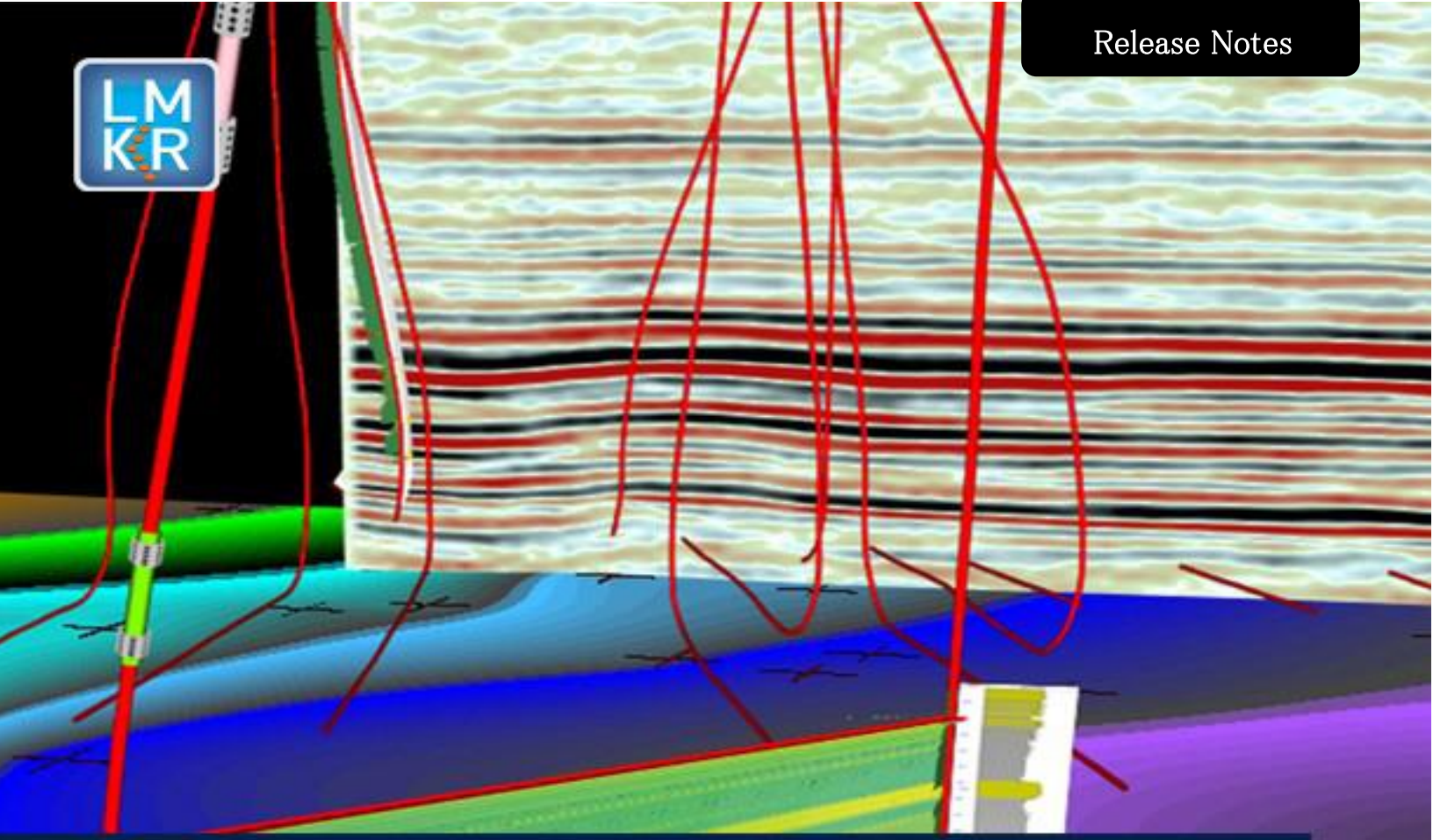

Release Notes

GEOGRAPHIX 2016

Release Notes for GeoGraphix 2016.1

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Note

The information contained in this document is subject to change without notice and should not be construed as a commitment by LMKR. LMKR assumes no responsibility for any error that may appear in this manual. Some states or jurisdictions do not allow disclaimer of expressed or implied warranties in certain transactions; therefore, this statement may not apply to you.

Contents

GeoGraphix® and Discovery™ on OpenWorks® 2016.1

LMKR is pleased to announce the release of the GeoGraphix® and Discovery™ on OpenWorks® 2016.1 software.

This release includes major technology upgrades, and also brings many new features, performance improvements and usability enhancements, which are highlighted in the New Features section of this document. The Fixed Issues section highlights the customer bugs fixed in this release. The Known Issues section lists the unfixed issues in this release.

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 2016.1 release.

Note: The GeoGraphix 2016.1 release is a license-control release that requires a new license file. In addition, there are mandatory upgrades to the License Management Tool (LMT) so that users can configure licensing for this release. This upgrade can occur before or after installation of the GeoGraphix 2016.1 software. See the "LMKR Licensing" section of the Installation Guide for Release 2016.1 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 2016.1 is an integrated product suite that incorporates shared data management and geological, petrophysical, and geophysical interpretation software. It utilizes a Sybase (GXDB) database in GeoGraphix Discovery mode, or accesses the OpenWorks®/SeisWorks® (Oracle) database in Discovery on OpenWorks mode.

The GeoGraphix software consists of the following:

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

PRIZM™

- An interactive petrophysical and log analysis system

smartSECTION® with FrameBuilder™

- The next generation geologic modeling and cross section tool for complex structural and sequence stratigraphic analysis and unconventional well planning and monitoring

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

SeisVision™

- The SeisVision comprehensive 2D/3D seismic interpretation system, which also includes a dynamic real-time link to SeisWorks®/OpenWorks®

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 SeisVision 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 2016.1 release are listed below.

- Microsoft® Windows® 10 support is added.
- SQL Anywhere 17.0 support is added.

smartSECTION

- Create Buffer Projected Cross Sections based upon specified buffer distance from the line of section. Click here for details.
- Draw color interpolation between log curves using the Interpolation feature. Click here for details.
- Highlight active well of PRIZM in smartSECTION. Click here for details.
- Create a custom font for the Interval Data Labels displayed on the smartSECTION cross section. Click here for details.
- Create multiple 3D Regions on the Map in smartSECTION. Click here for details.
- Apply seismic backdrop in smartSECTION cross section using any 2D/3D volume saved in SeisVision, select any color palette, and manually adjust the color range to match displays in SeisVision. Click here for details.

- Turn off the Surface Labels for soft points of the formation tops on wells in smartECTION cross sections. Click here for details.
- Launch GVERSE Planner directly from the well list in smartSECTION cross section. Click here for details.
- Draw Stratigraphic Column Manager lithologic patterns between surfaces in smartSECTION cross sections. Click here for details.

PRIZM

- Use a scanned image as a reference in the background for PRIZM crossplot and crop the image to size. Click here for details.
- Total*<Step> is added in the list of Summary Type options. Click here for details.
- Six new Data Posting Annotations are added to the Annotation drop-down. Click here for details.
- Import the Dipmeter data into the PRIZM database and display tadpole plots on the presentation template. Click here for details.
- View information of a directional survey of a well in log view. Click here for details.
- Create a multi-well report of zone summaries based upon minimum zone thickness or minimum zone breaks. Click here for details.
- Create a single well report of zone summaries based upon the minimum zone thickness or the minimum zone break thickness. Click here for details.

SeisVision

- Save preferred display settings and process parameters as a SynView template. Click here for details.
- New synthetic states are added to SynView. Click here for details.
- Add velocity control points in velocity model. Click here for details.
- Use the Distance Measurement tool to measure the time on the seismic section vertically. Click here for details.
- View errors generated by the application. Click here for details.

SeisXchange

- Data selection workflow is re-designed. Click here for details.

GeoAtlas

- GeoGraphix is compatible with ArcObjects 10.2.x and 10.3.x.
- Support for Blue Marble 7.1 is added.
- Create non-rectangular AOI. Click here for details.
- Active directory authentication support is added for ArcGIS portal. Click here for details.
- Use the trend and plunge tool on geologic maps to quickly view the values for intersecting surfaces. Click here for details.
- ESRI Direct DB Connect support added for Oracle/MS SQL and PostgreSQL. Click here for details.
- The angle tool now displays decimal numbers. Click here for details.

Coordinate System Manager

- GeoGraphix compatible with Blue Marble 7.1.

ProjectExplorer

- SQL Anywhere 17.0 is supported.
- Switch to any non-rectangular AOI. Click here for details.

WellBase

- Delete numerous types of data (erroneous or test data) present in WellBase tables. Click here for details.
- Filter option is added to the Zone Scan Calculator. Click here for details.
- View deviated wells. Click here for details.
- Tab text highlights blue if it contains data. Click here for details.
- Filter wells display. Click here for details.
- View or move wells. Click here for details.

Field Planner

- Plan fields with the new user interface. Click here for details.
- Add field planning slots to existing pads/laterals individually. Click here for details.
- Associate existing wells present in the database with field planning slots. Click here for details.
- Move saved wells to slots, laterals, and well pads. Click here for details.
- Duplicate well pads with their assembly in the GeoAtlas Map. Click here for details.
- Duplicate well pads from Field Planner. Click here for details.
- Plan stacked laterals. Click here for details.
- Delete slots in GeoAtlas. Click here for details.
- Delete well pads. Click here for details.

Pro 3D

- Support for SSDX format is added. Click here for details.
- Project units display in the status bar. Click here for details.
- 3D perspective Views and Capture Screen buttons are available as separate buttons. Click here for details.
- Load perforations data. Click here for details.
- Double-click on any item (except surfaces) in the Region Items pane to zoom in to that particular well. Click here for details.
- View wells specific to a cross section in the Region Items pane. Click here for details.
- Microseismic and perforations data folders are available in the Region Items pane. Click here for details.
- Groups can be renamed. Click here for details.

For details on the above new features, fixed issues and known issues for the GeoGraphix 2016.1 release, please click on the following.

- New Features
- Fixed Issues
- Known Issues

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:

- The GeoGraphix 2016.1 release is a license-control release that requires a new license file. In addition, there are mandatory upgrades to the License Management Tool (LMT) so that users can configure licensing for this release. This upgrade can occur before or after installation of the GeoGraphix 2016.1 software. See the "LMKR Licensing" section of the Installation Guide for Release 2016.1 for more information.
- Discovery on OpenWorks is compatible with OpenWorks for Windows 5000.10.1.05 and SeisWorks 5000.10.
- Please also refer to the GeoGraphix Customer Support Portal (http://support.lmkr.com) for up-to-date information on system requirements for all GeoGraphix products.

GeoGraphix Workstation and Laptops

The requirements for GeoGraphix Workstation and Laptops are as follows:

Software and Hardware 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	RAM	CPU
Windows® 7 Professional x64 Or Windows® 7 Enterprise x64 Or Windows® 7 Ultimate x64 Or Windows® 10 x64	8 GB Minimum 16+ GB recommended	Pentium i5/i7 or any Quad Core Processor

Additional Requirements and Recommendations

- DVD-ROM required for media installation. Download installation available through Electronic Software Delivery at http://support.lmkr.com.
- DCOM/Firewalls configured to allow remote access. Only necessary if sharing projects.
- Microsoft .NET 4.5.1 runtime required.

Graphics Hardware Requirements

We recommend the following Graphics Hardware to run the GeoGraphix applications:

Applications	Required Operating System	Graphics Hardware
All GeoGraphix Applications including Discovery 3D and advanced 3D visualization (Pro 3D)	All Supported	2 GB Minimum 4 GB Recommended DirectX 11 capable hardware (see Note 2)
GeoGraphix Applications except for Discovery 3D and advanced 3D visualization (Pro 3D)	All Supported	All Supported

Note 1: It is recommend to use the latest video drivers and MS updates for your system. Microsoft DirectX End-User Runtime (June 2010) is required to run Discovery 3D and advanced 3D visualization (Pro 3D).

Note 2: To run Discovery 3D and advanced 3D visualization (Pro 3D), it is recommended that an NVIDIA DirectX 11 compatible card be used.

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 or 2010 (32-bit or 64-bit)
Selected Help files	Adobe Reader
For Discovery on OpenWorks, GridXchange, and SeisXchange	OpenWorks for Windows 5000.10.1.05 – Basic or Full (recommended) Install available on Landmark's LSM. (See Notes below), 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 (included in the 3rd Party Installer)
For LOGarc™ Version 3.2.1.00 or 4.1.0.3 access in smartSECTION	To use the LOGarc™ feature, the LOGarc™ Version 3.2.1.00 or 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.

Notes 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 10.2.0.1.0 or Oracle client 11.2.0.2
- SQL*Plus 10.2.0.1.0, or Oracle client 11.2.0.2
- Oracle JDBC/THIN Interfaces 10.2.0.1.0, or Oracle client 11.2.0.2
- Oracle Net 10.2.0.1.0, or Oracle client 11.2.0.2

After these Oracle components are installed, run the upgrade patch to Oracle 10g 10.2.0.4 (32-bit)

GeoGraphix Project Server

The requirements for GeoGraphix Project Server are as follows:

Software and Hardware 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	RAM	CPU
Windows® Server 2008 R2 Standard x64 or Windows® Server 2008 R2 Enterprise x64	32 GB Minimum 64+ GB Recommended SSD Drives Recommended	Intel Xeon Processor or Equivalent Quad 2.4GHz 64-bit or better

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 white papers on the LMKR Support Portal.

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	2016.1	2015.1	2015.0	2014.0	2013.0	2012.0.0	5000.0.2.5	5000.0.2.1	5000.0.2.0	5000.0.1.1
	OW 5000.10.3.01	**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**	**R**			
	OW 5000.0.3.0						**C**	**C**	**R**		
	OW 5000.0.2.9						**U**	**U**	**U**	**U**	
	OW 5000.0.2.8						**U**	**U**	**U**	**U**	
	OW 5000.0.2.7						**U**	**R**	**R**	**R**	
	OW 5000.0.2.2										**R**
	OW 5000.0.2.0										
	OW 5000.0.1.7										
	OW 5000.0.1.6										
	OW 5000.0.1.5										
	OW 5000.0.1.4										
	OW 5000.0.1.2										
	OW 5000.0.1.1										
	OW 5000.0.0.3										**R**

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 2016.1 release.

