new surface location.



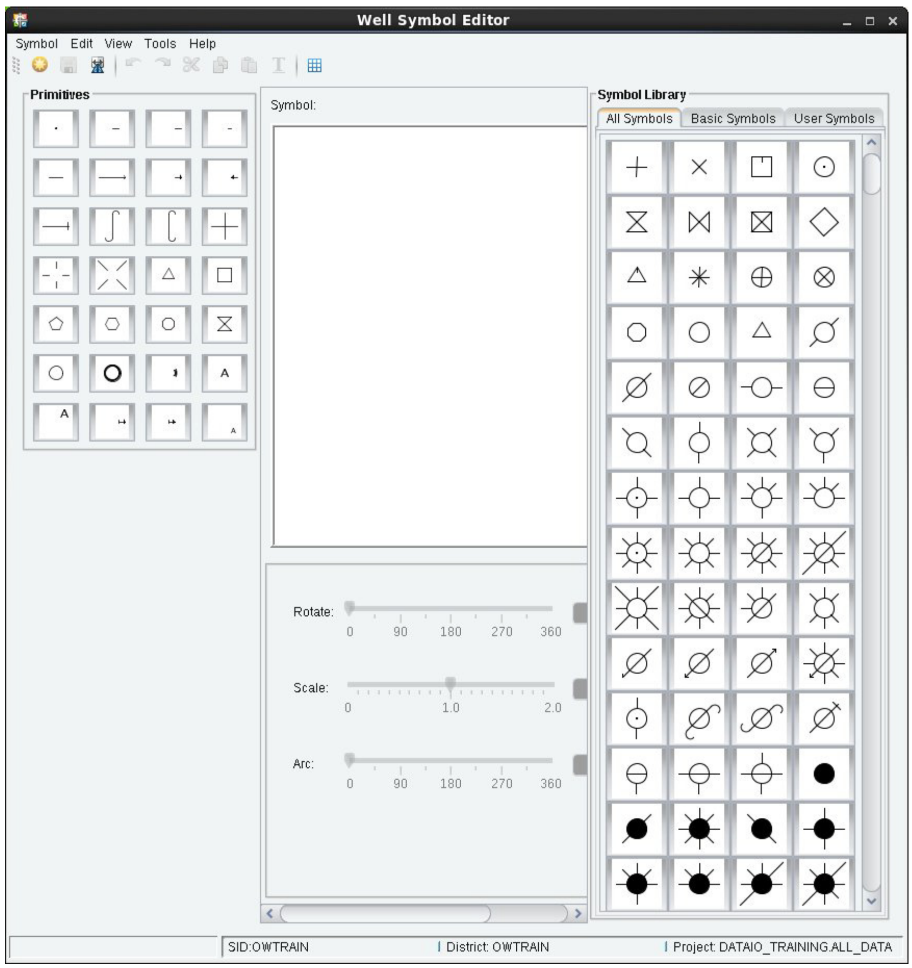
Notice that there are still problems with some wells. Some wells did not post with the correct status. In the next exercise, you will learn how to correct this problem.

Exercise 3-9. Mapping Current Status

As you saw in the previous exercise, the DecisionSpace Geosciences Map view displays the Current Status well symbol at the well location. However, unless this status is mapped to a valid well symbol, the proper symbol will not display.

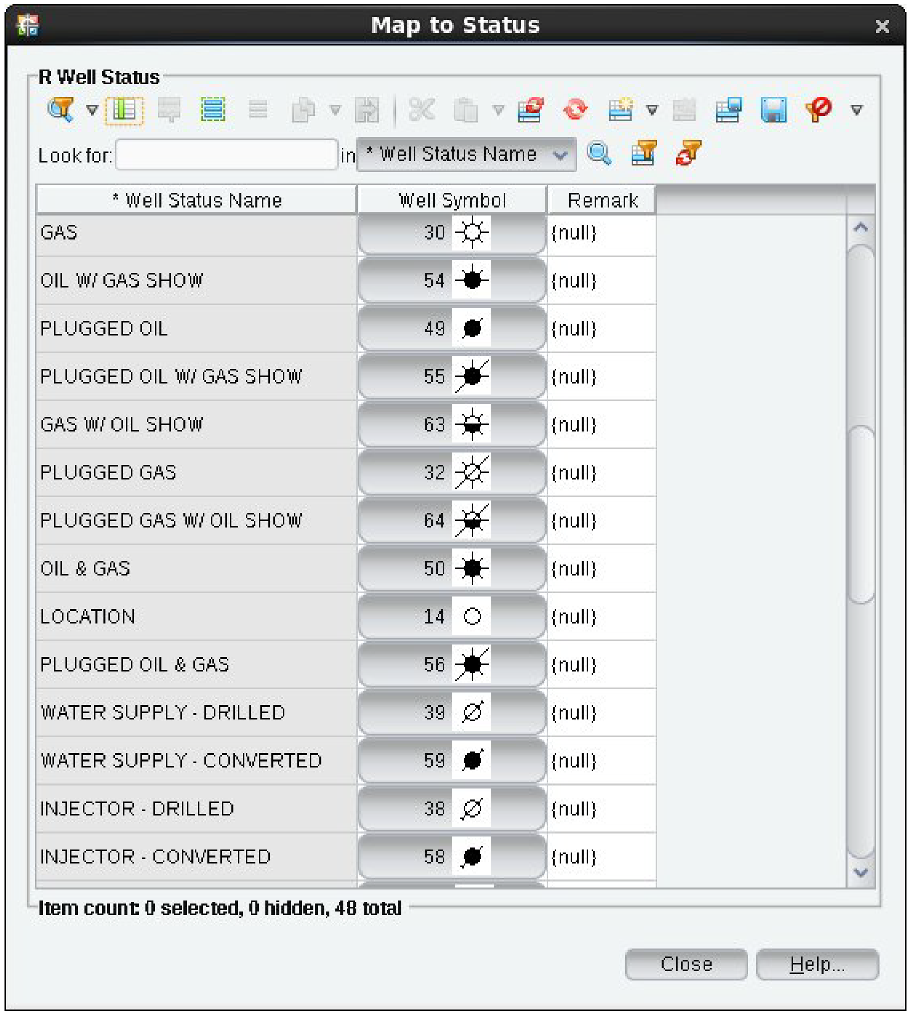
In this exercise, you map Current Status for several wells to a valid well symbol. This is done in the Well Symbol Editor.

1. Select **Data > Management > Well Symbol Editor** to launch Well Symbol Editor.



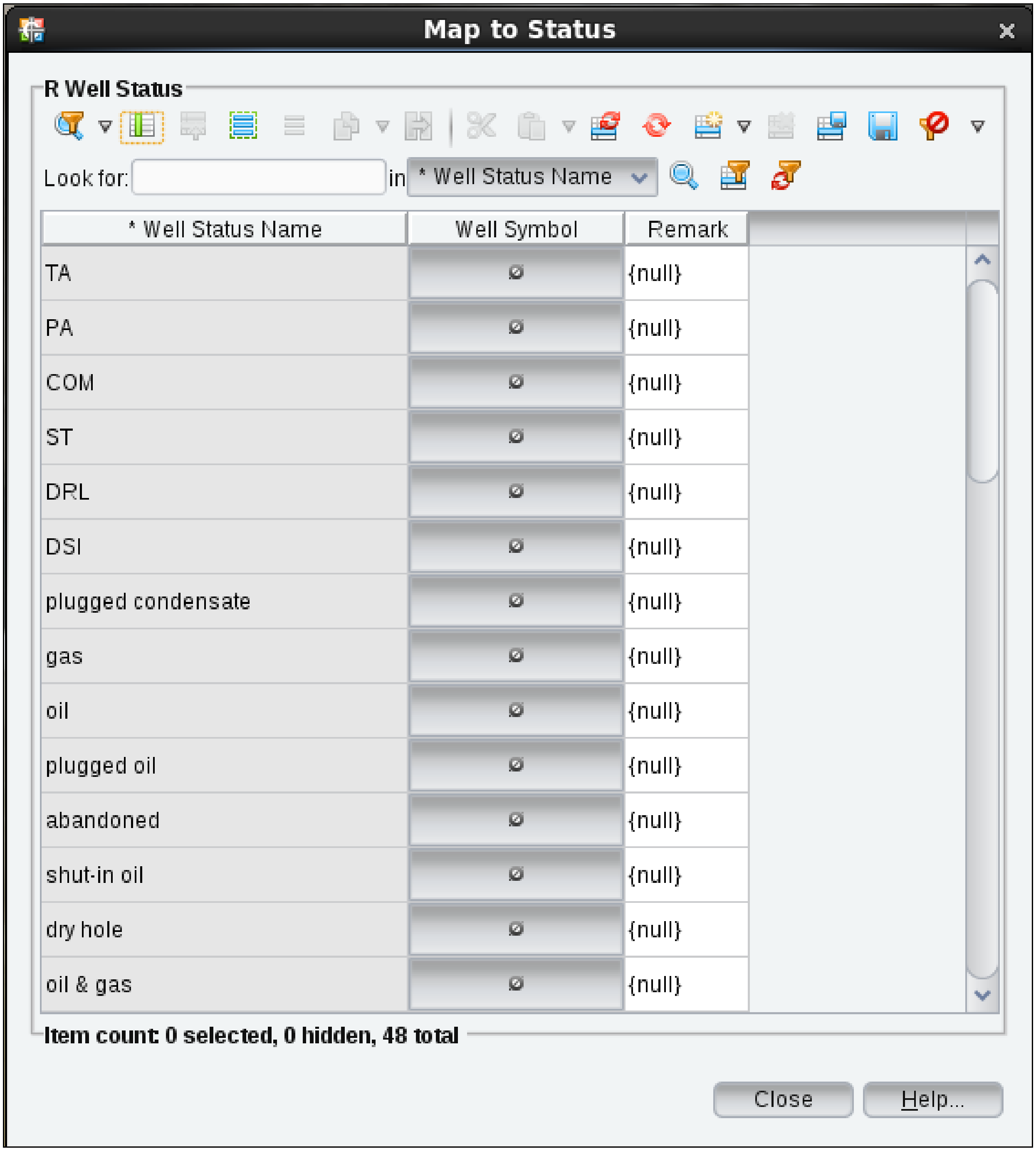
Well Symbol Editor is a utility that allows you to create new well symbols or to map a certain well status to a specific symbol. Symbols are created by editing existing symbols or by selecting graphic elements from a panel of primitives.

2. Select **Symbol > Map to Status** from the Well Symbol Editor menu.



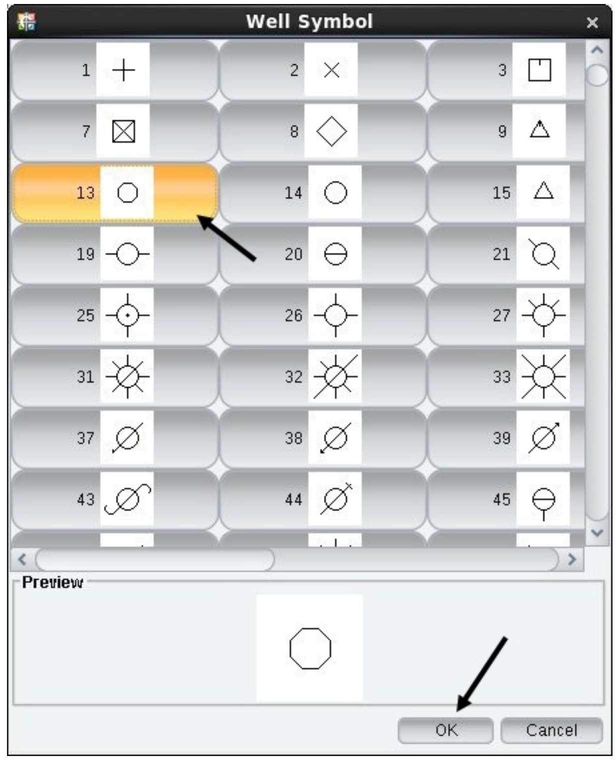
The Map to status dialog box displays valid Current Status entries and their assigned symbols. Current status names loaded to the database must match this list exactly or they will not map to a valid symbol.

3. In the Map to status dialog box, click the Well Symbol box next to well status **COM**.



The Well Symbol dialog box displays.

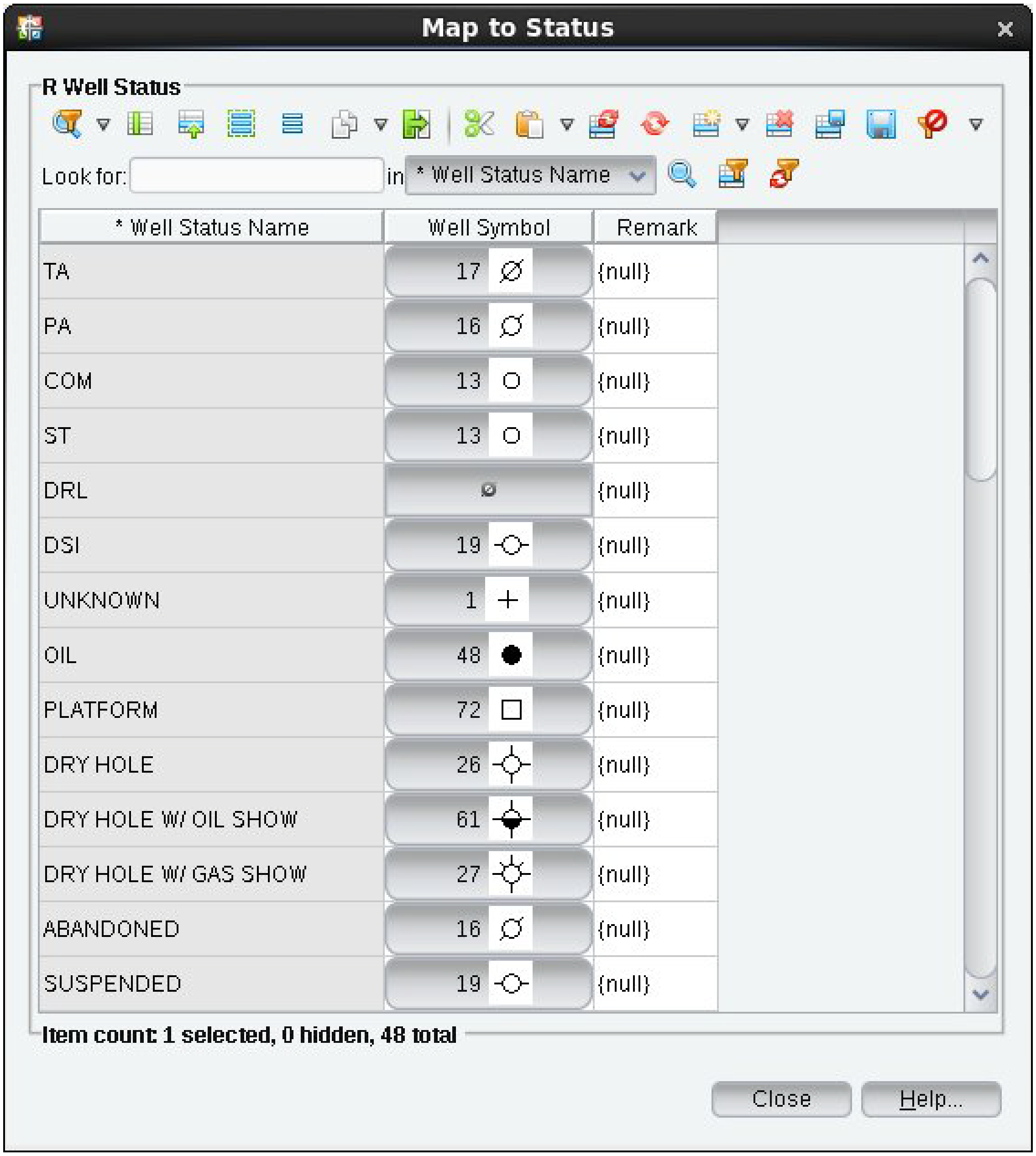
4. Click the **Well Symbol** button and select symbol **13** to map this symbol to COM. Click **OK**.



5. Repeat steps 3-4 to define the following:

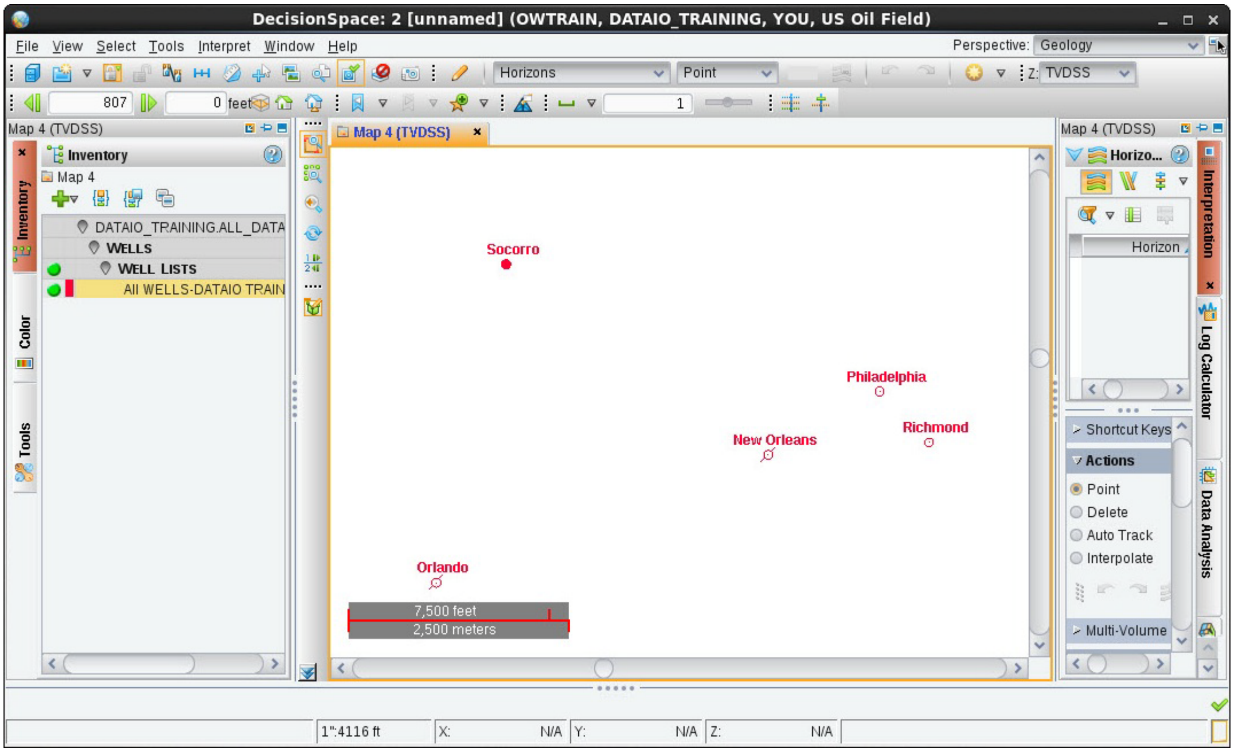
Current Status	Symbol ID
DSI	19
PA	16
ST	13
TA	17

6. To save the symbol assignments, click the  **Save all rows** icon.



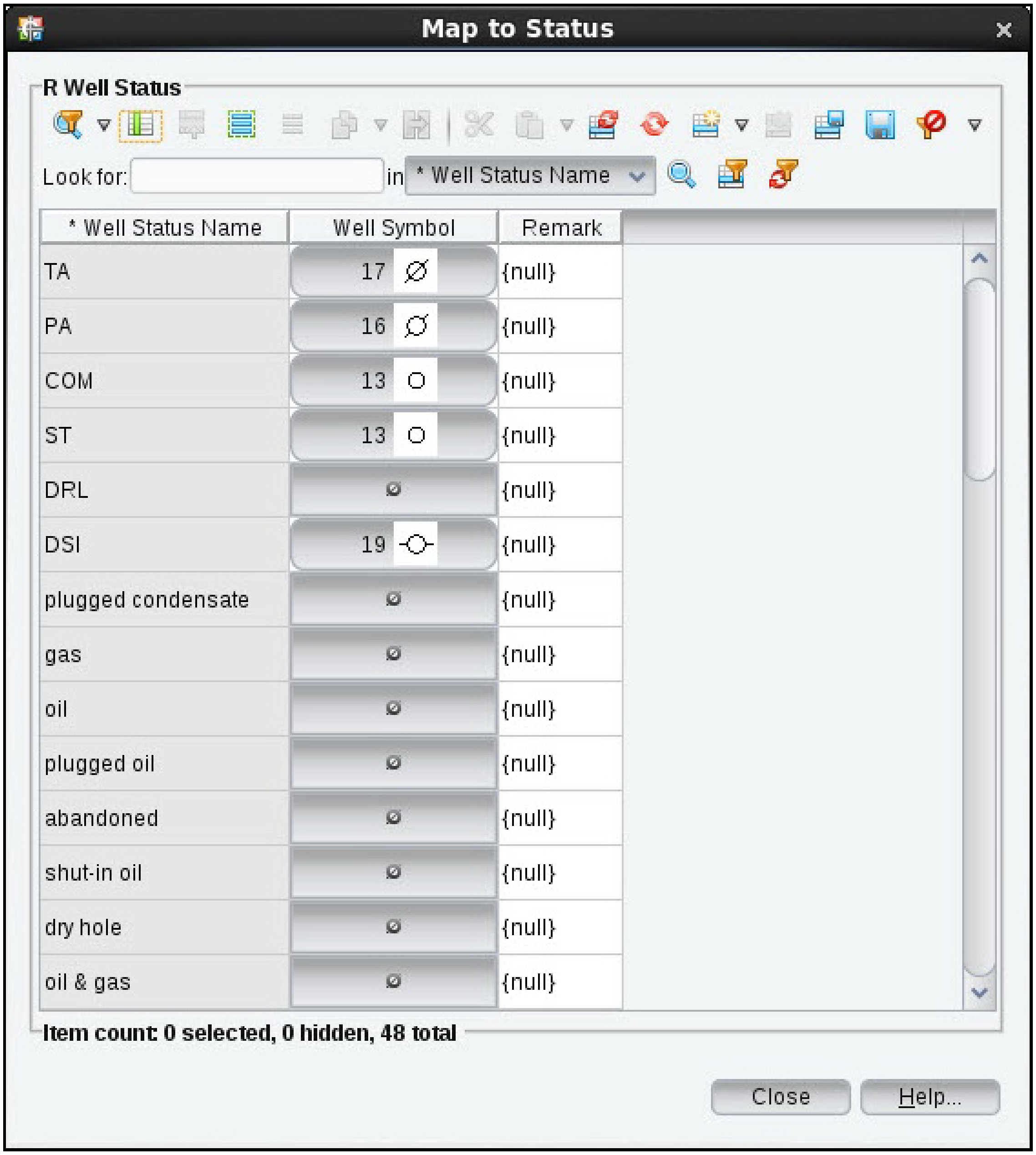
7. Click **Close** in the **Map to Status** dialog box, and **Symbol > Exit** to exit the Well Symbol Editor.

