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**Landmark Graphics Corporation**

3000 N Sam Houston Pkwy E

Houston, TX 77032-3219

Phone:

+713-839-2000

+713-839-2290

Internet:

[www.landmark.solutions](http://www.landmark.solutions)

AND

**LMKR**

Corporate Headquarters,

207, Building 4,

Gold and Diamond Park,

Sheikh Zayed Road,

Dubai, UAE, P.O.Box 62163.

Phone: +971 4 372 7900

FAX: +971 4 358 6386

Internet: [www.lmkr.com](http://www.lmkr.com)

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# GeoGraphix® and Discovery™ on OpenWorks® 2019.2

LMKR is pleased to announce the release of the GeoGraphix® and Discovery™ on OpenWorks® 2019.2 software.

This release introduces GVERSE® Petrophysics, an integrated log analysis solution for comprehensive interpretation. It also includes many new features and performance improvements, which are highlighted in the New Features section of this document. This document also provides important information regarding the system requirements and valuable resources that will allow you to get the most out of the GeoGraphix 2019.2 release.

**Note:** New users or users upgrading from other versions of GeoGraphix need a valid LMKR license. The LMKR License Management Tool (LMT) must be installed to configure the license. Download the latest LMT from the LMKR Support Portal > [Downloads](#) page. See the “LMKR Licensing” section of the Installation Guide for Release 2019.2 for more information.

**Note:** If working in a network environment, in order for all computers to work together on shared projects, ALL computers (clients and servers) must be updated to the same version of the software. It is intentional that computers with different versions of GeoGraphix software cannot and should not be connected with each other.

**GeoGraphix 2019.2** is an integrated product suite that incorporates shared data management and geological, petrophysical, and geophysical interpretation software. It utilizes a Sybase (SAP SQL Anywhere) database in GeoGraphix Discovery mode, or accesses the OpenWorks®/SeisWorks® (Oracle) database in Discovery on OpenWorks mode.

This release consists of the following:

## **GVERSE® Petrophysics**

- GVERSE® Petrophysics is a 64bit petrophysical application designed to assist geoscientists and petrophysicists in analyzing and interpreting well log data, and characterization of the reservoir using simple to advanced log interpretation workflows in a large multi-well multi-user environment.

## **GVERSE® Geomodeling**

- An integrated environment for modeling that incorporates existing mapping and cross section features of smartSECTION® with a newly built 3D View. It takes your smartSECTION interpretations to a whole new level with 3D modeling, while also enabling you to fully utilize the existing smartSECTION features.

## **GVERSE® Geophysics**

- An intuitive and easy-to-use seismic interpretation system with powerful 3D visualization and interpretation capabilities. GVERSE Geophysics enables geoscientists to execute end-to-end workflows for basic interpretation and more advanced geophysical tasks.

## **GVERSE® Field Planner**

- This application intelligently populates wells over an entire field based on defined hazards, lease areas, and constraints. It uses an advanced optimization algorithm to lay out hundreds of wells in minutes. It works with you by taking into account surface hazards, existing wells in the area, and lease boundaries to maximize lateral length in the zone.

## **Pro 3D**

- Enables interpreters to get the most from their data by quickly creating powerful and informative base maps, fence diagrams and seismic backdrops. Using the Pro 3D window you can show IsoMap® structural surfaces, cultural layers, wells, seismic data, cross sections and fence diagrams in the 3D Scene.

## **Field Planning**

- The advanced field planning tool is designed to reduce the time required for efficient field development. It provides the ability to create, save, analyze and manage multiple field plan scenarios before committing them to the database. Designed for horizontal well plans, the Field Planner includes determination of the optimum location and orientation of wells. These proposed wells can all be visualized by creating a layer for display in GeoAtlas™.

**Data Manager™ includes ProjectExplorer™, Coordinate System Manager™, WellBase™, SeisBase™, QueryBuilder™, LandNet™, LeaseMap™, and ZoneManager™.**

- The GeoGraphix and Discovery on OpenWorks project and data management engine

## **GeoAtlas™**

- The map display and montage environment working on ESRI MapObjects

## **IsoMap®**

- The gridding contouring engine, featuring 10 powerful gridding algorithms

## **XSection™**

- A fully integrated geological interpretation tool and cross section display tool

## **smartSECTION®**

- Map view for viewing GeoAtlas layers and defining cross sections for picking tops and faults for structural and sequence stratigraphic analysis

## **Discovery™ 3D**

- The 3D scene viewer that uses the most recent video and X-Box tools to display seismic and geologic data in three dimensions

## **pStaX™**

- The post stack processing module for enhancing seismic character and detecting anomalies related to geologic features

## **SCAN™**

- The patented semblance calculation for enhanced fault interpretation

## **LogM Advanced Synthetics™**

- The geophysical application used for interactively editing well logs and evaluating synthetic trace character response

## **LogM Modeling™**

- The 2D forward seismic waveform, ray tracing and structural modeling tool to predict seismic response away from the well

## **STRUCT™ Model Entry**

- The comprehensive forward seismic structural modeling tool that is used to determine the seismic response of complex geologic structures in areas where there is little or no well control

## **Discovery™ on OpenWorks®**

- Enables the GeoGraphix software to access OpenWorks and SeisWorks projects, and uses the OpenWorks and SeisWorks data within the GeoGraphix framework

## **Xchange Tools**

### **WellXchangePlus™**

- Transfer well information to or from two GeoGraphix projects, or between GeoGraphix and OpenWorks

### **SeisXchange™**

- Transfer seismic data between Geophysics and SeisWorks

### **GridXchange**

- Transfer of map point sets and grids from GeoGraphix to OpenWorks

**Note:** SeisBase, LandNet, LeaseMap, LogMModelBuilder (LogM Modeling), LogM Well Editor (LogM Advanced Synthetics), Field Planner, and Advanced 3D Visualization (Pro 3D) are not available in the current version of Discovery on OpenWorks.

## New Features at a Glance

The new features available in the GeoGraphix 2019.2 release are listed below.

- 4K Monitor Support is available. Click [here](#) for details.
- Microsoft Windows Server 2016 Standard x64 support is added. Click [here](#) for details.

### **GVERSE Petrophysics**

- 64-bit environment to work with larger projects. Click [here](#) for details.
- Color code the User Defined Equations syntax. Click [here](#) for details.
- Free-floating UDE Editor is supported. Click [here](#) for details.
- Assign custom colors to the Dip and Azimuth tadpoles based on the dip-type. Click [here](#) for details.
- Digitize chart function curves with the Isoline function utility. Click [here](#) for details.
- Use filters to assign or delete selected curve sets. Click [here](#) for details.
- Identify the completion intervals along the wellbore. Click [here](#) for details.

### **GVERSE Geomodeling**

- Create Block Diagrams to plan inside the drilling section units. Click [here](#) for details.
- Display distances between the wells in a Block Diagram. Click [here](#) for details.
- Display boundary distances between corner wells and cross section margins. Click [here](#) for details.
- Use the formations filter to display boundary distances for specific formations. Click [here](#) for details.
- Distinguish the overlapping wellbores and correlate the wells with other objects. Click [here](#) for details.
- Post the well footer at different locations and justify its position using the Digital Headers. Click [here](#) for details.
- Determine the structural trend in 3D View. Click [here](#) for details.
- Identify the wells in a Cross Section with multiple annotation options. Click [here](#) for details.
- Enhance performance through restricting modeling parameters. Click [here](#) for details.
- Add Surface/Fault points on the fence diagram as correlation lines. Click [here](#) for details.
- Smooth out the polygon edges in the Cross Section View. Click [here](#) for details.
- Activate and display a single surface in the Map View. Click [here](#) for details.

### **GVERSE Geophysics**

- Pick structures in seismic and attribute volumes and save them as geobodies. Click [here](#) for details.
- View and edit horizons based on pick attributes. Click [here](#) for details.
- Adjust synthetic traces interactively on seismic sections directly in the 3D viewer. Auto-calculate optimum time and phase shifts to maximize correlation between synthetic and seismic. Click [here](#) for details.
- Use enhanced velocity modeling algorithms to build more accurate and robust velocity models. Click [here](#) for details.
- Work efficiently with wells within the 3D module. Click [here](#) for details.
- Multiple new features to improve seismic visualization. Click [here](#) for details.
- Many usability improvements allowing you to efficiently run workflows. Click [here](#) for details.

## **GVVERSE Field Planner**

- Steam Assisted Gravity Drainage (SAGD) functionality is available in Field Planner. Click [here](#) for details.
- Multiple nodes, well sticks and well pads can be selected and moved. Click [here](#) for details.
- Multiple pads and group of wells can be selected and duplicated. Click [here](#) for details.

## **GeoAtlas**

- ESRI ArcGIS 10.6.x support is added. Click [here](#) for details.

## **ProjectExplorer**

- Project and Database security is implemented in GeoGraphix projects to enable client-specific roles for data management tasks. Click [here](#) for details.
- View the history of layers available in a GeoGraphix project, and related information. Click [here](#) for details.
- View the history of imports by different users in a GeoGraphix project. Click [here](#) for detail.

## **QueryBuilder**

- Create filters reflecting the latest date for any change in the selected data type for WellBase table. Click [here](#) for details.
- Total number of records are displayed for queries resulting in more than 5000 results. Click [here](#) for detail.

## **WellBase**

- Better-managed access to project data. Click [here](#) for details.
- Character length of the Remarks field in the DST table is extended to 1024 characters. Click [here](#) for details.

## **Utilities**

- ESRI ArcGIS Auto-Configuration utility. Click [here](#) for details.

# System Requirements

In the following sections, you will find hardware and software system requirements for this release of GeoGraphix and Discovery on OpenWorks:

- GeoGraphix Workstation
- GeoGraphix Project Server

System requirements can vary considerably, depending on your computing environment and software objectives. Please contact your Sales Representative or Customer Support if you have questions or need more information about system requirements.

## **Important Notes:**

- New users or users upgrading from other versions of GeoGraphix also need valid LMKR licenses. Please contact [COS@lmkr.com](mailto:COS@lmkr.com) to request a license. For information on license requirements for GVERSE applications, refer to their respective release notes and installation documents on the LMKR Support Portal > Knowledge Center > [Release Notes and Installation Guides](#) page. The LMKR License Management Tool (LMT) must be installed to configure the license. Download the latest LMT from the LMKR Customer Support Portal > [Downloads](#) page. See the “LMKR Licensing” section of the Installation Guide for Release 2019.2 for more information.
- Discovery on OpenWorks is compatible with OpenWorks for Windows 5000.10.6.03 and SeisWorks 5000.10.
- Refer to the LMKR Customer Support > Knowledge Center > [System Requirements](#) page for up-to-date information on system requirements for all GeoGraphix and GVERSE applications.

## Workstation

### System Requirements

We recommend using the latest Microsoft service packs and security patches. The following table lists the supported operating systems and the hardware requirements.

Supported Operating System	Memory	CPU
Windows® 7 Professional x64	8 GB RAM Minimum	Core i5 Minimum
Windows® 7 Enterprise x64	16+ GB RAM recommended	Core i7 Quad-core and
Windows® 7 Ultimate x64	<b>Note:</b> 32 GB RAM recommended	above with latest
Windows® 10 Professional x64	for GVERSE Geophysics.	generation recommended
Windows® 10 Enterprise x64	SSD drives recommended	

**Note 1:** GVERSE Geophysics and GVERSE Geomodeling specifically require Windows platform update package KB2670838 installed on the machine, in case the operating system is Windows 7.

## Graphics Requirements

Applications Support Level	Graphic Card Requirements
All GeoGraphix Applications including Discovery 3D, advanced 3D visualization (Pro 3D), and GVERSE Geomodeling	2 GB VRAM Minimum 4 GB VRAM Recommended DirectX 11 capable hardware ( <b>see Note 2 below</b> )
GVERSE Geophysics	<p><b>Minimum</b></p> <ul style="list-style-type: none"> <li>Any DirectX 11.1 capable card comparable with Nvidia® GeForce GTX 430 with 1GB VRAM. DirectX is not shipped with GeoGraphix 2019.2. You must download and install it separately.</li> <li>1366 x 768 screen resolution</li> </ul> <p><b>Recommended</b></p> <ul style="list-style-type: none"> <li>Any DirectX 11.1 capable card comparable with Nvidia® GeForce GTX 1060 with 6GB VRAM. DirectX is not shipped with GeoGraphix 2019.2. You must download and install it separately.</li> <li>1920 x 1080 screen resolution</li> </ul>

**Note 1:** Microsoft DirectX End-User Runtime (June 2010) is required to run Discovery 3D, advanced 3D visualization (Pro 3D), GVERSE Geomodeling, and GVERSE Geophysics.

**Note 2:** To run Discovery 3D, advanced 3D visualization (Pro 3D), and GVERSE Geomodeling, it is recommended that an NVIDIA DirectX 11 compatible card be used. We recommend using the latest video drivers and MS updates for your system.

### Additional Requirements and Recommendations

- DVD - ROM required for media installation. You do not need this if you have downloaded the installation from the **LMKR Support Portal > Downloads** page.
- DCOM/Firewalls configured to allow remote access. Only necessary if sharing projects on the network. For DCOM configuration recommendations, refer to the **LMKR Support Portal > Knowledge Center > White Papers** page.
- Microsoft .NET Framework 4.7.2 runtime is required.

## Software Prerequisites

This release has several prerequisites that are required to run the software, as well as prerequisites that are used to enhance the software. The prerequisites can be downloaded from the LMKR Support Portal, or from the respective link(s) provided.

### *Microsoft .NET Framework 3.5*

This is specifically required if you are using smartSECTION on a Microsoft Windows® 10 operating system. The Microsoft .NET 3.5 can be downloaded from Microsoft's website and then installed. It is also available in the 3rd Party installers shipped with Discovery 2019.2.

### *MATLAB Runtime R2018a (9.4)*

GVERSE Field Planner requires MATLAB Runtime R2018a (9.4).

The MATLAB Runtime R2018a (9.4) software can be downloaded from MATLAB's website and then installed. It is also available in the Downloads section of the LMKR Support Portal.

### *Microsoft .NET Framework 4.7.2*

Discovery 2019.2 must have Microsoft's .NET 4.7.2 installed. The Microsoft .NET 4.7.2 can be downloaded from Microsoft's website, and then installed. It is also available in the 3rd Party installer shipped with Discovery 2019.2.

### *ESRI ArcGIS Runtime Engine*

The functionality within GeoAtlas related to geo-referenced images and CAD files requires the ESRI ArcGIS 10 Engine Runtime with ESRI ArcGIS 10.2.x or 10.3.x or 10.4.x or 10.5.x or 10.6.x. ESRI ArcGIS license must be configured by running **ArcGIS Administrator** with administrative rights, and selecting the **ArcGIS Engine Runtime (Single Use)** option in the wizard. If the ArcGIS Engine is not installed, a message box will appear but the setup will continue.

The **ArcGISConfigurationTool.exe** utility is provided in **Utilities** shipped with GeoGraphix. IT Support teams can program and run this utility to remotely configure GeoGraphix on network machine(s) that have ArcGIS Runtime installed. For details, refer to the **Utilities** documentation.

### *ESRI ArcGIS Engine 10.6.1 Patch Installation*

If ESRI ArcGIS Engine 10.6.1 is installed on the machine, you must also install the ESRI ArcGIS Engine patch (ArcGIS-1061-E-BDP-Patch.msp) to ensure smooth execution of various Field Planner and GeoAtlas workflows. The patch can be downloaded from the ESRI website [here](#).

### *Microsoft DirectX 11 End-User Runtimes*

Discovery 3D, Pro3D, smartSECTION, GVERSE Geophysics and GVERSE Geomodeling require Microsoft's DirectX 11 June 2010 End-User Runtimes to work properly. The Discovery 3D application works only on the Windows 7 (64-bit) or higher operating system. Discovery 3D is not installed unless the computer has Windows 7 (64-bit) or higher. Further Discovery 3D requires a DirectX 11 compatible display card. DirectX 11 June 2010 End-User Runtimes can be installed by downloading the Discovery Third Party Installer.