Microsoft® Windows® 10 is supported

SQL Anywhere 17.0 is supported

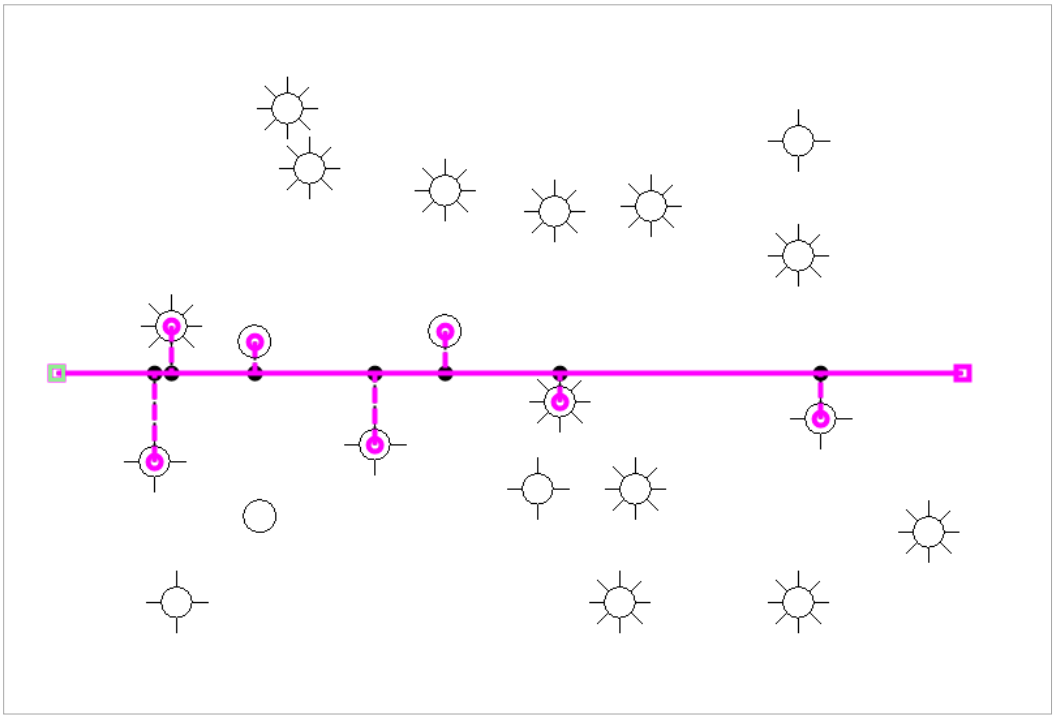
smartSECTION

This section describes the updates made in smartSECTION.

Buffer Projected Cross Section

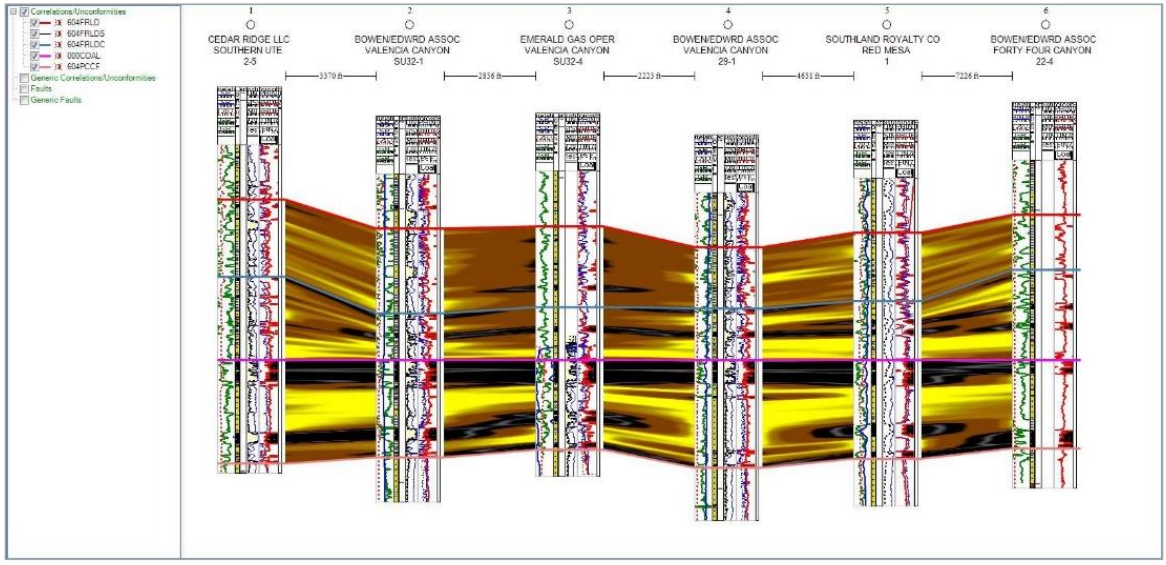
Create Buffer Projected Cross Sections based upon specified buffer distance from the line of section. The wells within the defined buffer distance are automatically included in the cross section. You can also move the line of section across the Map View to add new wells.

Buffer Projected cross sections can be created from the **Cross Section** menu >> **Define Buffer Projected** option. Further you can specify the buffer distance and scroll value for the cross section, from the **Set Buffer/Scroll Value for Loading Wells** dialog.



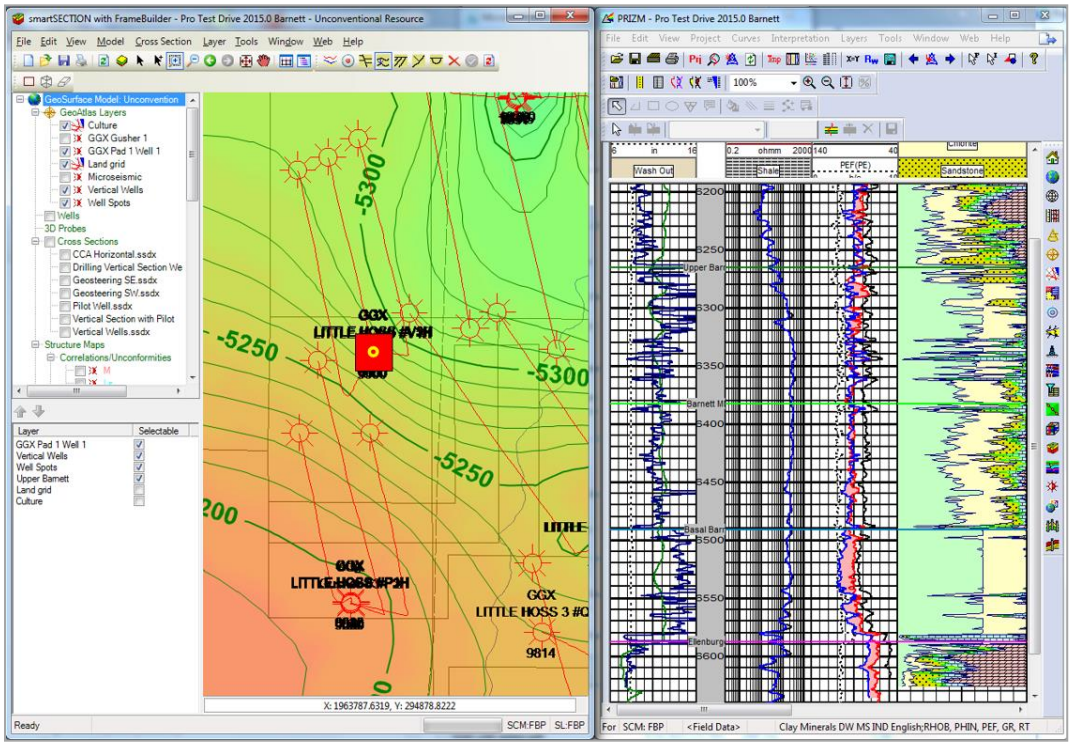
Curve Interpolation Color Fill

Use the Interpolation feature to draw color interpolation between log curves. This is based upon the interpolation of values of the selected digital curve between adjacent wells. The interpolation is guided stratigraphically by selecting interpolation method options of Stretch/Squeeze, Top Removal, or Bottom Removal. You can use curve interpolation in all three modes; i.e. Straight Line, True Space, and Deviated Wells.



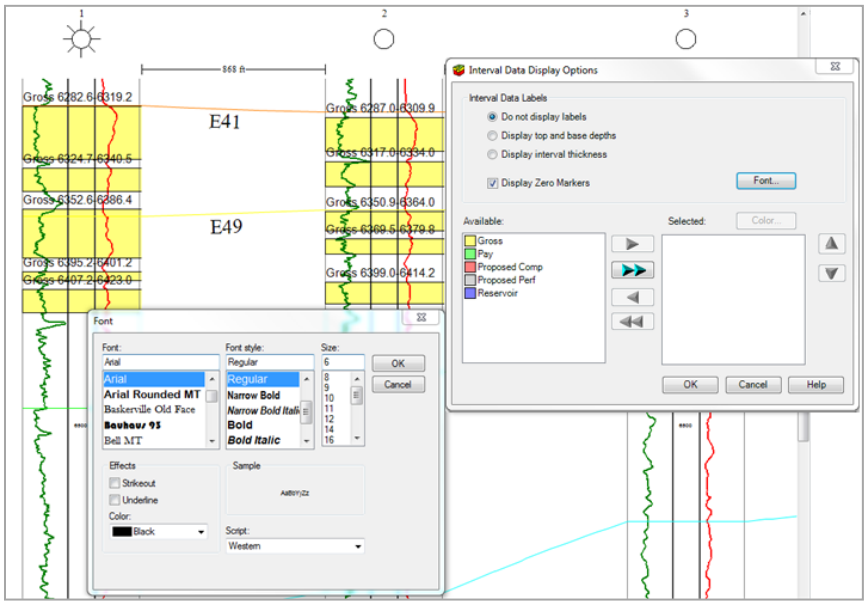
Highlight Active PRIZM Well in smartSECTION

Highlight the active well of PRIZM in smartSECTION. To view the active well in smartSECTION, right-click the log view in PRIZM, and then choose **View Active Well >> In smartSECTION** from the context menu. The well appears highlighted in smartSECTION.



Interval Label Fonts

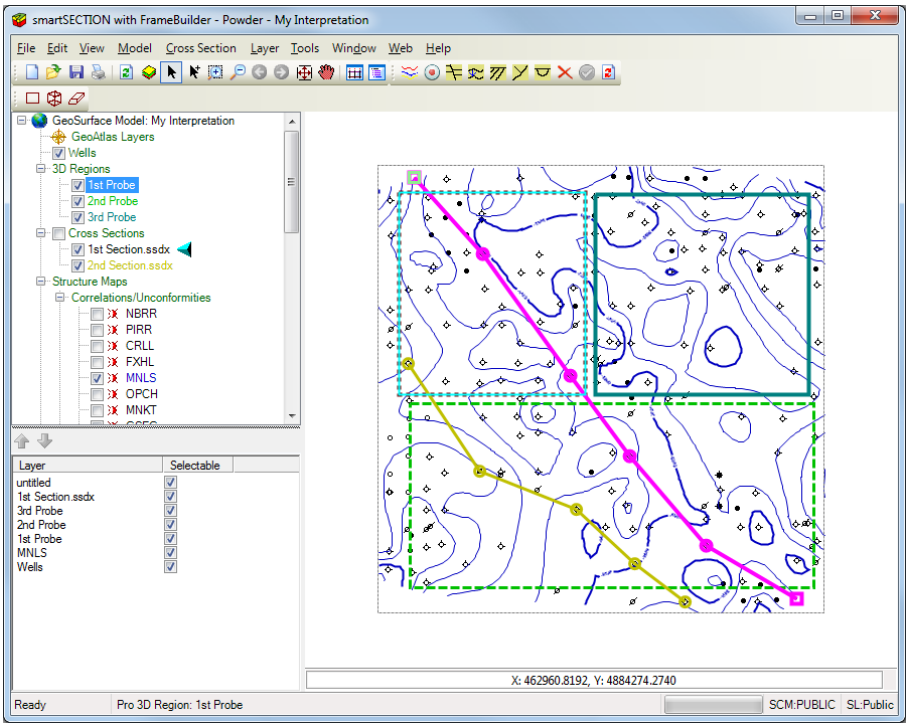
Create a custom font for the Interval Data Labels displayed on the cross section. Click **Font** from the **Interval Data Display Options** dialog to define your desired font settings.



Persist Reveal/Pro 3D Regions

Create multiple 3D Regions on the Map in smartSECTION. Further you can resize the 3D Region, drag it to adjust its position on the Map View, and right-click its boundary to access the context menu for more options.

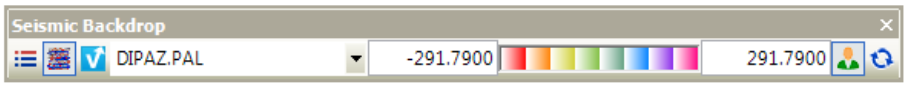
To create a 3D Region on the Map View, choose **View >> Toolbars >> Pro 3D,** and then choose **Create 3D Region**.

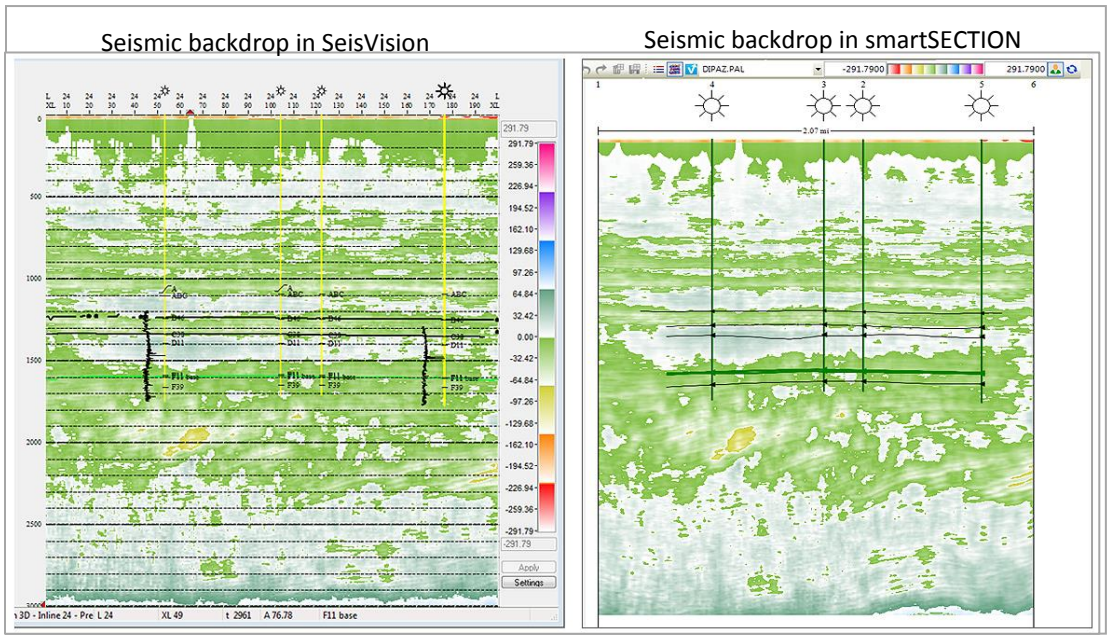


Seismic Backdrop Toolbar

Apply seismic backdrop in smartSECTION cross section using any 2D/3D volume saved in SeisVision. Default values of SeisVision palette are used for creation of seismic background. You can also use the custom minimum and maximum scale values to match the seismic backdrop of smartSECTION with that of SeisVision.