   Select **View > Reload > Wells** in the DecisionSpace Geosciences Map window to see the changes.



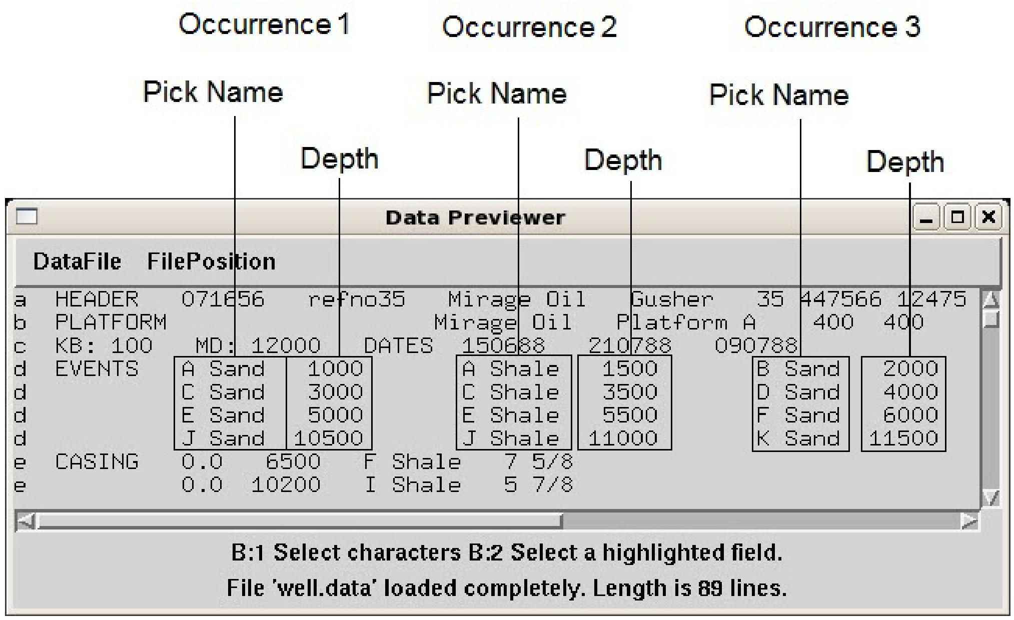
To see symbols for all the wells you have just loaded you must select appropriate symbols for all the unassigned Current Status entries by using the same procedure described in this exercise. If you have time, return to Well Symbol Editor and map any Well Status Name that has not been assigned.

Status names that still need to be mapped:

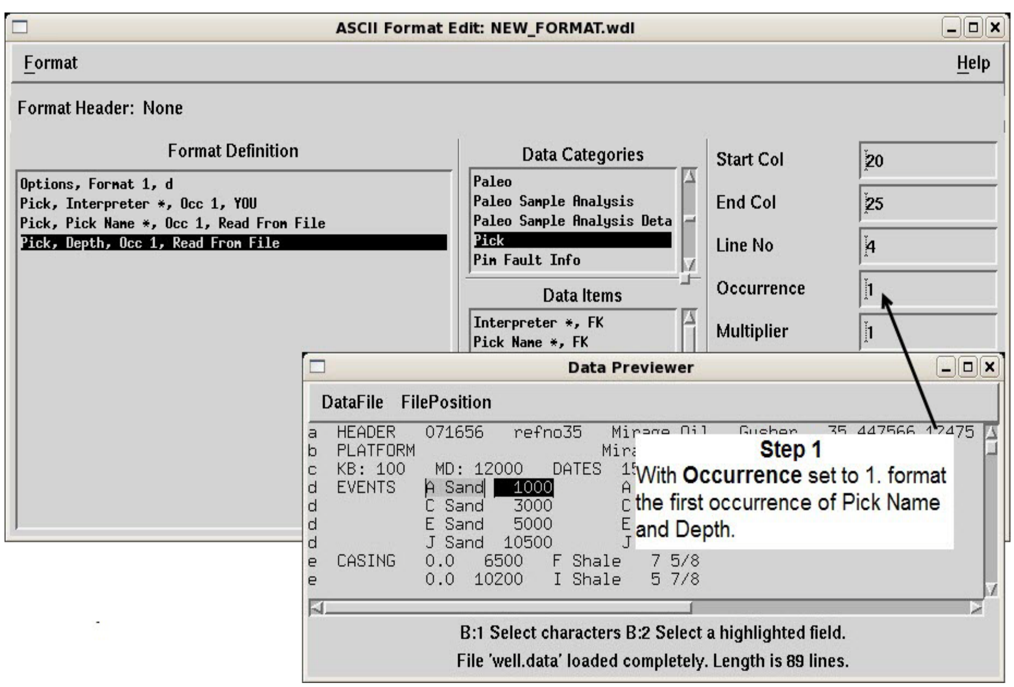


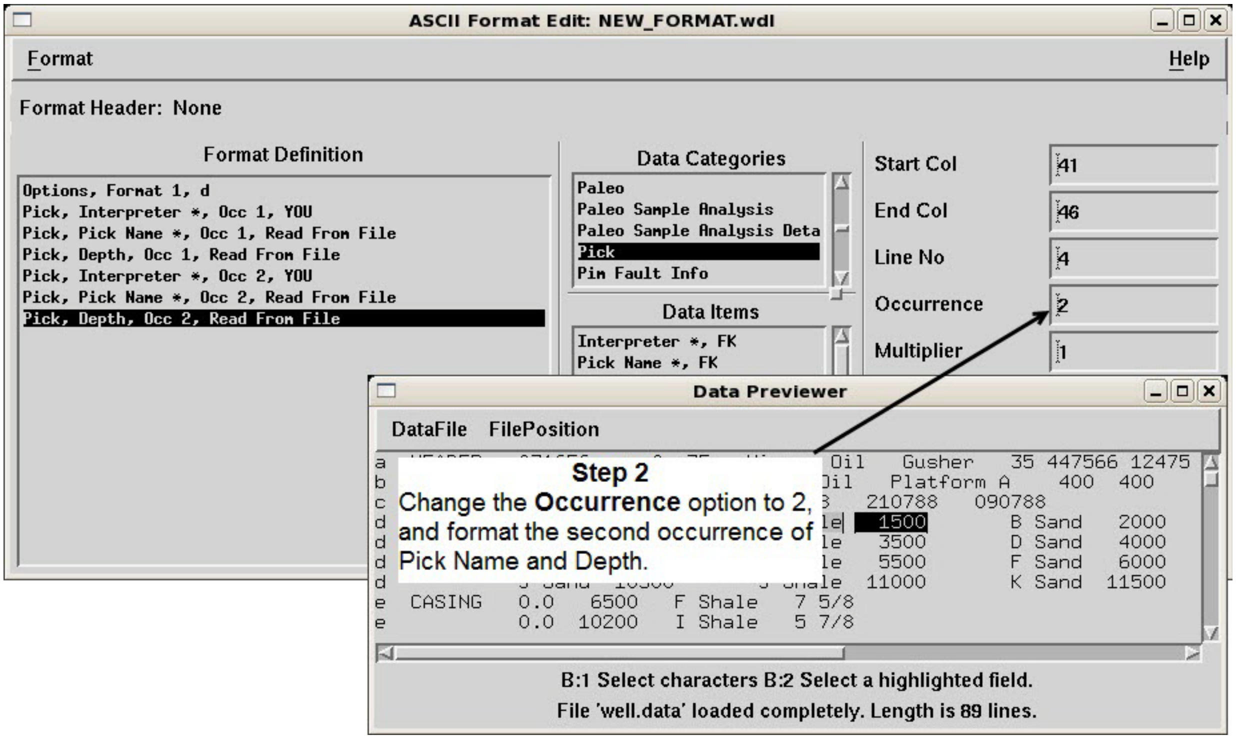
Formatting with the Occurrence Option

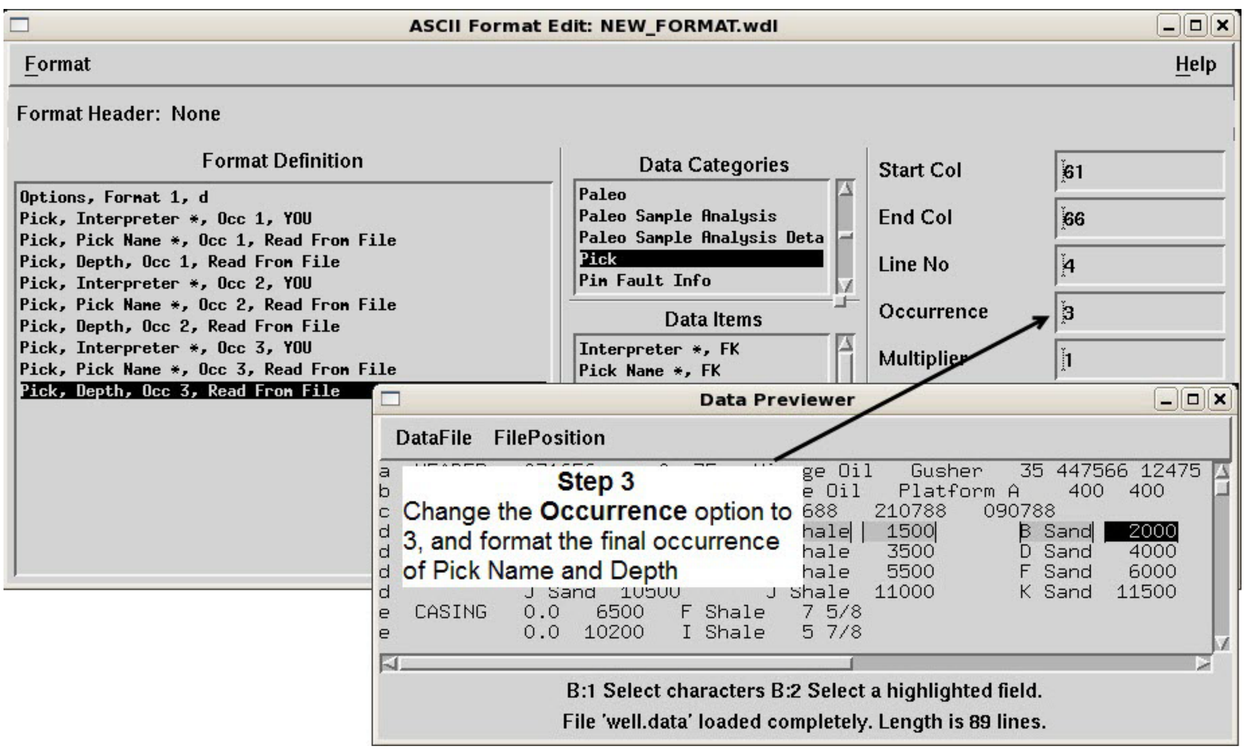
The Occurrence option is used when multiple occurrences of the same type of data item appear on the same line. In the example shown below, lines beginning with the “d” format flag contain several occurrences of Pick Name and Depth.



The example below shows how the Occurrence option works.



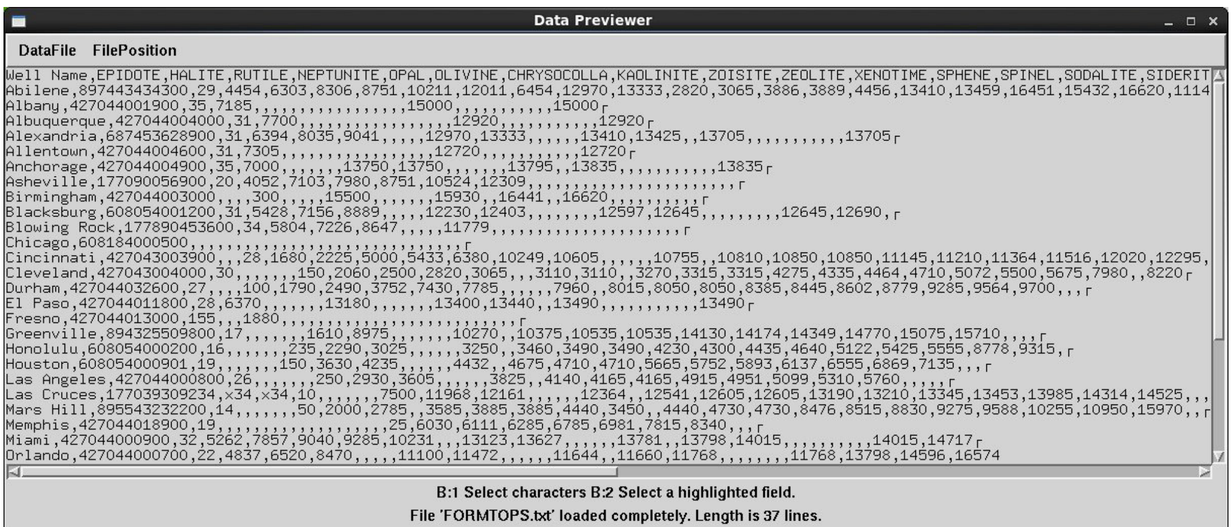

ASCII Format Edit: NEW_FORMAT.wdl
Format
Help
Format Header: None
Format Definition
Options, Format 1, d
Pick, Interpreter *, Occ 1, YOU
Pick, Pick Name *, Occ 1, Read From File
Pick, Depth, Occ 1, Read From File
Pick, Interpreter *, Occ 2, YOU
Pick, Pick Name *, Occ 2, Read From File
Pick, Depth, Occ 2, Read From File
Data Categories
Paleo
Paleo Sample Analysis
Paleo Sample Analysis Deta
Pick
Pim Fault Info
Data Items
Interpreter *, FK
Pick Name *, FK
Start Col
41
End Col
46
Line No
4
Occurrence
2
Multiplier
1
Data Previewer
DataFile
FilePosition
Step 2
Change the Occurrence option to 2, and format the second occurrence of Pick Name and Depth.
B:1 Select characters B:2 Select a highlighted field.
File 'well.data' loaded completely. Length is 89 lines.


ASCII Format Edit: NEW_FORMAT.wdl
Format
Help
Format Header: None
Format Definition
Options, Format 1, d
Pick, Interpreter *, Occ 1, YOU
Pick, Pick Name *, Occ 1, Read From File
Pick, Depth, Occ 1, Read From File
Pick, Interpreter *, Occ 2, YOU
Pick, Pick Name *, Occ 2, Read From File
Pick, Depth, Occ 2, Read From File
Pick, Interpreter *, Occ 3, YOU
Pick, Pick Name *, Occ 3, Read From File
Pick, Depth, Occ 3, Read From File
Data Categories
Paleo
Paleo Sample Analysis
Paleo Sample Analysis Deta
Pick
Pim Fault Info
Data Items
Interpreter *, FK
Pick Name *, FK
Start Col
61
End Col
66
Line No
4
Occurrence
3
Multiplier
1
Data Previewer
DataFile
FilePosition
Step 3
Change the Occurrence option to 3, and format the final occurrence of Pick Name and Depth
B:1 Select characters B:2 Select a highlighted field.
File 'well.data' loaded completely. Length is 89 lines.

Formatting with Delimited Fields

The ASCII Format Edit window discussed earlier in this chapter allows you to load data containing delimited fields. You can use the Delimiter data item in the Options category to specify the delimiter. The delimiter can be a constant value, for example, a comma, tab, or space, or it can be read from the file.

The example below shows a data file with commas as delimiters. These will be read from the file:



Note

The delimiter must be the first format you define, even though it probably will not be the first data item in the data file, otherwise the data will not load properly.

To specify a delimiter, do the following:

1. Select **Options** in the Data Categories area and then select **Delimiter** in the Data Items area.

2. Use the mouse to highlight the first comma in the Data Previewer and then click **Add**. The Delimiter format is posted in the Format Parameters field, and a Field No. field displays in the top right corner of the ASCII Format Edit window.

Designating Comments

If your input file contains lines that you do not want to read, you can designate those lines as comments in one of two ways: as comment records or as number of comments. You can designate comment records whether you have elected to assign formats or to specify lines per record.

The Comment Record data item provides a way to ignore lines in the file that contain a particular string in a particular column position. The program does not load comment records, and comment records do not affect the line counts used to determine the formats of individual lines.

If your input file has a fixed number of lines per record, you could have a variable number of comment records as long as the number of non comment lines is fixed in each block of data.

For example, you could use comment records to read files that provide column headers on blocks of data. In the example below, the string "Well ID" would be used as a comment record.

Well ID	Well Name	Lat	Long
45729764830001	Harrison & Jones #1	-90.004	29.876
45729764830101	Harrison & Jones #2	-90.101	29.900
45729764830201	Harrison & Jones #3	-90.154	29.881
45729764830211	Harrison & Jones #4	-90.205	29.950

To set comment records:

1. Click on **Options** in the Data Categories area and then select **Comment Record** in the Data Items area.

2. Move the cursor to the Data Previewer window and highlight the line or consecutive group of lines that you want the program to ignore.

3. Click **Add** to post the definition to the Format Definition field of the ASCII Format Edit window.

The Number of Comments data item allows you to specify a certain number of lines at the beginning of the file to be treated as comments and skipped.

To specify a number of lines as comments:

1. Click on **Options** in the Data Categories and select **Number of Comments** in the Data Items area.

2. Click on the **Constant** radio button.

3. Enter the number of comment lines in the **Value** text field.

4. Click **Add**. The definition is posted in the Format Definition field of the ASCII Format Edit window.

Exercise 3-10. Troubleshooting an ASCII Format File

Now that you are finished loading well header information, you may load well tops. The well data in this exercise are formatted with one line per record. Commas are used as delimiters. The data file in this exercise was exported from Microsoft Excel in a comma delimited format (csv).

1. From the OpenWorks Command Menu, select **Data** > **Import** > **Well Import (Classic)** to start the ASCII Loader.The format editor opens.

2. Use **Format** > **Open** in the ASCII Format Edit window to open the existing data file **FORMTOPS.txt** and the existing format file named **FORMTOPS.wdl** in your training directory. The existing Format Definition list will display on the left side of the ASCII Format Edit window.

To view the data file in WOW software:

- Enter **http://<*your machine name here*>/** in your browser window.
- Click **Other Data** in the left pane of the WOW software main menu.
- Click **GDM_Data** and then load.
- Click **FORMTOPS.txt** in the middle pane.

3. Use the Data Previewer and Format Definition list to examine the following characteristics of the data file. (You can pick any item in the Format Definition list and see it highlighted in the Data Previewer.)

   - Each well entry contains the common well name, UWI, and well picks for each well.
   - The top line has no well specific information.

4. Examine the following in the format file:

   - The comma is used as a delimiter.
   - The occurrence option is used to differentiate the 30 instances of Pick Name and Depth.

5. Test the format file: Select **Format > Test** from the ASCII Edit Format window. then select **Start** to begin the test. When the test is finished, click **Stop** and then click **Close**.

6. Examine the Data Previewer and ASCII Loader windows. The test claims to be successful, but was all of the data in your file tested?

   The second line in the file was used to format Data Items. The first line in the data file is a comment. Because no comment lines are recognized in the format, the format editor assumes that data exists on only this one line.

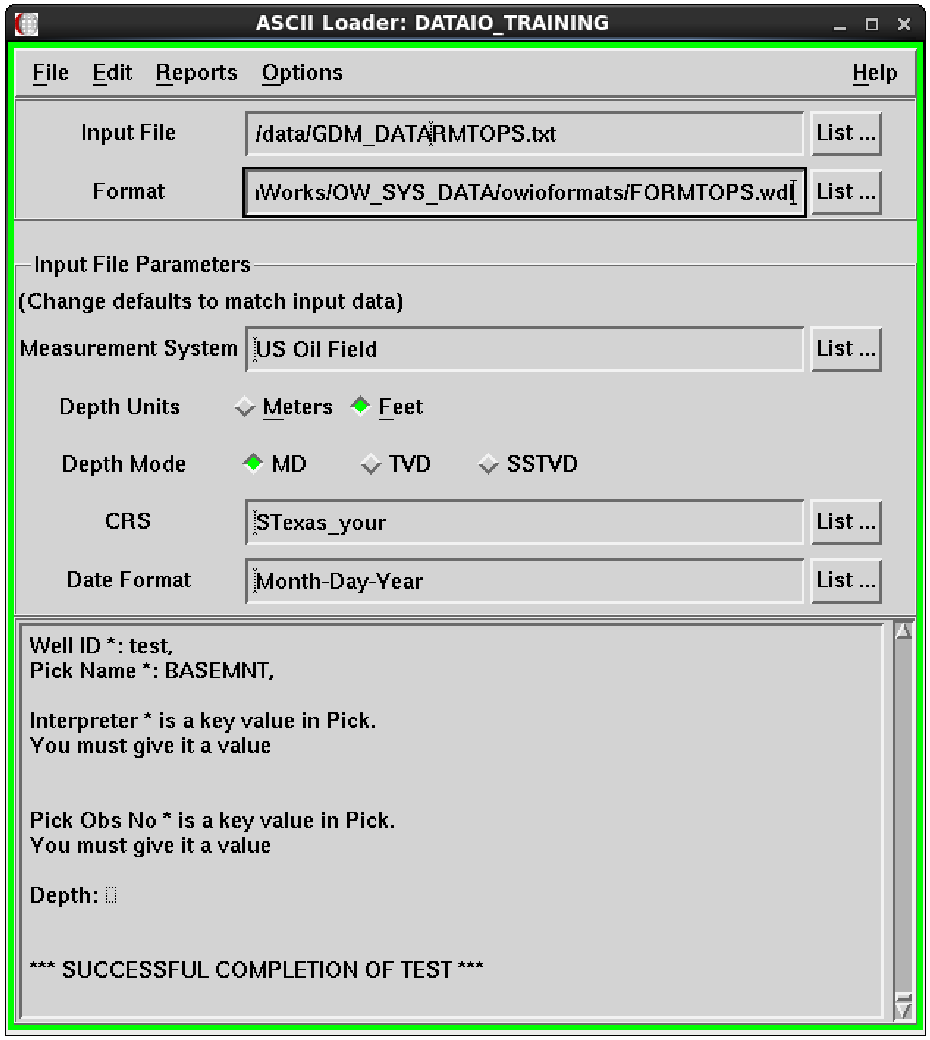
7. Add a comment line to the format file.