### *Platform Update for Windows 7*

GVERSE Geomodeling and GVERSE Geophysics specifically require Windows platform update package KB2670838 installed on the machine, in case the operating system is Windows 7.

### *Microsoft Internet Explorer 10 or 11*

Microsoft Internet Explorer 10 or 11 must be installed in order to launch GVERSE NOW.

## Optional Software Requirements

The following table lists the software requirements for using different tools available in GeoGraphix.

Tools	Software Requirements
Spreadsheet import utility in WellBase, SeisBase, and LeaseMap	Excel 2007, 2010, 2013 or 2016 (32 or 64 bit) In case the macros are not working in Excel, ensure the <b>gxdb.xla</b> file is present in the relevant Microsoft Office Library installation folder.
Selected Help files	Adobe Reader
For Discovery on OpenWorks, GridXchange, and SeisXchange	OpenWorks for Windows 5000.10.6.03 – Basic or Full (recommended) Install available on Landmark’s LSM. (See Notes on the next page), and SeisWorks 5000.10 (for seismic workflows)
ESRI geo-referenced images and ESRI CAD file import in GeoAtlas	ESRI ArcGIS Runtime Engine 10.2.x or 10.3.x or 10.4.x or 10.5.x or 10.6.x (included in the 3rd Party Installer).
For LOGarc™ Version 4.1.0.3 access in smartSECTION	To use the LOGarc™ feature, the LOGarc™ Version 4.1.0.3 software must be downloaded from IHS LogTech Canada, LTD and a valid account must be in place. You must have administrator rights to the computer on which you will load the software.

**Note for Discovery on OpenWorks:** The OpenWorks Full installation requires Hummingbird Exceed. The Oracle client installation in use with the OpenWorks Full installation requires that the “Administrator” option be selected. The “Administrator” option type includes the SQL Plus and the Oracle Database Utilities components, which are needed to run Discovery on OpenWorks, as part of the total OpenWorks package.

**Note:** Hummingbird Exceed is not required for the OpenWorks Basic installation. If the OpenWorks Basic installation is used, the Oracle client installation can use the “Administrator” option, which will include all of the needed components. Or, the Oracle client installation for the OpenWorks Basic installation can use the “Custom” installation type. However, the following components must be installed with the “Custom” installation type:

- Oracle Database Utilities 12.1.0.2
- SQL \*Plus 12.1.0.2
- Oracle JDBC/THIN Interfaces 12.1.0.2
- Oracle Net 12.1.0.2

You may experience the following error related to Oracle installation:

The SQLLoader.exe error may generate when working with Filters in GeoGraphix due to a missing Oracle DLL file. This is a known issue of Oracle 12.1.0.2 where oranfsodm12.dll is not shipped with the installer.

**Workaround:** After Oracle installation, create a copy of the oraodm12.dll file, rename it as oranfsodm12.dll, and then place the renamed file in the BIN folder of both 32-bit and 64-bit Oracle installations.

## GeoGraphix Project Server

### System Requirements

We recommend using the latest Microsoft service packs and security patches. The following table lists the operating systems which are supported.

Supported Operating System	Memory	CPU
Windows® Server 2008 R2 Standard x64	32 GB minimum	Intel Xeon Processor or equivalent
Windows® Server 2008 R2 Enterprise x64	64+ GB recommended	Quad 2.4GHz 64-bit or better
Windows® Server 2012 R2 Standard x64	SSD drives recommended	
Windows® Server 2016 Standard x64		

### Additional Requirements and Recommendations

- DVD-ROM is required for media installation.
- DCOM/Firewall must be configured to allow remote access. For DCOM configuration recommendations, refer to the [LMKR Support Portal > Knowledge Center > White Papers](#) page.

Server performance is subject to a large number of variables. It is impossible to give specific recommendations here, but these are some guiding principles to use. In general, multi-user performance of a GeoGraphix project server is best when the server is dedicated to GeoGraphix and not shared with other applications, especially database applications or intensive file-system applications. In addition, consideration should be made for the number of GeoGraphix users and the size and number of concurrently accessed projects. At some point, having multiple project servers becomes a better solution than having all users on one server. Generally, somewhere between 10 and 20 users is when a second server might be suggested.

### Networking

Networking performance depends on the number of users trying to access a server simultaneously, as well as the bandwidth requirements for those users. Recommendations for server bandwidth typically specify server connectivity at a higher bandwidth than an individual user. For instance, users running at 100 Mbit should be accessing a server running on a 1-Gbit backbone. If users are at 1 Gbit, consider running multiple 1-Gbit connections or a single higher-bandwidth connection on the server.

## Database Cache

A large database cache is an important factor to consider when dealing with multiple users accessing large databases. The database engine is capable of addressing a practically unlimited amount of cache memory. The best way to size the memory is to estimate the memory requirements for other running applications and allow the database cache to dynamically allocate any remaining free memory. The engine will only allocate what it needs when using dynamic allocation up to the maximum specified.

It is highly recommended that you let the database engine use as much cache memory as it requires on the host server. Increasing database cache memory is the quickest and most effective way to improve database-related performance on large network projects.

On a workstation, it might be appropriate to reserve 1 to 2 GB for the OS and file system cache and 2 to 4 GB for other running applications. On a dedicated project server, not much memory needs to be reserved for other applications. The ideal maximum varies by the project size, the number of users, and other load considerations. But as a general rule, the higher you can set the maximum, the better.

## Storage

A great deal of GeoGraphix's access patterns on a server deal with file I/O. Database access, raster images, and seismic data are examples of files that benefit substantially from a fast disk sub-system. Server environments also place a high importance on data integrity and reliability. At a minimum, consider using a RAID 5 (stripe-set with parity) array. As the size of disks increase, you may also want to consider a hot swap drive and/or RAID 6 (striped with dual parity). Using a controller card with its own cache can also help improve performance.

## Network Attached Storage (NAS), Storage Area Networks (SAN), and Other Non-Windows Storage Solutions

There are two typical methods used for accessing external storage devices from a project server: iSCSI and CIFS.

- iSCSI allocates a block of storage on the external device and makes it appear to be a physical disk on the project server. This has the advantage of a 100% compliant file system. However, since the external device sees the allocation as one big file, it can make backing up and restoring of individual files using the external device's capabilities more difficult. Standard backup and restore procedures from the server will still work.
- Using CIFS for external storage devices depends greatly on the vendor's implementation of the CIFS protocol used by the Windows platform. In general, a 100% compliant implementation of CIFS for a performant system is required. In particular, vendor's implementation of the "File Change/Notify" functionality has been problematic. Devices based on Windows Storage Server should be 100% compatible since it shares its components with Windows. Implementations based on UNIX/Linux are where problems occur due to the fact that the kernel level support is not present. Due to these uncertainties with CIFS implementations LMKR does not technically support CIFS.

## Compatibility with OpenWorks Software

The Discovery™ on OpenWorks® (DOW) software directly links a GeoGraphix application to the data in an OpenWorks® project, and provides a shared project environment for interpretation applications. Landmark Software has delivered the OpenWorks and DOW software for Release 5000 and will continue to provide updates and enhancements to these products. When planning your uptake of Release 5000 and verifying your workflow, you should consider version compatibility between the OpenWorks software and the Discovery on OpenWorks software.

In the compatibility table below, the table indicates the level of compatibility of previous releases and of upcoming scheduled and planned releases. This table will be updated as new releases are planned. The objective is to provide closely coupled compatible versions of the software to allow you to more easily take up current releases.

LMKR performs full release testing for those combinations indicated as Release, R, in the table, but may not exercise full release testing on other version combinations. For these iterative releases, LMKR performs compatibility testing between the OpenWorks and DOW software (indicated as Compatibility, C, in the table). See the table below for the level of testing for each version combination. Although LMKR does not anticipate any integration issue, in these cases it is recommended that customers also verify compatibility in their own environment.

LMKR supports the versions listed as Release in the table. However, while LMKR has completed compatibility testing, LMKR/GeoGraphix Support may not be able to fully support the versions listed as Compatibility in the table. When customers request support for a Compatibility environment, LMKR/GeoGraphix Support works on a best effort basis to troubleshoot any issues, and if an issue needs additional attention, LMKR/GeoGraphix Support reports such issues to LMKR Research & Development. The LMKR/GeoGraphix Support Team cannot guarantee any resolution service levels associated with issues from a compatibility environment.

Combinations which have not been tested, either in the full release or in a compatibility environment, are indicated by U (untested). P indicates the indicated versions are probably incompatible, as the OpenWorks version has a newer development kit (devkit) than that of the indicated DOW version. Blank cells in the table indicate that OpenWorks and GeoGraphix are incompatible and will not operate together.

For the most current version of this information and an overview of suggested compatibility test paths, please refer to the LMKR Technical Support Solution Document KBA-65218-F9D7D5.

# Compatibility Matrix

## Discovery on OpenWorks

OpenWorks Version	OW License 5000	DOW License 5000.02										
	GeoGraphix Version	2019.2	2019.1	2017.3	2017.2	2017.1	2016.1	2015.1	2015.0	2014.0	2013.0	2012.0.0
	OW 5000.10.6.03	R	R	R	R	R	C	U	U			
	OW 5000.10.3.02	C	C	C	R	R	C	U	U			
	OW 5000.10.1.05						R	R	R			
	OW 5000.8.3.01						R		C	R		
	OW 5000.8.1.1										R	
	OW 5000.8.0.0											R
	OW 5000.0.3.5											C

### Legend

**R** = Release level full testing

**C** = Compatibility level basic testing

**U** = Untested

**P** = Probably incompatible since OW and GeoGraphix are running different OW devkits.

A blank cell indicates that OW and GeoGraphix are incompatible

## New Features

This section contains a brief description of the exciting new features included in the 2019.2 release.

### *4K Monitor Support*

GeoGraphix & GVERSE applications support 4K monitors on Windows 10 with latest operating system updates installed.

### *Microsoft Windows Server 2016 Standard x64 Support*

Support for Microsoft Windows Server 2016 Standard x64 is available.

## GVERSE Petrophysics



GVERSE® Petrophysics is a 64bit petrophysical application designed to assist geoscientists and petrophysicists in analyzing and interpreting well log data and characterization of the reservoir using simple to advanced log interpretation workflows in a large multi-well multi-user environment.

GVERSE Petrophysics supports the import of digital data from numerous sources and provides you with integrated data views and analysis. Using this application you can view, edit, and analyze well log data in three different views:

- Log View
- Crossplot View
- Report View

GVERSE Petrophysics enables you to quickly analyze well log data using industry standard petrophysical algorithms. In addition, the Petrophysics Development Kit allows you to write user-defined interpretive models in C, C++, and Visual Basic programming languages for application in GVERSE Petrophysics.

GVERSE Petrophysics works on the Windows platform and is integrated with the GeoGraphix Discovery Geology applications, and GVERSE Geophysics. In GVERSE Petrophysics, you work with the active GeoGraphix project (selected in ProjectExplorer), into which you import curve data and well files, and access well data directly from the database. You can use log templates created in GVERSE Petrophysics to display wells in GVERSE Geomodeling and XSection, create cross sections from wells displayed in GVERSE Petrophysics, view WellBase information for wells displayed in GVERSE Petrophysics, and create IsoMap layers from GVERSE Petrophysics curve data statistics. In addition to these integration features, when working with well data in GeoAtlas, GVERSE Geomodeling, or XSection, you can instantly view the selected wells in GVERSE Petrophysics.

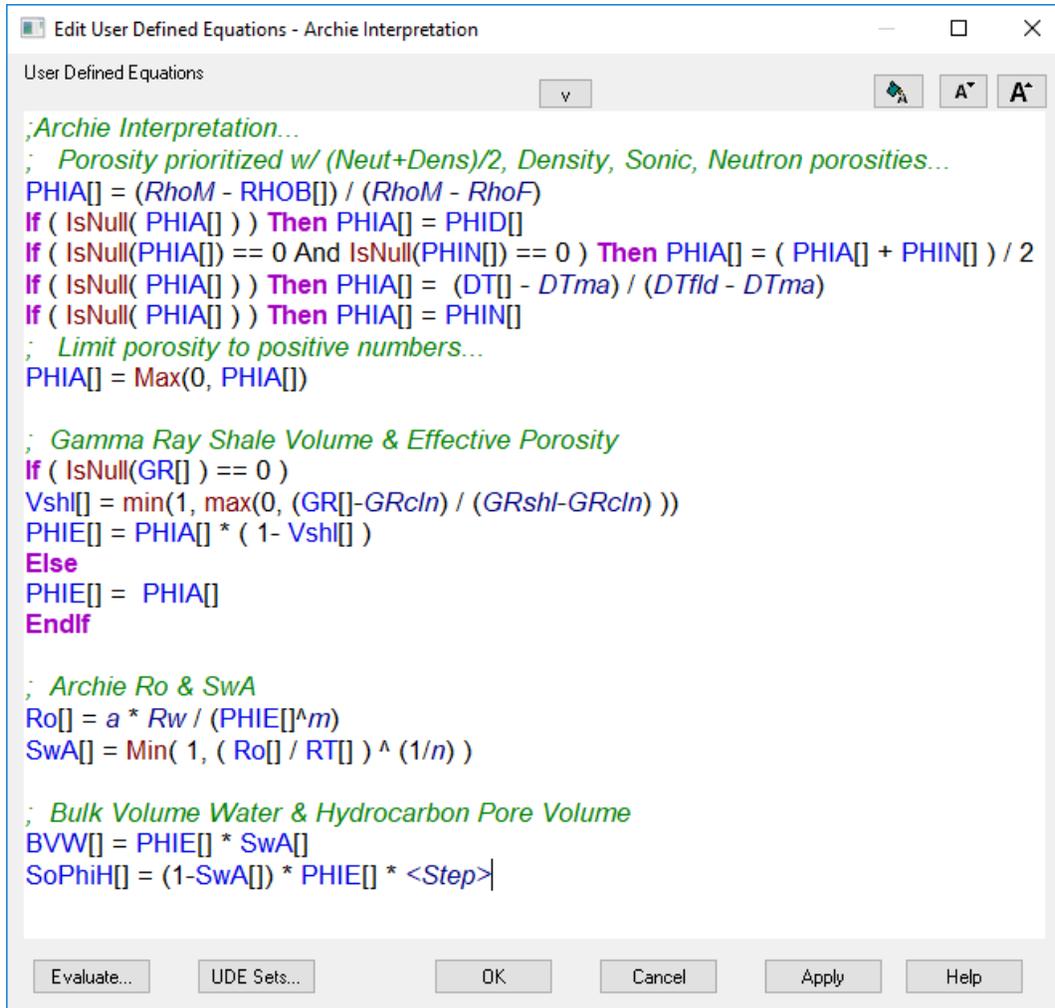
### *64-Bit Application*

GVERSE Petrophysics enables you to work effortlessly with large petrophysical projects and workflows in the 64-bit environment.