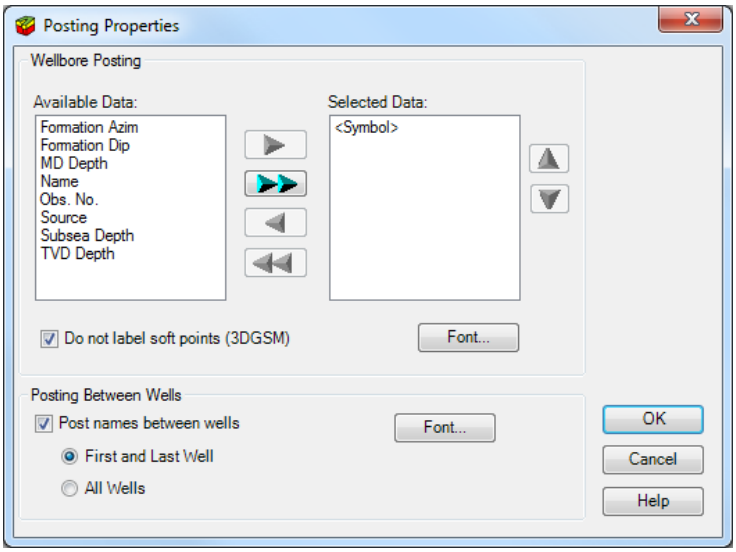
To use these options, select **View >> Toolbars >> Seismic Backdrop** from the menu in Cross Section view.





Surface Labels for Soft Points

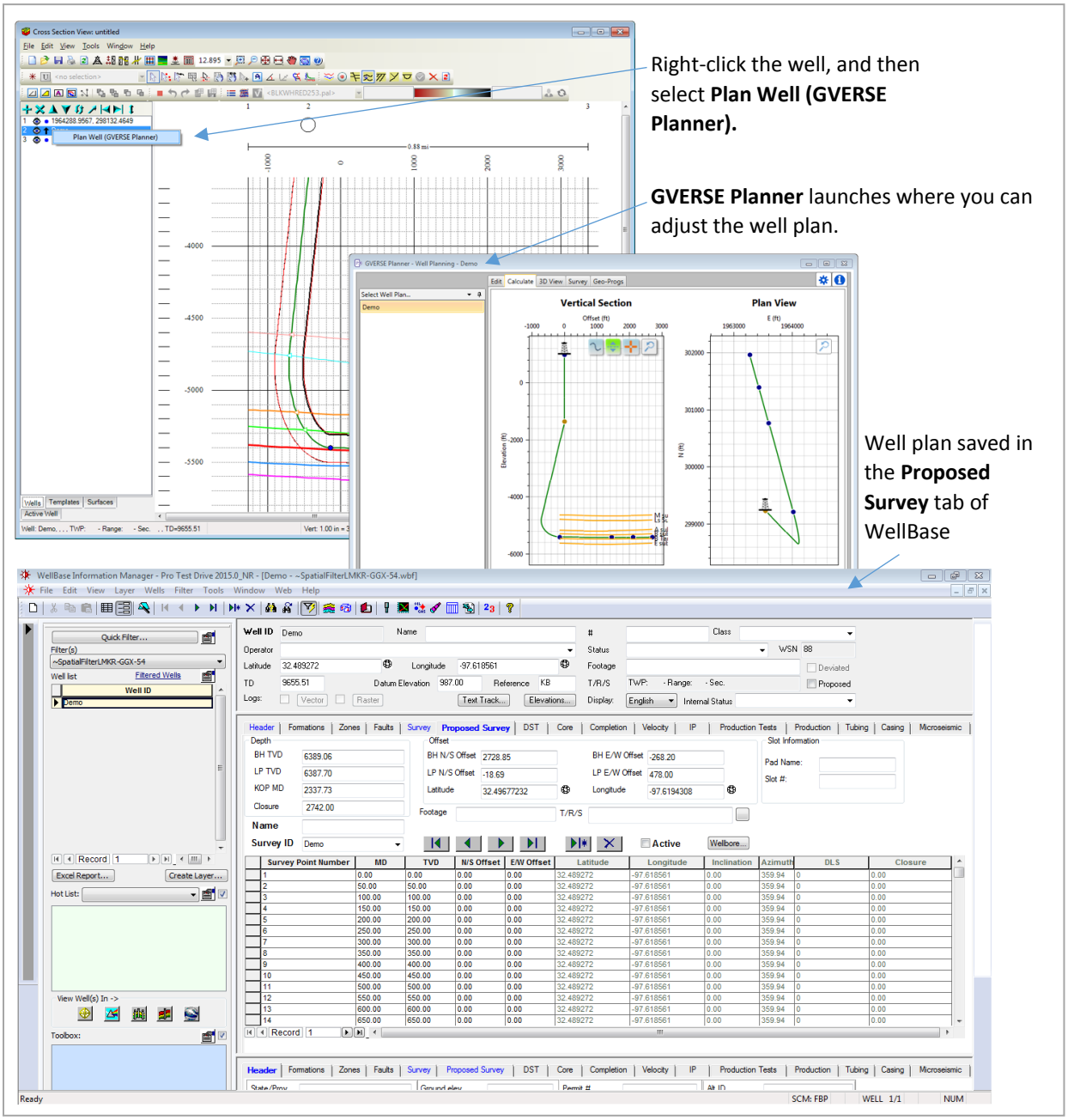
Turn off the Surface Labels for soft points of the formation tops on wells. To do so, go to **Cross Section Display Preferences** dialog **>> Surfaces tab >> Posting Properties >>** and check the option **Do not label soft points (3DGSM).**



smartSECTION / GVERSE Planner / WellBase Integration

Launch GVERSE Planner directly from the well list in smartSECTION cross section. You can also interactively digitize your well plan in smartSECTION, and adjust the well plan in either smartSECTION or GVERSE Planner. The well plan is automatically saved in the Proposed Survey tab of WellBase.

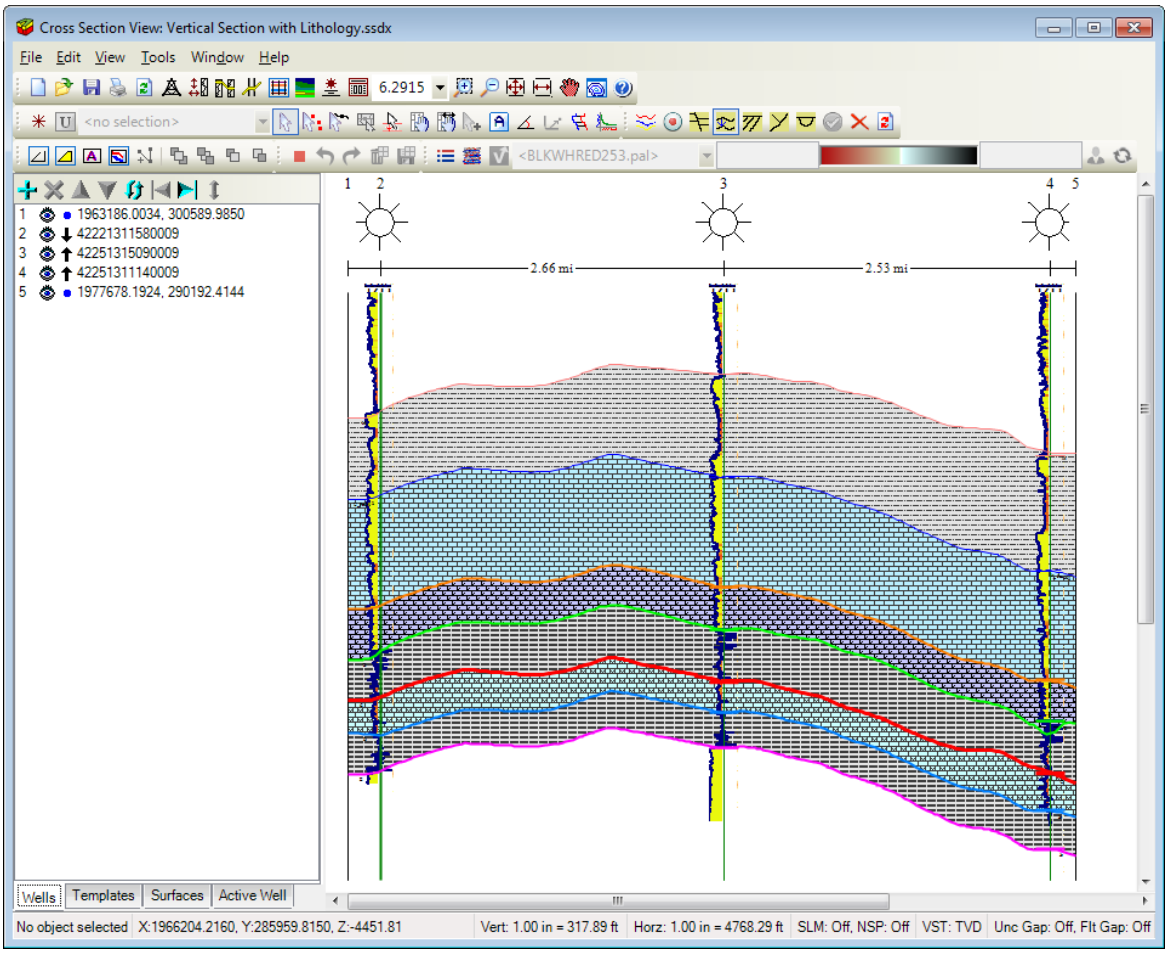
To launch GVERSE Planner from smartSECTION, right-click the well from the **Wells Selection Panel,** and then choose **Plan Well (GVERSE Planner)**.



Start Column Manager Lithology Fills in Cross Sections

Use lithology patterns based upon the defined lithology in the Strat Column Manager to display the formations across the wells. Alternatively, you can use the line color to fill the formation if the lithology is not defined.

To fill the surfaces with the formation lithologies, choose the **Edit >> Surfaces >> Fill Surfaces using Lithology Fill** option.



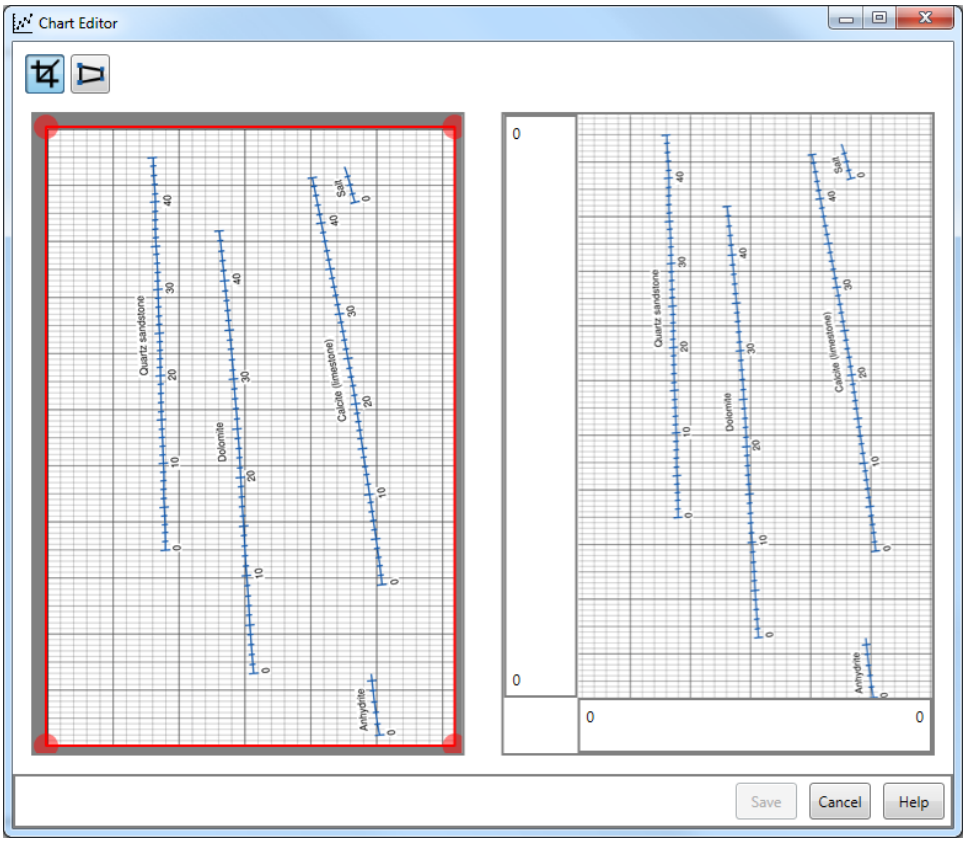
PRIZM

This section describes the updates made in PRIZM.

Crossplot Chart Editor

Use a scanned image as a reference in the background for PRIZM crossplot, further you can edit the image according to your interpretation requirement. Use the Chart Editor to crop or skew the image and adjust it to the extents you want to use in the background.

To edit the image of the Background Chart, go to **Crossplot Template Properties** dialog **>> Background Chart >> Edit.**



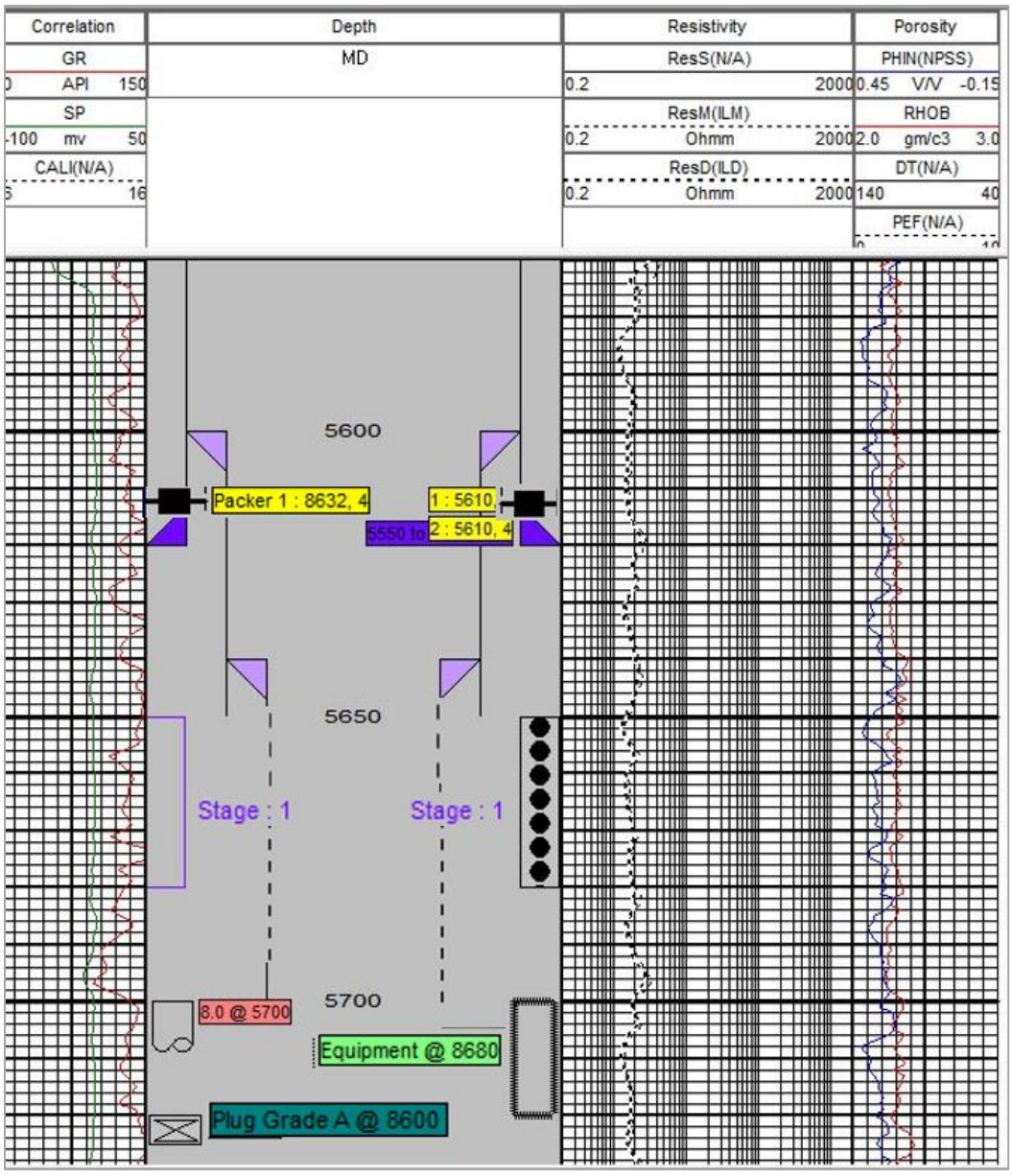
Summary Type Option

A new option of **Total*<Step>** is added in the list of **Summary Type** options. It multiplies the Total Value (sum of all numbers) by the step interval to calculate the true thickness of flag curve attributes if the step is not 1.