   - Select **Options** from the Data Categories area of the ASCII Format Edit window.
   - Select **Number of Comments** from the Data Items section.
   - Enter a **Value** of `1`.
   - Click **Add**.

8. Save your format and test it again to verify that the comment line is working correctly.

   - Select **Format > Save** to save the file. Click **Yes** to confirm.
   - Select **Format > Test** from the ASCII Edit Format window.
   - Select **Start** to begin the test.
   - When the test is finished, click **Stop** and then **Close**.

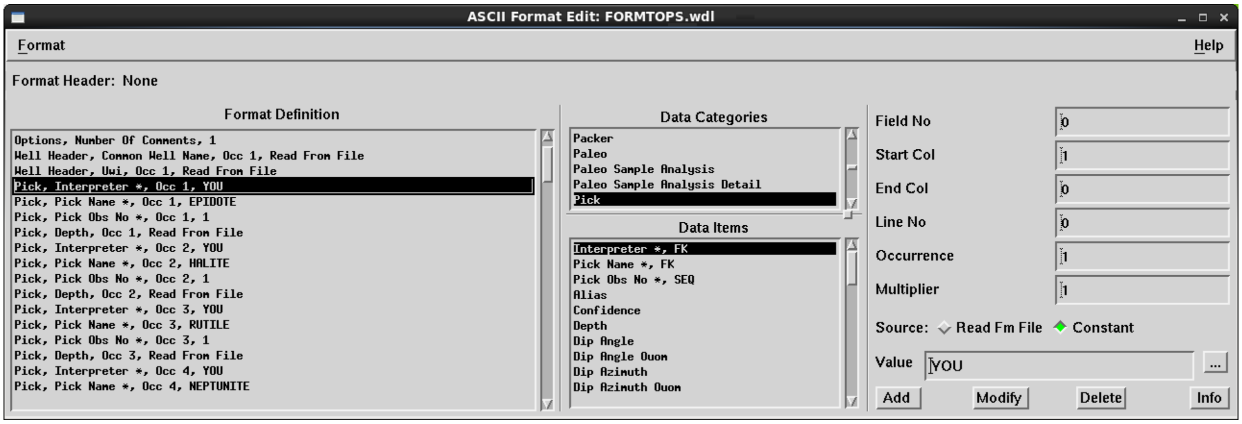
9. Examine the Data Previewer and ASCII Loader windows. Do you notice any messages in the ASCII Loader window?



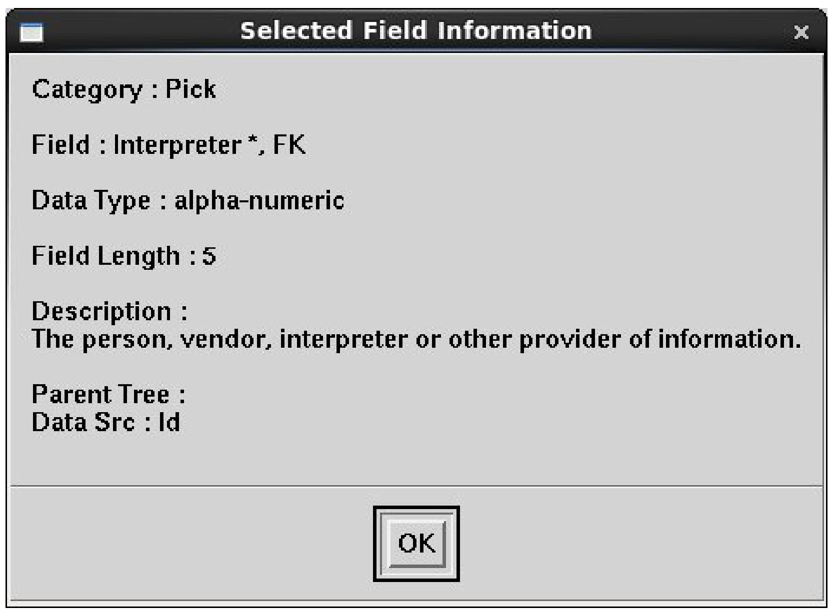
Although the test was successful, there were still problems with the format file. The message "Pick Obs No is a key value in Pick. You must give it a value" is a warning that problems may occur if you use the current format file to load data. Let's take a closer look at the Pick Data Category in our ASCII Format Edit window.

10. Select **Pick** from the Data Categories area of the ASCII Format Edit window.

    Notice that the Interpreter, Pick Name, and Pick Obs No fields are the Primary Keys. Together these fields uniquely identify the well. Notice that Interpreter and Pick Name are also Foreign Keys. These fields reference a data item in a different category.



11. Select **Interpreter** from the Data Items area and select the **Info** button at lower right (if this button is grayed out, make sure you clicked the Stop and Close buttons on your previous Test). The following dialog box displays:



Because the Interpreter field is a foreign key constraint that defines the source of the Pick data, you must define an Interpreter for each Pick instance.

12. Click **OK** to close the Selected Field Information window. Observe the format definitions for the different pick occurrences. Pick occurrences 28 through 30 have no interpreter defined in the current format. Correct the file by formatting an interpreter for these picks.

    - Select the **Pick**, **Interpreter**, **Occ27**, **YOU** from the Format Definition list.
    - Change **Occurrence** in the definition to **28**.
    - Toggle **Constant ON**.
    - Select the **Valid Values (…)** button and select your interpreter ID from the selection list.
    - Click **Add**.

> **Note**
>
> For more information on OpenWorks tables, including specific foreign key references, refer to the Support section of the Landmark corporate website https://www.landmarksoftware.com/Pages/Support.aspx.

13. Continue using this procedure to add an interpreter format definition for occurrences 29 and 30. Remember to click **Add** each time you create a format definition.

14. **Pick Obs No** is also a required item (used to define multiple occurrences of a pick in a well) and must be defined for each pick occurrence. The format definition for this data item is also missing in the format file for pick occurrences 28 to 30, and must be added to the Format Definition. Use the following procedure to add the observation number to the format file.

    - Select **Pick Obs No ***, **SEQ**.
    - Change Occurrence to 28.
    - Make sure Constant in toggled ON.
    - Click **Add**.

    Repeat this process for occurrences **29** and **30**.

15. Save and test your format again.

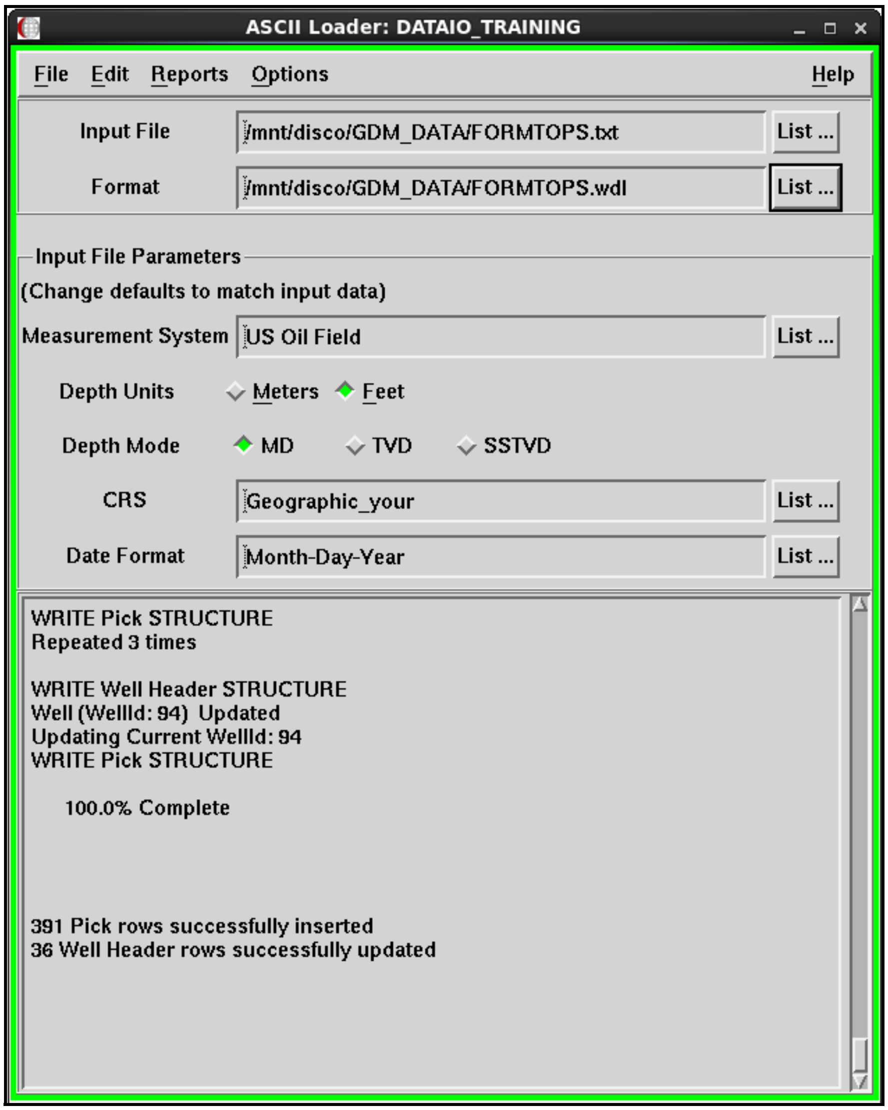
    - Select **Format** > **Save**. Click **Yes** to confirm.
    - Select **Format** > **Test** from the ASCII Edit Format window.
    - Select **Start** to begin the test.
    - When the test is finished, click **Stop** and then **Close**.

    At this time, your format should test with no apparent problems.

16. Load the data file into your DATAIO_TRAINING project.

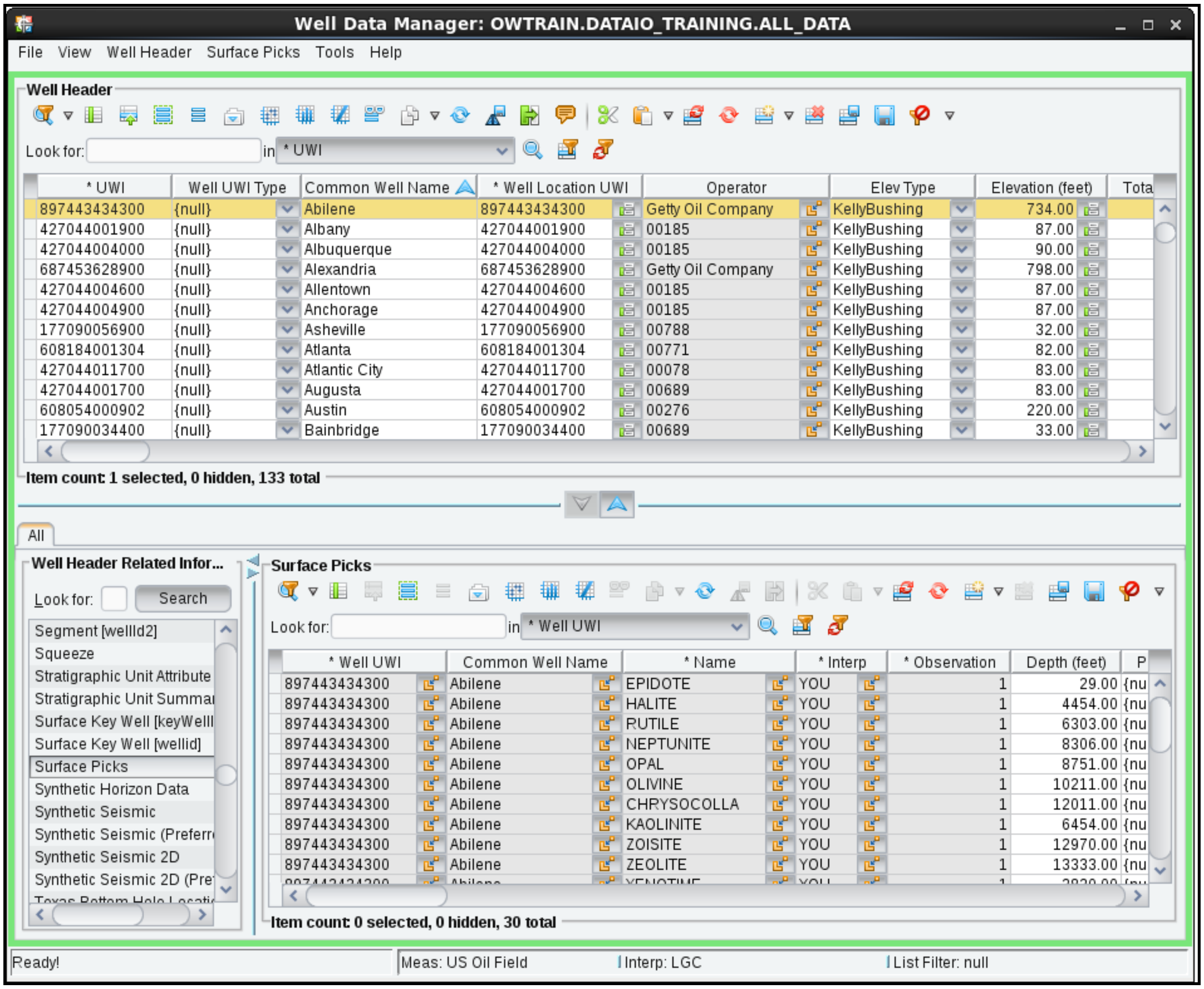
    - Verify the correct Input File and Format in the ASCII Loader window.
    - Select **File** > **Load**.

17. Close the ASCII Format Editor.



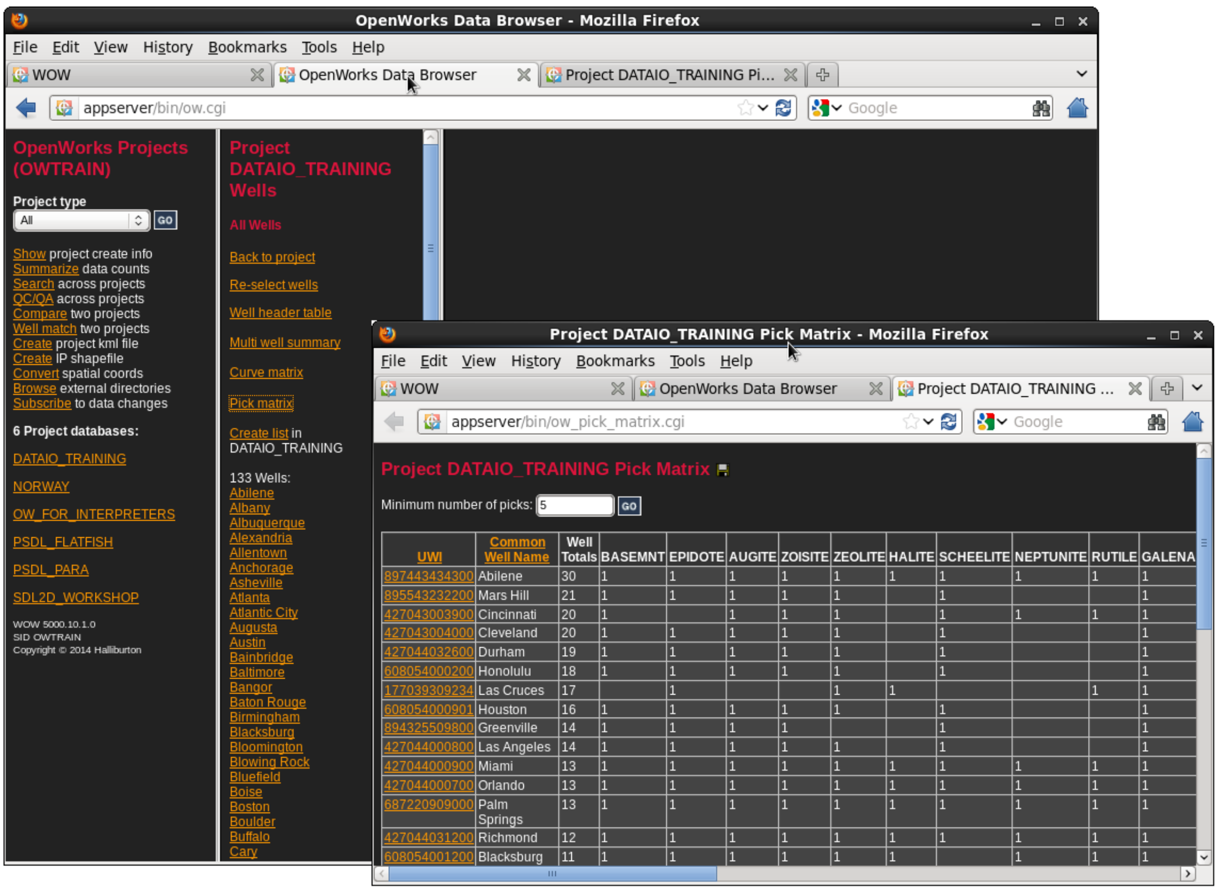
18. Verify the data load using Well Data Manager.

- If it is not already open, open the Well Data Manager.
- Select one of the wells with tops (e.g., Abilene).
- Select **Surface Picks** from the list of Well Header Related Information to view the loaded picks.



19. Verify the data load using WOW software:

    - Type `http://<your machine name here>/` into the address line of your browser window.
    - Click **OpenWorks** in the left pane of the WOW software main window.
    - Click **DATAIO_TRAINING** in the middle pane.
    - Click **133** next to Wells in the Main Data table.
    - Click **Pick matrix**.



20. Close Well Data Manager and WOW.

Other ASCII Loader Features

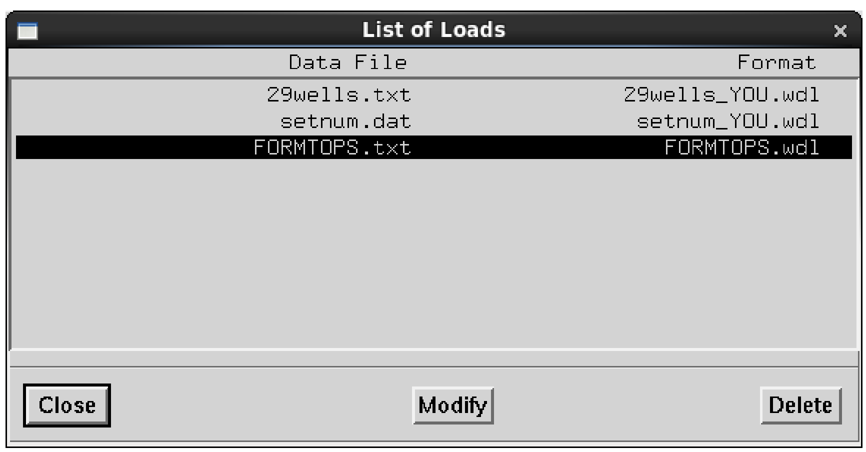
The ASCII Loader includes two features that can streamline the data loading process: a batch loader to set up a series of load jobs, and a reporting function to verify or troubleshoot the load job.

Batch Loader

The ASCII Loader's batch loading feature allows you to set up a series of data loads and run them sequentially without user intervention. This feature is particularly useful when you have a large amount of data to be loaded or when you wish to make a series of loads using different loading parameters for each.

The batch loading options are on the ASCII Loader's File menu. The Add Load Job option allows you to place a data loading job into the batch queue. After setting up a data loading job as described in the preceding sections, simply select **File >Add Load Job**. Repeat for additional jobs as desired.

To see the jobs that are in the queue, select **File > View Load Jobs**. The following window displays:



To load the batch queue, select **File > Load All Jobs**.

> **Note**
>
> Batch jobs always load into the current project. Jobs loaded using the batch loading interface are loaded into the current project. To batch load into different projects, use the command line **`wdlbch.exe`** program.

Reports

The ASCII Loader's Reports option allows you to view reports on the results of data loading. Before using Reports, use the Options menu to select the type of report and enter a name for it.

You can generate the following types of reports:

- **SQL Trace Report**: shows the SQL commands that preceded a data loading error. This report can help you determine why certain data might not have loaded correctly.
- **Reject Data Report**: lists data items that were not loaded.
- **Test Data Report**: shows the results of testing a data loading format.

After naming these files and attempting the data load, use the Reports option to view the reports.

String Replacement

The ASCII Loader lets you easily change selected text strings within a set of well data while you are loading it. This is accomplished using a feature similar to Find/Replace in an ordinary word processor. For example, if your original well data file contains incorrect or unwanted data, you can replace it with new data as the file is being loaded.