### Color Code UDE

Color code the User Defined Equations syntax to easily identify the keywords, operators, and comments for an enhanced user experience. To color code the UDE syntax, choose **Home** or **Interpretation** tab >>

**Edit User Defined Equations** option and use  button.



```
; Archie Interpretation...
; Porosity prioritized w/ (Neut+Dens)/2, Density, Sonic, Neutron porosities...
PHIA[] = (RhoM - RHOB[]) / (RhoM - RhoF)
If ( IsNull( PHIA[] ) ) Then PHIA[] = PHID[]
If ( IsNull(PHIA[]) == 0 And IsNull(PHIN[]) == 0 ) Then PHIA[] = ( PHIA[] + PHIN[] ) / 2
If ( IsNull( PHIA[] ) ) Then PHIA[] = (DT[] - DTma) / (DTfld - DTma)
If ( IsNull( PHIA[] ) ) Then PHIA[] = PHIN[]
; Limit porosity to positive numbers...
PHIA[] = Max(0, PHIA[])

; Gamma Ray Shale Volume & Effective Porosity
If ( IsNull(GR[]) == 0 )
Vshl[] = min(1, max(0, (GR[]-GRcIn) / (GRshl-GRcIn) ))
PHIE[] = PHIA[] * ( 1- Vshl[] )
Else
PHIE[] = PHIA[]
EndIf

; Archie Ro & SwA
Ro[] = a * Rw / (PHIE[]^m)
SwA[] = Min( 1, ( Ro[] / RT[] ) ^ (1/n) )

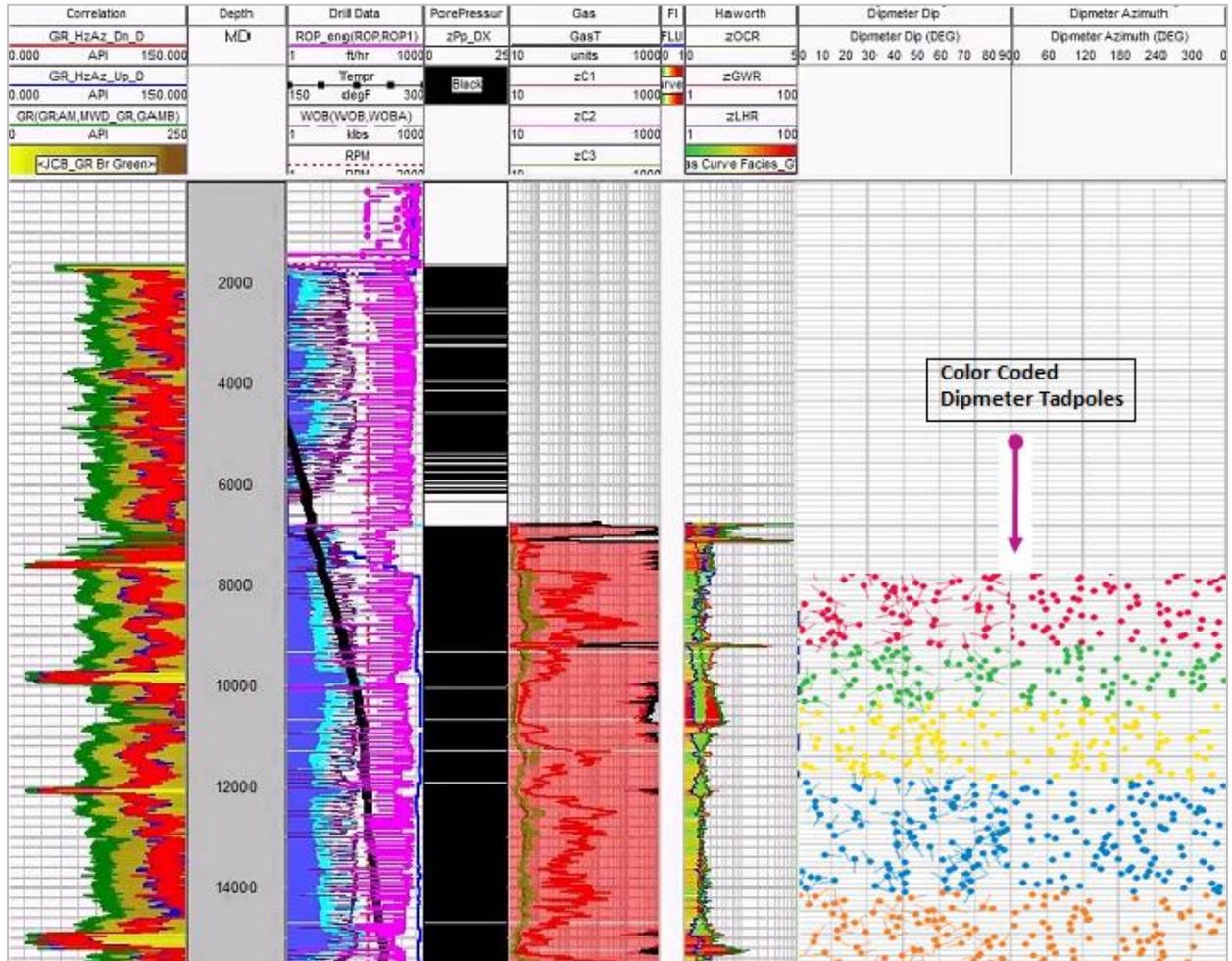
; Bulk Volume Water & Hydrocarbon Pore Volume
BVW[] = PHIE[] * SwA[]
SoPhiH[] = (1-SwA[]) * PHIE[] * <Step>
```

### Independent UDE Editor

Perform calculations or apply mathematical operations to petrophysical workflows with the help of a free-floating UDE editor. You can now scroll through the wells and visualize the results of the UDE while being able to make edits on the fly. To use the UDE Editor, select **Home** or **Interpretation** tab >> **Edit User Defined Equations** option.

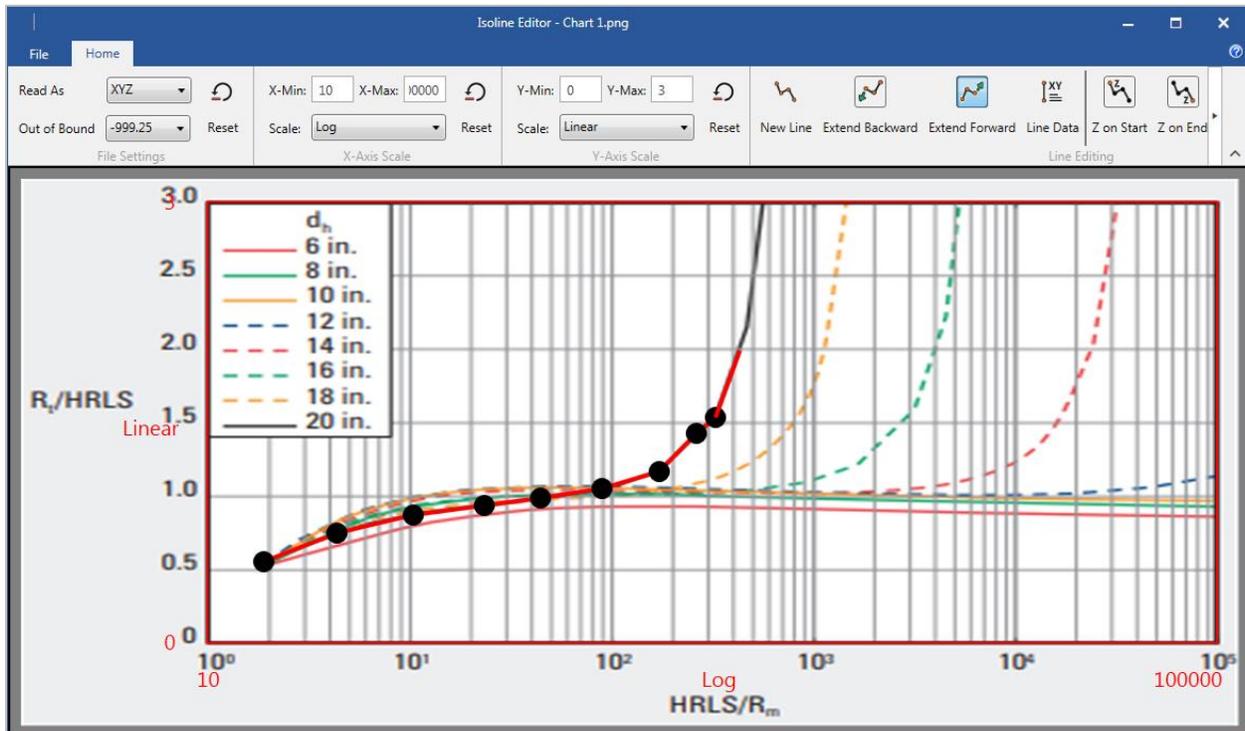
### Color Code Dipmeter Tadpoles

Assign custom colors to the Dip and Azimuth tadpoles based on the dip-type parameter to better interpret the data along the wellbore. To access the **Dipmeter Tadpole Colors** dialog box, right-click a Dipmeter Dip Track or a Dipmeter Azimuth Track and choose **Tadpole Colors** from the context menu.



### Isoline Functions

Digitize chart function curves with the Isoline Function utility and save the output as an Isoline equation which can be used in the User Defined Equation for enhanced results. Through this utility, you can either create a new PIL file for creating new Isolines or edit an already existing PIL file for existing Isolines. To launch the Isoline utility, select **Home** or **Interpretation** tab >> **Create Isoline Functions**.

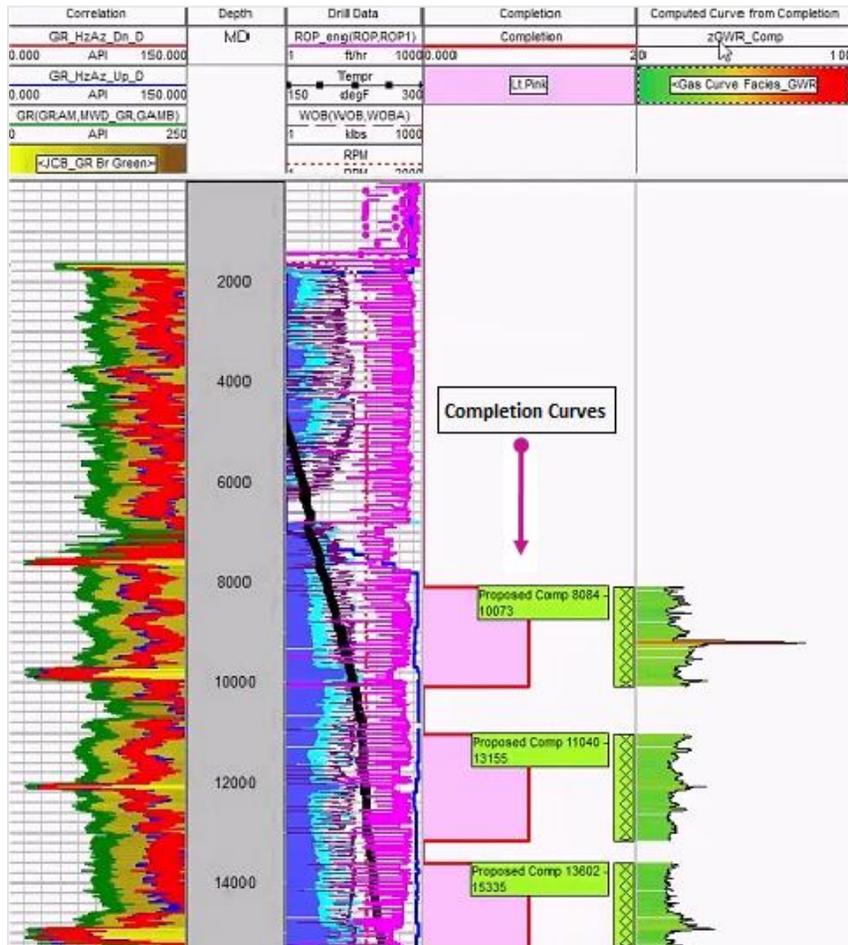


### Curve Set Handling

Experience smart curve handling with the introduction of filtering options for assigning or deleting the Field Data Curve Sets. You can assign **Field Data** to all or filtered set of wells in a selected computed curve set or **Delete** selected computed curve sets from the active project. To assign a field data curve set, select **Project >> Assign Field Data Curve Set**. To delete a curve set, select **Project >> Delete Computed Curves**.

## Completion Curves

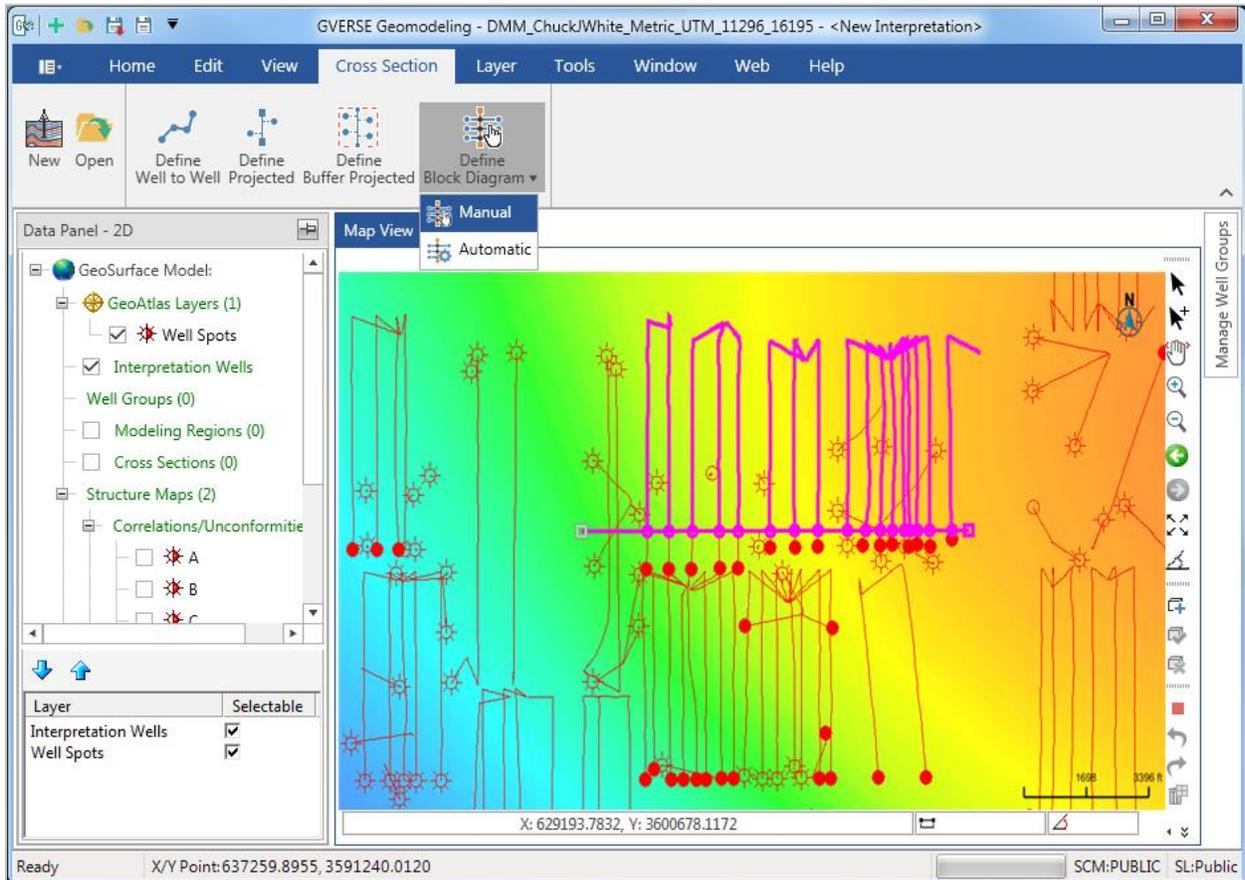
Identify the completion intervals along the wellbore by generating curves using the completion data from WellBase and use these completion curves as discriminator curves in different petrophysical workflows and equations. To generate completion curves, select **Home >> Completion Curves**.