Data Posting Annotations

Six new Data Posting Annotations are added to the Annotation drop-down, which include; Equipment, Packer, Plug, Perforation Stage, Tubing, and a new liner type Slotted Liner. These new additions currently only work with GXDB.

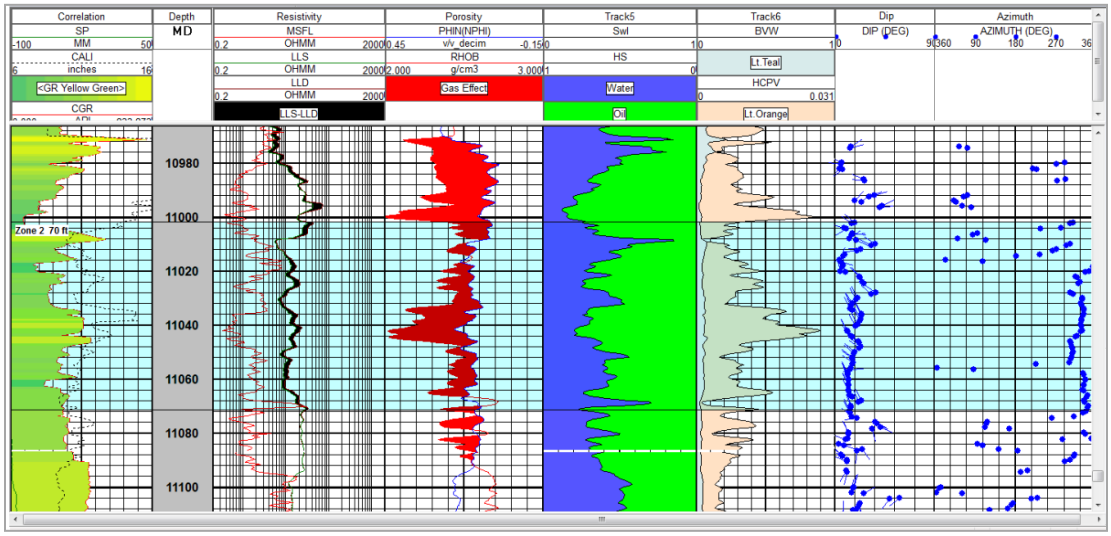
To use these annotations, go to **Edit >> Data Posting >> Add,** and then choose the required annotation from the **Annotation** drop down.



Dipmeter Data Visualization

Import the Dipmeter data into the PRIZM database, and use it to graphically display as well as analyze the dip information. You can also view the Dipmeter data, and export it for your record.

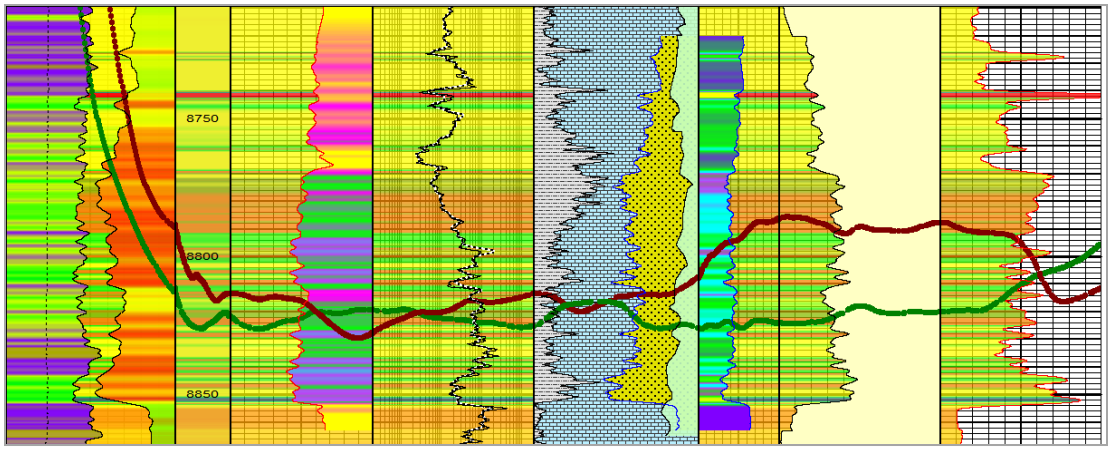
To import the Dipmeter data for visualization, choose **File >> Import >> Dipmeter Data Import**.



Lateral Curves

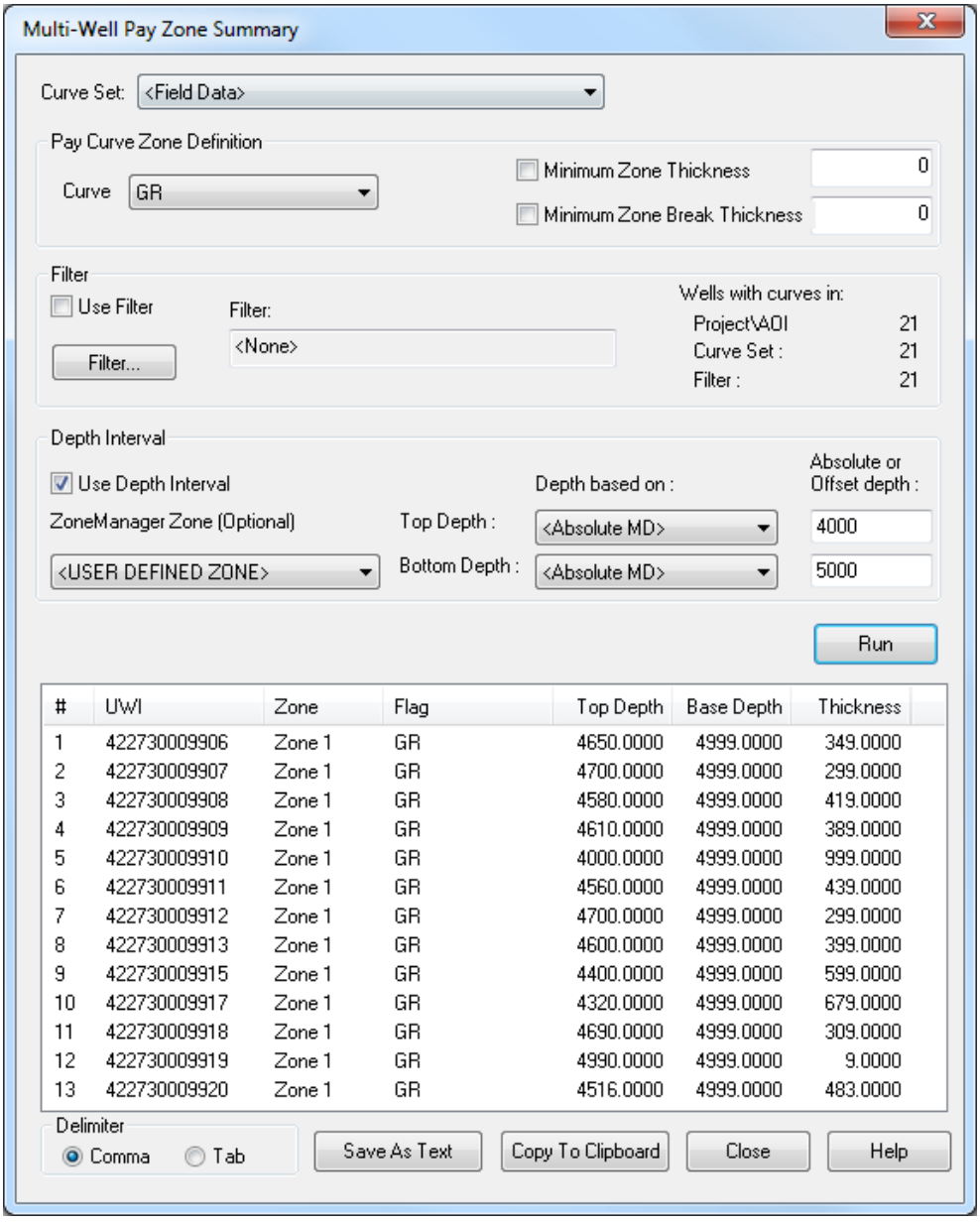
To the view information of a directional survey of a well in log view, insert the Lateral Curves on top of your PRIZM template and view all the formations that a borehole crosses. You can also set unique attributes of the Lateral Curves to differentiate them from the curves in the background. Lateral Curves are saved as annotations and are only available in PRIZM templates.

To insert the Lateral Curves, go to **Edit >> Lateral Curves >> Add.**



Multi-Well Pay Zone Summary

Using the Multi-Well Pay Zone Summary option, you can prepare a multi-well report of zone summaries, based on the values of minimum zone thickness and minimum zone break thickness.



Single Well Pay Zone Summary

Using the Pay Curve Zone Definition option, you can create a single well report of the zone summaries based upon the minimum zone thickness or the minimum zone break thickness.

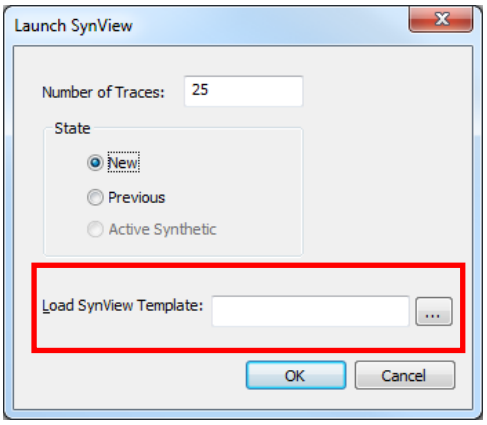
SeisVision

This section describes the updates made in SeisVision.

Saving/Loading SynView Templates

You can save preferred display settings and process parameters as a SynView template. You can load a saved template while launching SynView to apply the saved settings to your synthetic seismogram.

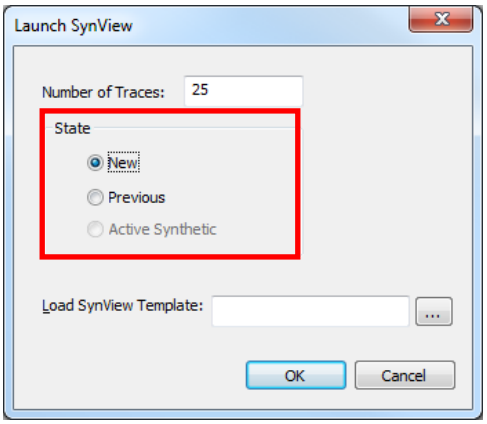
SynView templates can be saved by selecting **File >> Save SynView Templates** from the main SeisVision window. You can load the saved SynView templates by selecting the required file from the Launch SynView dialog (**Tools >> SynView**).



New Synthetic States in SynView

When launching SynView, you can select the initial SynView state. You can open a new synthetic, load the last viewed, or the active synthetic for the well.

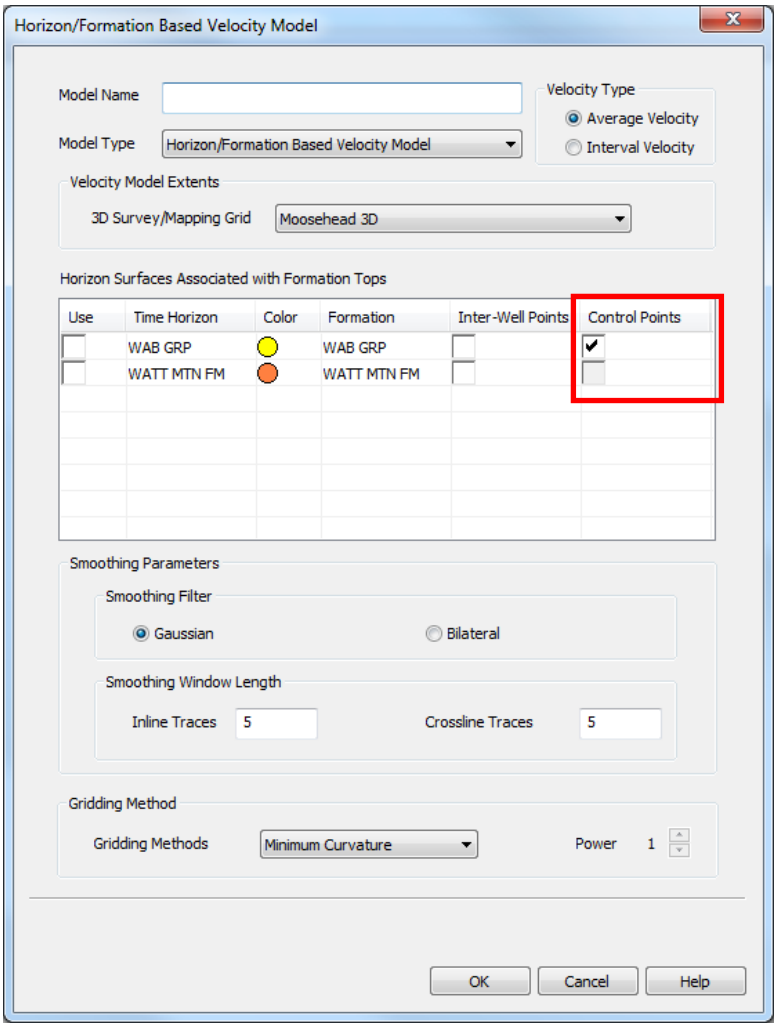
The SynView state can be selected from the Launch SynView dialog. This dialog is accessed by selecting **Tools >> SynView** from the menu. This option is only enabled when a well is selected in Main Map View (MMV).