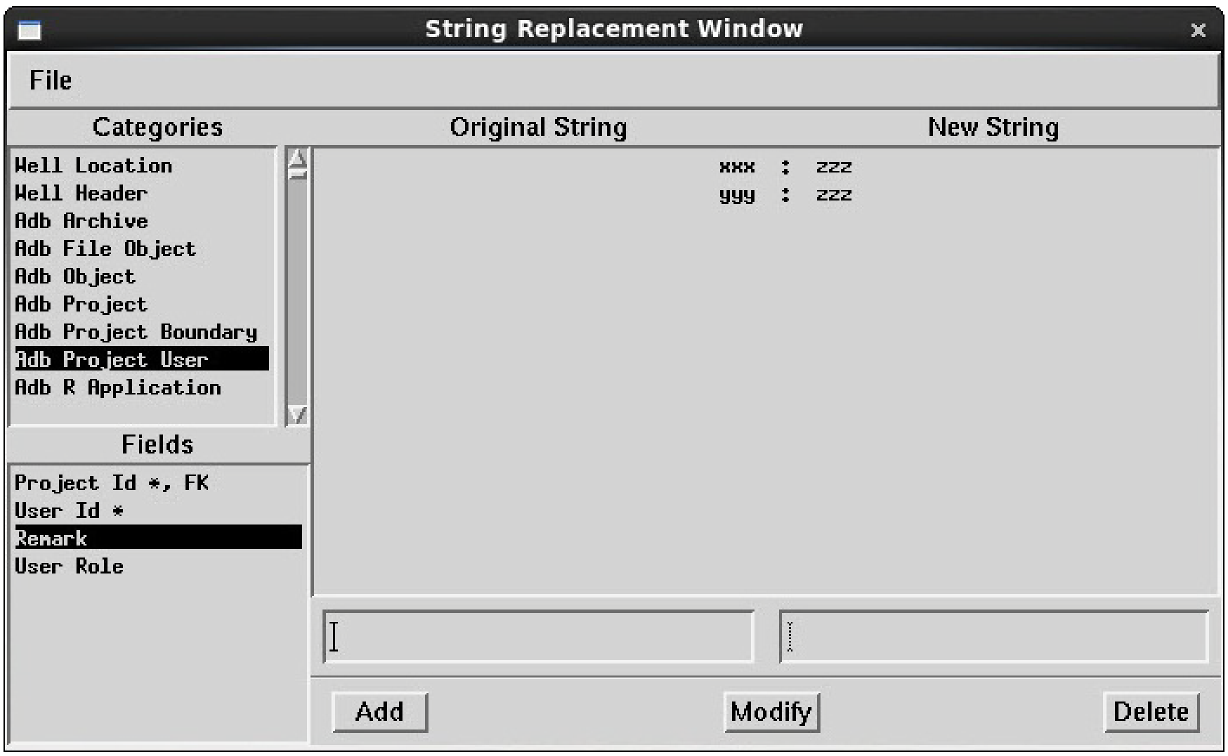
The original data file is not changed in any way; the loader simply substitutes one string for another while it is extracting the data from the file. The data loading application keeps your string replacement preferences in memory and performs the substitution for each job you load during the current session.

The original strings and the corresponding substitute strings can be saved to a file and used again during subsequent sessions. This file can also be used when batch loading.

Defining Strings to be Replaced

To perform string replacement you must first define the strings that need to be replaced and the strings that will be used to replace them.

1. Select **Edit > String Replacement**. This opens the String Replacement Window:



2. Under **Categories**, select the data category that contains the string you want to replace.

3. Under **Fields**, select the data item containing the string to replace.

4. Under **Original String**, type the text string to be replaced.

5. Under **New String**, type the string that you want the loader to substitute for the Original String.

6. Click **Add**. The original and new strings are posted in the String Replacement window. You can now define more string

replacements. Each new string replacement will be kept in memory. You can also save your set of defined strings for later use.

Saving and Reusing Replacement String Files

If desired, you can save the current set of replacement strings to a file so that you can use them during another load session.

- To view all data categories, fields, and string sets that you have defined in the current set, select **File > Display All**. The display fills the middle of the String Replacement window. To turn off this display, select **File > Display All** again.

- To save the current set of defined strings, select **File > Save**. This automatically saves your strings to a file called `StrSub.dat` in your home directory. The program will overwrite the last string set each time you use this option. To save multiple string sets, select **File > Save As** and enter a unique file name for each set of strings.

- You can open replacement string files for use during a loading session, or for editing purposes. To open an existing string replacement file, select **File > Open**, locate and select the file, and then click **OK** to open it. When you open a replacement string file, the original and replacement strings are stored in memory.

- If you decide not to perform the string substitutions at load time, you must clear the strings from memory. To do so, select **File > Clear** to clear the String Replacement window, then select **File > Close** to close it. You can also delete individual string definitions from the list using the following procedures.

Editing Existing String Definitions

The buttons at the bottom of the String Replacement Window can be used to edit the current set of string replacement definitions:

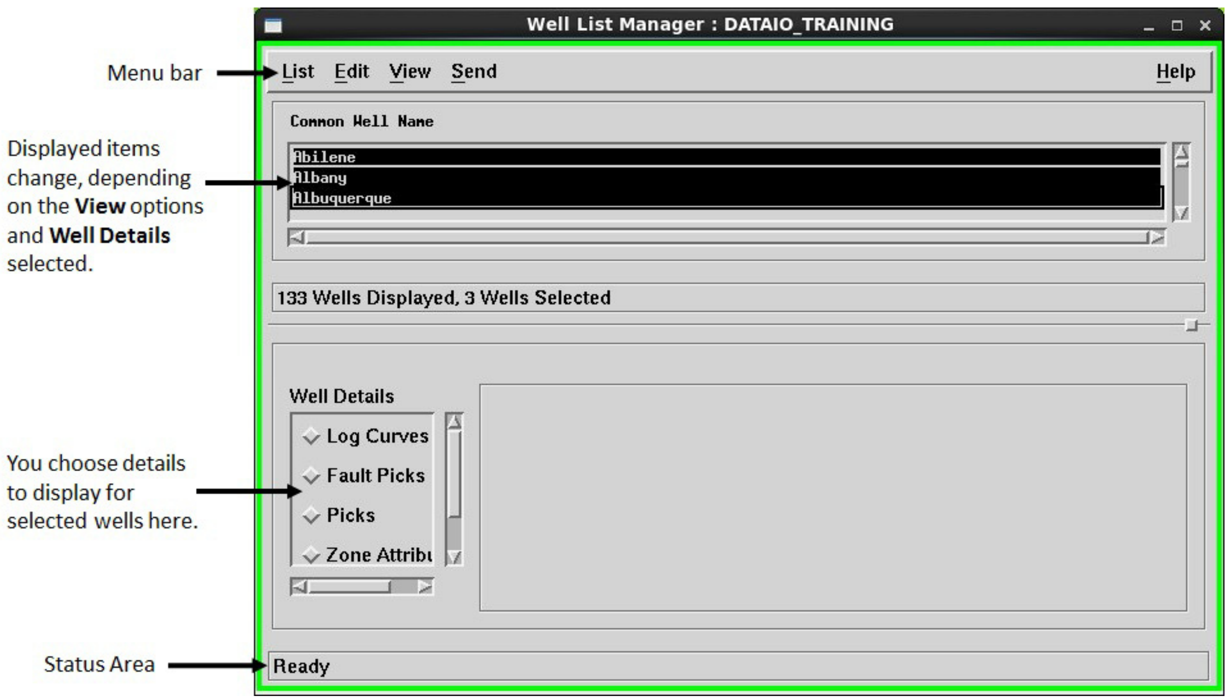
- To modify a replacement string, select the appropriate category and data item in the left side of the String Replacement Window. The original and new strings are posted in the text boxes at the bottom of the window. Edit the strings in the bottom fields and then click **Modify**.

- If you define replacement strings during a session and then decide not to perform the substitution at load time, you must clear the strings from memory. To remove a replacement string, select the appropriate Category and Field on the left side of the String Replacement Window, click on the string to be deleted, and click the **Delete** button at the bottom of the window.

Viewing Data with the Well List Manager

Most Landmark applications require well lists to be able to access data. To create, examine, or modify well lists, you use the Well List Manager (**Data > Management > List Management > Well List Manager**).

The Well List Manager main window is shown below.



Purpose and Use

The Well List Manager is used to:

- Create, modify, and delete well lists.
- Display summary information about wells.
- Send or receive lists or individual wells to and from other Applications.

Well lists determine the wells available for other OpenWorks applications and utilities. Well lists may contain all or a subset of the wells in a project.

The following data can be displayed for wells posted in the Well List Manager:

- Operator
- Well name (full name, common name, and/or unique ID)
- Total depth (in project units)
- Well status (oil, gas, dry hole, etc.)
- Completion date
- Plot name
- Well geometry type
- Well location UWI
- Parent well path UWI
- Kick-off depth
- Borehole number

Wells posted in Well List Manger can be arranged in ascending or descending order.

Well lists can be filtered to “pull out” only those wells meeting your particular criteria. For example, you might want to select all wells with an SP curve that also contain a Top 3 pick. You can use the filter options to either read wells into the Well List Manager, or select them once they are contained in the Well List Manager dialog box.

The following are Read/Select filter criteria:

- Field Name
- Completion by Field
- Completion by Formation
- Operator
- Geometry Type

- Pick Name
- Fault Pick
- Curve Name
- Total Depth
- Area Of Interest
- Time Depth Curve
- Position Log
- Directional Survey
- Production
- Injection
- Fracture Job
- Tests
- Economics

Well lists can be sent to, or received from, other OpenWorks applications via the Pointing Dispatcher (PD) software.

Main Functions

The menu bar of the Well List Manager indicates the main functions you can perform with this utility:

- **List** allows you to create, retrieve, combine, import/export, delete, save and print well lists.

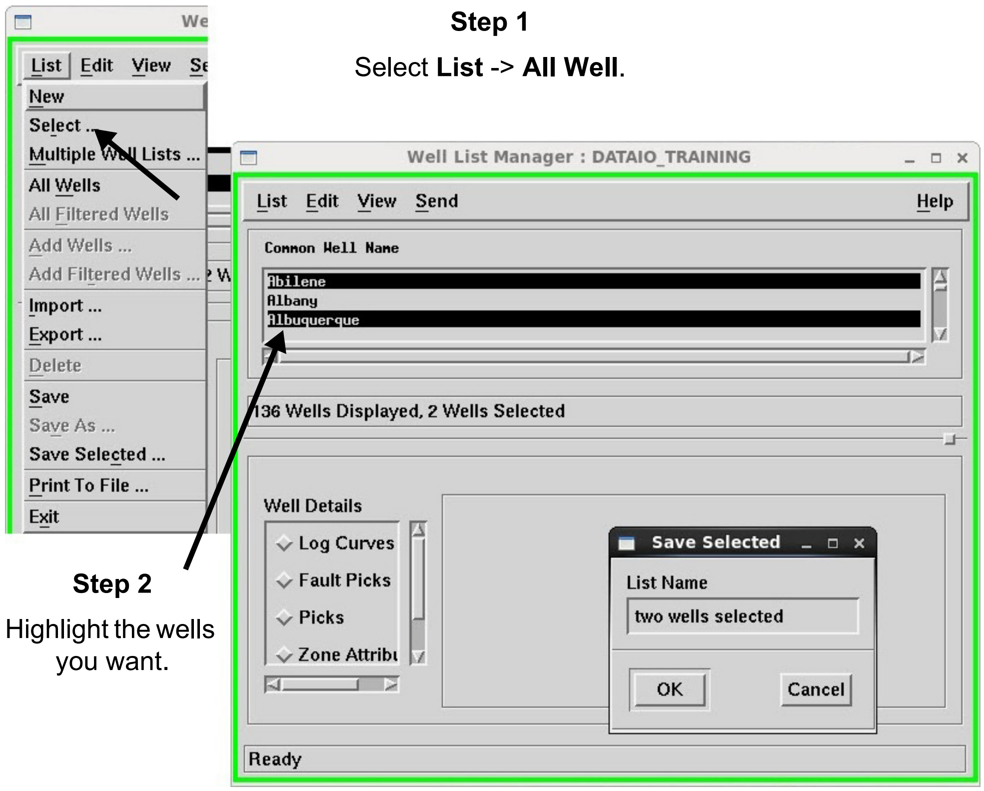
- **Edit** allows you to select or deselect wells, delete wells, or rearrange the list by cutting and pasting wells.

- **View** allows you to display and filter various types of well information and then re-order the list based on that information. You can use filters to select wells using various criteria. You can specify the units for the depth measurement in the Well List Manager window by selecting View > Units > Feet or View > Units > Meters. You can conditionally include or exclude well records in the list based on whether or not it contains a particular field name, completion, operator, geometry type, pick name, fault pick, curve name, total depth, or area of interest. You can limit the list to wells in a certain area of interest. You can also include or exclude well records based on whether or not they contain time-depth curves, position logs, directional surveys, production (PDM) data, injection data, test data, economics data, or reserve data.

- **Send** allows you to send all or selected wells to other OpenWorks applications via the Pointing Dispatcher software. In the lower portion of the main dialog box, you find the Well Details section, which allows you to display the details of curves, fault picks, well picks, or zone attribute data for the selected wells.

Creating Well Lists

The basic method for creating a well list is to use the **List > All Wells** option, and then select the desired wells, as illustrated below:



Step 1

Select **List** -> **All Well**.

Step 2

Highlight the wells you want.

Step 3

Select **List** -> **Save Selected**. Enter a name for your list and click **OK**. The programs adds your interpreter's initials to the name.

In the later exercises, you will use many other methods for creating well lists.

You can also create wells lists in WOW software and in Well Data Manager (this was explained in Well Data Manager section earlier in this chapter), but Well list manager has more options to filter and query the wells you want to save to the list.

Creating a New List from Multiple Well Lists

The Multiple Well Lists option allows you to create a new well list from two previously created well lists. You can use the following steps to create a new well list.

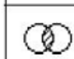
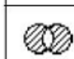
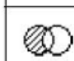
1. Select **List > Multiple Well Lists**. This opens the Multiple List Selection dialog box:

   Notice that this dialog box contains the same list in both the right and left columns (Well List One and Well List Two).

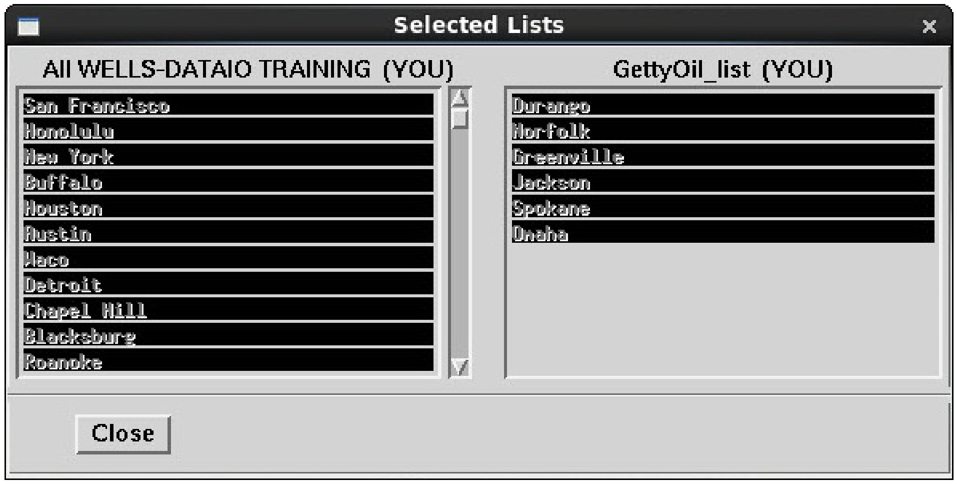
2. Select a well list name from Well List One. Your selection displays in the Selection One field. Notice that the well list you selected in Well List One is now removed from Well List Two.

3. Select a well list from Well List Two. The well list you selected displays in the Selection Two field, and is removed from Well List One. The following figure illustrates two selected well lists.

   Select one of the icons located between the lists. The icons represent various ways to join well lists from the two lists.

Icon	Purpose
	**Join**: The new list contains all wells from both lists. Any wells common to both lists occur only once in the final list.
	**Intersect**: The new list contains only those wells that are common to both lists.
	**Extract**: The new list contains wells that are unique to each list, but not wells that are common to both.
	**Subtract**: The new list contains only the wells that are unique to the first list. The wells in the second list and the wells that occur in both lists are not included.

4. To see how the new well list will look, click on the View button below the icons. This opens the Selected Lists dialog box.



This shows you which wells were picked from each of the two original lists, and will display in the new list. All wells that meet the condition of the new well list are shown selected. For example, the illustration above shows the wells selected with the Extract icon (third from top).

While the Selected Lists dialog box is displayed, you can create a different well list by selecting or deselecting any well lists in the Multiple List Selection dialog box, or by choosing another icon. The new well list is then displayed in the Selected Lists dialog box.

5. Click **Close** to close the Selected Lists dialog box.

6. Click **OK** in the Multiple List Selection dialog box to create the new list of wells for the Well List Manager window. The Multiple List Selection dialog box closes, and the resulting new well list displays in the Well List field of the Well List Manager window.

7. Select **List > Save**, and type a name for the new well list in the Save List dialog box.

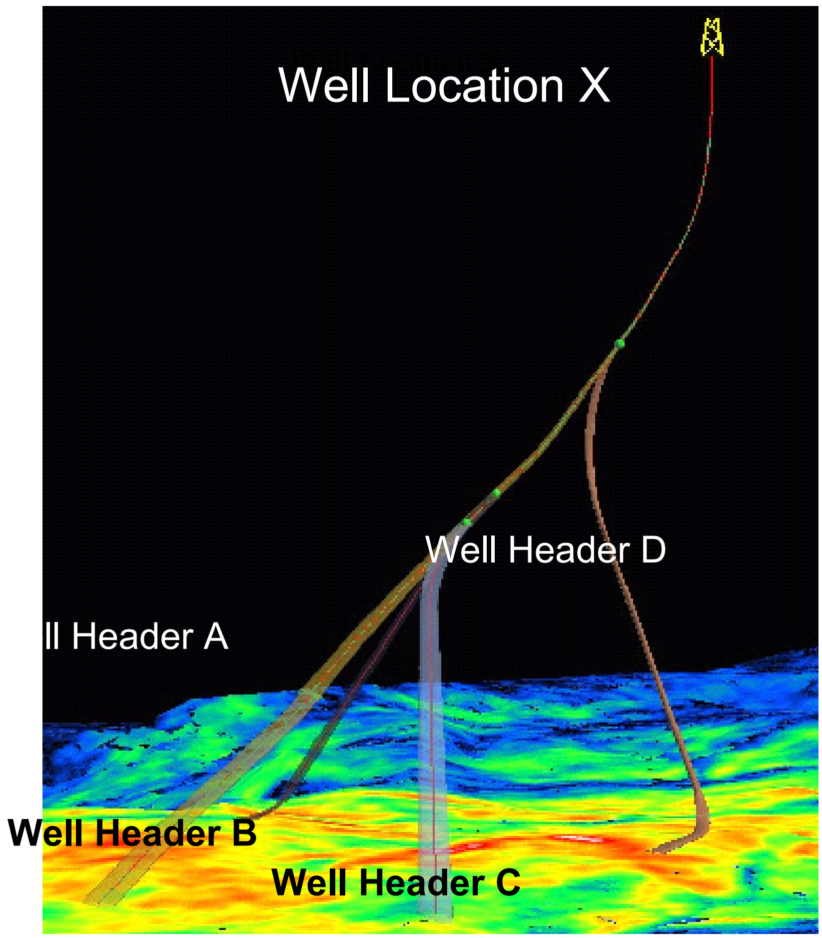
Importing and Exporting Well Lists

Well List Manager allows you to import or export files containing lists of wells. Well list files are usually generated by Well List Manager; however, you can edit well list files or create a well list in a text editor.

- To import a well list from a text file, select **List > Import** from the Well List Manager menu bar, select the name of the text file, and then click **OK**.
- To make the imported well list active, choose **List > Select** on the menubar, select the name of a list, and click **OK**.
- To export a well list from Well List Manager to a text file, use **List > Select** to select the name of a well list, and then elect **List > Export**. When you see the Export List Selection dialog box, enter the full pathname of the file to be used for saving the exported well list. and then click **OK**. The well list is saved to the file.

Creating Wells and Sidetracks

As mentioned previously, changes in the OpenWorks data model have been made for R5000. A new table WELL_LOCATION has been introduced to represent the surface location on a well network that may contain multiple wellbores. The Well Header table represents wellbores as before, and OpenWorks applications will continue to reference this master table as the main source for well information. A typical view of an OpenWorks well in R5000 is shown below:



The picture shows a well network with a surface Well Location X, the original wellbore A, and three sidetrack wellbores B, C, and D.

Loading a New Wellbore

When you manually load a new well to a project in R5000, a complete well definition requires entries to two tables: WELL_LOCATION and WELL_MASTER (a.k.a. Well Header).

WELL_LOCATION is the parent table to the WELL_MASTER table therefore the Well Location table must be populated first with surface information. Required fields for the Well Location table are:

- Well Location UWI
- Original surface CRS
- Original surface X /Longitude
- Original surface Y/Latitude

After the above required information is saved to the Well Location table, wellbore information is entered into the Well Header table. Minimum required information for the Well Header table is:

- Well Location UWI
- Well Header UWI

Note:

Well Header entries are linked to the Well Location table through the common key, Well Location UWI. The Well Location UWI is entered in the Well Location table, and is automatically loaded to the Well Location UWI field in the Well Header table during well creation.

Additional subsurface well information may be entered into the Well Header as they become available such as:

- Common Well Name
- Original Bottomhole CRS
- Original Bottomhole X/Longitude
- Original Bottomhole Y/Latitude
- Elevation Type
- Elevation
- Total Depth

Loading a Sidetrack Wellbore

Loading a sidetrack well to the OpenWorks project requires you to first identify the existing Well Location UWI of the original wellbore, and then associate that Well Location UWI to the Well Header table row for the secondary (sidetrack) wellbore. Subsequently, the UWI and other subsurface information for the sidetrack well are entered into the Well Header table.

Exercise 3-11.Create a New Well

In this exercise, you use Well Data Manager to create a new well in DATAIO_TRAINING.