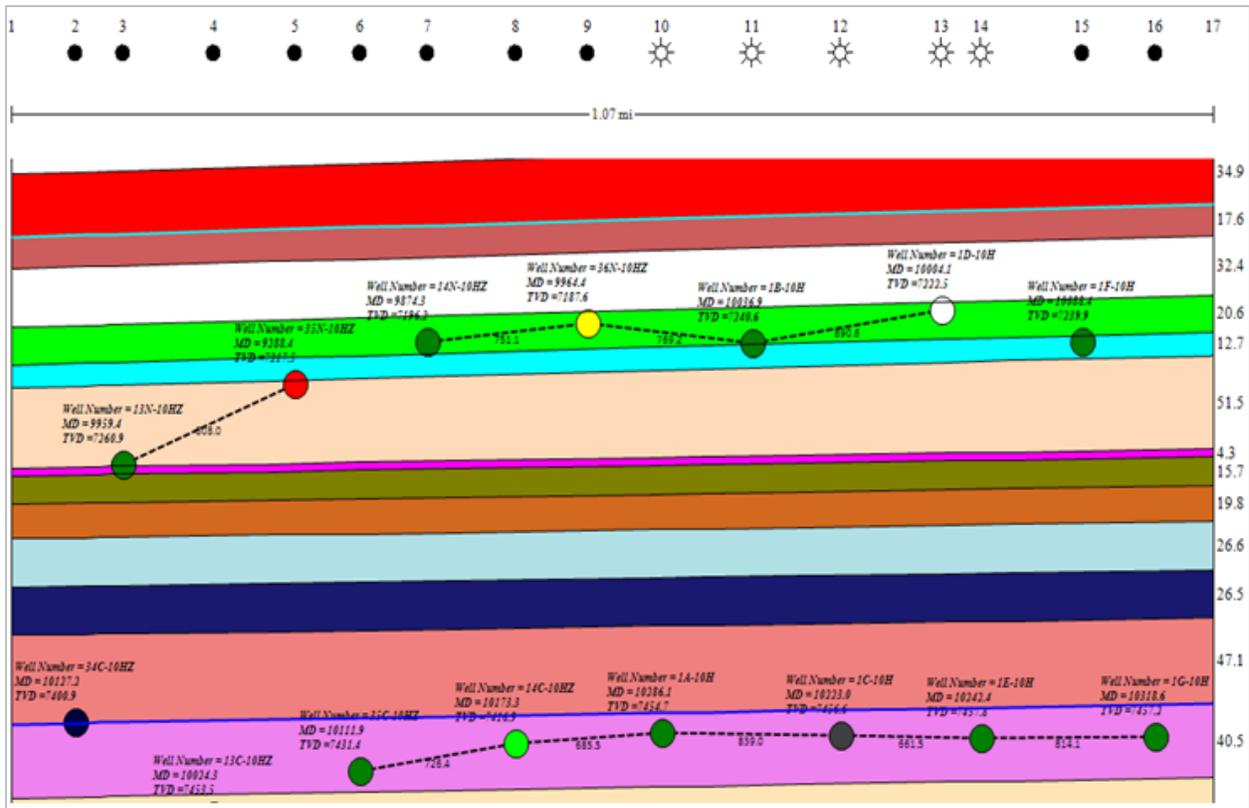


## GVARSE Geomodeling/smartSECTION

### Block Diagram

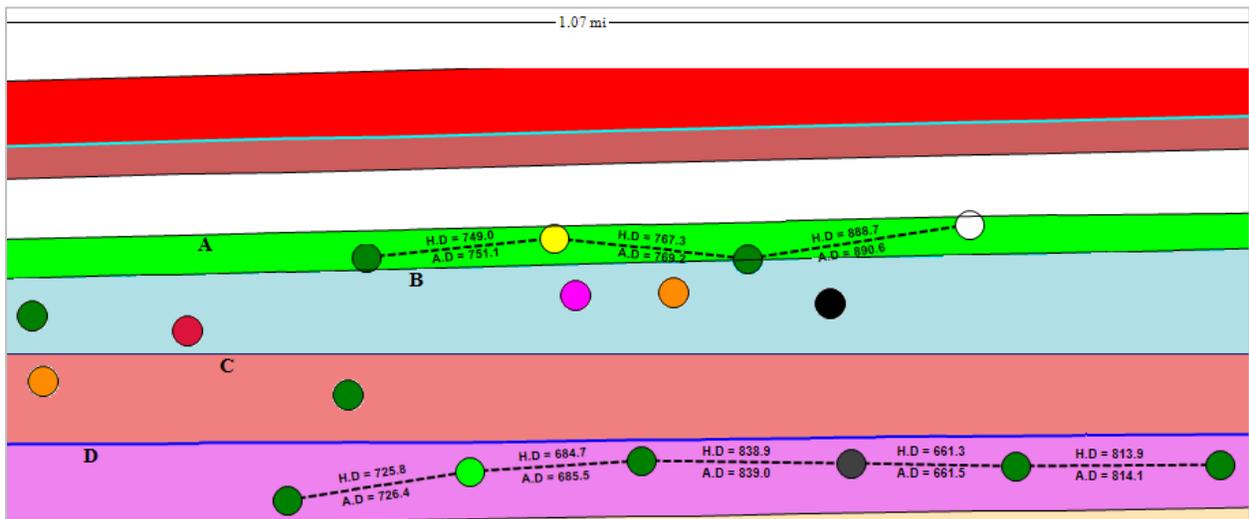
Create Block Diagrams to display the point of penetration of a horizontal wellbore with the line of section to interpret it in the desired formations. You have the option to create Block Diagrams in the Map View either manually or automatically. To create a **Block Diagram**, select **Cross Section** tab >> **Define Block Diagram** and choose **Manual** or **Automatic** from the drop-down list.





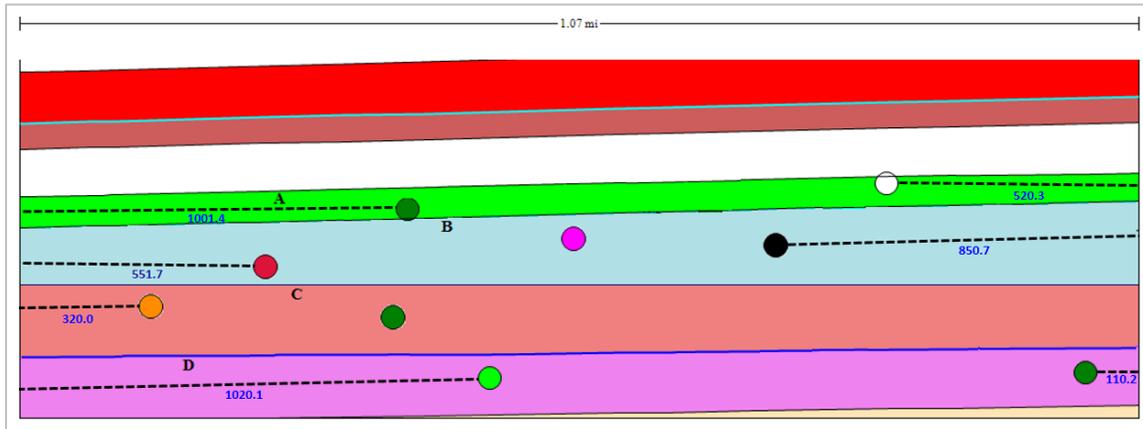
*Display Distance between wells in Block Diagram*

Identify the exact separation between the wells using Absolute and Horizontal well distance options on the **3D Annotation and Distance** toolbar in Cross Section View. To display the desired distances, click **Display Absolute Well Distance**  or **Display Horizontal Well Distance** .



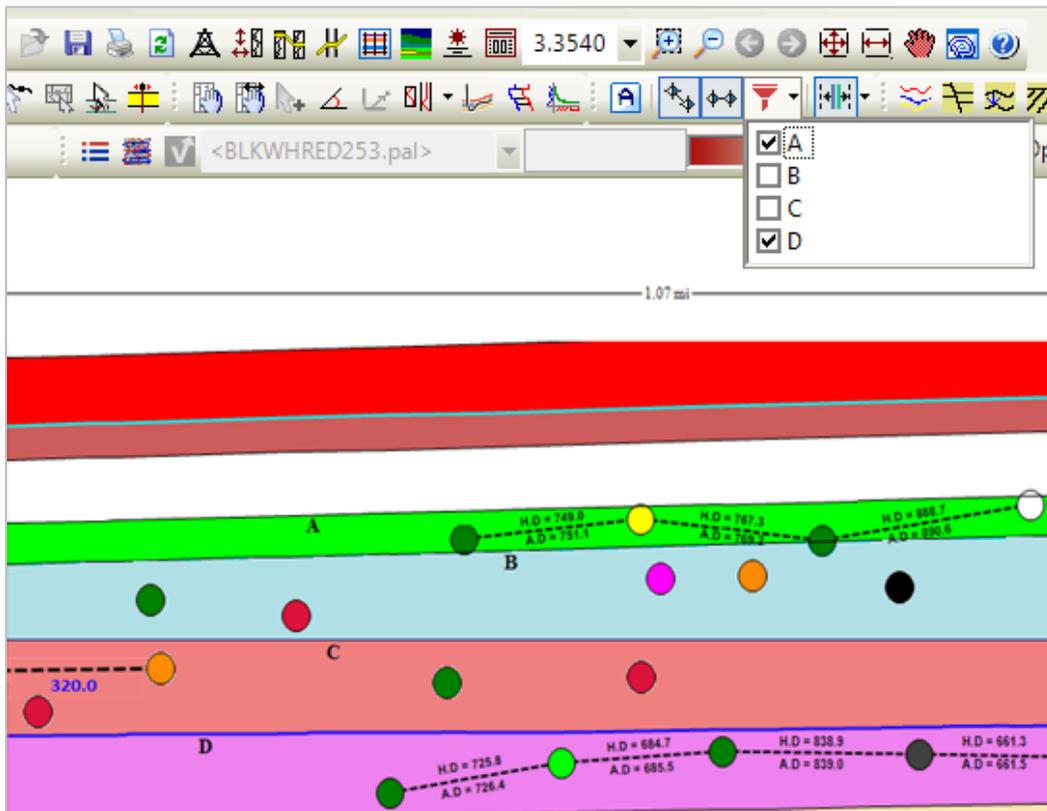
### Display Boundary Distance

Display the distance between cornered wells and the cross section margins in Block Diagram by using the boundary distance option. To display the boundary distance, select **Display Boundary Distance** option from the **3D Annotation and Distance** toolbar in Cross Section View.



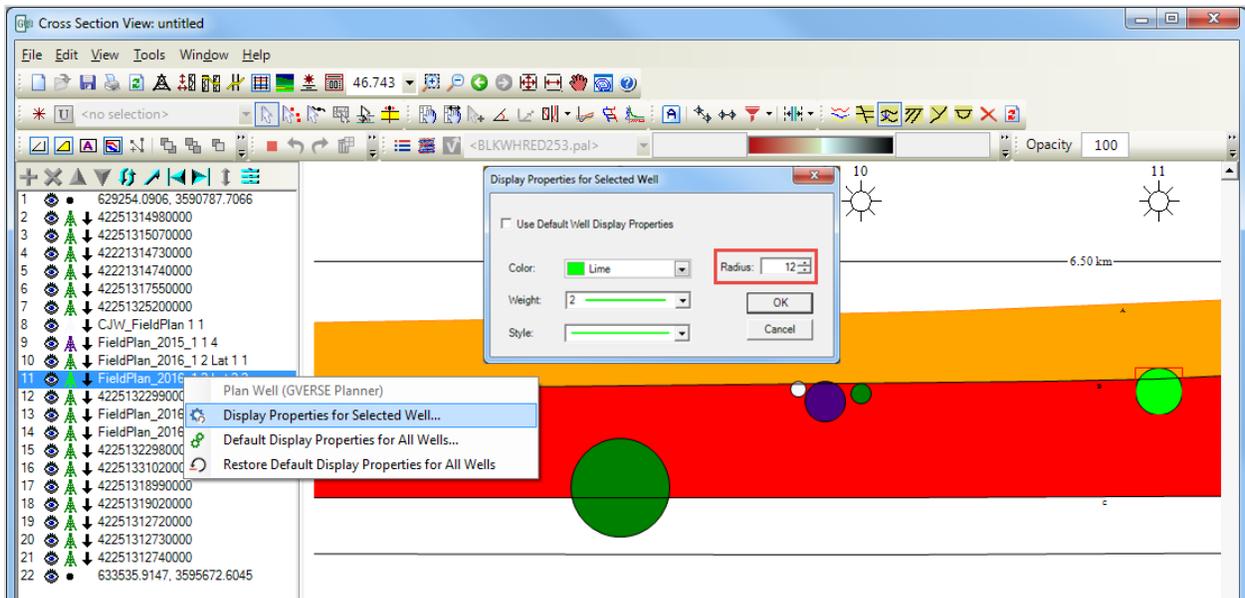
### Display Well and Boundary Distances for Specific Formations in Block Diagram

Display the well and boundary distances for specific formations in a Block Diagram by applying the formations filter. To display the well and boundary distances for selected formations, click **Well Distance Formation Filter** or **Display Boundary Distance** option from the **3D Annotation and Distance** toolbar in Cross Section View and select the desired formations from the drop-down.



### Apply Custom Display Properties to Wellbores in Block Diagram

Distinguish the overlapping wellbores and efficiently correlate the wells with other objects of cross section by assigning custom colors and adjusting the symbol size for individual wellbores. To set custom display properties, right-click the desired well and select **Display Properties for Selected Well** option from the context menu.

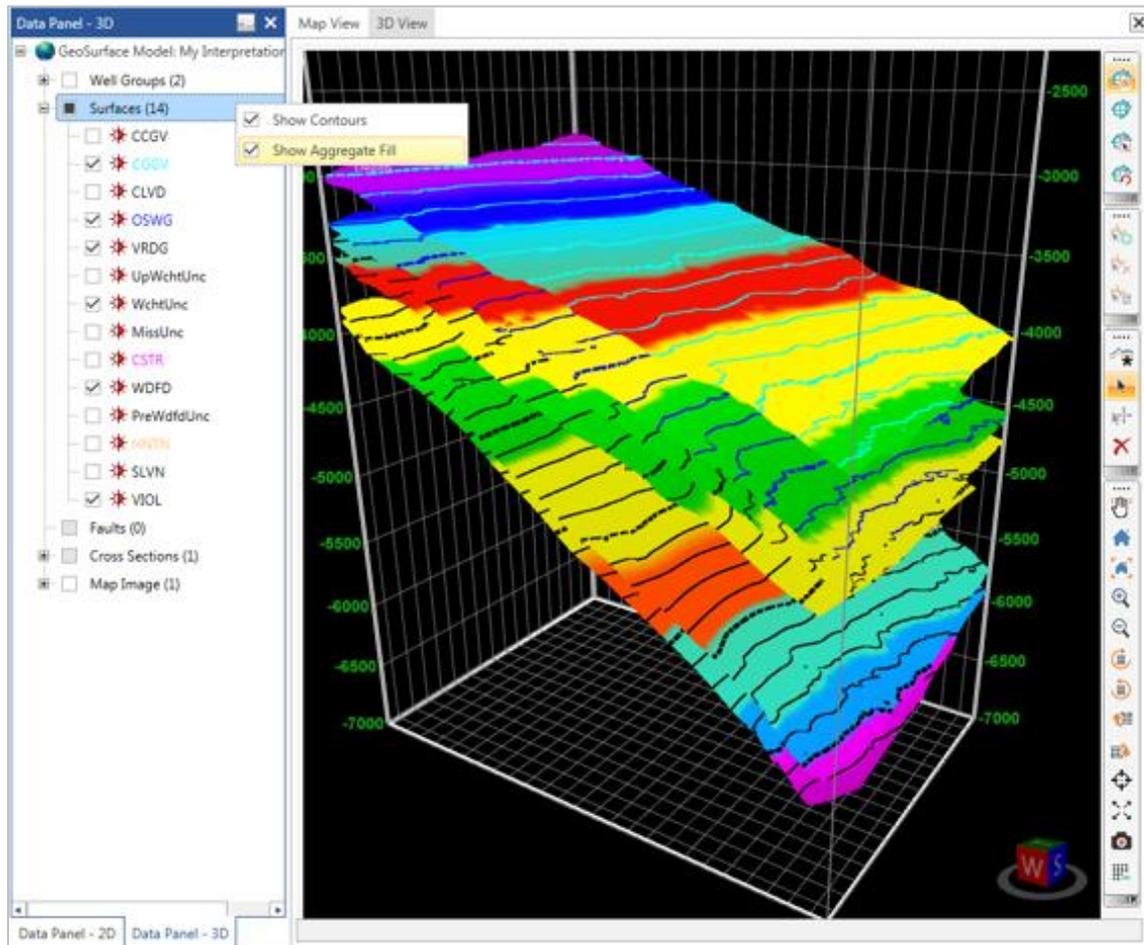


### Posting Properties for Wells

Post the well footer at different locations and justify its position using the **Digital Headers** tab of the **Cross Section Display Preferences** dialog box.