Adding Velocity Control Points in Velocity Model

You can add the velocity control points associated with a particular surface when creating a velocity model. This gives an accurate and reliable velocity model that can be used in all the relevant GeoGraphix applications**.** This option is available for surfaces that have velocity control points associated with them.

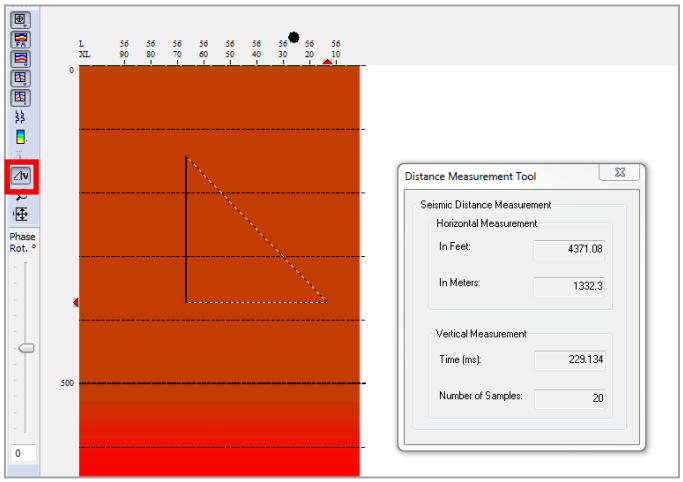
You can access the Velocity Model dialog by selecting **Depth Conversion >> Create Velocity Model.** You can include as many control points as required by selecting the adjacent check-box while creating the velocity model.



Distance Measurement Tool

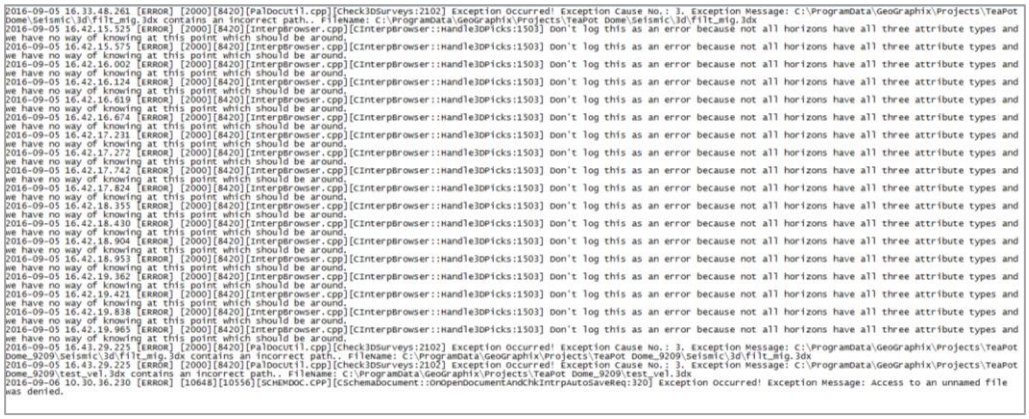
The Distance Measurement tool is used to measure time on the seismic section vertically. It also calculates the number of samples.

The Distance Measurement Tool can be used by clicking the **Distance Measurement Tool** button from the Seismic View toolbar.



Error Logs

Error logs are maintained and contain useful information in case the application crashes, or gives an error.

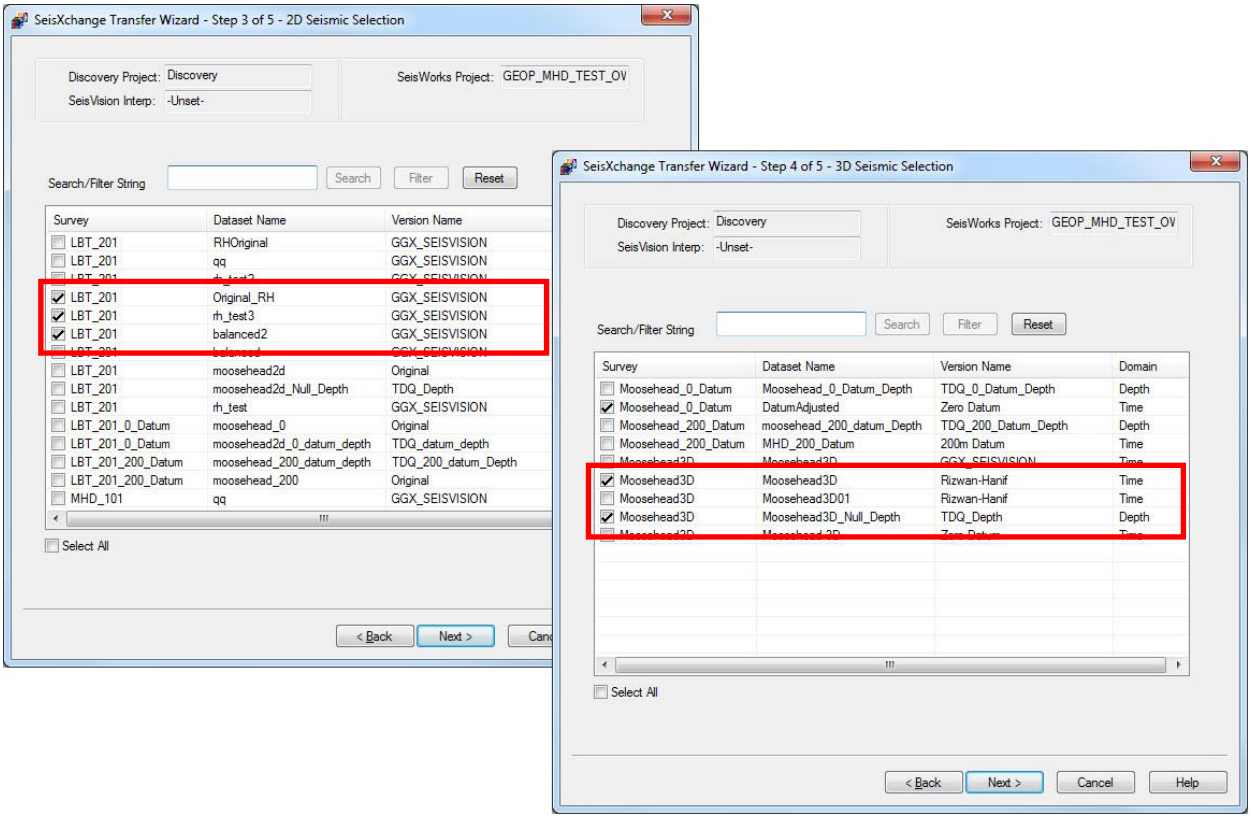


SeisXchange

This section describes the updates made in SeisXchange.

Data Selection Workflow Re-Designed

SeisXchange workflow is re-designed to include data selection boxes, 2D/3D datasets and surveys; these can be selected through separate columns for survey, dataset, version, and domain. In the same manner, you can also select horizons, faults and surfaces. The exported file to SeisVision contains the survey, version and dataset information. This information is included in the file name when it is exported to SeisVision.



GeoAtlas

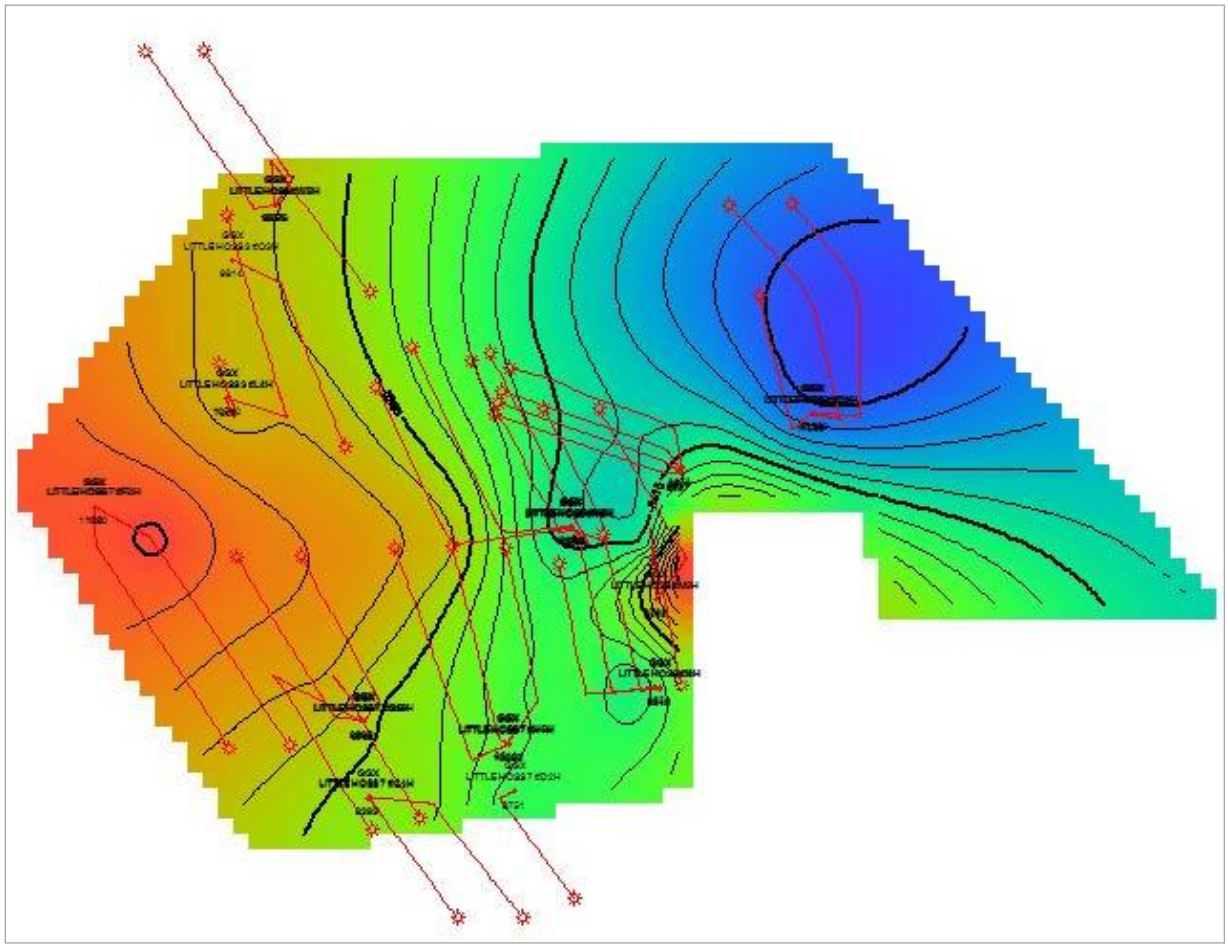
This section describes the updates made in GeoAtlas.

GeoGraphix 2016.1 is compatible with ArcObjects 10.2.x and 10.3.x

Support for Blue Marble 7.1 is added

Creating Non-Rectangular AOI

Create non-rectangular AOI to accurately delineate the prospect area that you are currently working on. Choosing **AOI >> Create >> Non Rectangular AOI** in Map View mode changes the cursor into a Non Rectangular Area of Interest selection tool (an arrow enclosed in a non-rectangular box), which is used to create a new Area of Interest. The image below shows a non-rectangular AOI selected in GeoAtlas.



Active Directory Authentication Support for ArcGIS Portal

Connect to ArcGIS Portal configured with integrated windows authentication, to publish or import layers from ArcGIS Portal, improving overall data security, management, and usability.

Trend and Plunge Tool

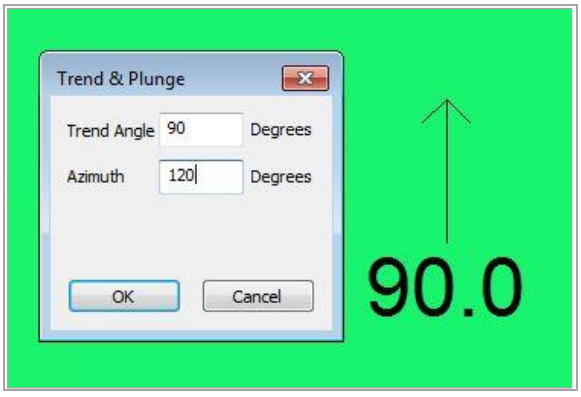
Use the trend and plunge tool on geologic maps to quickly view the values for intersecting surfaces. Use one of the following methods to open the Trend and Plunge dialog box:

- Select **Trend and Plunge** option from the **Draw** menu.

Or

- Click  on the **Edit** Toolbar.

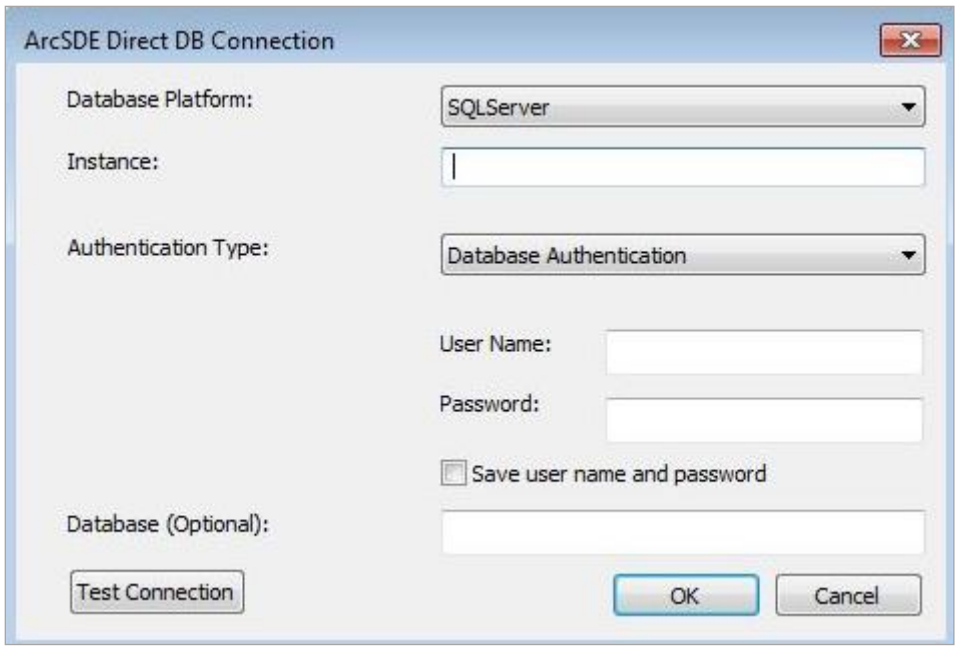
Enter the required Trend Angle and Azimuth values, and view the changes in the GeoAtlas map.