1. Open Well Data Manager (**Data > Management > Well Data Manager**).

2. Select **All Well Header** in the Filter Project Data dialog box.

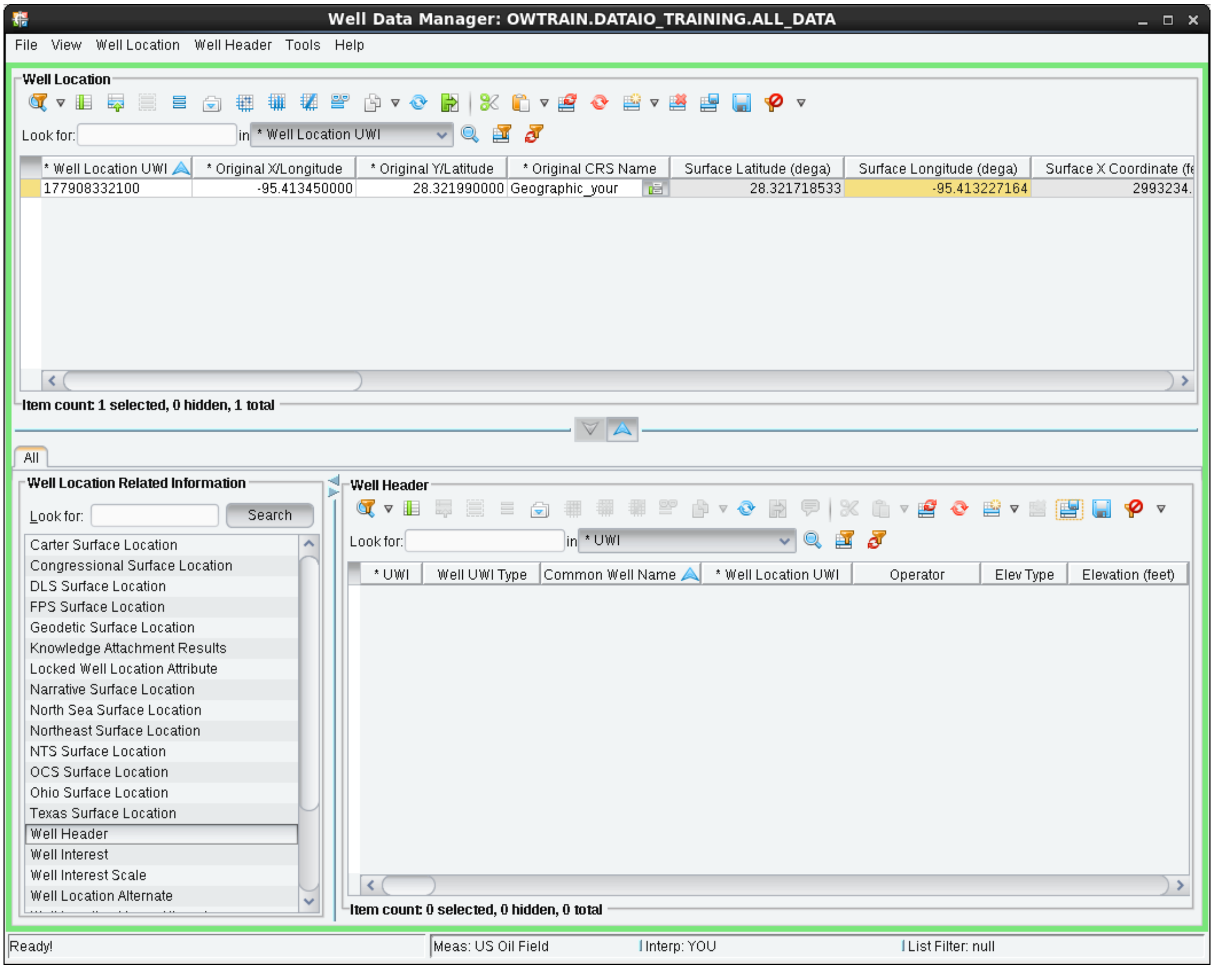
3. Creating a well manually in Well Data Manager for R5000 is now a two-step process because of the wellbore change to the OpenWorks data model to better capture complex wellbore geometries. You have to create a well location first and then create the well header.

4. To create a new well location, click the **Set Top Level Focus** icon. Select **Well Location**; click **OK**. Select **No Well Location** from the Filter Project Data dialog box.

5. Click the **Add new Well Location** icon . This will add a new blank line to the Well Location table.

6. Insert these values for the well location:

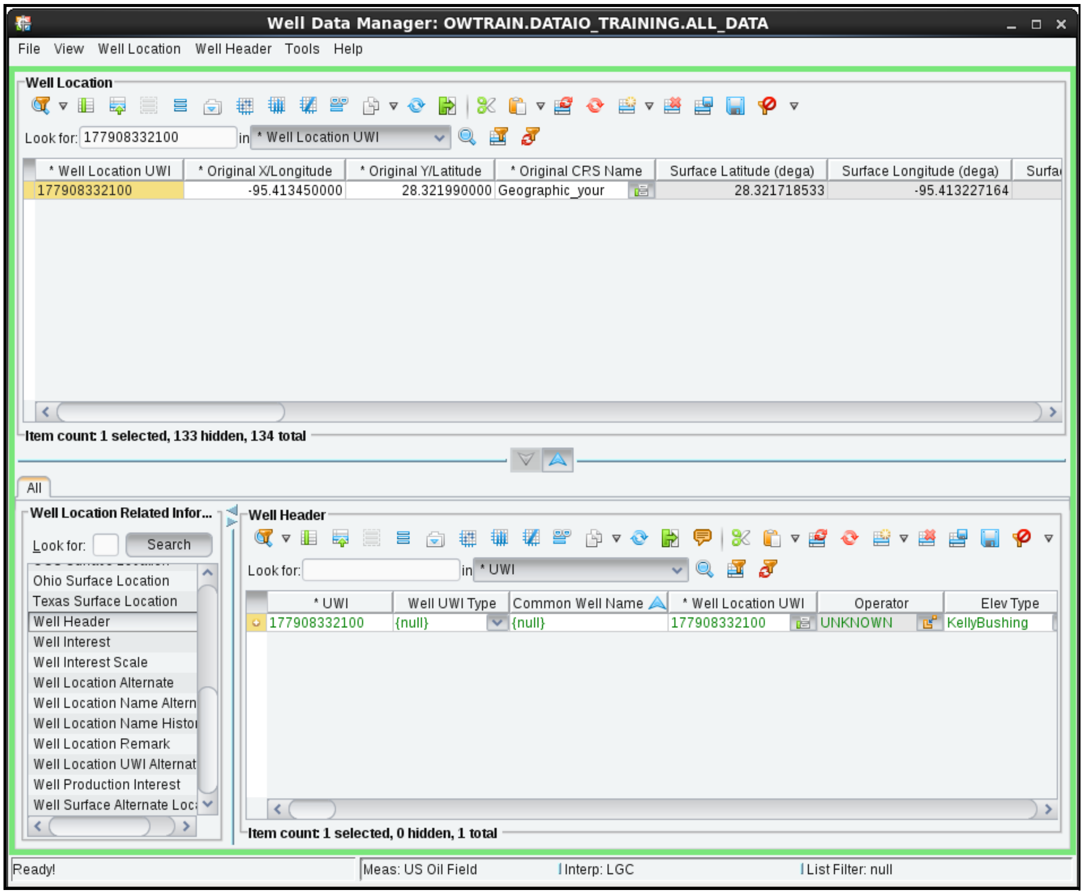
Well Location UWI	177908332100
Well Location Name	Bangor
Original CRS Name	(World Geodetic System 1984) Geographic_YOU
Original X/Longitude	-95.41345
Original Y/Latitude	28.32199



7. Click the **Save** icon to store the well location data to the OpenWorks project.

8. In the bottom pane, highlight **Well Header** in the list **Well Location Related Information**. From the toolbar above the Well Header child table, click the **Add new Well Header** icon.

9. Notice the Well Location UWI is the common key between the Well Location and Well Header tables and it is automatically populated in the Well Header table for the new well.

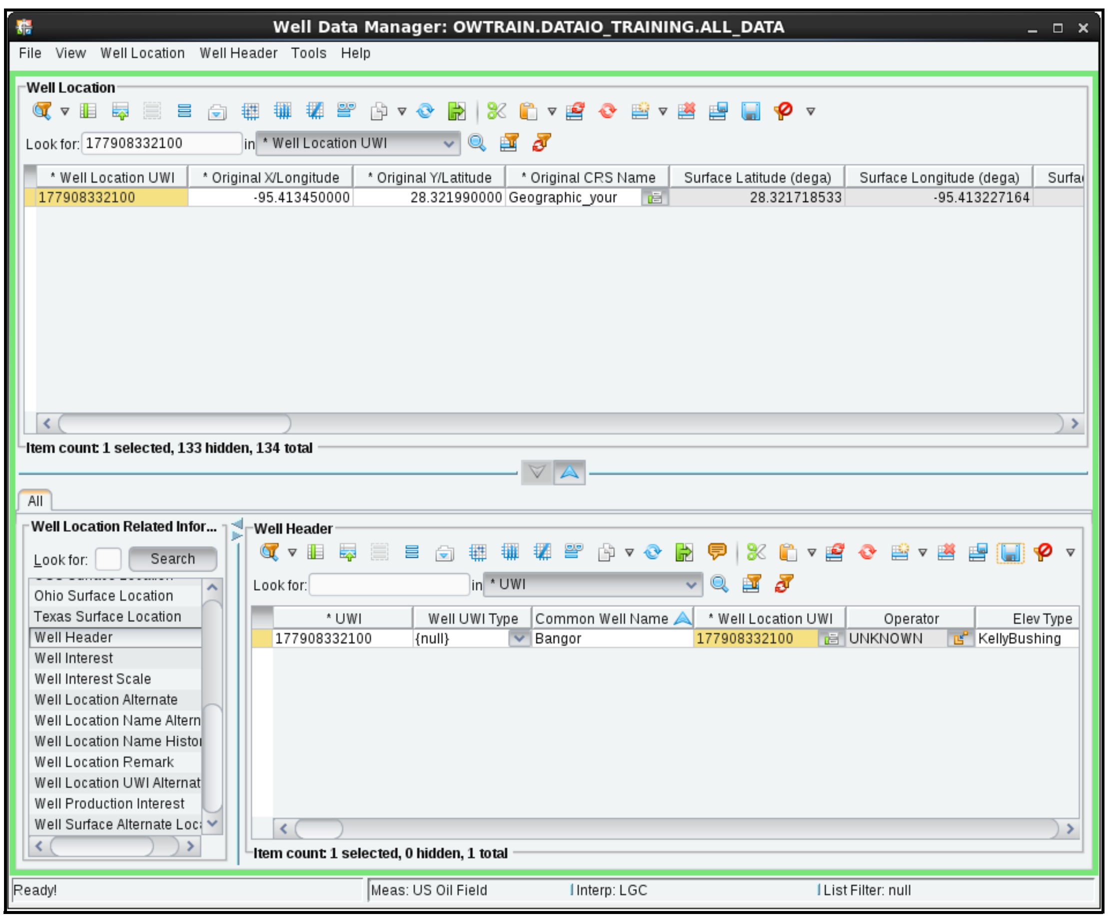

Well Data Manager: OWTRAIN.DATAIO_TRAINING.ALL_DATA
File View Well Location Well Header Tools Help
Well Location
Look for: 177908332100 in * Well Location UWI
* Well Location UWI
* Original X/Longitude
* Original Y/Latitude
* Original CRS Name
Surface Latitude (dega)
Surface Longitude (dega)
177908332100
-95.413450000
28.321990000
Geographic_your
28.321718533
-95.413227164
Item count: 1 selected, 133 hidden, 134 total
All
Well Location Related Infor...
Look for:
Search
Ohio Surface Location
Texas Surface Location
Well Header
Well Interest
Well Interest Scale
Well Location Alternate
Well Location Remark
Well Production Interest
Well Header
Look for:
in * UWI
* UWI
Well UWI Type
Common Well Name
* Well Location UWI
Operator
Elev Type
177908332100
{null}
{null}
177908332100
UNKNOWN
KellyBushing
Item count: 1 selected, 0 hidden, 1 total
Ready!
Meas: US Oil Field
Interp: LGC
List Filter: null

10. Add the following values to the new line created in the Well Header table:

UWI	177908332100
Well Location UWI	177908332100
Common Well Name	Bangor
Total Depth	7872
Elevation Type	KellyBushing
Elevation	721
Current Status	GAS

Click **Save** to store the Well Header information to the project.

The information for your new well distributed between the Well Location and Well Header tables in the Well Data Manager is shown below.



Exercise 3-12. Create a New Sidetrack

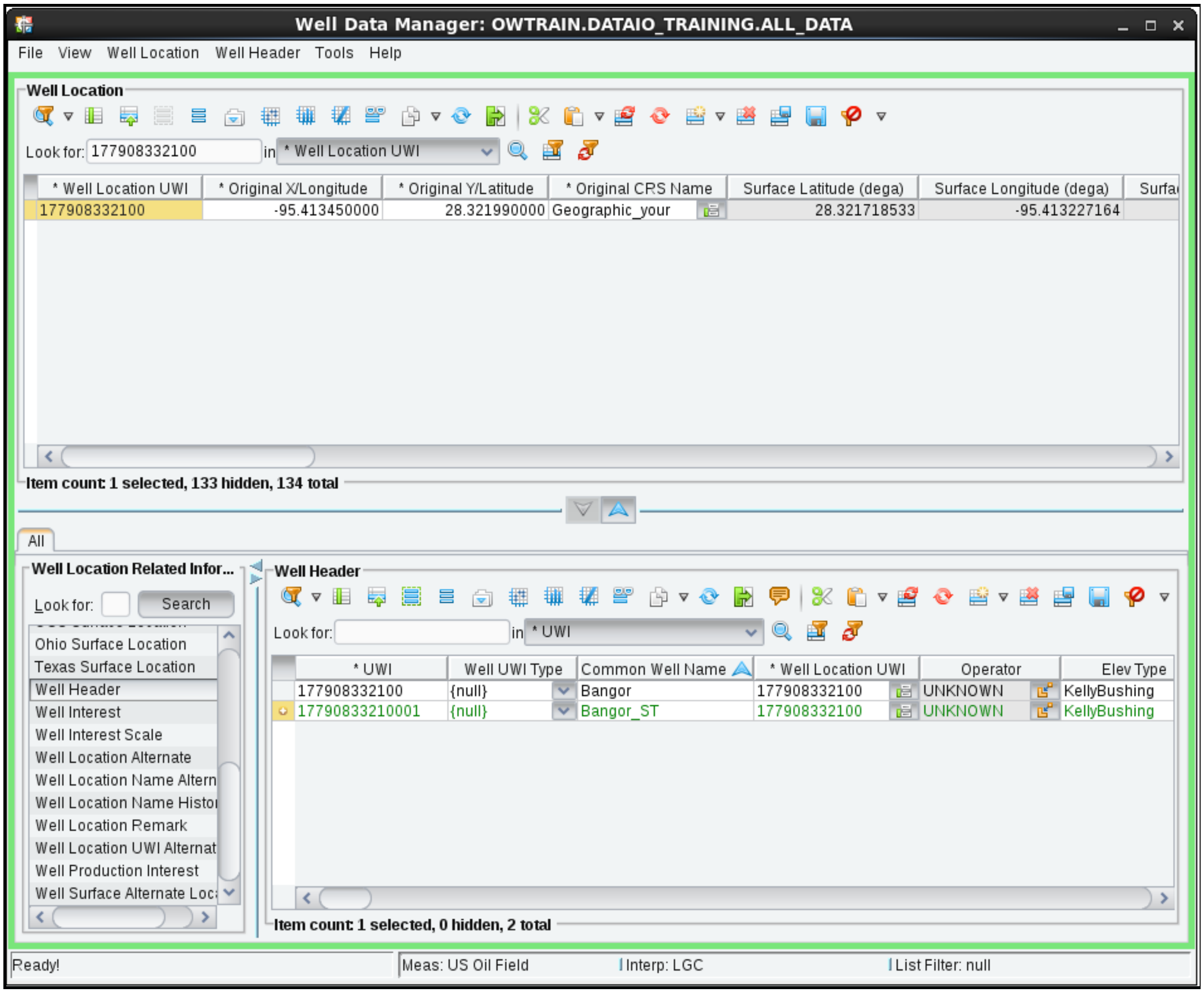
Now you will create a sidetrack from the above well location.

1. In the Well Data Manager, highlight the line containing the well location **UWI 177908332100** in the Well Location table.

2. In the bottom pane, highlight **Well Header** in the list **Well Location Related Information**. From the toolbar above the Well Header table, click the **Add new Well Header** icon. Enter the following values in the new line created in the Well Header table:

Well Location UWI	177908332100
UWI	17790833210001
Common Well Name	Bangor_ST
Total Depth	6888
Elevation Type	KellyBushing
Elevation	721
Current Status	GAS

The data entries for the new sidetrack well in Well Data Manager is shown here.



3. Click the **Save** icon. The sidetrack well is saved to the OpenWorks project.

Exercise 3-13.Edit Well Data

Remember that the Total Depth for the Bangor_ST well was loaded as 6888. Use the following steps to correct this value:

1. Click the **Set top level focus** icon and, in that dialog box select the category **Well Header**. Click **OK.**

2. In the **Filter Project Data** box, select **All Well Header**.

3. Highlight **Wheeling** well (Bangor_ST) in the Well Header table. Scroll right, to the **Total Depth** column.

4. Overwrite **6888** with **12187** feet. Press **Enter**, then click **Save**.

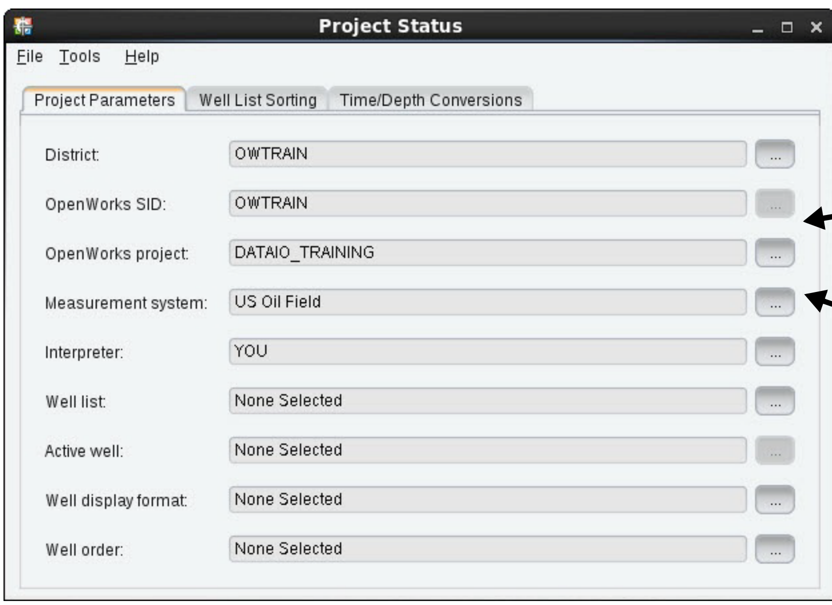
5. Exit the Well Data Manager.

Mini-Workshop: ASCII Well Loading

In this mini-workshop you add a new well to an existing project. The well contains a number of data types and occurrences that you have not loaded before. If you need more guidance, more detailed instructions for loading this data are given in Appendix B. Core and production data are loaded into this project in Chapter 4.

Changing Projects

1. Use **Project Status** to change from DATAIO_TRAINING to MINI_WORKSHOP, <ALL DATA>.



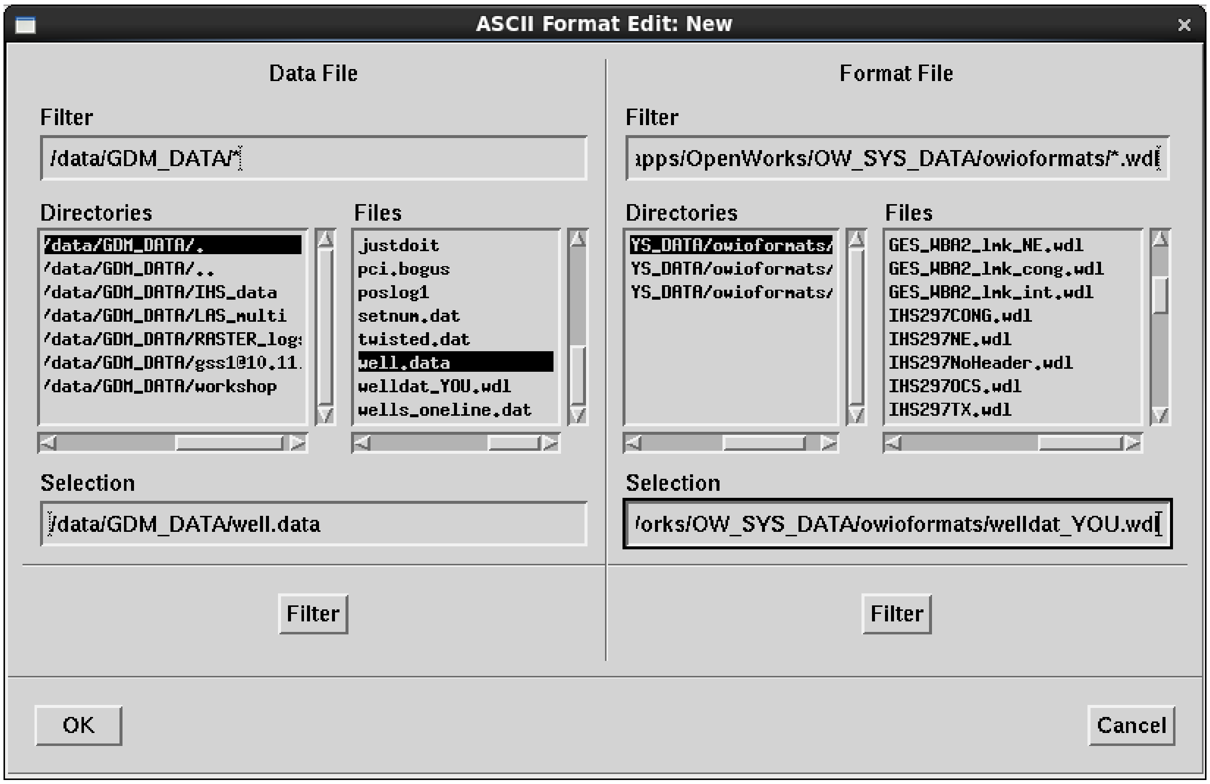
Click to change the Project database to **DATAIO_TRAINING**.

Select **US Oil Field** for the session measurement system.