### *Apply Single Color Palette to All Displayed Surfaces*

Working with multiple surface/fault trends in 3D View is made a lot easier with the **Aggregate Fill** option. You can use this option to apply a single color palette to all the displayed surfaces and faults in order to determine the structural trend in 3D View. To apply a single color palette, select the Surfaces or Faults (main node) from the 3D Data panel and use the **Show Aggregate Fill** option from the properties panel.

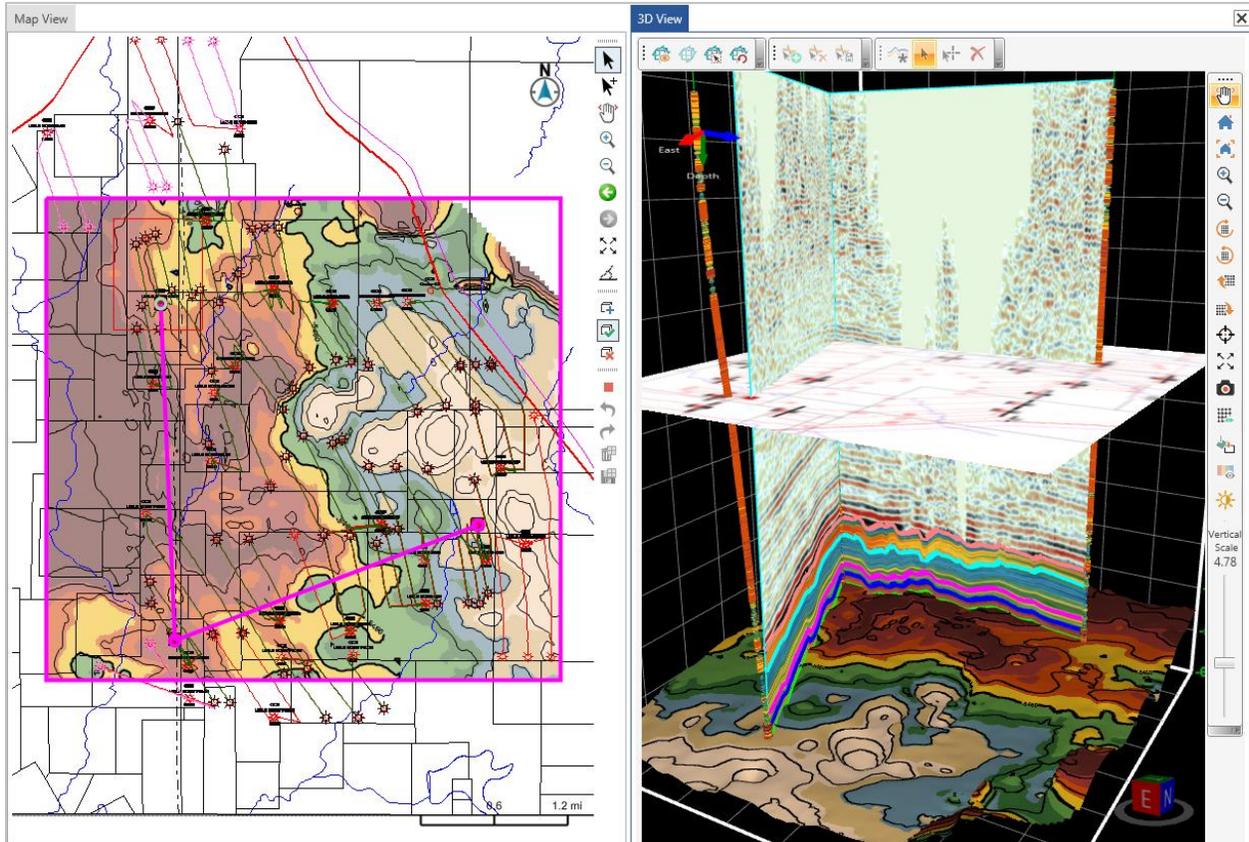


### *List Wells with Well Name, Number, Operator, and Status*

Identify the wells in a Cross Section with multiple annotation options using a **Well List Text Options** button on the wells tab of the Cross Section View. You can use it to list the wells with **Well Name, Well Number, Operator, and Status**.

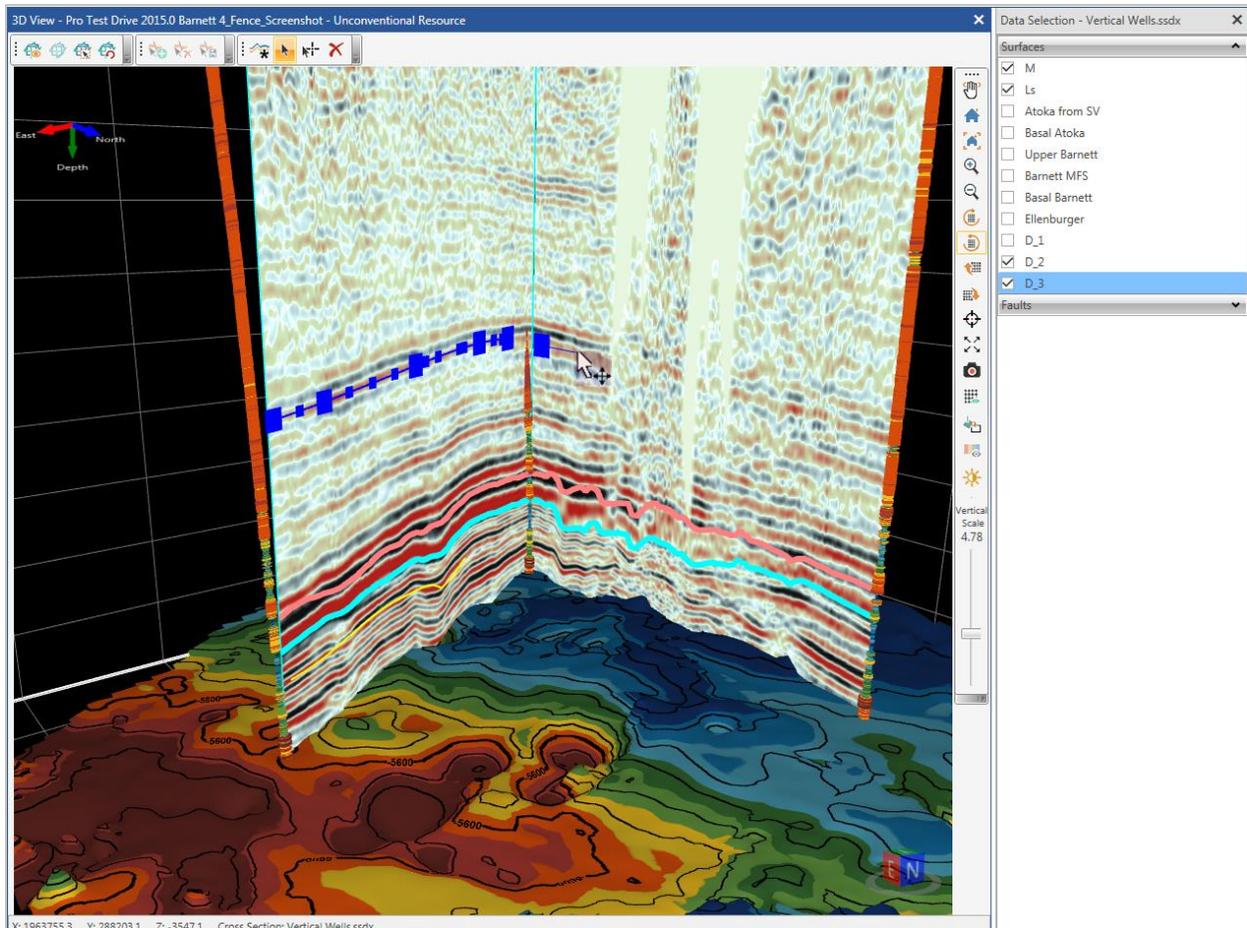
### Modeling within Defined Regions and Cross Section Handling

Restrict modeling parameters within a defined region on the Map and 3D View for enhanced performance and detailed analysis. Use the **Create Modeling Region** button on the Map View toolbar to draw the modeling region and activate it. You can also load the cross sections lying partially or completely inside the active modeling region.



### Add/Select Surface and Fault Points on Fence Diagrams

Add Surface/Fault points on the fence diagram as correlation lines using the Data Selection panel in the 3D View. To do so, click a desired fence, fault, or a surface to activate the **Data Selection** Panel and use the **Add Surface/Fault Pick** tool from the **Picking Options Toolbar**. You can also select and drag a point on the fence to modify its depth.

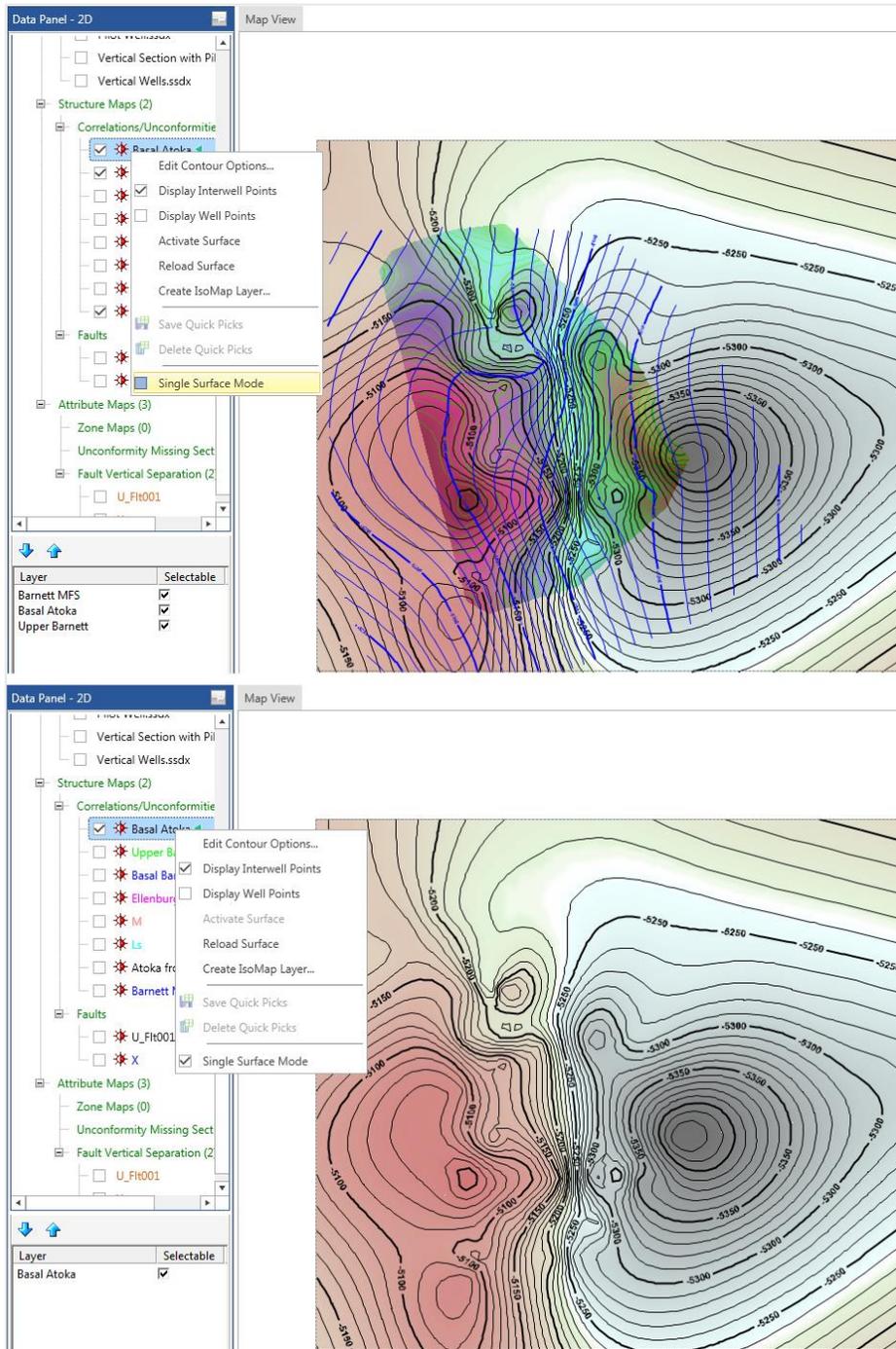


### Spline Polygons

Choose to smooth the polygon edges in the Cross Section View using the Spline Factor option in the **Polygon Properties** dialog box. To apply the **Spline Factor**, right-click a polygon node, select **Display Properties** from the context menu and use the **Spline** check box on the **Polygon Properties** dialog box.

## Single Surface Mode

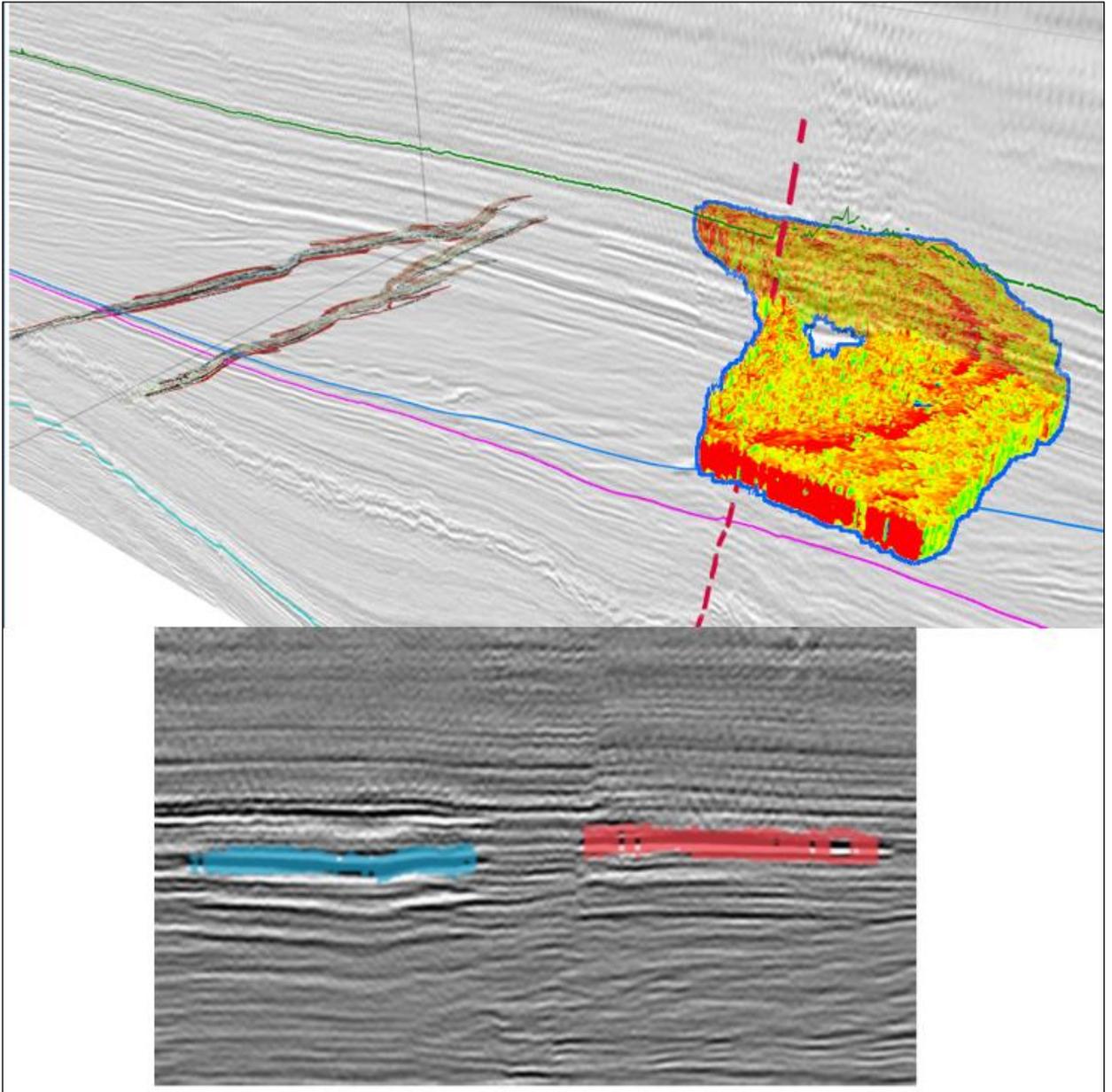
Perform your interpretations on individual surfaces in Map View with **Single Surface Mode**, through which you can activate and display a single surface in Map View while keeping the other surfaces hidden. To activate the **Single Surface Mode**, right-click any surface from the 2D Data panel and use the **Single Surface Mode** checkbox from the context menu.