ESRI Direct DB Connect Support for Oracle/MS SQL and PostgreSQL

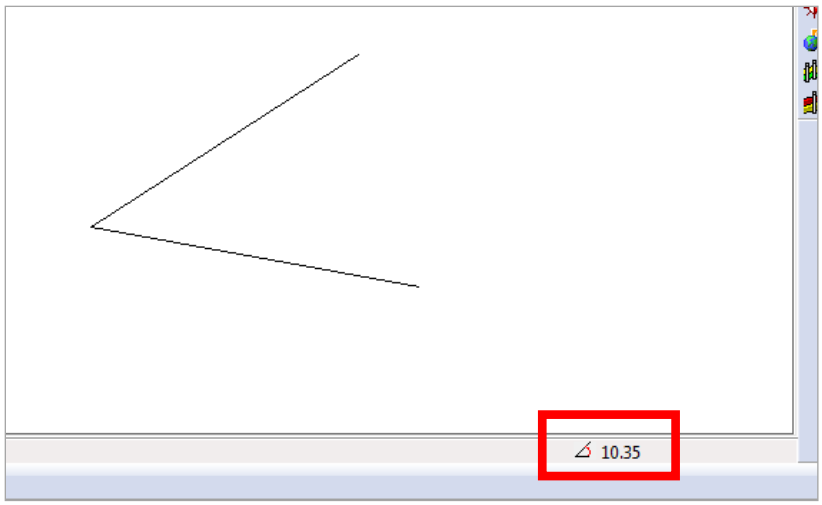
The users can use the ArcGIS Direct Connect option to connect to an enterprise spatial database using Direct Connect, instead of SDE. Both Database and Active Directory authentication are supported with Direct DB Connect.

To open the ArcSDE Direct DB Connection dialog box, either click the **Add Connection** button or the **Edit Connection** button on the **Data Source Selection** dialog box.



Decimal Values for the Angle Tool

For precise calculation, the angle tool now displays decimal numbers. The values display in the status bar of the GeoAtlas application window.



Coordinate System Manager

This section describes the updates made in Coordinate System Manager.

GeoGraphix is compatible with Blue Marble 7.1

ProjectExplorer

This section describes the updates made in ProjectExplorer.

SQL Anywhere 17.0 is supported

Non-Rectangular AOI

You can switch to any non-rectangular AOI and look into its properties from ProjectExplorer.

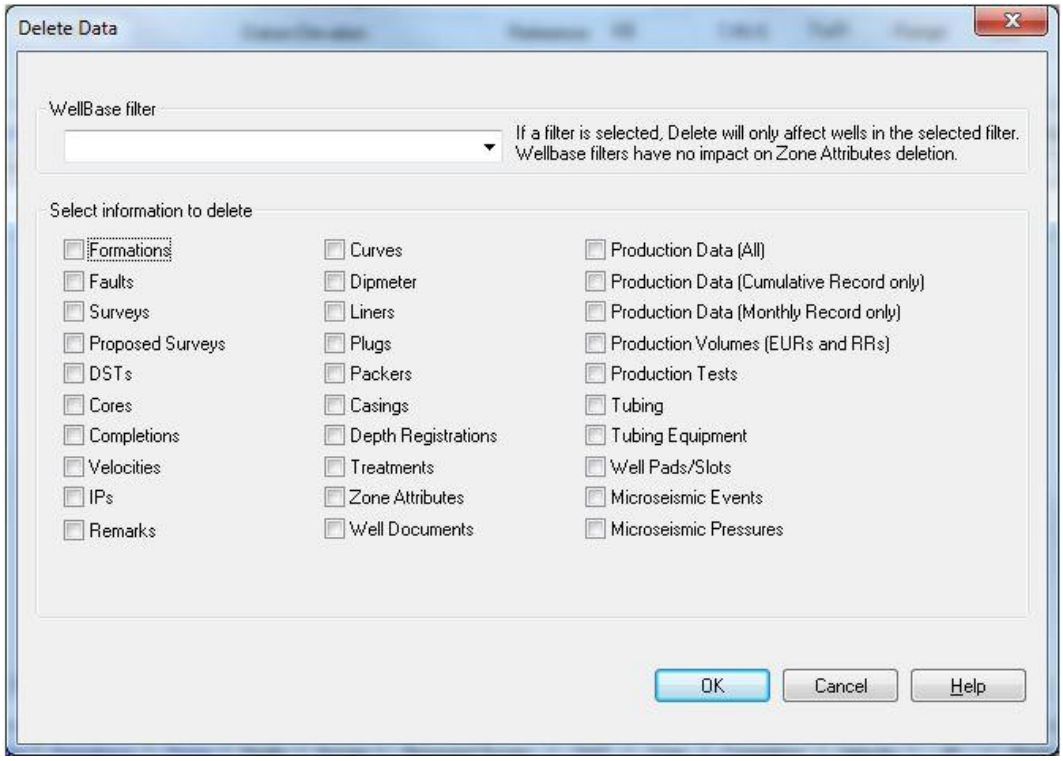
WellBase

This section describes the updates made in WellBase.

Deleting Data

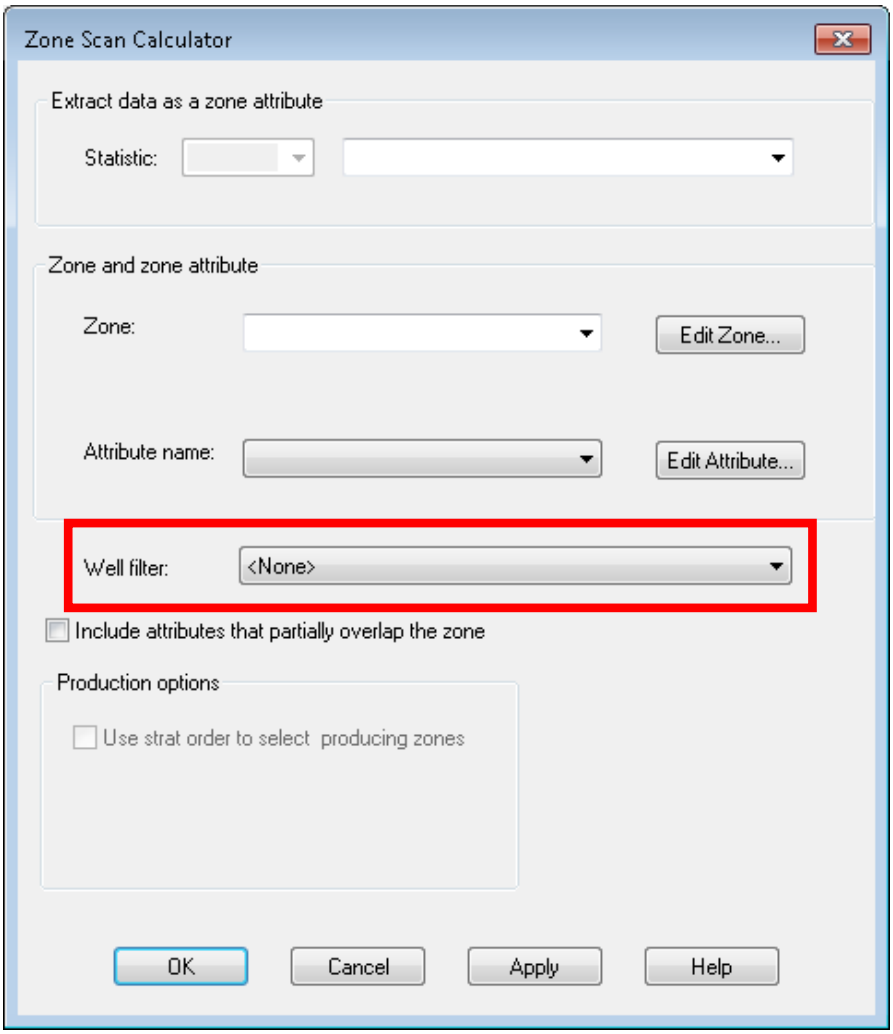
Delete numerous types of data (erroneous or test data) present in WellBase tables using the Delete Data feature.

Select **Wells >> Delete Data** to open the **Delete Data** dialog box. Use this dialog box to delete information from individual tables in the WellBase data base.



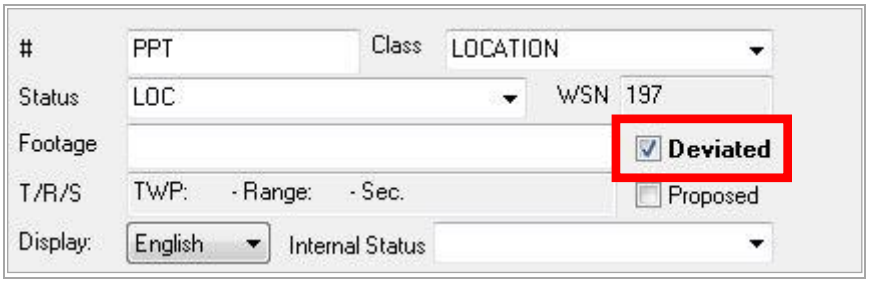
Zone Scan Calculator using Filter Selection

The **Well Filter** option is added to the **Zone Scan Calculator** dialog box to scan information with the help of filtered data. This information (depths, volumes, intervals, etc.) can then be imported into the zone as attributes for the filtered wells. This feature saves you time when you have a large dataset.



Viewing Deviated Wells

The **Deviated** check box in the **Well Scout** ticket indicates if the well is deviated. This helps you create better filters and streamline your search. This check box is dependent on the survey information and is only available for selection if survey point data is available.



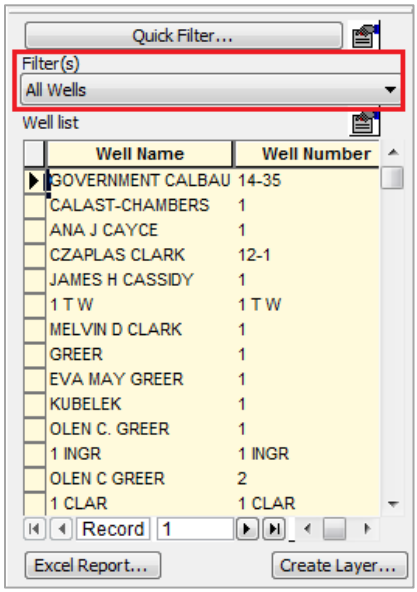
Tab Text Highlights Blue if it Contains Data

The color of tab label text in Information Manager changes to blue if it contains data. Previously, you had to manually scroll through the tabs to view if they contained any data.

In the image below, the label of the Remarks tab is blue and **bold**, indicating that it contains data.

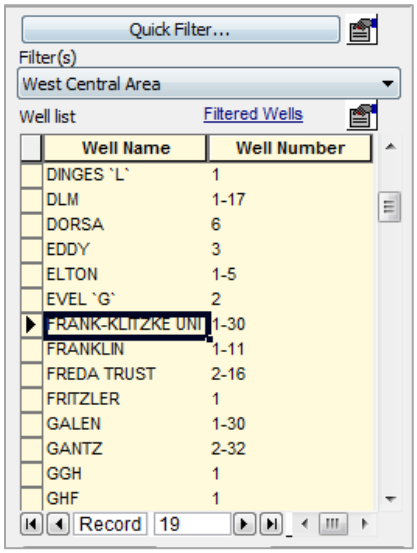
Filtering Wells Display

Use the Quick Filter feature to limit the display of wells in Information Manager to only those wells that meet the specified filter criteria. This feature is synced with WellBase Scout Ticket and List View.



Viewing/Moving Wells

Navigate to any well in Scout Card View by selecting a well in the list control located on the WellBase bar.



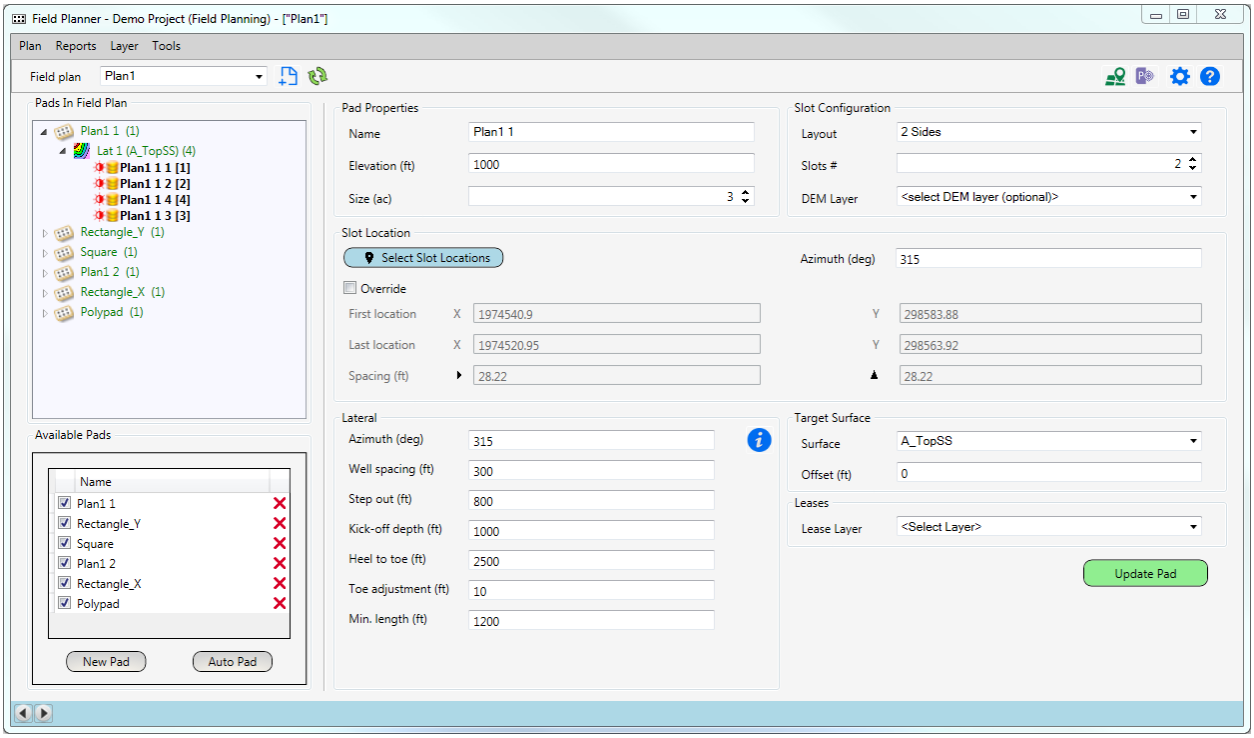
Field Planner

This section describes the updates made in Field Planner.

Plan Fields with New User Interface

The field planning workflow User Interface is enhanced to further improve the user experience, as follows:

- Field planning workflows are simplified to reduce the number of steps to carry out the necessary tasks.
- Interactive interface guides you through the entire field planning process.
- Change the color theme of the Field Planner as required.
- Automatically update only active well pads using the **Automatic Well Pad** option.



Add Slots

Add field planning slots to existing pads/laterals individually. This provides greater flexibility in planning unconventional/horizontal wells. To do so, in the Field Planner tree, right-click on either a well pad or a lateral, and then select **Add Slot**.

Associate Wells with Slots

Associate existing wells present in the database with field planning slots. To associate a well with a slot, in the Field Planner tree, right-click on a well, and then select **Associate Well**.

The saved wells can be associated from:

- Slot to slot.
- Slot to lateral.
- Slot to well pad.