2. Use **Project > Interpretation ID Manager** to create and set an interpreter for this project.

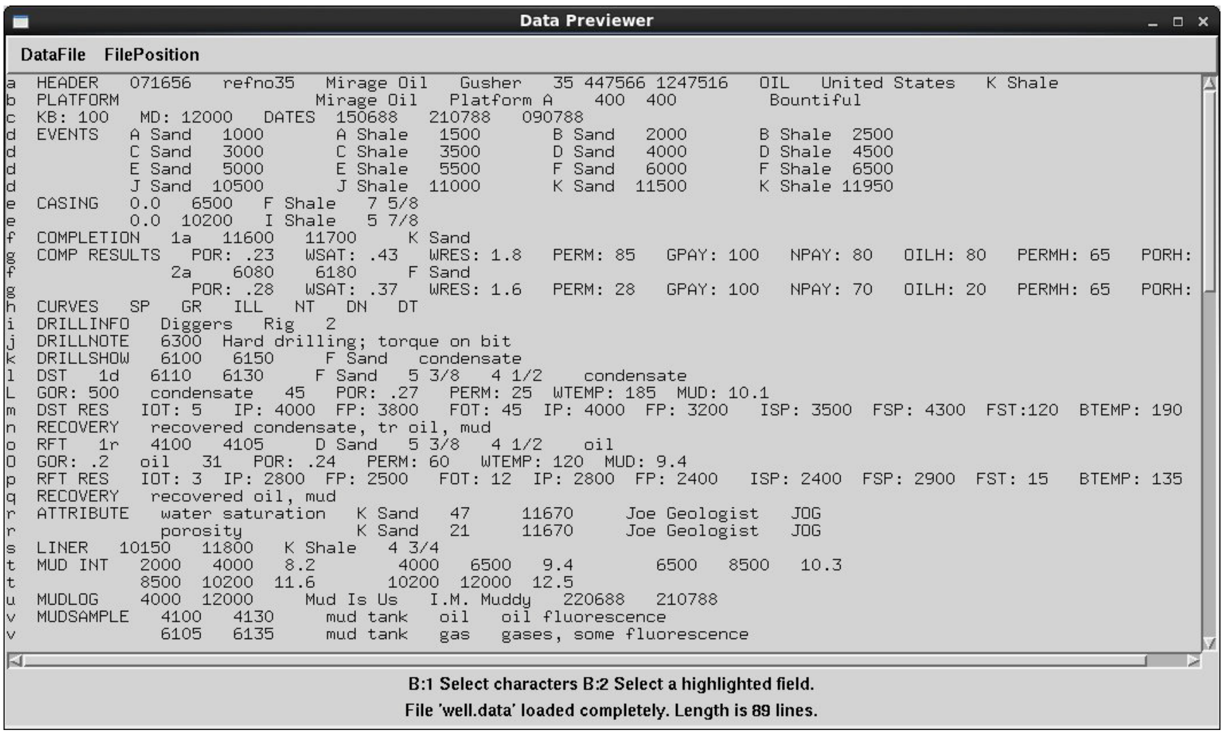
Loading a New Well into the Project Using ASCII Loader

3. Use **Data > Import > Well Import (Classic), Edit > Format** to open ASCII Loader and display the format editor. Select **Format > New** to load the data file named **well.data** and create a new format file. Name it **welldata_*<your_initials>*.wdl**.



4. In the Data Previewer window, use the **File Position > Search** option to find occurrences of the string “a” in column 1.

   In this file the start of a new well is indicated by the format flag “a.” Notice that the file also contains a format flag “aa” (see CUM PROD line). It is necessary to distinguish “a” from “aa.” So, instead of just formatting “a” as a format flag, you would highlight (using MB1) “a” plus a space (“a ”). Entering only “a” with no space in the Value field renders the editor unable to distinguish between “a” and “aa.”



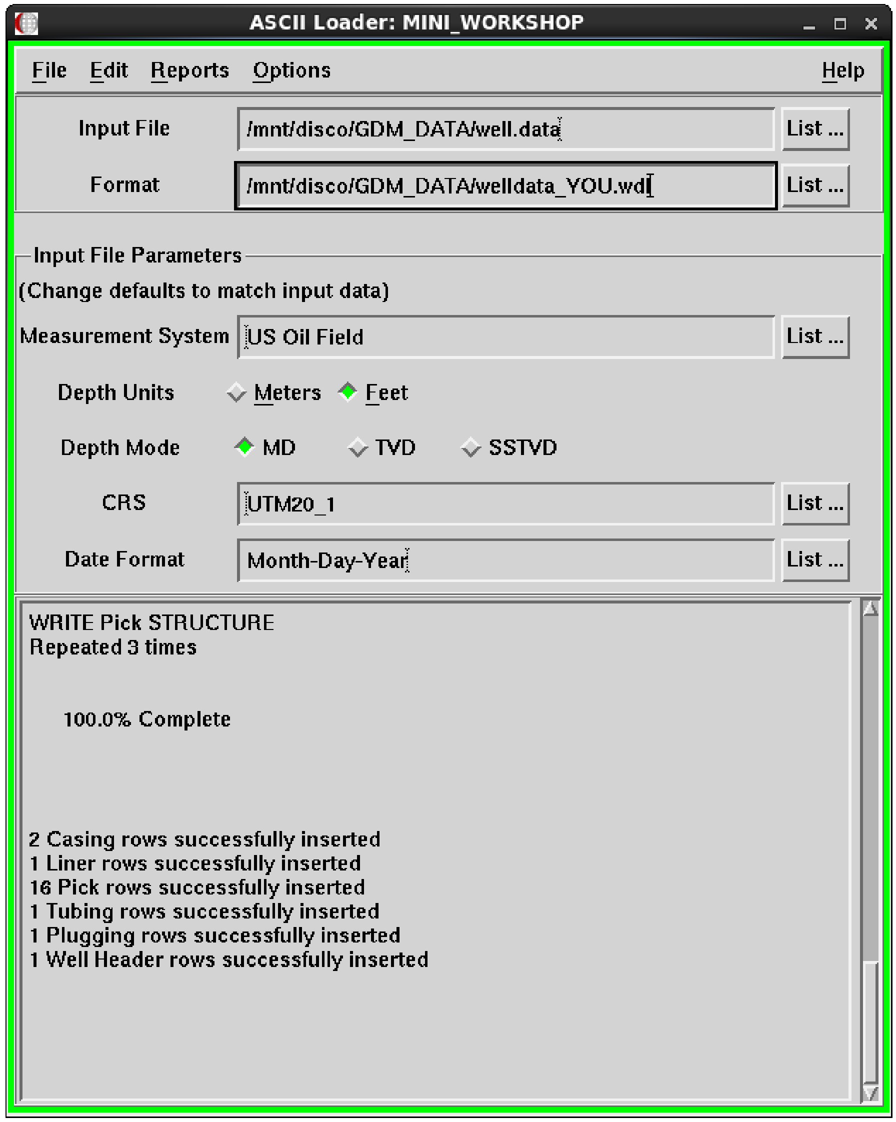
5. Create necessary Format Flags for the file. You only need to create Format Flags for the lines which contain data you wish to load.

6. Load the following data:

Data Category	Data Item
Well Header	UWI, R
	Common Well Name
	Current Status
	Elev Type
	Elevation
	Total Depth
	Well Operator
	Orig X or Lon Sf
	Orig Y or Lat Sf
Pick	Pick Name*, FK
	Depth
	Interpreter*, FK
Casing	Top Depth, R
	Base Depth, R
	Casing Size
Liner	Top Depth
	Base Depth
	Liner Size
Plugging	Plugging Depth
Tubing	Tubing Set Depth *
	Tubing String No*, SEQ
	Tubing Size

> **Note:**
>
> Try to load the data with these abbreviated instructions. If you have difficulty, full instructions for loading this data are located in Appendix B.

7. Save and load the format.



8. Verify the load in Well Data Manager.

    - From the Well List, select your new well: **UWI = 071656, Common Name = Gusher 35**
    - Examine the following Data Forms to ensure that your data loaded properly:
        - — Casing
        - — Liner
        - — Pick
        - — Plugging
        - — Tubing
        - — Well Header

    Verify the load data in WOW software:

    - Enter `http://`*`<your machine name here>`*`/` in your browser window.
    - Click **OpenWorks** in the left pane of the WOW software main window.
    - Click **MINI_WORKSHOP** in the middle pane.
    - Click **36** next to Wells in the Main Data table. The **MINI_WORKSHOP** Wells list displays, showing that Gusher 35 was added to the list.

9. In Well List Manager, select **List > All wells**.

    This should retrieve 36 wells. (The 35 original wells, loaded into the project for you, and the one well just loaded in this miniworkshop.)

10. Exit from Well Data Manager and Well List Manager.

Exercise: Create a Well List Using Well Data Manager (WDM)

In this exercise you will use WDM to create a new Well List in the same project (MINI_WORKSHOP).

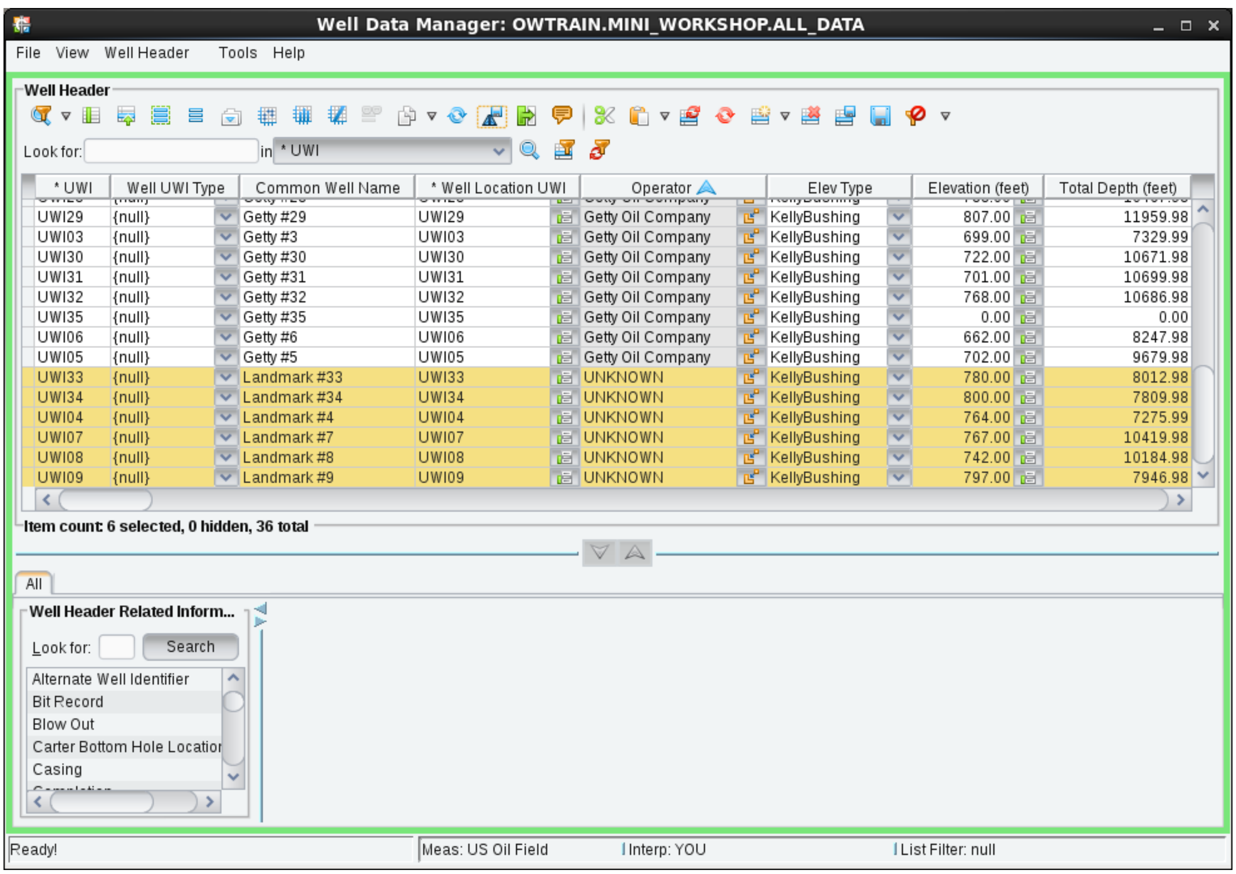
Remember that you can also create wells lists in WOW software and from Well List Manager that has options to filter and query the wells you want to save to the list.

1. To open the Well Data Manager select **Data** > **Management** > **Well Data Manager**.

   The Filter Project Data dialog box displays.

2. Click the **All Well Header** button. The Well Data Manager window displays.

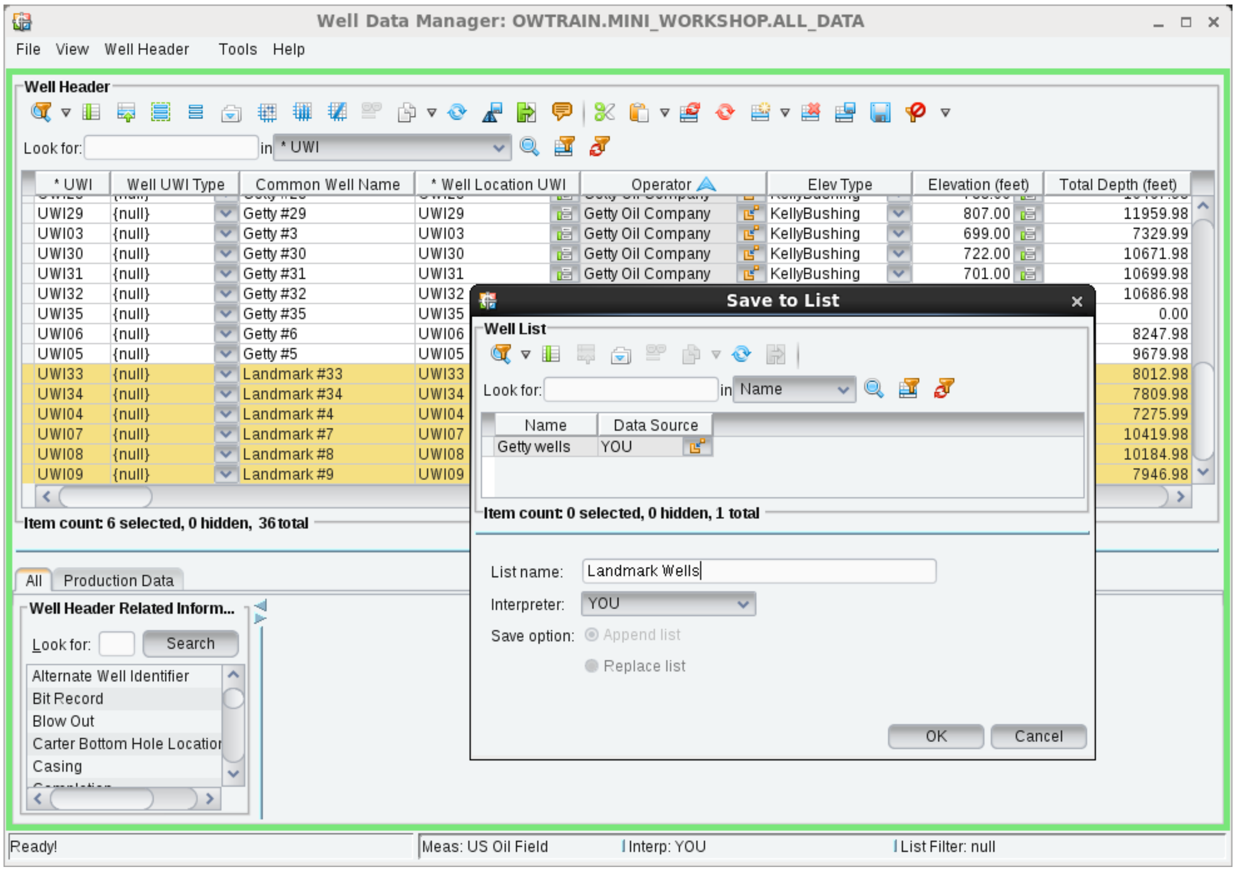
3. Select all the Wells that need to be listed.



4. Click the **Export current selection to the Well list**  icon.

   A **Save to List dia**log box displays.

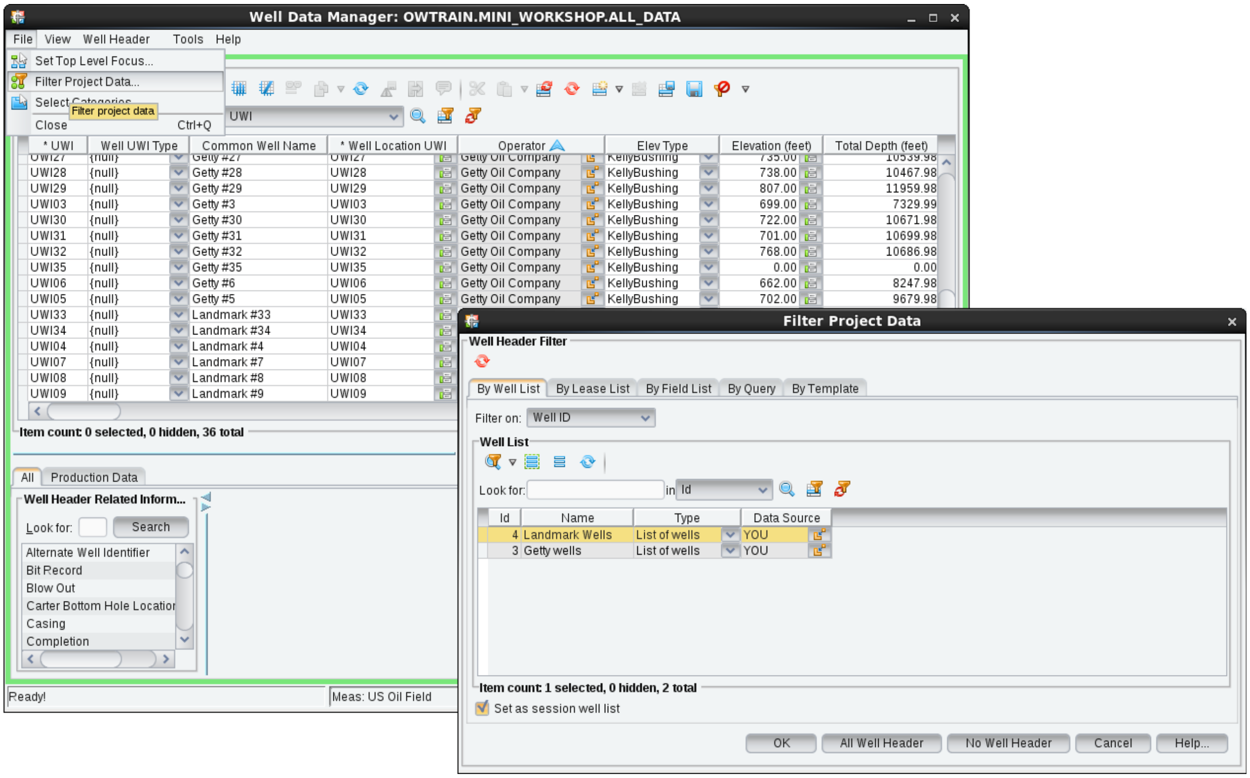
5. Type the name `Landmark Wells` into the List Name field.



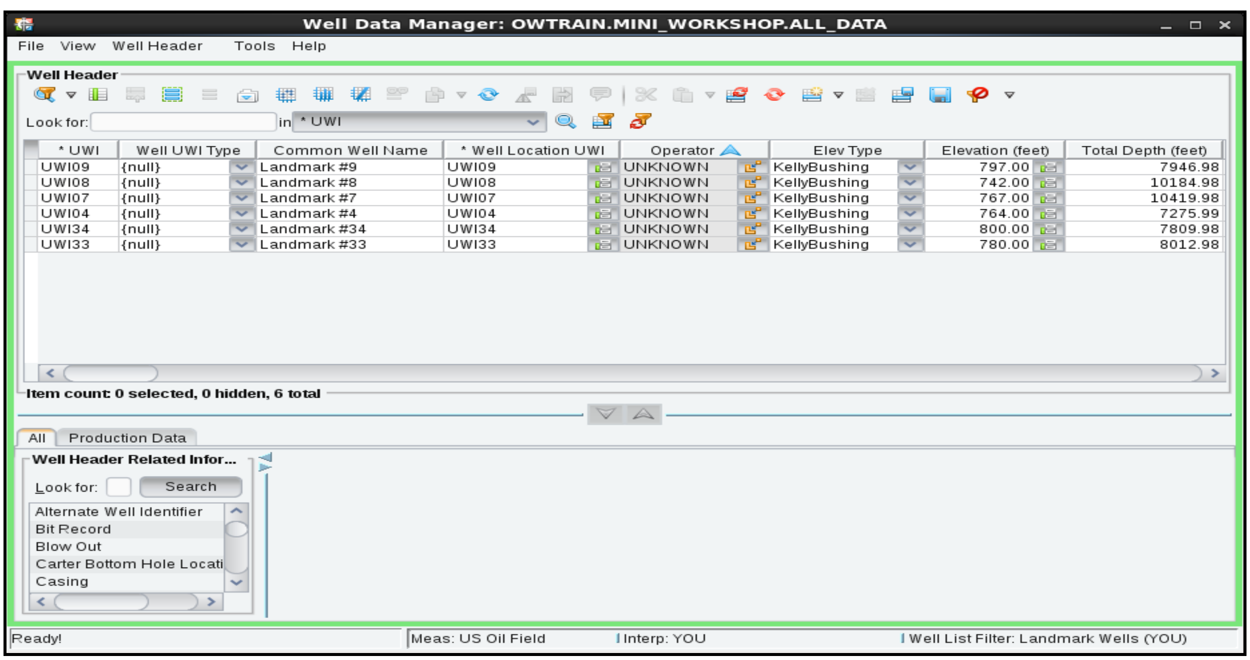
6. Click **OK**.

   All selected Landmark Wells are saved in the list.

7. Select the **Landmark Wells** list from Filter Project Data dialog box.



8. Click **OK**. Wells are saved in the displayed list.



Chapter 4

Core and Production Data Loading

The same rules and guidelines given for loading well data (Chapter 3) apply to the loading of production and core data. The OpenWorks software has multiple tables into which production and core data may be loaded.

Depending on what applications you wish to use and what type of core or production data you are working with, you should load the data using different data categories.

This chapter provides examples of loading core and production data.