## GVERSE Geophysics

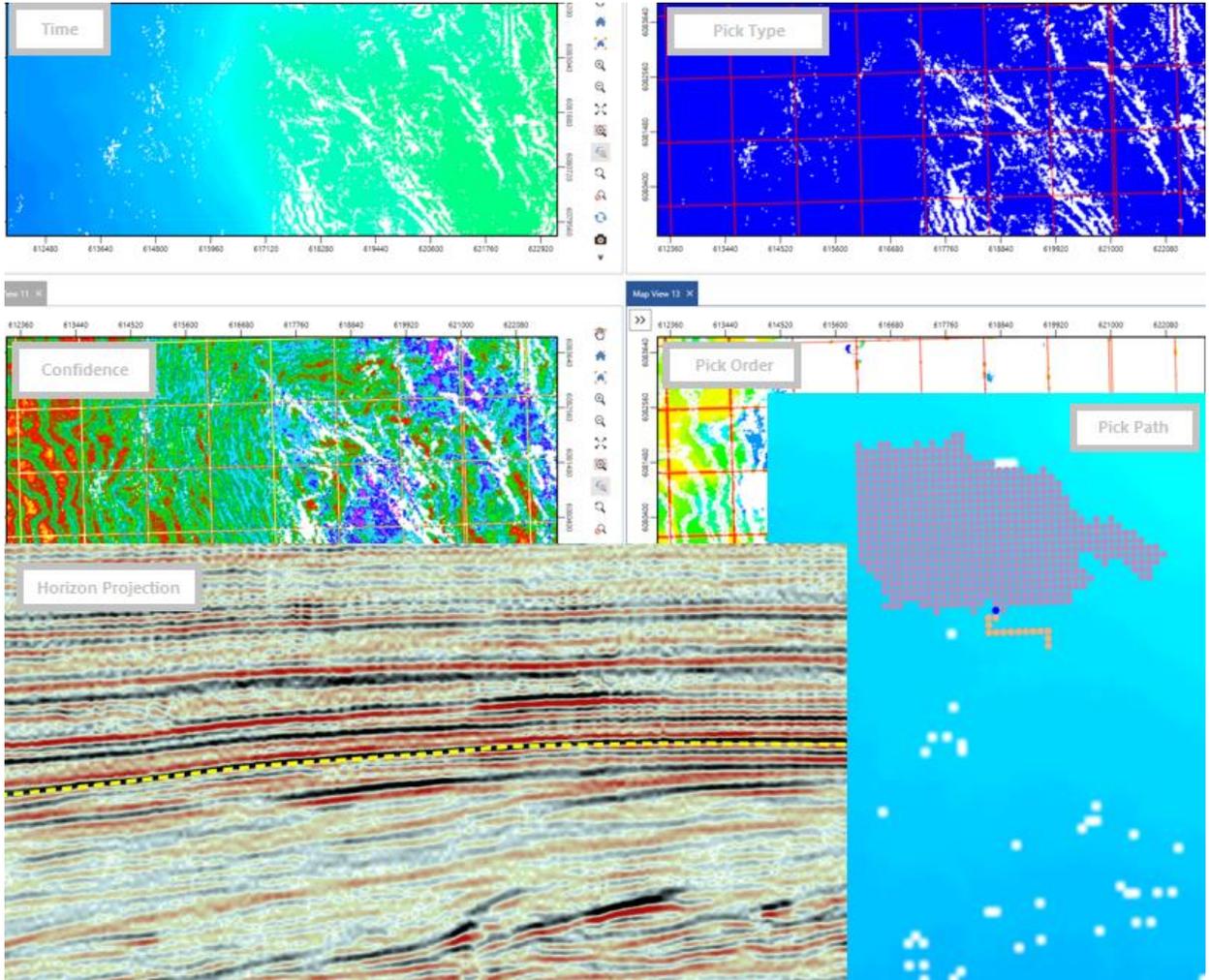
### *Interpreting Geobodies*

- Pick and save structures on seismic and attribute volumes as geobodies.
- Interpolate picks or track seismic signatures automatically.
- Drape data directly on the body or show intersections with seismic sections.
- Use the Volumetrics calculator to compute the volume of your geobodies.



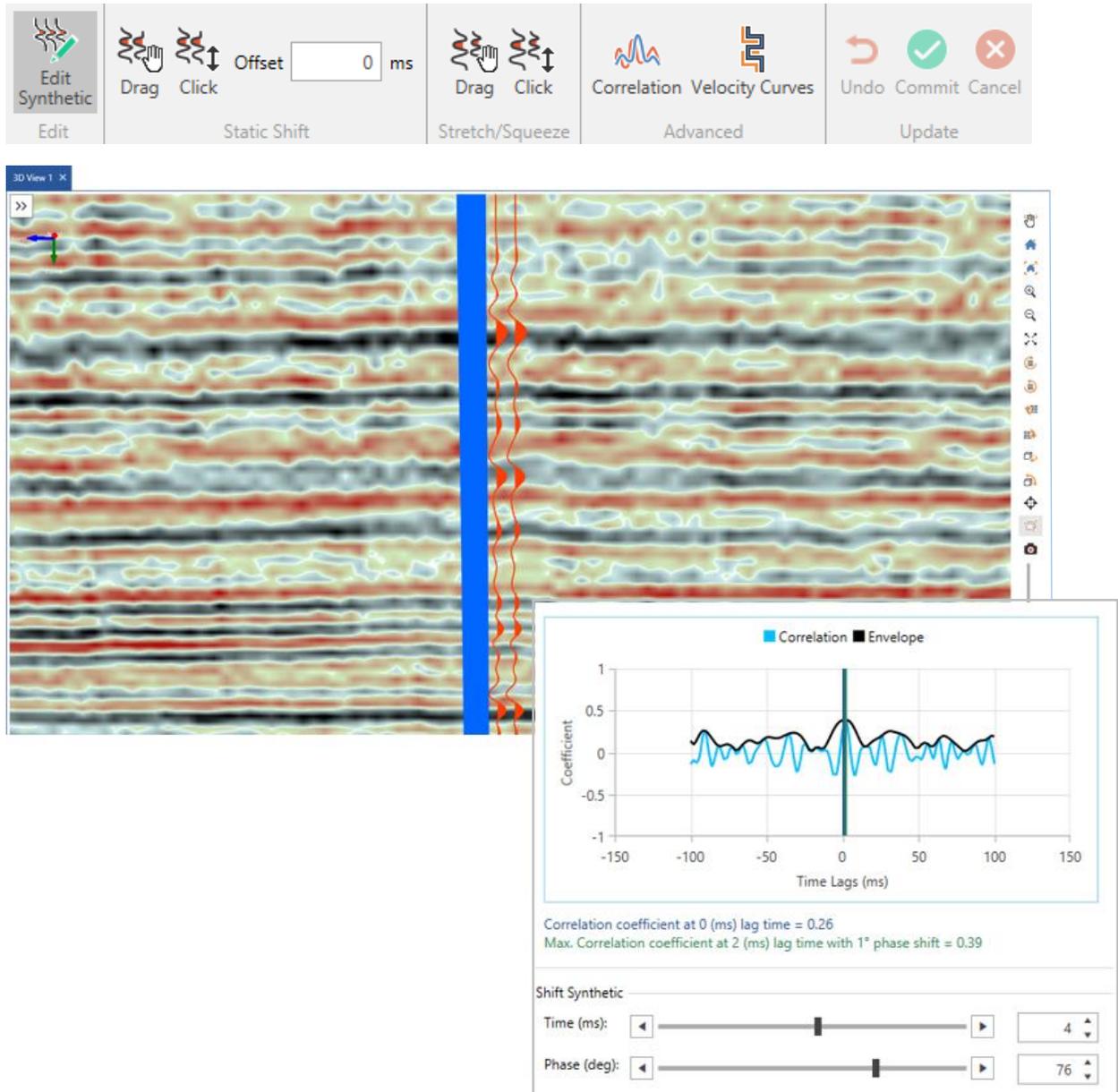
### Setting Horizon Pick Attributes

- Display confidence, pick order and pick type maps by selecting a **Pick Attribute** from the **Scene** tree entry of a horizon.
- Edit horizons using pick attribute criteria from the **Pick Attributes** window of the **Horizon** tab.
- Identify and eliminate potential bad picks using pick relationship displays.
- Guide your picking by projecting horizon picks on to unpicked sections.



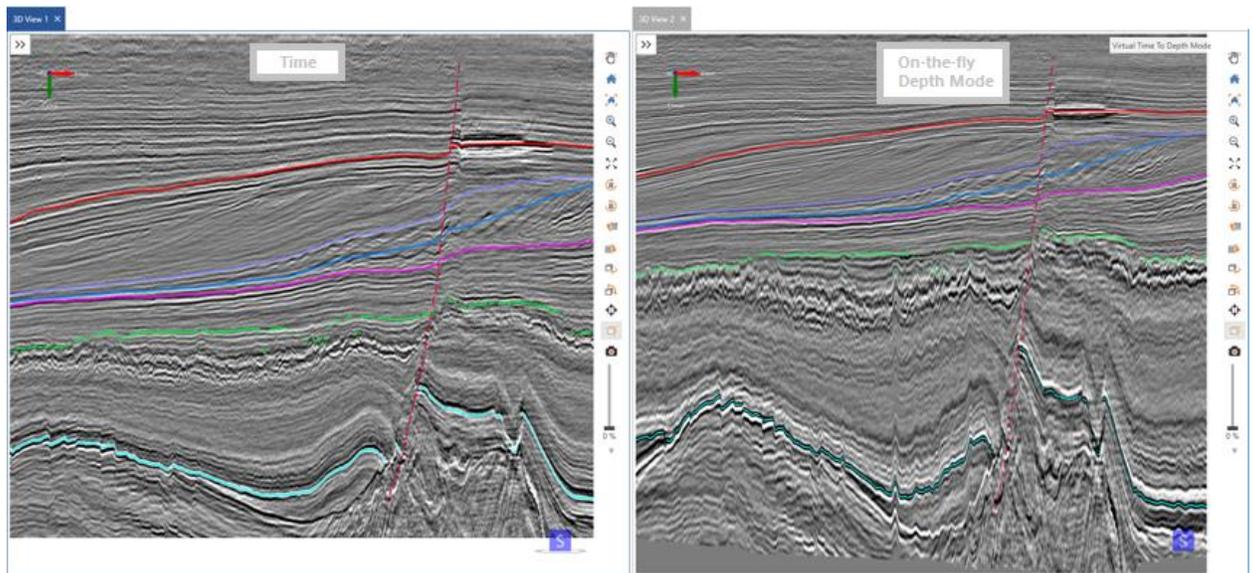
### Tie Synthetic in 3D

- Shift, stretch and squeeze synthetic traces using different controls within the 3D viewer.
- Auto-calculate optimum time and phase shifts to maximize correlation between synthetic and seismic.
- View changes to interval velocity due to modifications in synthetic.



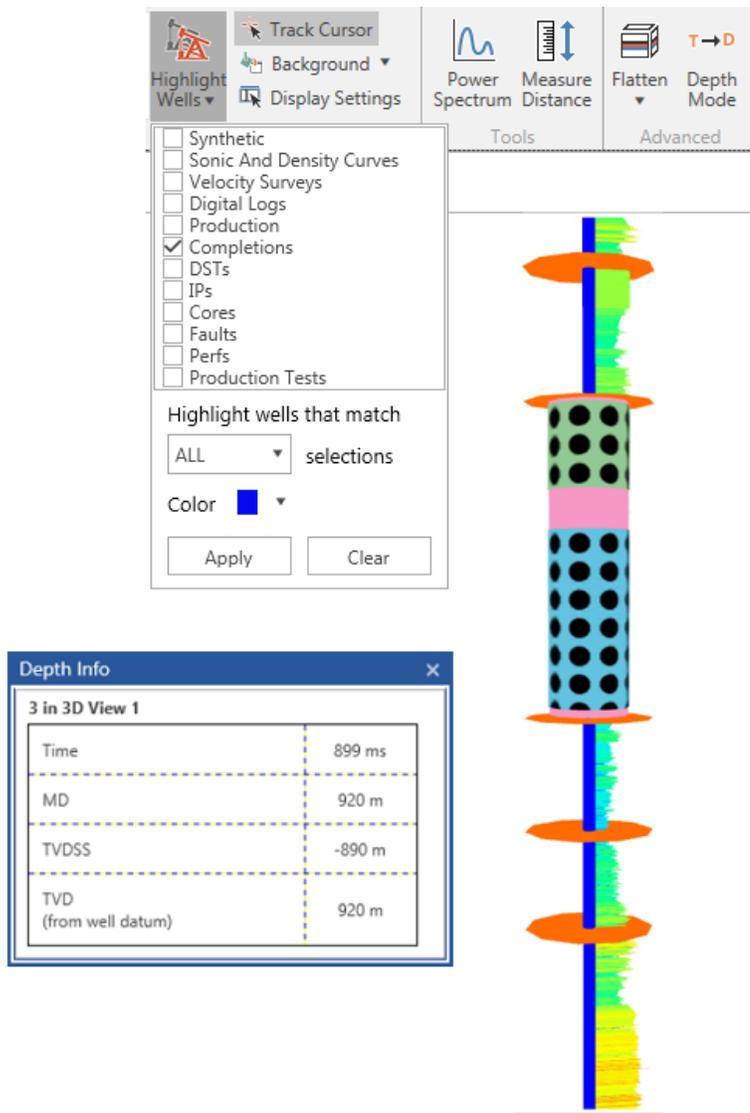
### Build Better Velocity Models

- Switch to Depth mode in time interpretations and convert entire time scenes to depth on-the-fly.
- Use improved algorithms to build more robust velocity models.
  - Determine depth values for the interval between two horizons by considering the velocities of current and preceding horizons.
  - Control how velocity pairs are used against each horizon
  - Incorporate fault polygons within the velocity grid of the selected horizon.
  - Option to set extrapolated or custom velocity below the last horizon while generating a velocity model.
- View measured depth (MD) along wells in time scenes.