Move Wells within Plans

Move saved wells to slots, laterals, and well pads, allowing more flexibility planning fields. To move wells, in the Field Planner tree, select a saved source well, and then either:

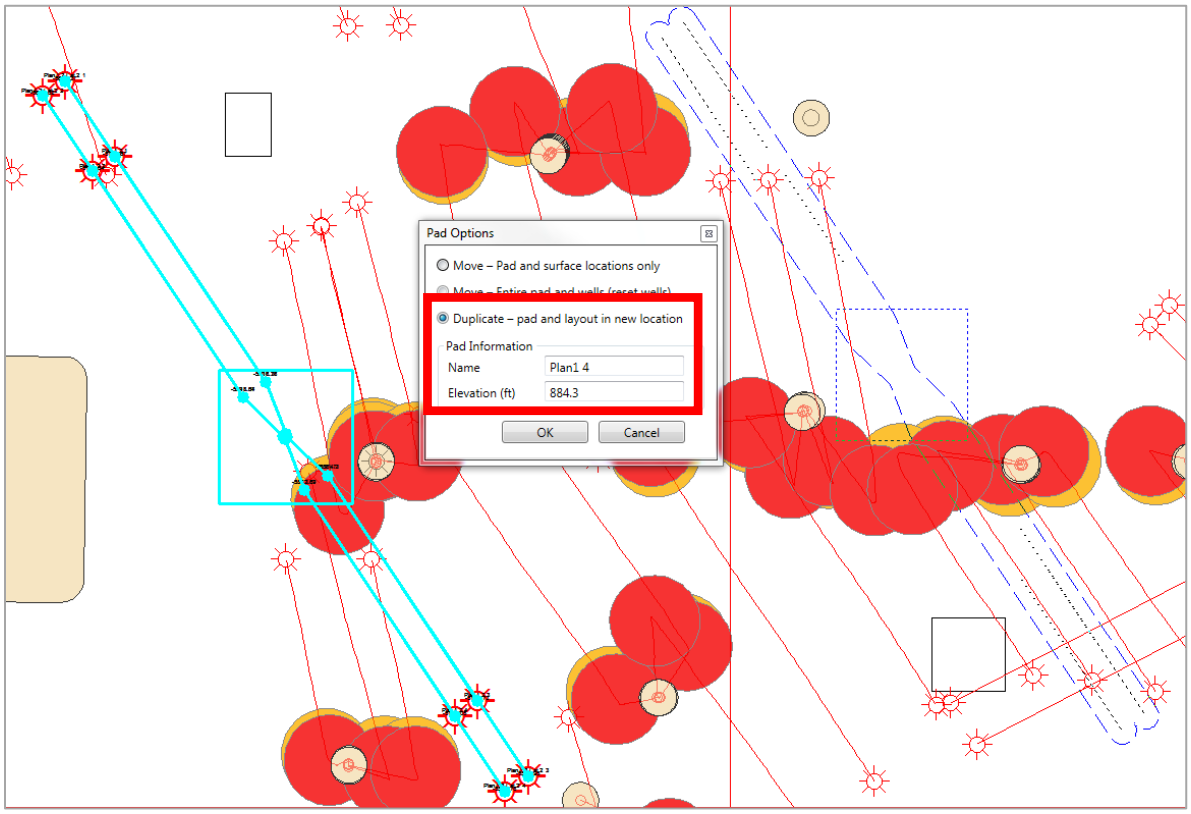
- Drag & Drop the well to the target slot location in the Field Planner tree.

Or

- Right-click the source well and select **Move** from the context menu.

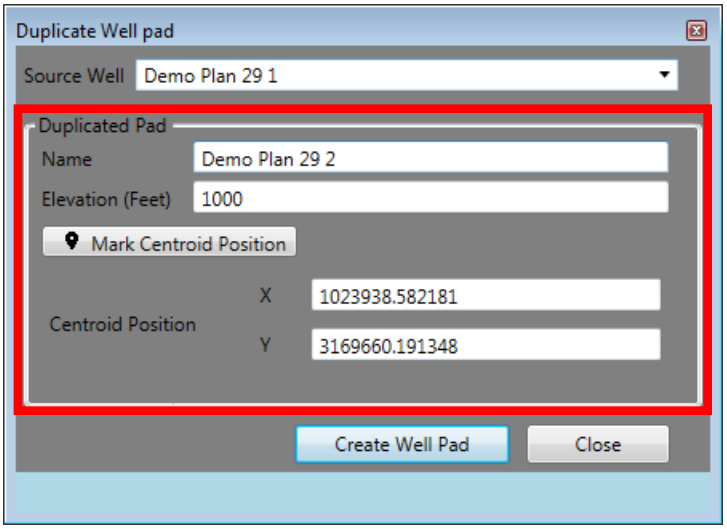
Duplicate Well Pads in GeoAtlas

Duplicate well pads with their assembly in the GeoAtlas Map via the drag and drop operation. The changes also reflect in the Field Planner tree. To do so, select the well pad assembly and drag it to the new location. The Pad Options dialog box displays. Select the **Duplicate – pad and layout new location**, and specify the **Name** and **Elevation** for the duplicate as required. The image below shows the Pad Option dialog in GeoAtlas.



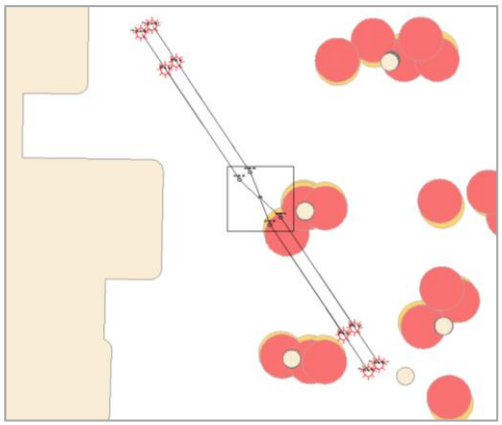
Duplicate Well Pads

Duplicate well pads in the Field Planner tree after marking the location for the pad. To do so, in the Field Planner tree, right-click on a well pad, and then select **Duplicate**.

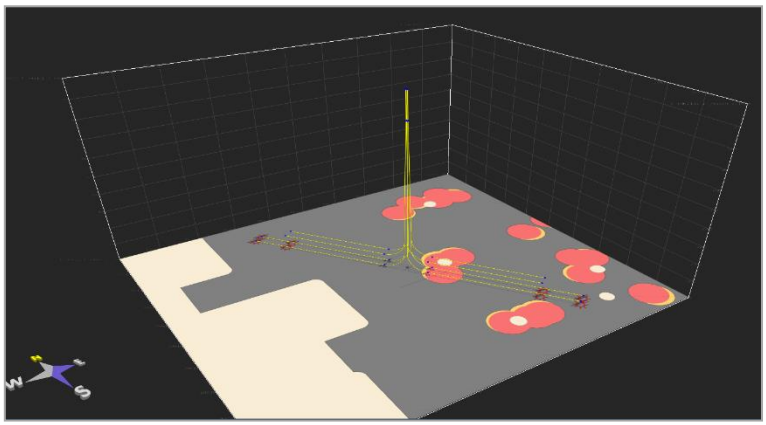


Plan Laterals with Stacked Lateral

Plan multiple laterals along different formations or the same formations with different parameters using the stacked lateral off of a single slot location feature. To do so, in the **Field Planner** tree, right click on a well pad, select **Add Stacked Latera**l, and then enter the **Target layer** in the dialog that displays.



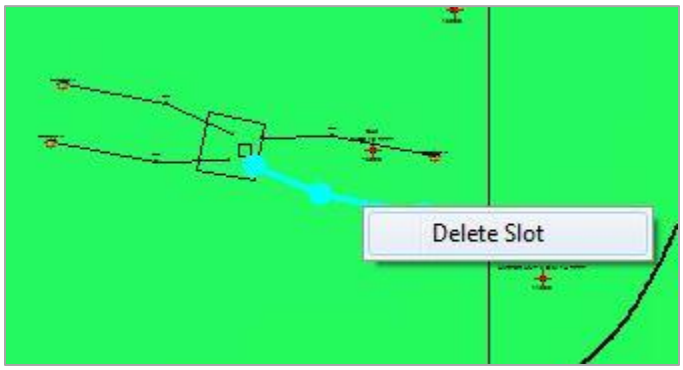
Stacked Lateral on GeoAtlas map (2D View)



Stacked Lateral (3D View)

Delete Slots in GeoAtlas

Deleting a slot directly from the GeoAtlas Map also deletes it from Field Planner, giving you more control over field planning. Previously, slots could be deleted from Field Planner only. To do so, in the GeoAtlas Map, right-click on a slot, and then select **Delete Slot**.



Delete Well Pads

Directly delete well pads from the Field Planner tree. To do so, in the Field Planner tree, click  in front of the well pad name under the **Available Pads** group box.

Pro 3D

This section describes the changes to Pro 3D.

Support for SSDX

All old and new cross section formats (XSD, SSDX) are supported.

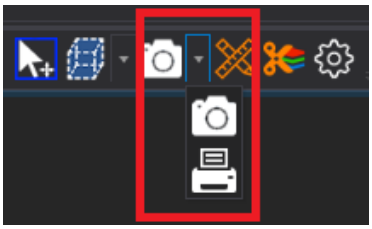
Project Units in Status Bar

The units for the active project display in the status bar.

3D Perspective Views and Capture Screen Buttons

The 3D perspective Views and Capture Screen buttons are available as separate buttons in the **General** toolbar. Previously, both features were placed under the same button.

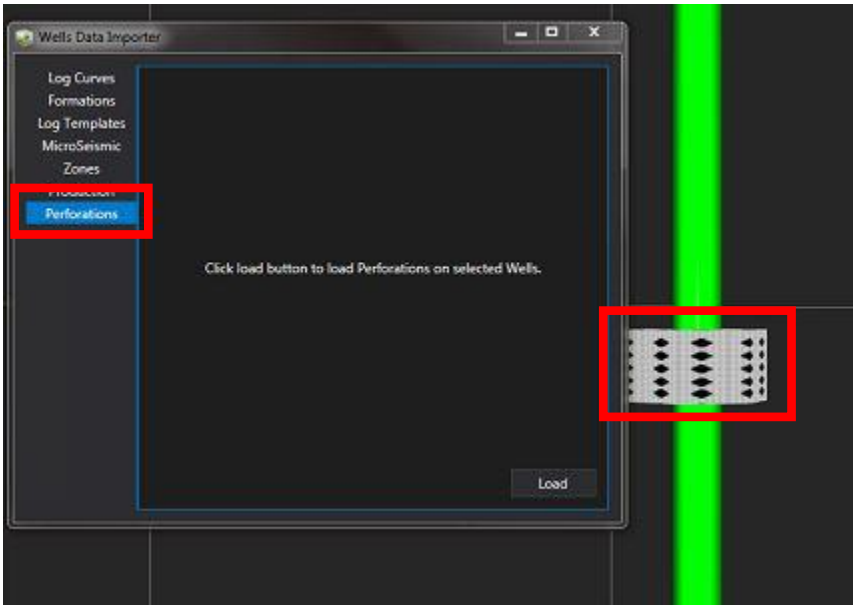
3D Perspective Views



Capture Screens

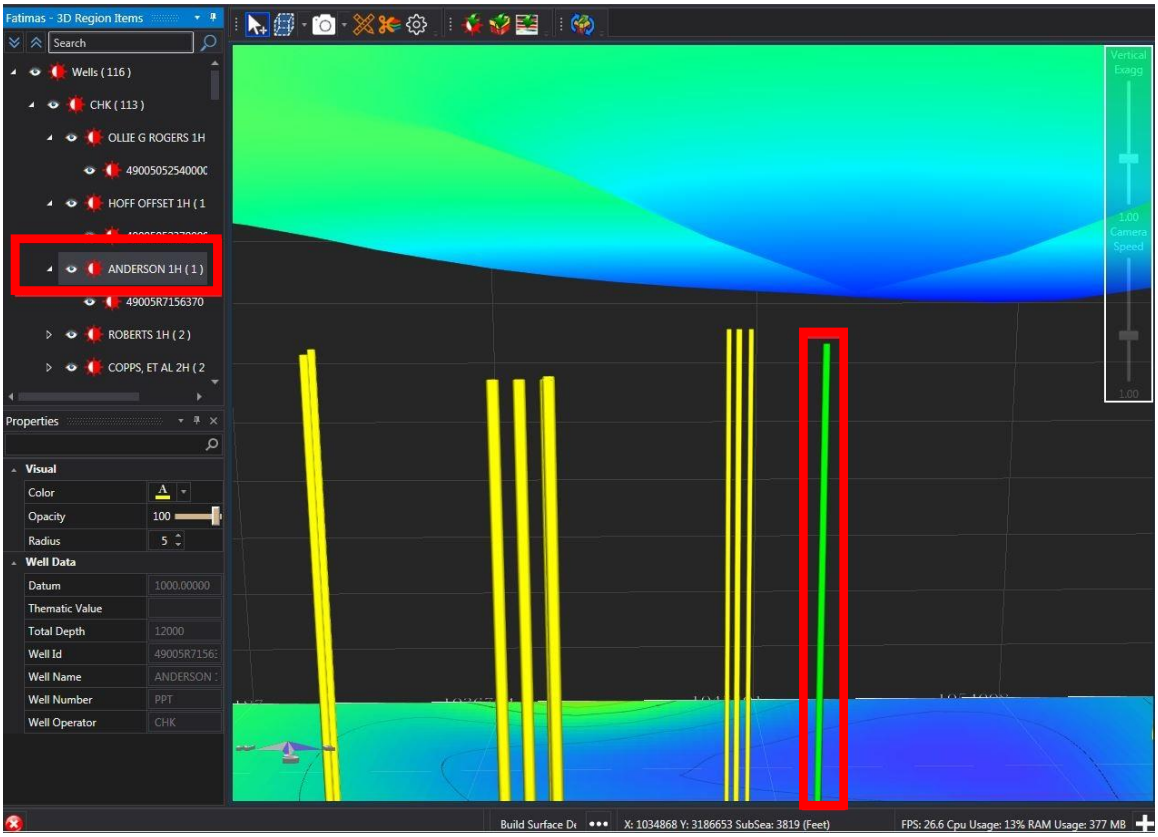
Load Perforations

You can load perforations data using **Wells Data Importer >> Perforations**. The image below displays the **Wells Data Importer** dialog box along with a perforation displayed in the map.



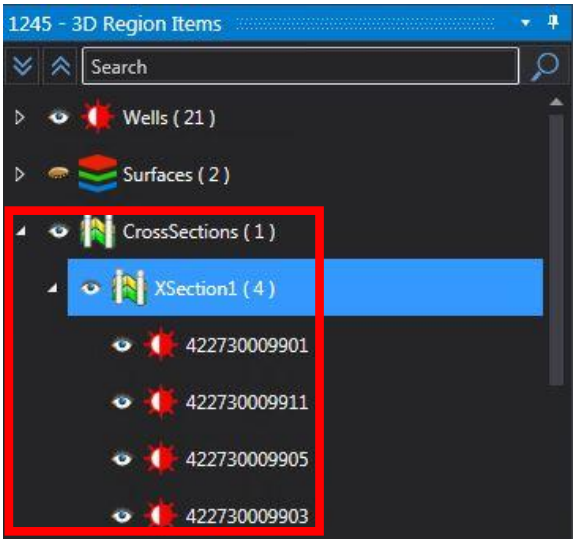
Zoom on a Particular Well

Double-click on any item (except surfaces) in the **Region Items** pane to zoom in to that particular well.