Chapter Objectives

In this chapter you will learn about:

- Tables that hold core and production data
- Loading core and production data

Data Categories with Core Data Information

The following Data Categories in the ASCII Loader Format Editor hold information on core data:

- Core Property Analysis
- Core Property Analysis Detail
- R Core Analysis Type
- R Core Property
- Well Core
- Well Core Analysis
- Well Core Analysis Method
- Well Core Analysis Remark
- Well Core Description
- Well Core Formation
- Well Core Remark
- Well Core Sample Analysis
- Well Core Sample Description
- Well Core Sample Property
- Well Core Sample Remark
- Well Core Shift

Changes in Production Data Model for R5000

Production data models in R5000 have been simplified, by removing several outdated legacy tables and updated the new tables to correspond more closely to the current model in EDM™ software, this will facilitate integration between this two systems.

If you load any new production data to your project you will be using this new model, but if you restored a project from a previous OpenWorks version, the data must be migrated to the new data model.

If the production data stored in the more free form old model followed a standardized format it will be automatically migrated to the new model during the OpenWorks project upgrade process. If there was inconsistency in naming conventions you may have to migrate some of the production data to the new model manually. For more details about this process please consult the R5000 Project Administration manual.

Data Categories with Production Data Information

The following Data Categories hold information on production data:

- Prod Cumulatives
- Prod Daily Injection
- Prod Daily Production
- Prod Economic Detail
- Prod Economic Monthly
- Prod Economic One Line
- Prod Facility Group
- Prod Group Allocation
- Prod Monthly Injection
- Prod Monthly Production
- Prod Table Column
- Production Facility
- Production Gas Analysis
- Production Gas Analysis Detail
- Production Header
- Production Oil Analysis
- Production Oil Analysis Detail
- Production Oil Viscosity
- Production Water Analysis
- Production Water Analysis Detail
- Well Prod Cumulatives
- Well Prod Daily Injection
- Well Prod Daily Production
- Well Prod Economic Detail
- Well Prod Economic Monthly
- Well Prod Economic One Line
- Well Prod Facility Group
- Well Prod Group Allocation
- Well Prod Monthly Injection
- Well Prod Monthly Production
- Well Producing Zone
- Well Production Gas Analysis
- Well Production Gas Analysis Detail
- Well Production Interest
- Well Production Oil Analysis
- Well Production Oil Analysis Detail
- Well Production Oil Viscosity
- Well Production Water Analysis
- Well Production Water Analysis Detail

Exercise 4-1: Loading Core Data using ASCII Loader

In this exercise you load a file containing core data for well Getty #19 into your project using the ASCII Loader. The file you will use was created in an Excel spreadsheet and saved as a space delimited file.

1. Make sure that **MINI_WORKSHOP** is still the project selected. If not, use **Project > Project Status** from the OpenWorks command menu to set the project.

2. From the ASCII Loader window select **Edit > Format**. Choose **Format > New** from the ASCII Format Edit window.

3. Choose the **Get19_Core.prn** data file and name the new format file `Coredata_Get19_YOU.wdl`. Click **OK**.

4. Create the following format.

Format Flag	Data Category	Data Item	Start Column	End Column
a	Options	Format 1	1	1
b		Format 2	1	1
c		Format 3	1	1
a	Well Header	UWI, R	81	85
b		Common Well Name	9	17
b	Well Core	Contractor, FK	88	98
c		Core Id *, SEQ	23	24
		Data Source *, FK	Constant Value = YOU	
		Core Diam	Constant Value = 1	
		Base Depth	29	32
		Recovered AMT	Constant Value = 1	
		Remark	65	68
		Top Depth	29	32

Also create this format:

Format Flag	Data Category	Data Item	Start Column	End Column
c	Well Core Analysis	Analysis Obs No *, SEQ	15	16
c		Core Id *, FK	23	24
		Data Source *, FK	Constant Value = YOU	
b		Core Analyst Name	51	56
	Well Core Description	Core Id *, FK	Constant Value = 100	
		Data Source *, FK	Constant Value = YOU	
c		Description Obs No	15	16
c		Lithology Desc	105	146

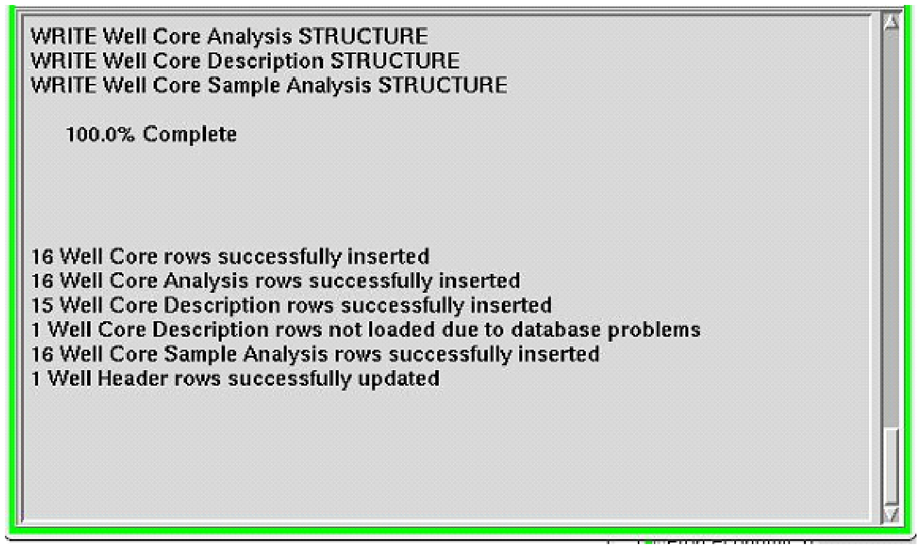
Also create this format:

Format Flag	Data Category	Data Item	Start Column	End Column
c	Well Core Sample Analysis	Analysis Obs No *, FK	15	16
c		Core Id *, FK	23	24
		Data Source *, FK	Constant Value = YOU	
c		Sample Analysis Obs No *, SEQ	15	16
c		Sample Number *, SEQ	23	24
c		Bulk Volume Oil Sat	78	80
c		Bulk Volume Oil Sat Ouom	Constant Value = %	
c		Critical Wtr Sat	103	104
c		Critical Wtr Sat Ouom	Constant Value = volpercent	
c		Gas Sat Bulk Vol	86	88
c		Gas Sat Bulk Vol Ouom	Constant Value = %	
c		Kmax	38	40
		Kmax Ouom	Constant Value = mD	
c		Oil Sat	53	56
		Oil Sat Ouom	Constant Value = %	
c		Porosity	45	48
		Porosity Ouom	Constant Value = %	
c		Prob Production	65	68
c		Top Depth	29	32
c		Water Sat	61	64
c		Water Sat Ouom	Constant Value = %	

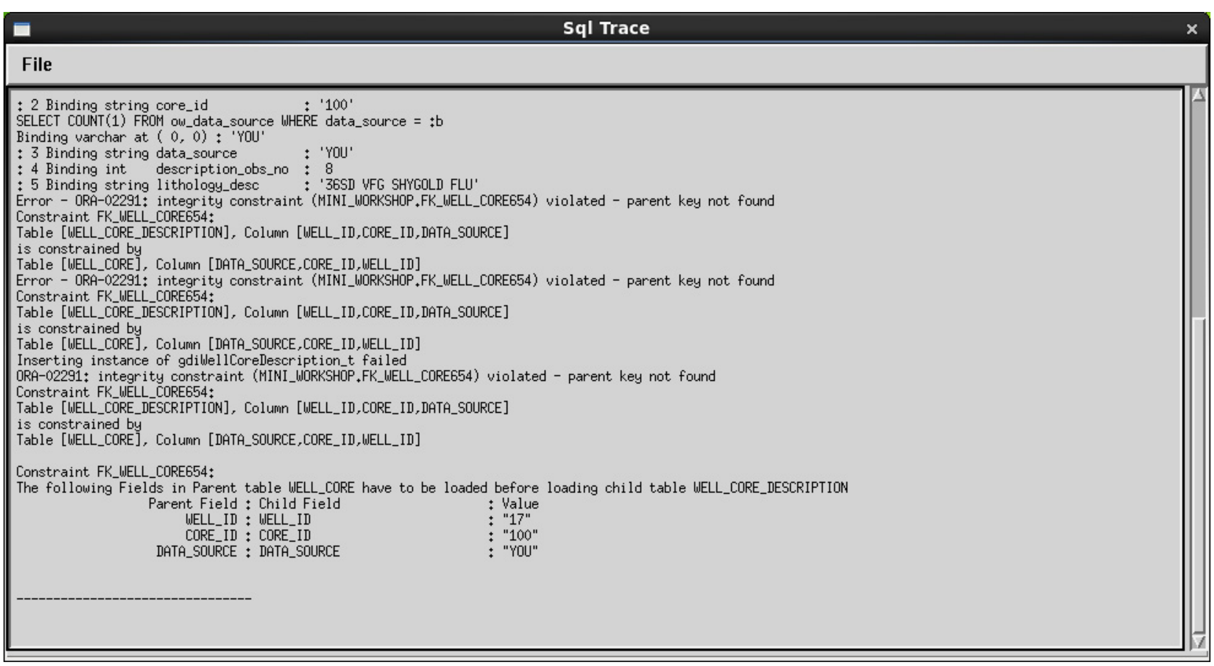
5. Once you have entered the format select **Format >Save** (needed).

6. Select **Format > Test** to test your format. Make sure to stop and close the Test window once the test is complete.

7. Load the core data using **File > Load**. Click **OK**. Watch the ASCII Loader window carefully as the data attempts to load. Notice that all of the data does not load correctly. Within your ASCII Loader window you will receive a message similar to the following (you may need to scroll up to see the message).



8. In the ASCII Loader window select **Reports > SQL Trace Report**. You should have a load error similar to the one below.



The error is related to Foreign Key constraints. Tables within the OpenWorks data model are linked through parent-child relationships.

In this exercise, you were given the following value for Well Core Description, Core Id.

Format Flag	Data Category	Data Item	Start Column	End Column
c	Well Core Description	Core Id *, FK	Constant Value = 100	

In reality, this value is incorrect.

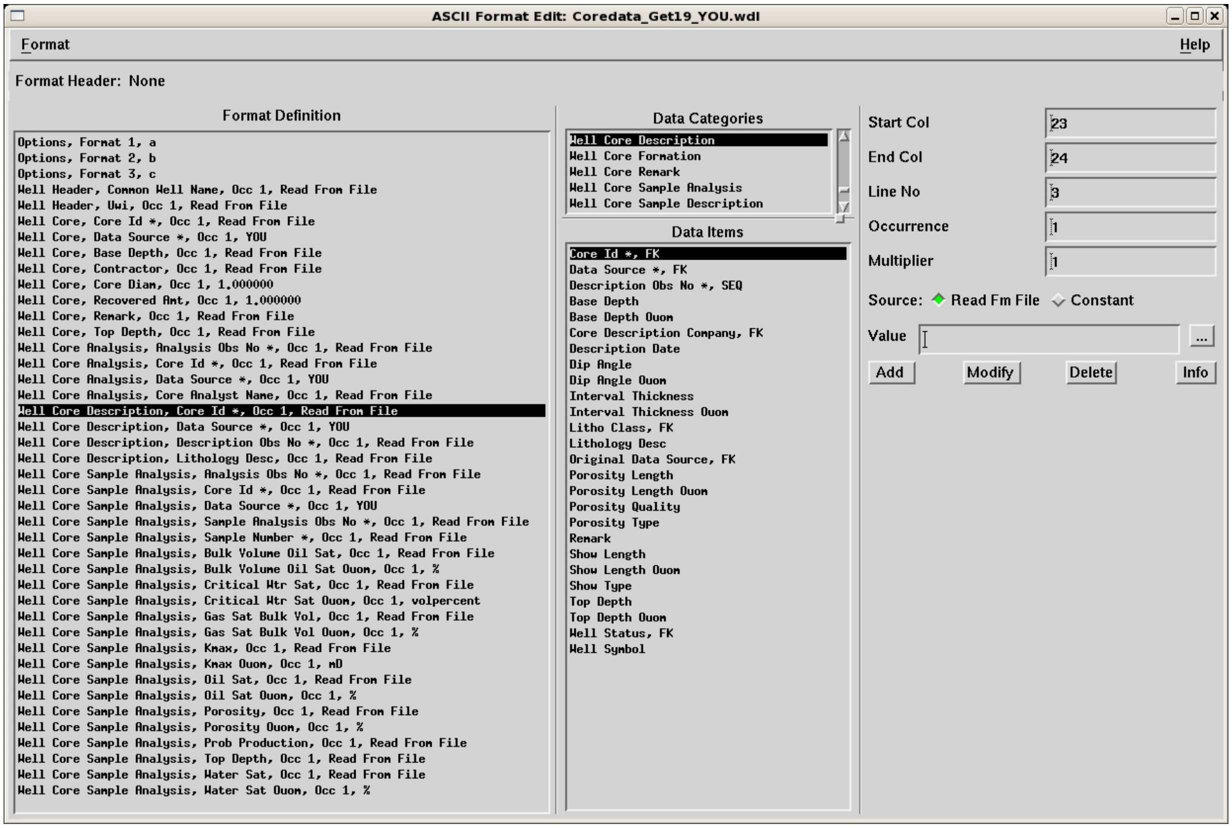
9. Observe your ASCII Format Edit window. Notice that **Core Id** was entered previously under the Well Core Data Category. Well Core Analysis is a child table of Well Core. When you entered a value different from the one below, you upset the relationship between these two tables. Change the value of **Well Core Description**, **Core Id** to match the value of **Well Core**, **Core Id**. Click **Modify** to change the format to the one shown below.

Format Flag	Data Category	Data Item	Start Column	End Column
c	Well Core Description	Core Id *, FK	23	24

10. Save the format by selecting **Format > Save** (needed).

11. Test your format.

    Your ASCII Format Edit window should appear similar to the one following.



12. Close the Format Edit window and return to the ASCII Loader window. Select **File > Load**. Click **OK** to load the current job.

To verify that the data has been loaded correctly, we will create a new Category in Well Data Manager in order to select the five production categories loaded. To create a new tab (category of related information) in the lower pane of Well Data Manager:

- From Well Data Manager, select **File > Select Categories**, or click the **Select Categories** toolbar button ( ) in the toolbar. The **Category Selector** dialog box displays.
- In the dialog, click the **Create Category** toolbar button ( ). A new row appears in the list box, and a new tab appears in the lower pane. The category and tab name of a newly created category is **New Category n**, where *n* is a number.
- Double-click the **Category Name** cell of the new row.
- Change the name of the category to reflect production data that describes your new category.
- Press the <**Tab**> key or click in another cell in the **Category Selector** table to select another cell. After you select another cell, the box in the Show column should still be selected in order for the tab to display in the lower pane.

  Click **Close**.
- Select the new tab that Production Data created.
- Click the **Customize Related Information** toolbar button ( ) located in the lower left lower pane. The Related Information Selector dialog box displays.
- In the left pane of the dialog, select the following names of the related tables where we loaded production data and we want available in the tab, then click **OK**.

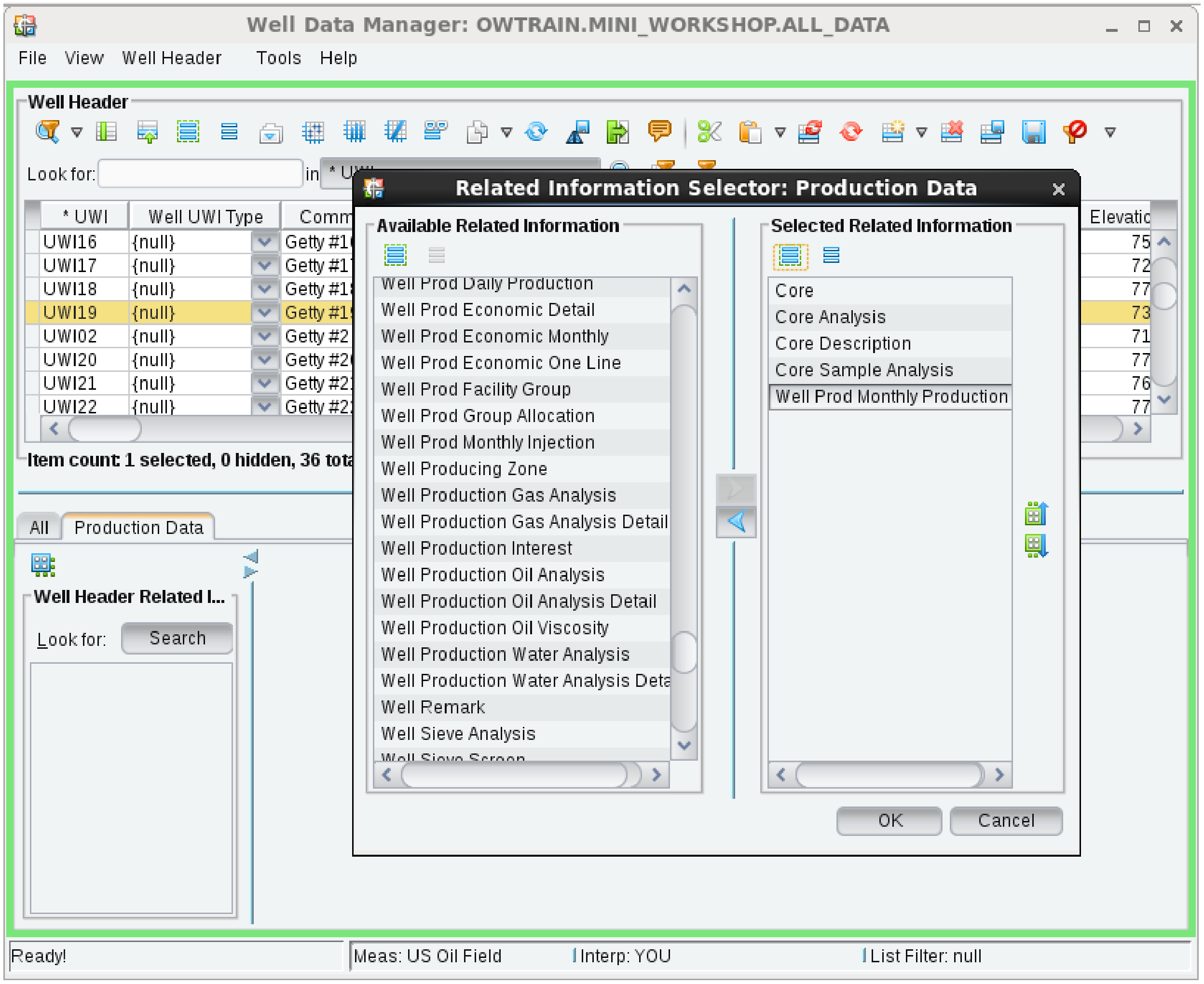
— Core

— Core Analysis

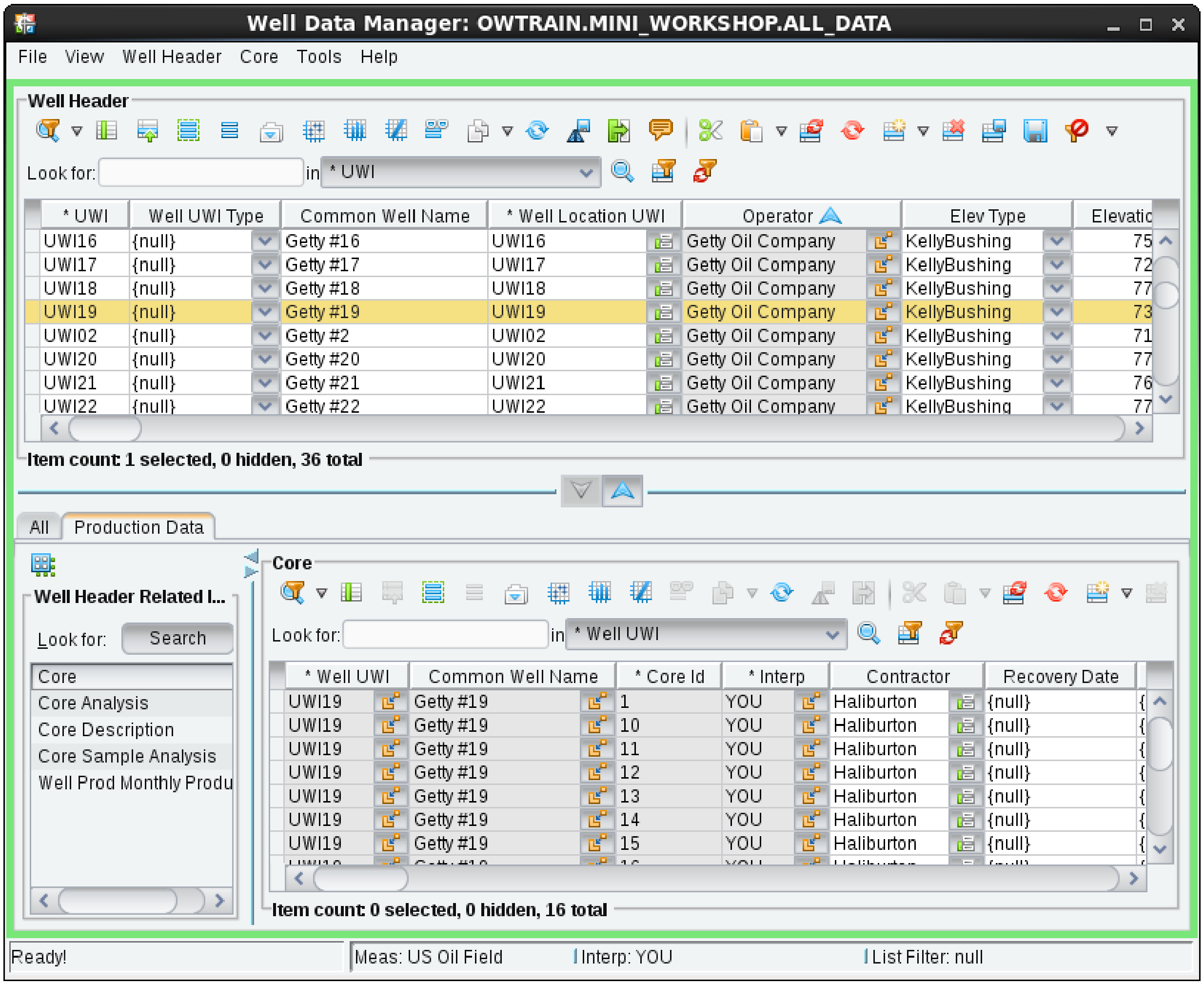
— Core Description

— Core Sample Analysis

— Well Prod Monthly Production (We'll be loading data for this category in the next exercise).