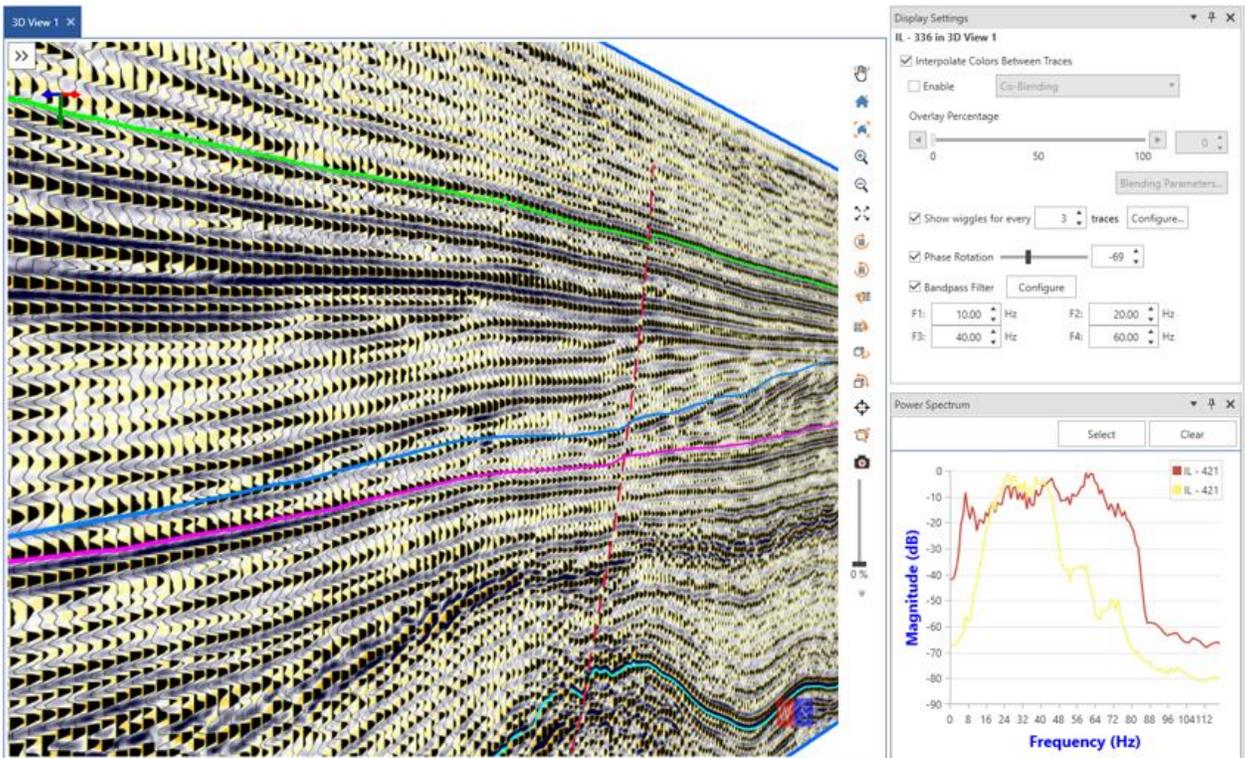
### Enhanced Wells & Well Data Display

- Extract seismic data along a wellbore and save it as a log curve using the context menu. These log curves can be used in various **GeoGraphix** applications.
- Open an arbline along a deviated wellbore from the context menu of the well.
- Send wells and well data directly from the main interface to the 3D module quickly and efficiently.
- Open a well-to-well arbline in **Map View**.
- Highlight specific wells on maps and 3D scenes using pre-defined filters.
- Display multiple perfs within a completion zone.
- Use **PRIZM** alias list for well log display along wells.



## Improved Seismic Visualization

- Load seismic volumes to RAM for faster data visualization. To do so, right-click the desired version in the **Interpretation** tree, and select **Load in Memory** from the context menu.
- Apply phase rotation and bandpass filters to vertical sections using the respective **Display Settings** pane.
- Compute and compare power spectrums for seismic in the **Power Spectrum** window accessed from the **3D View** tab.
- Overlay wiggles on sections using the **Display Settings** pane.



## Enhanced Usability

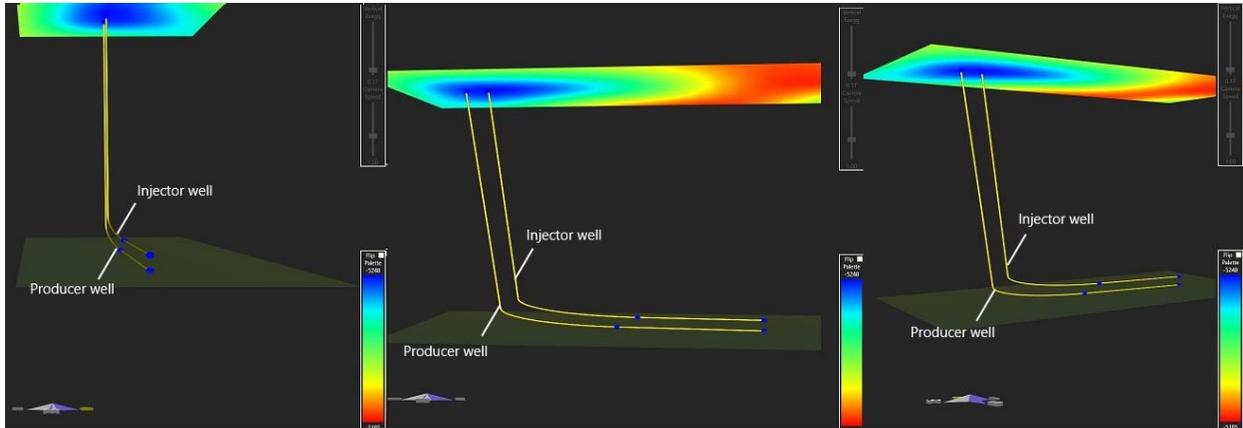
- Show contours on horizons in **3D View** by selecting **Show Contours** from the horizon's context menu.
- Clip the 3D scene to an area of interest (AOI) using the **Clipping** drop-down list from the **Display** menu of the **3D View** tab.
- More control on hiding and removing items from a scene from the respective context menus.
- Create and access **Horizon** and **Fault** lists from the **Horizon/Fault Manager** or the **Interpretation** tree.
- Calculate distance between points or along a path on the map or 3D scene using the **Measure Distance** button in **Map** or **3D View** tab.
- The horizon and fault order defined in **Horizon/Fault Managers** is replicated in the respective **Horizon/Fault** nodes in **Interpretation** and **Scene** trees.
- Flatten seismic data in a 3D scene with respect to a selected horizon.
- Mark horizons on flattened seismic sections.
- Display fault polygons on a horizon using the **Display Settings** pane.
- Processing applied to seismic traces on an open seismic section is also applied to the seismic trace display in **SynView** during synthetic creation and modification.
- Control interpolation of color display between individual seismic traces using the respective seismic section's **Display Settings** pane.
- Improvements in the **Interpretation Browser** to make transfer of data between interpretations even easier.
- Quicker access to **Fault** and **Geobody segments** dialogs from the **Faults** and **Geobodies** tabs, respectively. Moreover, **Horizon/Fault Managers** can be accessed using the **Horizons/Faults** tab.
- Focus on an object in 3D view by double-clicking the associated entry in the **Scene** tree.

## GVVERSE Field Planner

### *Steam Assisted Gravity Drainage (SAGD)*

Steam Assisted Gravity Drainage (SAGD) functionality is provided in Field Planner Core. It is a thermal production method for heavy oil trapped in tight sands and pores which reduces oil's viscosity by injecting high pressure steam into the reservoir through injector well. The oil is pushed down to formation due to gravity and is extracted using the producer well. Injector wells are placed at a vertical distance (offset) with producers, already planned wells in the plan.

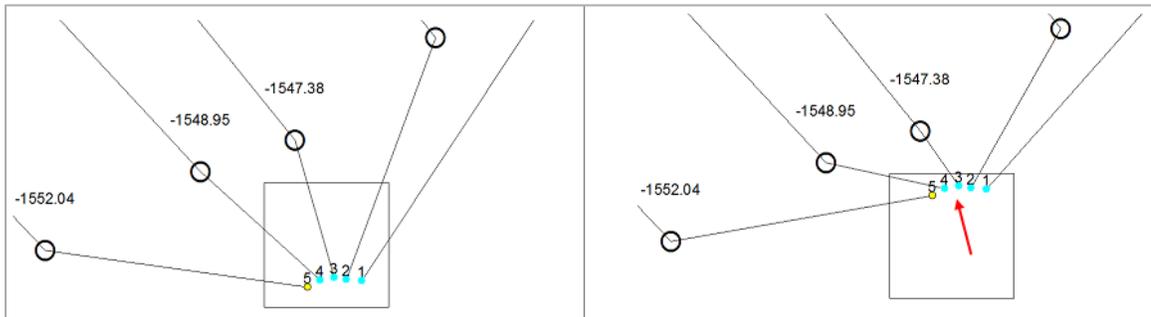
The functionality of the SAGD feature in Pro3D is shown below.



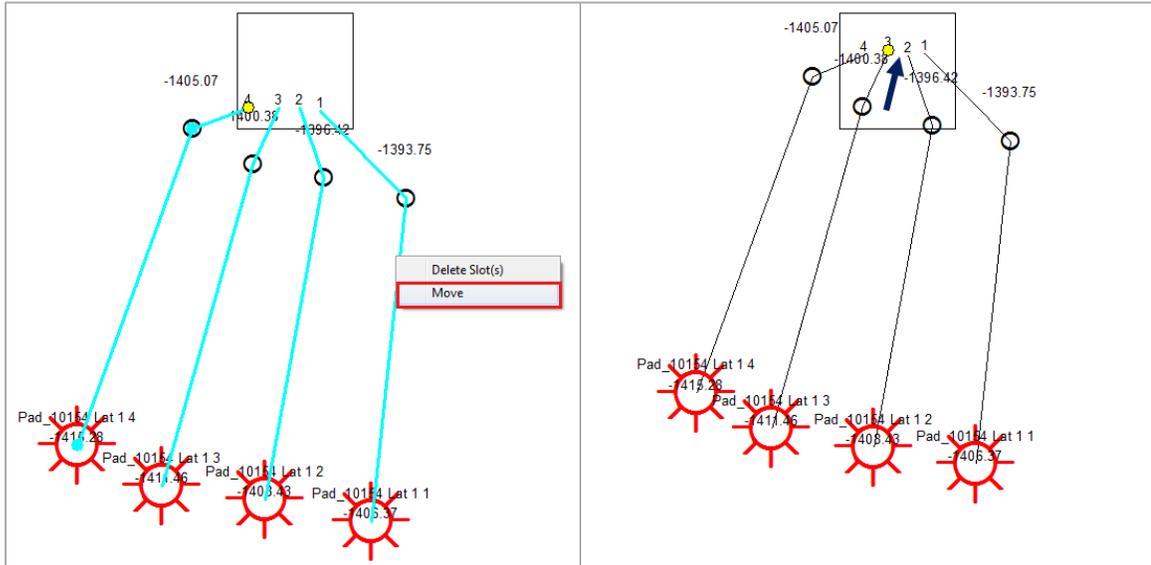
### *Move Multiple Well Pads, Sticks and Nodes Simultaneously*

Multiple nodes, well sticks and well pads can be selected and moved simultaneously using the Pad Options dialog box.

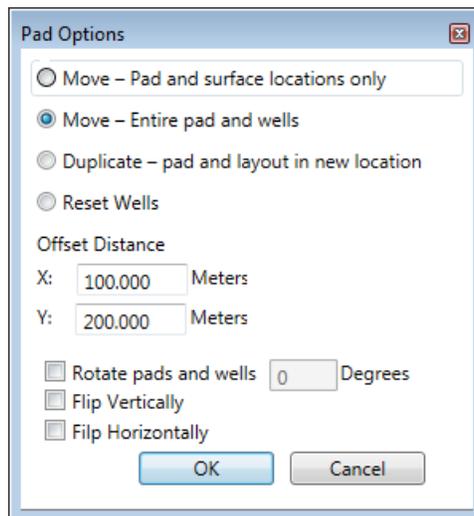
- Select **multiple well nodes** using the <Ctrl> key and right-click. Set the **XOffset** and **YOffset** distance to place the selected nodes at the new location on the map. You can also drag and drop the selected multiple nodes at the desired location.



- Select **multiple well sticks** using the <Ctrl> key and right-click. Set the **XOffset** and **YOffset** distance to place the selected well sticks at the new location on the map. You can also drag and drop the selected multiple well sticks at the desired location.

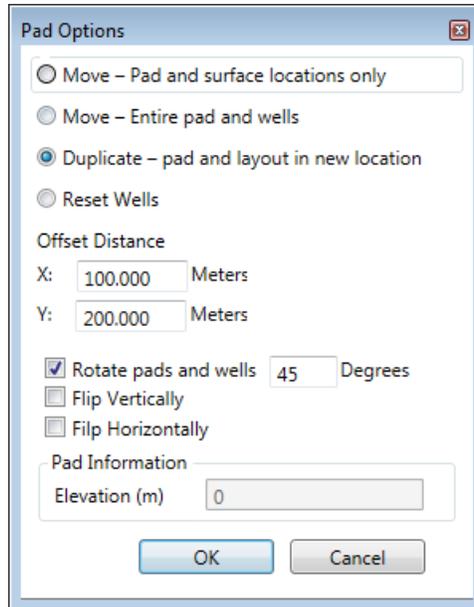


- Select **multiple well pads** using the <Ctrl> key and right-click. In the **Pad Options** dialog box,
  - **Move – Pad and surface locations only** relocates the pads and surface locations, leaving the landing points and bottom hole locations at original positions.
  - **Move – Entire pad and wells** moves the whole well pads and wells to a new location.
  - **Reset Wells** resets wells to the original layout as defined in the field plan.
  - Define the X and Y coordinates for the new placement position and place the selected pads at an angle in degrees or flip horizontally or vertically at the new position.



### *Duplicate Multiple Well Pads*

Multiple pads and group of wells can be selected and duplicated simultaneously using the Pad Options dialog box. Select multiple pads or groups of pads using the <Ctrl> key and right-click. Select **Duplicate – pad and layout in new location**. Set the offset distance as X and Y coordinates and place the duplicated pad(s) at an angle in degrees or flip the duplicated pad(s) horizontally or vertically.



## GeoAtlas

### *ESRI ArcGIS 10.6.x Supported*

All GeoGraphix applications support the latest ESRI ArcGIS 10.6.x versions.

## ProjectExplorer

### *Project and Database Security Added*

GeoGraphix has implemented database security using database roles so that only specific users can perform data management tasks. This feature lets you:

- Access information on users in a GeoGraphix database/project.
- Access information on users importing data into a GeoGraphix database/project through Defcon2, LAS or Spreadsheet Loader.
- Control who is allowed to import data into a GeoGraphix database/project from Defcon2 or the Spreadsheet Loader to prevent the accidental overwriting of interpretive data (tops, fault cuts).
- Access information on import history.

### *Viewing Layer History*

You can view the history of layers available in a GeoGraphix project. To do so, in ProjectExplorer, select **Tools >> Layer History** from the main menu to display the **Layer History** dialog box. This dialog box displays the following information:

- Number and type of layers associated with any map, their respective AOIs and map names.
- Created by and modified by information for a layer with respect to user IDs.
- WellBase filters used during layers creation.

In the same dialog box, you can also:

- Filter layers by number of days, number of hours, and date range during which layers were last modified.
- Refresh the layer history log to include the information about the new layers created in a project by clicking the **Refresh Catalog** button.
- Export the layer list in a CSV file format.

### *Viewing History of Import Operations*

You can view the history of the imports by different users in a GeoGraphix project. To view this information, in ProjectExplorer, select **Tools >> Import History** from the main menu to display the **Import History** dialog box. This dialog box displays the following information:

- Files imported using DefCon2 import definition, Spreadsheet Import and LAS file import
- Location of file
- Time period of the import process
- Data imported

## QueryBuilder

### *Row Changed Date Added*

In the **WellBase** table, the **Row Changed Date** field is added enabling users to create filters that reflect the latest date for any change in the selected data type.

### *Displaying Total Number of Records*

For queries resulting in more than 5000 results, the application displays the total number of records returned by the query.