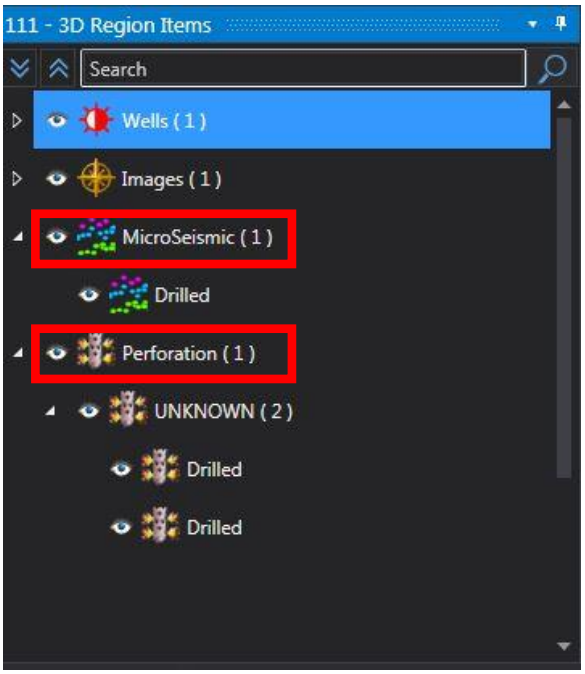
CrossSection Wells

Wells specific to a cross section are available under the **CrossSections** folder in the **Region Items** pane, making it easier to locate wells belonging to specific sections. Previously, the wells only displayed under the **Wells** folder.



MicroSeismic and Perforations Data Available in Region Items Pane

Two new folders, MicroSeismic and Perforations are available in the **Region Items** pane. You can choose to remove or display both data types in the 3D Scene. Previously, MicroSeismic data could only be viewed in the 3D Scene, and Perforation data could not be viewed in Pro 3D.



Rename Groups

Groups can now be renamed in the **Region Items** pane using the right-click context menu.

Fixed Issues

The following customer reported issues were fixed in this release.

DepthRegistration

ID	Description
74585	Disabled the delete operation if Depth Calculated points list is null, to prevent the application crash. Previously, the application crashed when a cloned well was deleted.
85962	Allowed the import of DRA data file which does not have quotation marks around the Well ID. Previously, such a file displayed trimmed original ID on import.

PRIZM

ID	Description
107800, 108387	PRIZM no longer crashes upon Res/Pay computations.
110050	A checkbox is added in the Project Default Curves settings, to apply unit conversions to all the alias listed curves. Previously, the unit conversions were applied only to the first curve in the alias list.
113538, 113539	Crossplot displays Normalize curve as well as Reference curve. Previously, the Graphical Curve Normalization Reference curve did not display in the crossplot with a zone selected.
14018	Error on importing the LAS file is fixed by disabling the rounding off of the step after four decimal points. Previously, the LAS metric imports, with odd top and bottom depths and even step value, returned an error.
72191	Fixed the LAS file import issue. Previously, when the curve values had 10 decimal places, the import resulted in spiky log presentation and abnormal values.
48715	Fixed the formation selection issue by selecting correct values in the formation drop-down list. Previously, the formation names having similar suffixes were not selectable in the Multi-Well UDE window.
81514	Increased the Parameters values to five significant figures.
72192	Increased the size of New Alias Curve drop-down list. Previously, longer curve names were truncated in the Edit Alias Curves dialog.

13895	Improved the copy function of the Curve Inventory to fix the Copy to Clipboard option.
114409	Increased the size of the drop-down list in Save to ZoneManager dialog from 12 to 20 characters.

smartSECTION

ID	Description
117865	Fixed the .ssdx file size issue by creating a new list of unique faults upon saving. Previously, the list of seismic faults was being appended in the file on every save, resulting in duplicated faults and increased .ssdx file size.
84487	Improved the template resolution scheme to return cross-section level template only if the node-level template is not set. Previously, it always returned cross-section template if Default was set at node level.
82456	Adjusted the tolerance factor in surface modelling to fix the 3D Model soft points which were erroneously created on the horizontal wellbore.
18997	The position of the toolbar is now saved with the interpretation, so that it displays at the same position whenever the dialog is opened.

xSection

ID	Description
108851	Improved the rendering logic to fix the perforation display in prt. Previously, when perforations were displayed in the prt., and a display interval was set based on tops, some curves were off-depth in printed or exported XSection cross-sections.
109858, 13096	Added a check to verify that top and bottom MD values are not null before assigning these values to the well raster log. Previously, the wells were off-depth because of missing values.
110051	A checkbox is added in the Project Default Curves settings, to apply unit conversions to all the alias listed curves. Previously, the unit conversions were applied only to the first curve in the alias list.
15782	Revisited the help topic for Interpolation, and added information that interpolation fill does not work with UDE curves.
84014	Adjusted well track draw range to use well track height instead of the constant value. Previously, log curve templates were truncated when the scaling (vertical/horizontal) was changed to a specific value.
84312	Improved the rendering logic to prevent the template shift that occurred when the user scrolled and picked tops.

SeisVision

ID	Description
8815	Added support for exporting depth volumes with sample interval in Feet. Previously, the depth volume could only be exported with the sample interval in Meters.
13053	In SEGY Loader, the IBM IEEE 4-byte float format (if selected) is recognized automatically as input. Previously, you had to manually select this format as input in SEGY Loader.
73959	In SeisVision, a generated volume's projection system is set to the project's map display coordinates, when it is loaded to an interpretation. This guarantees that the projection of various surveys/volumes in the project display at the correct location on the Main Map View (MMV).
78472	In SeisVision depth interpretations, the seismic data is converted to TVDSS before it is used as a seismic backdrop in smartSECTION. This ensures that the seismic data is displayed above the sea level.
101706	Fixed an issue in fault triangulation that was causing SeisVision 64-bit version interpretations to close abruptly.
103180	The DT curves with null values at the end of the well curve files are ignored, which results in SynView working correctly.
103439	The SEGY files exported from Petrel[1] using SEGY Loader are converted to 3dx files and create valid amplitudes. This is achieved by converting the values to IEEE 32-bit float format. Previously, the files were treated as simple IEEE format files.
103756	The IsoMap Layer to Horizon functionality successfully exports to a SeisVision depth interpretation, with correct subsea values. This is accomplished by converting the depth values to TVDSS before exporting to a SeisVision depth interpretation.
110250	The Correlation 3D Autopick option works correctly for higher amplitude data. This is rectified by avoiding integer overflow in the updated correlation calculation process.
115368	In SynView, the formation names' font is directly proportional to the display scale. This is attained by automatically calculating the font width in relation to the display scale.

ProjectExplorer

ID	Description
101203	The server project deactivates correctly. Hence, the Red checkmark no longer displays against the project after deactivation, and the user can continue to use the project.

[1] Mark of Schlumberger

DefCon2

ID	Description
101204, 75542	A new option 'Calculate Batch Proposed Surveys' is added. Previously, the user had to go to each well to calculate the proposed survey.
103182	Enhanced the precision used to completely import the Bottom Hole Lat/Long data from ASCII 3 files. Previously, Bottom Hole Lat/Long information was not completely imported (with 12 digit precision) from ASCII 3 files.
103757	Separated the survey header and survey station entities to independently import and update the survey header and stations. Previously, importing any survey header field without survey station data, deleted the survey stations.
107917	Remapped the Bottom Hole Lat/Long information from DA record to Drilled Survey, instead of Proposed Survey. Previously, on importing IHS 297 files, the Bottom Hole Lat/Long information from DA record was imported to Proposed Survey which converted the internal status of the well to 'Proposed' regardless of its status.
108106	Remapped the Bottom Hole Lat/Long information from DA record to Drilled Survey, instead of Proposed Survey. Previously, on importing IHS 297 files, the Bottom Hole Lat/Long information from DA record was imported to Proposed Survey, and actual survey information (if existed) was not used for showing borehole on GA layers.
108264	Updated online help for fields under Well Header records of ASCII4 format.
103183	Updated the ASCII4 definition for SD Survey record, BH Latitude, and BH Longitude fields, in the online help.

GeoAtlas

ID	Description
80933	The Quartering tool no longer generates irregular results for some of the square/polygons.
108237	The Data Source option displays the correct units for an LYR file.
107707	The deviated path maintain their thickness and well postings no longer shift after being exported to an EMF format file.
108656	The Fill Color feature turns on and off without any issues for polygons after Advanced Rendering.

QueryBuilder

ID	Description
47649	Applied checks on SQL query semantics and selected fields for the query to prevent the empty report generation. Previously, generating any report on Log Curves table, generated empty report if description field was included in the query.
32742, 16684	Improved SQL query semantics to enable saving of a query with the same name as that of AOI. Previously, if the name of the queried attribute matched the name of the AOI, the query was not executed and not saved.
39849	Applied checks on SQL query semantics, to allow export of Log Curves report, even if the description field is included in the query. Previously, exporting any report on Log Curves table used to fail if the description field was included in the query.
107150	The saved filters/queries on Datum Elevation field from previous releases can be rerun without any error.
47649	The query reported/exported results from Log Curves tables no longer generate empty results.

WellBase

ID	Description
81390	The Excel report for Formation Tops with multiple observations display the output data correctly. Previously, the output data on the report did not display correctly.
80976, 106414	Enabled the manual editing as well the right-click Paste operation for BH Lat/Long information to the Survey Tab.
103517	Two distinct Scout Ticket reports are added to differentiate between Congress Wells and Texas Wells. Previously, the Excel report for Scout Ticket included wells with congress data that confused the user when results were compared with a query on wells.
103604	Improved data structure to list all attributes in the zone tab.
103033	Updated ASCII4 format definition for Perforation (PF) Date, and Top Depth spacing, in the online help.

IsoMap

ID	Description
19248	The Data Sources display the data points in decimals correctly. Previously, the data points in decimals were changed to zero.

ZoneManager

ID	Description
14556	Excel report on Zone Data in WellBase provides a count of attributes that have data listed by zone and attribute name.

Known Issues

This section lists the known issues in this release.

PRIZM

ID	Description	Workaround
110626	PRIZM gives 'Out of memory' error when an attempt is made to import a LAS file of size 600 MB or more.	To import large LAS files, it is recommended to reduce the file size to 500 MB or less.
112383	Lateral Curves cannot be displayed in TVDSS mode.	To view Lateral Curves, use MD or TVD mode.

Field Planner

ID	Description
106883	A runtime error generates on creating a field plan layer.

Pro 3D

ID	Description
102989	Multiple Fault/Horizons from different Interpretations but having the same name are not loaded into Pro 3D.
106984	The same color palette cannot be applied to individual wells.
116450	The straight wells do not display in the Region Items pane if the Datum Elevation Value is set to null in WellBase.
117994	The seismic drop along the cross-section only works for one survey in SeisVision Interpretation.

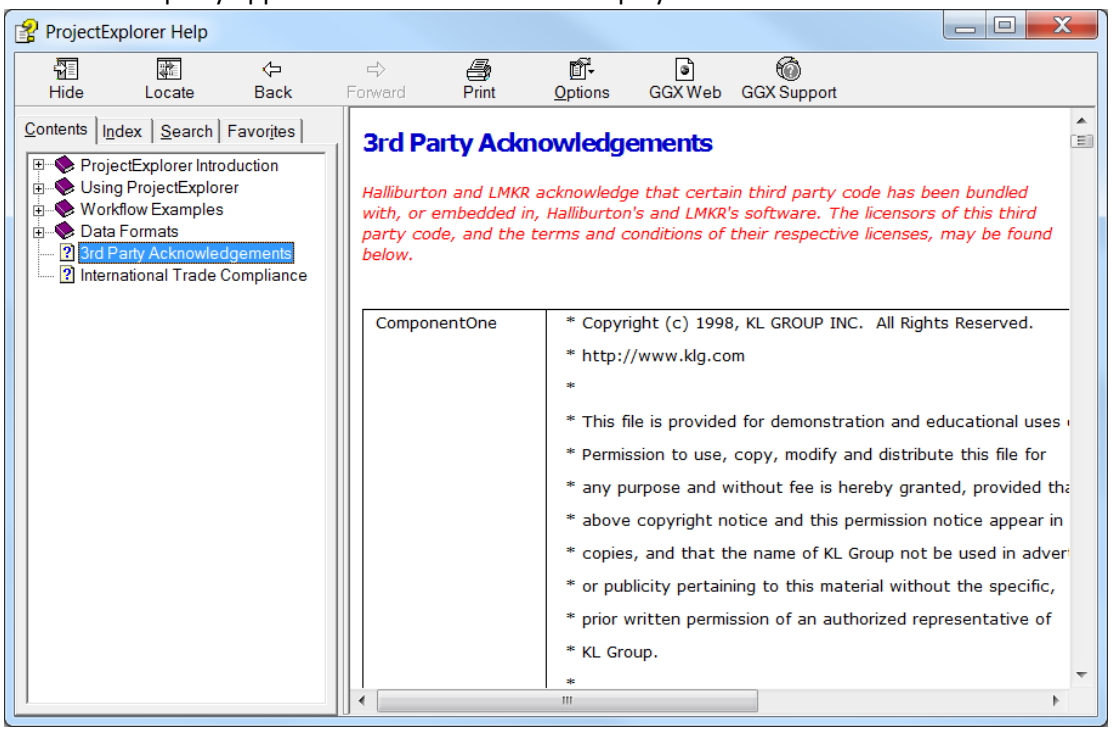
Third Party Applications

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 **Third Party Acknowledgements** topic and click to open the topic.

   A list of third party applications and their details display.



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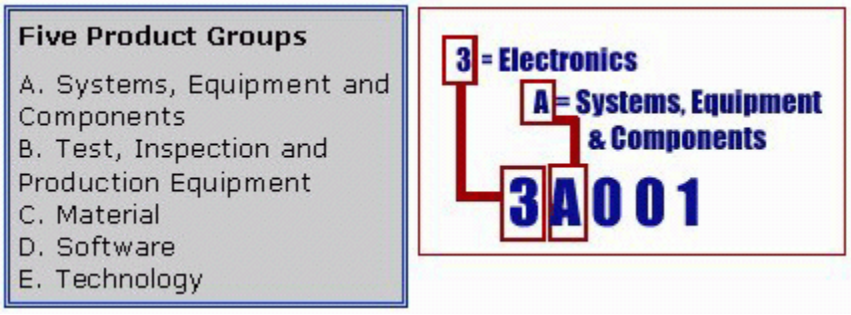
The ECCNs provided here represent LMKR's opinion of the correct classification for the product today (based on the original software and/or original hardware). Classifications are subject to change. If you have any questions or need assistance please contact us at support@lmkr.com.

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

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Helpful Links

Name	Website Address
LMKR home page	http://www.lmkr.com
LMKR Support Portal	http://support.lmkr.com