Optionally, select **Tools > Save Application Preferences as User Default** to save the tab.


Well Data Manager: OWTRAIN.MINI_WORKSHOP.ALL_DATA
File View Well Header Core Tools Help
Well Header
Look for:
in * UWI
* UWI
Well UWI Type
Common Well Name
* Well Location UWI
Operator
Elev Type
UWI16 {null} Getty #16 UWI16 Getty Oil Company KellyBushing 75
UWI17 {null} Getty #17 UWI17 Getty Oil Company KellyBushing 72
UWI18 {null} Getty #18 UWI18 Getty Oil Company KellyBushing 77
UWI19 {null} Getty #19 UWI19 Getty Oil Company KellyBushing 73
UWI02 {null} Getty #2 UWI02 Getty Oil Company KellyBushing 71
UWI20 {null} Getty #20 UWI20 Getty Oil Company KellyBushing 77
UWI21 {null} Getty #21 UWI21 Getty Oil Company KellyBushing 76
UWI22 {null} Getty #22 UWI22 Getty Oil Company KellyBushing 77
Item count: 1 selected, 0 hidden, 36 total
All
Production Data
Well Header Related I...
Look for:
Search
Core
Core Analysis
Core Description
Core Sample Analysis
Well Prod Monthly Produ
Core
Look for:
in * Well UWI
* Well UWI
Common Well Name
* Core Id
* Interp
Contractor
Recovery Date
UWI19 Getty #19 1 YOU Haliburton {null}
UWI19 Getty #19 10 YOU Haliburton {null}
UWI19 Getty #19 11 YOU Haliburton {null}
UWI19 Getty #19 12 YOU Haliburton {null}
UWI19 Getty #19 13 YOU Haliburton {null}
UWI19 Getty #19 14 YOU Haliburton {null}
UWI19 Getty #19 15 YOU Haliburton {null}
Item count: 0 selected, 0 hidden, 16 total
Ready!
Meas: US Oil Field
Interp: YOU
List Filter: null

Exercise 4-2: Loading Core Data using Data Import

In this exercise you load the same data file that you loaded in the previous exercise using the ASCII Loader tool. Now you will load the core data for well Getty #19 into your project using the Data Import tool.The file you will use was created in an EXCEL spreadsheet and saved as a space delimited file.

1. Make sure that MINI_WORKSHOP is still the project selected. If not, use **Project > Project Status** from the OpenWorks command menu to set the project.

2. Select the category **Well** from the **Import data type** list.

3. From the Data Import tool, select **Get19_Core.prn**. You may need to change the **Files of Type** to **All Files**.

4. Select ***Interactively define a new format*** and click **Continue.**

5. Create the following format.

File Sections
a
b
c

Data Category	Data Items	Starting with tag	Start Column	End Column
Well Header	*UWI	a	81	85
	Common Well Name	b	9	17
Core	Base Depth	c	29	32
	Core Id	c	23	24
	Core Diam	Constant Value = 1		
	Interp	Constant Value = YOU		
	Recovered AMT	Constant Value = 1		
	Remark	c	65	68
	Top Depth	c	29	32

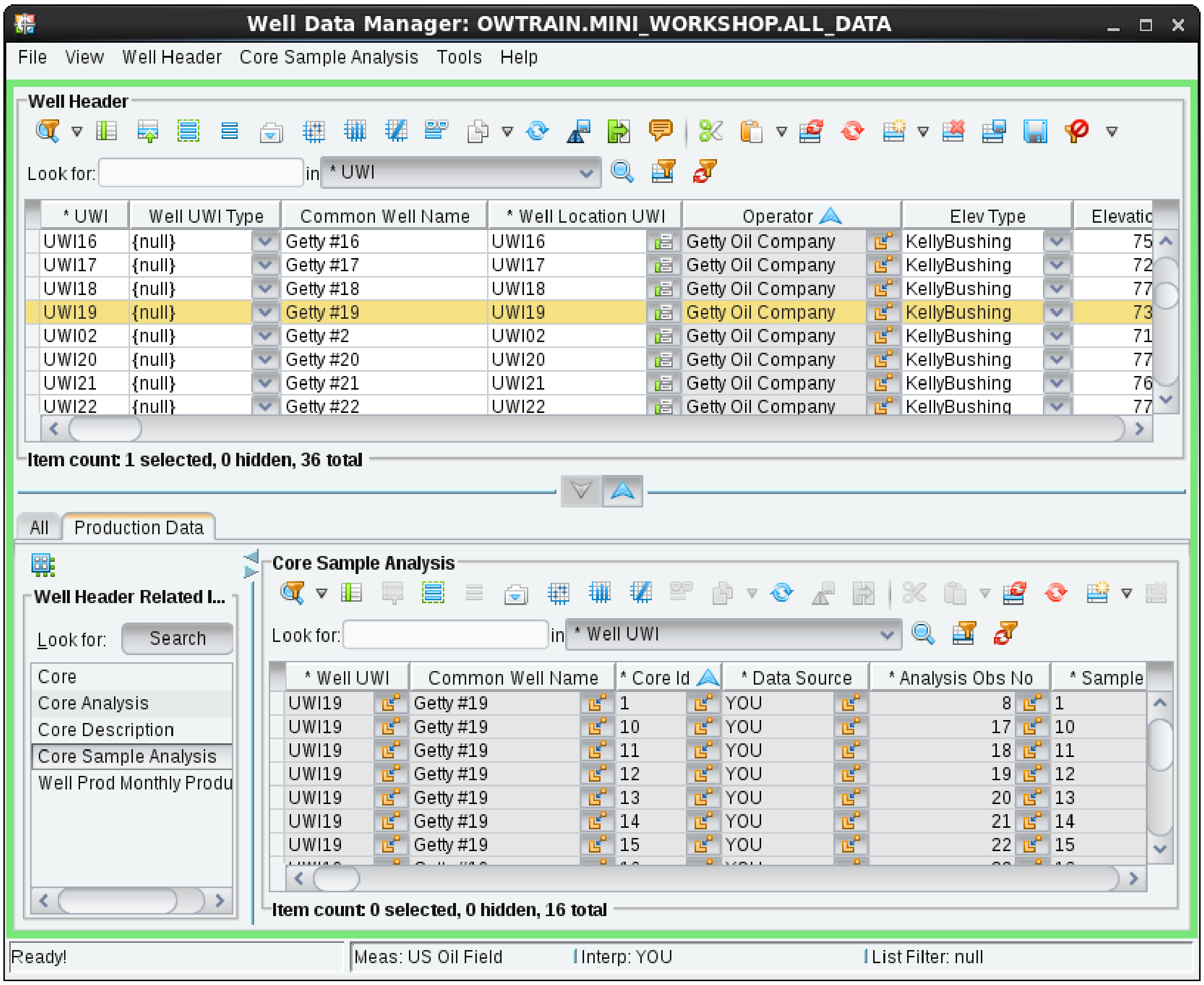
Data Category	Data Items	Starting with tag	Start Column	End Column
Core Description	Core Id	c	23	24
	Data Source	Constant Value = YOU		
	Description Obs No	c	15	16
	Lithology Desc	c	105	146
Core Analysis	Analysis Obs No	c	15	16
	Core Id	c	23	24
	Data Source	Constant Value = YOU		
Core Sample Analysis	Analysis Obs No	c	15	16
	Core Id	c	23	24
	Data Source	Constant Value = YOU		
	Sample Analysis Obs No	c	15	16
	Sample Number	c	23	24
	Bulk Volume Oil Sat	c	78	80
	Critical Wtr Sat	c	103	104
	Gas Sat Bulk Vol	c	86	88
	Kmax	c	38	40
	Oil Sat	c	53	56
	Porosity	c	45	48
	Prob Production	c	65	68
	Top Depth	c	29	32
	Water Sat	c	61	64

6. Once you have entered the format, click the **Save as**  icon. Name the file `YOU_Get19_Core.afm.xml`.

7. Proceed through the **Data Import** tabs as you have in previous exercises. The default values are correct. Scanning the file in the **Well Mapping** tab should return the well already exists, loaded in

the previous exercise with the ASCII Loader tool. Continue to the **Import Data** tab and click the **Run** icon.

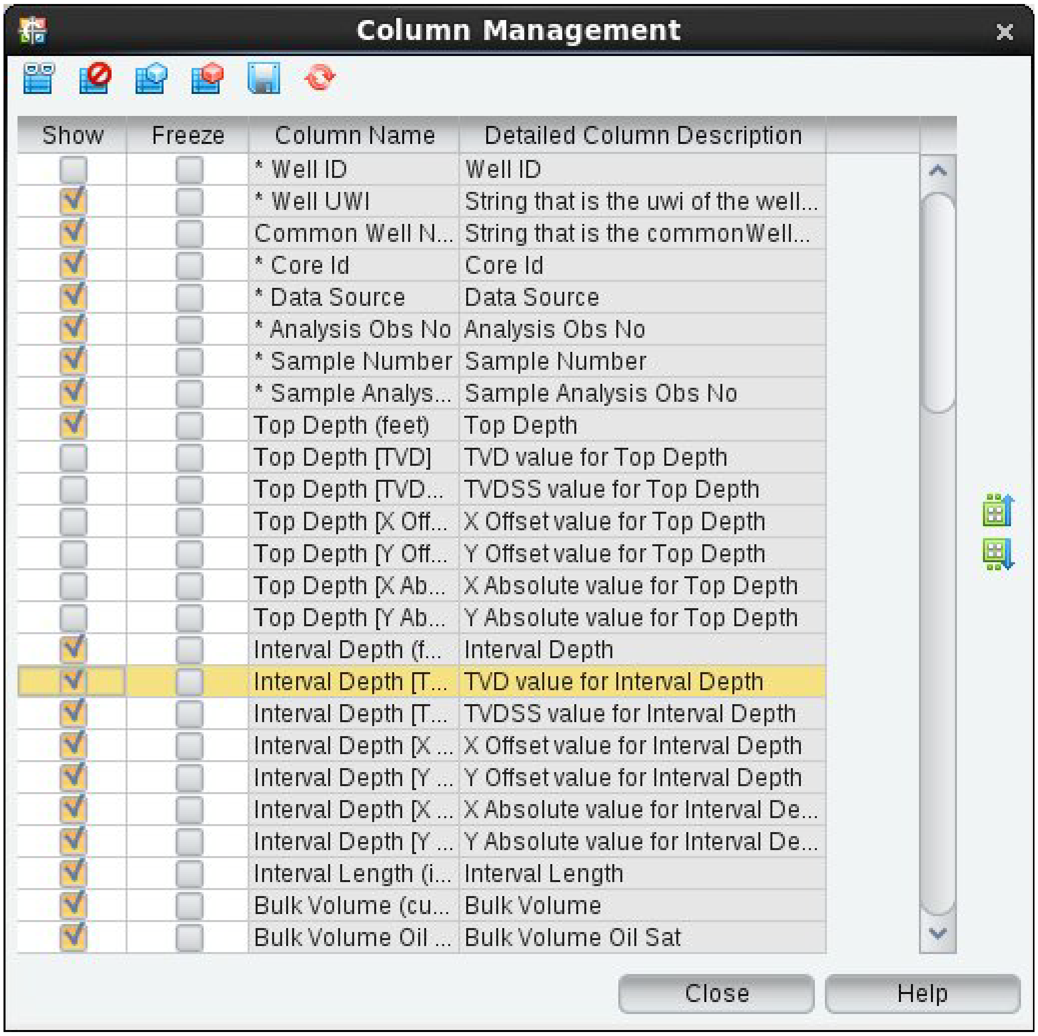
8. To verify that the data loaded correctly, open **Well Data Manager**. Select the **Getty #19** well. In the Well Header Related Information, select **Core Sample Analysis**.



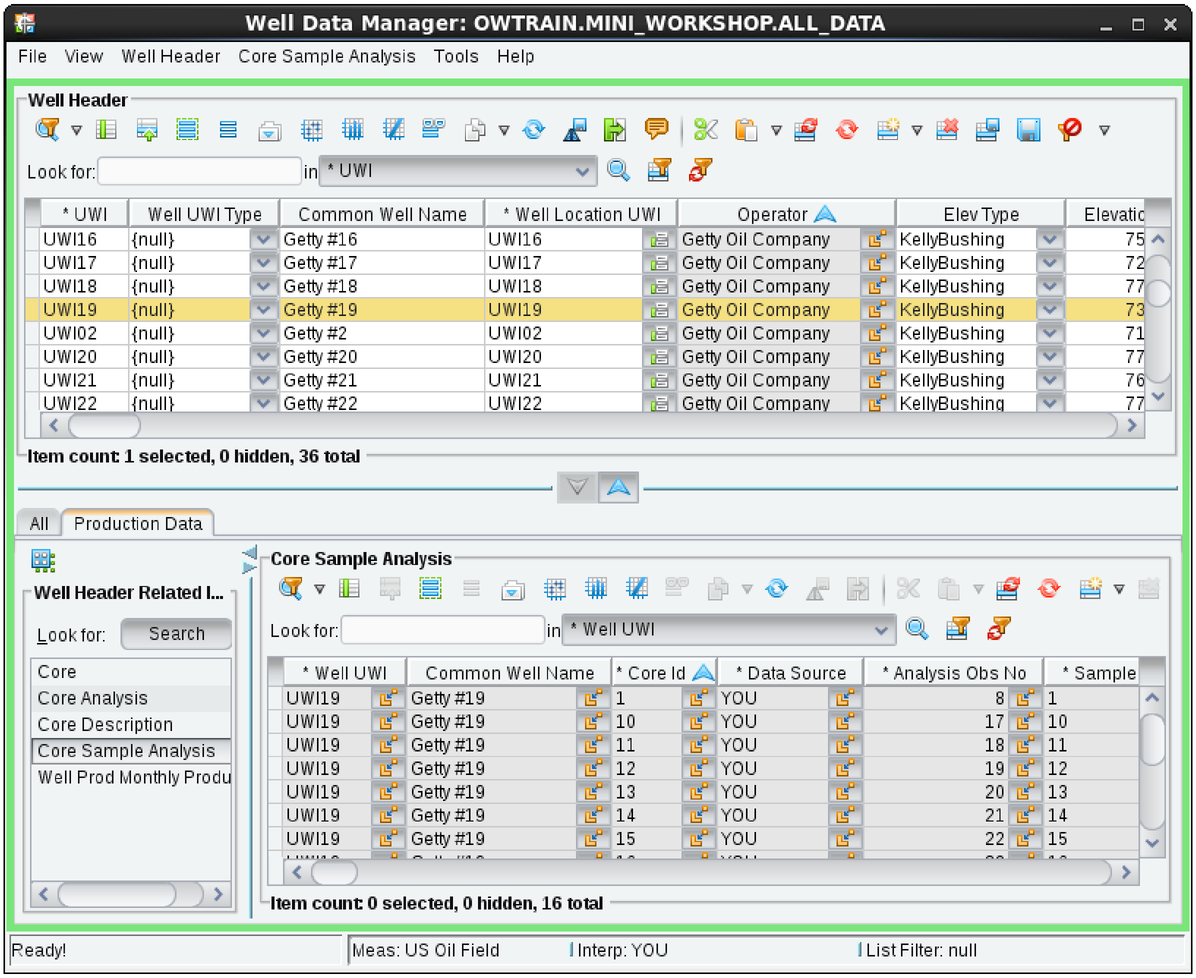
You can customize the columns displayed in any category displayed in the Well Data Manager.

9. From the command line in Well Data Manager, select **Core Sample Analysis > Select Columns**.

   The Column Management window displays. Select, deselect, or rearrange the configuration to the data columns you would like to see. To see a column, toggle on **Show**. Freezing a column keeps that particular column in a set position in the display. Use the **Move selected rows up** (or **down**) icons located along the window to rearrange the column order to fit your needs.



Result:



Note that you can also drag and drop columns in the display to rearrange the column order.

10. Click **Close** in the Column Management window.

11. Minimize Well Data Manager.

Exercise 4-3: Loading Production Data

In this exercise you load production data for the same well Getty #19, into your project using the ASCII Loader.

1. Choose **Format > New** from the ASCII Format Edit window.
2. Choose the file **Prod_data_Get19.prn** and name your format file `Proddata_Get19_YOU.wdl`.
3. Enter the following format data:

Format Flag	Data Category	Data Item	Start Column	End Column	Line Number	Occurrence
a	Options	Format 1	1	1	1	1
b		Format 2	1	1	2	1
		Format 3	1	1	3	1
a	Well Header	Common well name	74	81	1	1
a		UWI	90	95	1	1
	Well Prod Monthly Production	Data Source* FK	Constant value = YOU			
b		Pden Type*	9	12	2	1
c		Prod Dt*	11	16	3	1
b		Zone name *, FK	28	32	2	1
		Vo Gas Ouom	Constant value = Mscf (60F)			
c		Vo Gas Prod	35	38	3	1
c		Vo Liq Ouom	Constant value = stb (60F)			
c		Vo Oil Prod	23	27	3	1
c		Vo Wat Prod	48	51	3	1

To get a list of valid values for “Constant” data items such as *Vo Gas Ouom* and *Vo Liq Ouom*: After selecting the item, toggle **Constant** for **Source** and click next to the Value box. Compare the values with the data in Data Previewer to help you select the correct value.

4. Save and test your format.

5. Attempt to load your data by selecting **File > Load** in the ASCII Loader window. Watch your ASCII Loader window carefully. Has all of the data been loaded?

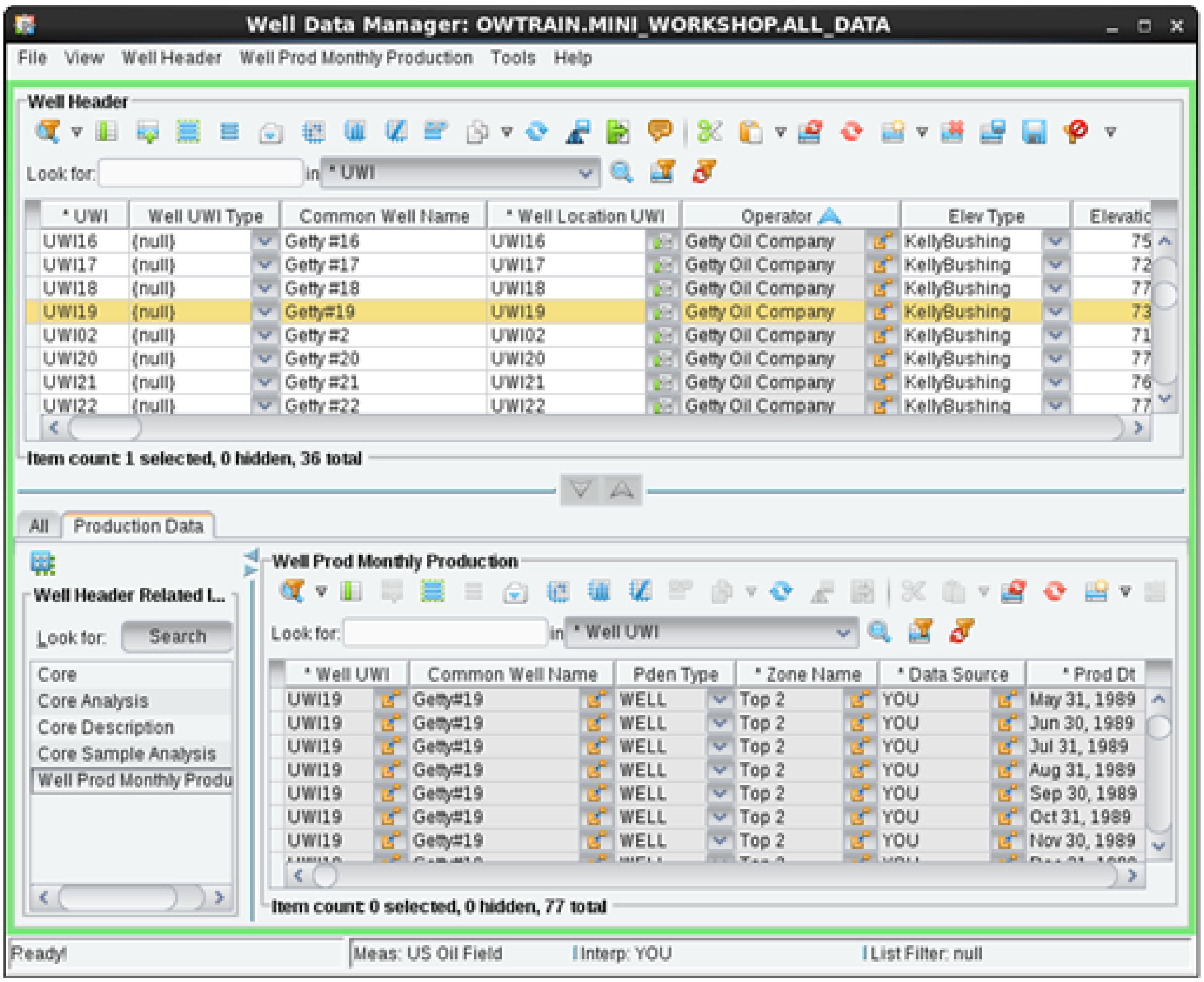
6. Maximize the Well Data Manager. Highlight **Production Monthly Production** from the Well Header Related Information list for **Getty #19**.

   Only the first two rows of the production data file have been inserted. Why did the other data not load? Go back to your data and format files to determine the problem.

7. We did not define “**c**” as the third format. **Format 3** must be defined in order for the ASCII Loader to recognize the data. Add this third format to your file, save the file, and load the data again.

8. View the loaded data using **Well Data Manager** and select the **Getty #19** well. In the Well Header Related Information, select **Production Monthly Production**.

   Well Data Manager with customized column selection:



9. Exit from the Well Data Manager, the Format and Data Previewer windows, and the ASCII Loader.