## WellBase

### *Secure Access to Data*

With Project and Database Security enabled in GeoGraphix, users can be assigned the import role allowing for secure data management. This role lets the user:

- Import data into GeoGraphix and perform certain bulk data operations in WellBase.
- Access and edit (add and/or export) data and change source ownership.
- Display the name of the source, the ownership of the source, and whether the source is public or private.

### *DST Table Remarks Field Character Length Increased*

For GeoGraphix projects, the character length of the **Remarks** field available in the **DST** table is extended to 1024 characters.

## Utilities

### *ArcGIS Auto-Configuration Utility*

This is a command line utility used to automatically configure GeoGraphix with the installed ArcGIS Runtime. The IT Support personnel can program this utility easily with any deployment/scripting tool such as **Microsoft System Center Configuration Manager (SCCM)**. An IT administrator can then run this utility to remotely configure ArcGIS Runtime on all network machines that have GeoGraphix installed.

## Fixed Issues

The following customer reported issues were fixed in this release.

### GVERSE Geomodeling/smartSECTION

ID	Description
168347	The Cross Section Template setting of the Straight Line View mode automatically resets to True Space mode if the template is applied to smartSTRAT vertical section, due to which the wells display properly without any manual editing.
179614	The selection of surfaces, faults, or annotations in the Cross Section view is preserved on moving a projected or buffer projected cross section in the Map view.
177802	Fixed the rendering issue of the Seismic Backdrop traces in the Cross Section view, where the computation was correct but one of the traces was being rendered outside the view in reverse order.
186518	Fixed the angle calculations of well distance text annotations so that they rotate and follow the trajectory of distance line. Previously, in the Block Diagram cross section, surfaces and faults shifted irregularly on displaying well distance text annotations between the wells, specifically when the wells were duplicated or their wellbore paths were intersecting in the Map view.
186792	Added a check to resolve the Null Reference Exception. Previously, on reloading a drilled well in smartSTRAT or Map view, a disposed object reference was being accessed that caused the error.

### GVERSE Geophysics

ID	Description
170501	The horizon surfaces picked in GVERSE Geophysics and used as seismic backdrop in GVERSE Geomodeling display properly, after a mechanism is identified to discard the temporary files properly.
171700	All operations related to a horizon and fault displayed as an intersection on a seismic section are available in the corresponding context menus.
171702	Disks representing formation tops display perpendicular to the wellbore direction. This is especially useful for horizontal wells.
174018	A new TD pair in the user defined velocity table allows for specifying a time value for the total depth point of a well.
175023	Any processing (filters) applied to sections in SynView is enforced on all seismic traces. This enables seismic traces to match sections opened in SynView.

180710	A target horizon can be specified for any set of control points being imported using the interpretation browser. The points are directly imported to the specified target horizon.
180711	Units for data in interpretation browser are in sync with those in the target interpretation.
186500	The Attribute and Surface Calculator can be accessed even if the loaded seismic survey does not have a version. Previously, the GVERSE Geophysics application crashed when Attribute and Surface Calculator was accessed for seismic surveys without a version.

## GVERSE Field Planner/Lease Planner

ID	Description
177753	The complex geometry of polygons in a shapefile (if any) is successfully converted to simple geometry on performing geometric operations in Lease Planner. Previously, an error displayed on importing shapefiles in Lease Planner and prompted to exit and relaunch the application.

## XSection

ID	Description
5135 19258	Correct well information is now sent from GeoAtlas to XSection depending upon the cross section type, which preserves the cross section type and layout. Previously, the cross section type changed to projected when the edited cross sections were sent from GeoAtlas to XSection using the double-click option.

## DefCon

ID	Description
65146	The mappings in GXI files for IHS 297 imports are fixed for Base Depth in the Completion table. The Base Depth initially read the information from the Initial Potential (Base Depth) field instead of the Well Completion Base depth field.
134485	The Project Bottom Hole Latitude/Longitude values for an import are preserved to the number of digits defined in Defcon2. Previously, these values were truncated to one decimal point.
178911	Proposed survey is only calculated for wells included in the DefCon imports. Previously, proposed survey was calculated for all wells in the project.

## WellBase

ID	Description
40534	The North Reference field under the Survey table can be manually updated by a user.
153997	Error during Enerdeq import no longer generates on saving the changes in the Import Definition tab in WellBase.
164308	A well, imported from DefCon2 with both Drilled and Proposed surveys, with internal status set to Proposed, has regular survey calculated during batch survey calculation.
169566	The performance delays in importing formation data using custom defined template are fixed.
169650	You can enter depth more than 20000 feet in the Text Track field. Previously, the depth value was limited to 20000 feet.
173338	When a well has data more than the limit of 8193 characters for Remarks field, error message irrelevant to this issue does not restrict the workflow. Previously, when data of more than 8193 characters was added to Remarks field, an irrelevant error message used to generate.
173915	The Excel Pivot Report for Project Extents shows wells with bad Bottom Hole Latitude/Longitude values.
175905	ASCII2 export writes B0 record for every well. Previously, ASCII2 file export missed the Latitude and Longitude records for some wells for exports supported by B0 record.
179670	The Calculate Formation option calculates the formations for Core Header tab in WellBase.
181352	Quick Filter dialog displays correctly after using the Customize Dialog button. Previously, after using the Customize Dialog button, the Quick Filter dialog was not displaying correctly.
181934	While calculating surveys with both Holding MD and Holding TVD constant, the easting and northing values are calculated for tops when Top MD is set to 0. Hence, the correct values display in the Easting and Northing column of the WellBase Formation tab. Previously, no values were calculated when Top MD was set to 0.
184603	Bottom Hole Latitude/Longitude values, using spreadsheet imports, update correctly and do not revert during survey calculation.

## WellBase/DefCon

ID	Description
170480	Using a customized GXI file, DLS Bottom Hole location is updated correctly.
175046	IHS 297 import error for 32 and 64 bit is fixed. Previously, during an IHS 297 import, an Out of Memory error message displayed on 32 bit machines due to memory leak in the import process.
178532	All locations for IHS 297 imports display correctly. Previously, for IHS 297 import with Regular settings set to either Overwrite All or Define Settings, the Texas location data displayed with T/R/S caption under the Scout Ticket view.

## QueryBuilder

ID	Description
150785	When deviated flag is selected, QueryBuilder returns the correct value as the query result. QueryBuilder previously returned 0 for all wells.
174789	Export query results are consistent with results shown in QueryBuilder. Previously, a project with X and Y extents showed incorrect results under CSV or TXT output files on exporting the query results for Latitude and Longitude fields.

## GeoAtlas

ID	Description
164573	The decimal precision for US Survey Feet unit is fixed and is compatible with ArcMap.

## Discovery on OpenWorks (DOW)

ID	Description
171678	Error message does not display on opening surface picks, log curves and ZoneManager tables in Well Data Manager for Discovery on OpenWorks Interpretation Project (DOW-IP).

## Known Issues

This section lists the known issues in this release.

### GVERSE Geomodeling/smartSECTION

ID	Description
189380	<p>In a smartSTRAT cross section, reloading a well without saving the Quick Picks displays an error message.</p> <p><b>Workaround:</b> Save the Quick Picks before reloading a well in the smartSTRAT cross section.</p>

### GVERSE Geophysics

ID	Description
181863	<p><b>GVERSE Geophysics 3D Module</b> - Faults may not be incorporated in structurally interpolated T/D models created with less than 3 wells with active velocity surveys.</p> <p><b>Workaround:</b> To incorporate faults in structurally interpolated models, wells with active velocity surveys should be at least three (3) in number.</p>
183427	<p><b>GVERSE Geophysics Main Interface</b> - Units for curves are not updated when user overwrites an existing curve.</p> <p><b>Workaround:</b> Units are updated once a curve is saved with a new name.</p>
186468	<p><b>GVERSE Geophysics 3D Module</b> - 3D View is unaware of 'Update Wells' process from main interface of GVERSE Geophysics.</p> <p><b>Workaround:</b> When the GVERSE Geophysics 3D Module is open, wells should be updated from the 3D Module instead of the main interface.</p>
187648	<p><b>GVERSE Geophysics 3D Module</b> – Wellbores located at the clipping extents boundary cannot be selected in 3D View.</p> <p><b>Workaround:</b> Change the <b>Well Drawing Mode</b> from <b>Tube</b> to <b>Line</b>. Well Drawing Mode is changed from the <b>Preferences</b> dialog box.</p>

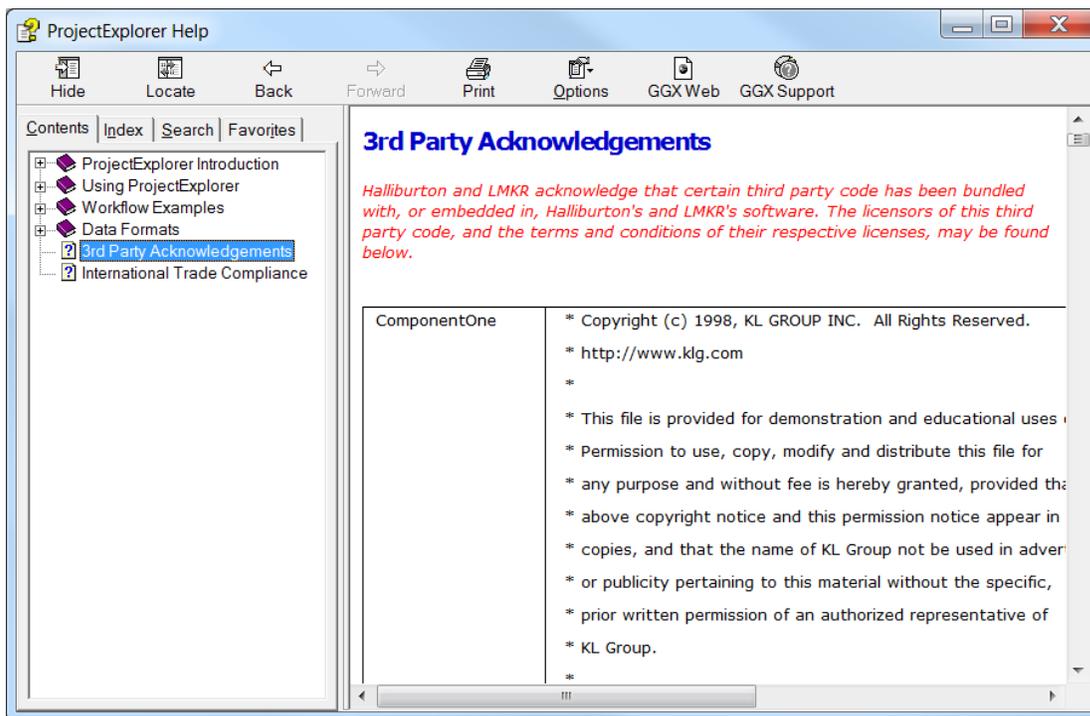
# Third Party Applications

LMKR uses various third-party applications in the development of its software.

LMKR acknowledges that certain third party code has been bundled with, or embedded in, its software. The licensors of this third party code, and the terms and conditions of their respective licenses, may be found in the GeoGraphix Help files:

1. Open your help files.
2. In the list of topics on the left, locate the **3rd Party Acknowledgements** topic and click to open the topic.

A list of third party applications and their details display.



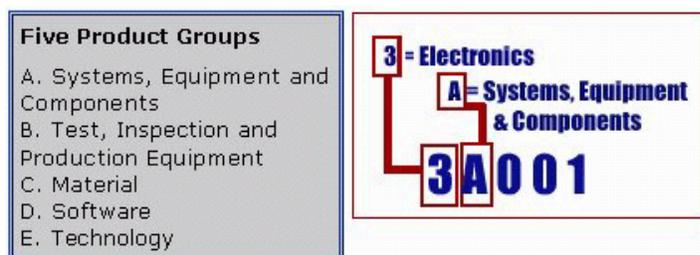
# International Trademark Compliance

This application is manufactured or designed using U.S. origin technology and is therefore subject to the export control laws of the United States. Any use or further disposition of such items is subject to U.S. law. Exports from the United States and any re-export thereafter may require a formal export license authorization from the government. If there are doubts about the requirements of the applicable law, it is recommended that the buyer obtain qualified legal advice. These items cannot be used in the design, production, use, or storage of chemical, biological, or nuclear weapons, or missiles of any kind.

The ECCNs provided here represent LMKR's opinion of the correct classification for the product today (based on the original software and/or original hardware). Classifications are subject to change. If you have any questions or need assistance please contact us at [support@lmkr.com](mailto:support@lmkr.com).

Under the U.S. Export Administration Regulations (EAR), the U.S. Government assigns your organization or client, as exporter/importer of record, responsibility for determining the correct authorization for the item at the time of export/import. Restrictions may apply to shipments based on the products, the customer, or the country of destination, and an export license may be required by the Department of Commerce prior to shipment. The U.S. Bureau of Industry and Security provides a website to assist you with determining the need for a license and with information regarding where to obtain help.

The URL is: <http://www.bis.doc.gov>.



## Definitions

CCATS (Commodity Classification Automated Tracking System) - the tracking number assigned by the U.S. Bureau of Industry and Security (BIS) to products formally reviewed and classified by the government. The CCATS provides information concerning export/re-export authorizations, available exceptions, and conditions.

ECCN - Export Control Classification Number - The ECCN is an alpha-numeric code, e.g., 3A001, that describes a particular item or type of item, and shows the controls placed on that item. The CCL (Commerce Control List) is divided into ten broad categories, and each category is further subdivided into five product groups. The CCL is available on the [EAR Website](#).

The ECCN number, License Type, and the CCATS Numbers for this product are included in the table below. Also included is the date the table was last updated.

Product/Component/R5000	ECCN Number	License	CCATS Number	Last Updated On
GeoGraphix	--	-	-	-
LMKR License Manager	5D002C.1	ENC	G055172	6/19/2007

## Contacting LMKR Support

LMKR is committed to providing the highest level of technical customer support in the industry. With an average tenure of more than thirteen years, our highly trained and experienced staff of technical analysts is comprised of geoscientists, engineers, land professionals, petrophysicists, and system specialists.

Please refer to our Customer Support timings mentioned below to ensure that you have access to our support analysts assigned to your region. When getting in touch with LMKR support, please remember that real-time support will not be available during bank holidays or after office hours. If you do get in touch with LMKR Support outside of work hours, please leave a voice message with a brief description of the issue that you are facing. Your voice message will be used to automatically create a support case for you. This will enable our analysts to attend to your issue and provide you with a resolution as soon as possible

North and South America	Europe, Middle East & Africa
<p>Monday – Friday 8 am-6 pm CST* Toll Free (US/Canada) : +1 855 GGX LMKR (449 5657)</p> <p><b>Colombia:</b></p> <p>+57 1381 4908</p> <p><b>United States:</b></p> <p>+1 303 295 0020</p> <p><b>Canada:</b></p> <p>+1 587 233 4004</p> <p><i>*Excluding bank holidays</i></p>	<p><b>UK:</b></p> <p>Monday - Friday 8 am – 5 pm* +44 20 3608 8042</p> <p><b>UAE:</b></p> <p>Sunday - Thursday (Dubai GMT+4) 8 am – 5 pm* +971 4 3727 999</p> <p><i>*Excluding bank holidays</i></p>
Asia Pacific & Australian Continent	Southwest Asian countries
<p><b>Malaysia:</b></p> <p>Monday - Friday (Kuala Lumpur GMT+8) 9 am – 6 pm* +60 32 300 8777</p> <p><i>*Excluding bank holidays</i></p>	<p><b>Pakistan:</b></p> <p>Monday - Friday (Islamabad GMT+5) 9 am – 6 pm* +92 51 209 7400</p> <p><i>*Excluding bank holidays</i></p>

## ***Helpful Links***

<b>Name</b>	<b>Website Address</b>
LMKR home page	<a href="http://www.lmkr.com">http://www.lmkr.com</a>
LMKR Support Portal	<a href="http://support.lmkr.com">http://support.lmkr.com</a>