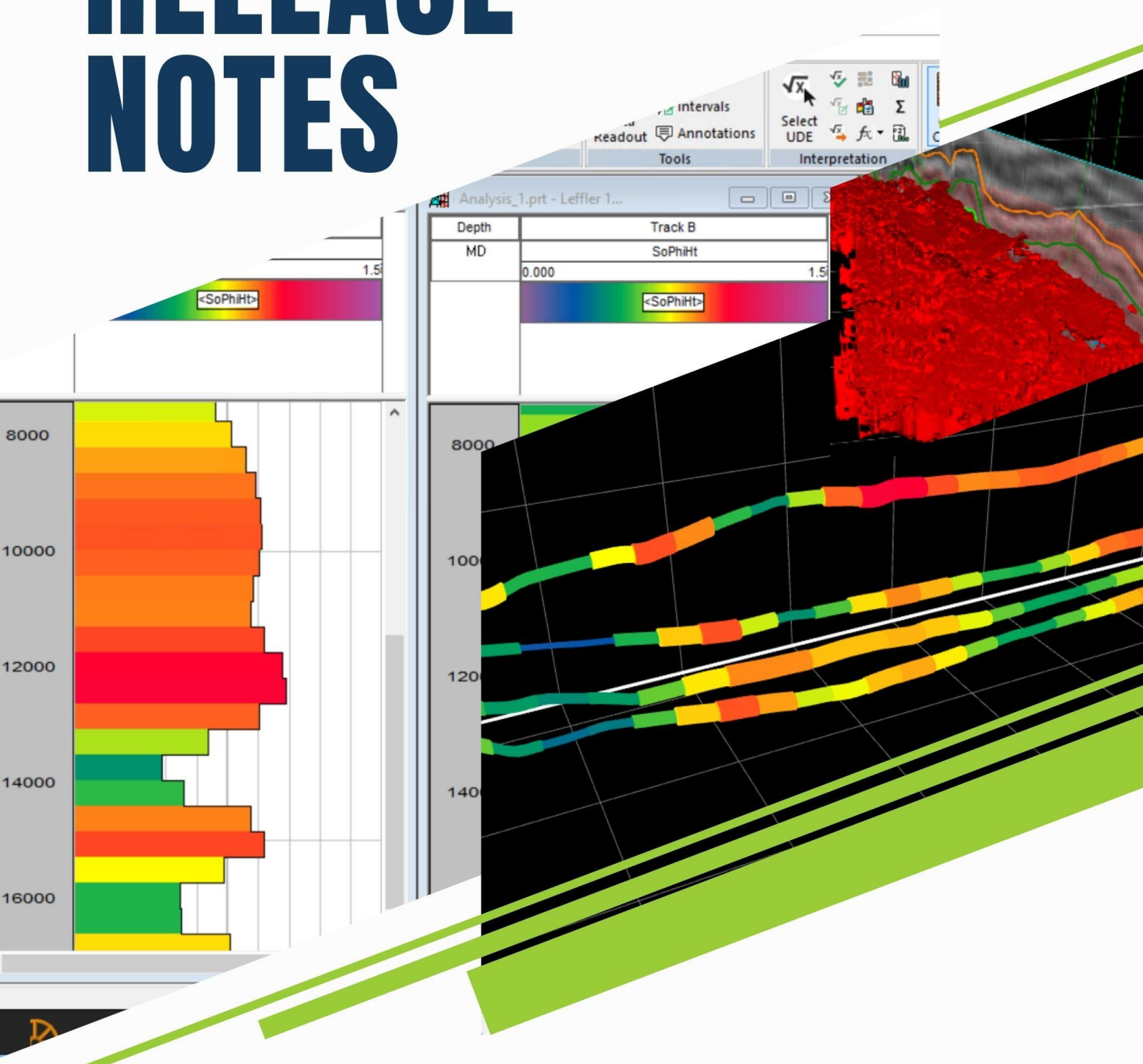
GVERSE® GeoGraphix®

RELEASE NOTES



GVERSE® GeoGraphix®

2022IR1

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Note

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GeoGraphix® and Discovery™ on OpenWorks® 2022.1

We are pleased to announce the release of the GeoGraphix® and Discovery™ on OpenWorks® 2022.1 software.

GeoGraphix 2022.1 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.

Note: New users or users upgrading from other versions of GeoGraphix need a valid license. The License Management Tool (LMT) must be installed to configure the license. Download the latest LMT from the GVERSE GeoGraphix Support Portal > Downloads page. See the **Licensing** section of the Installation Guide for Release 2022.1 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.

This release consists of the following:

GVERSE® Petrophysics

- GVERSE® Petrophysics is 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® Geo+

- Combine geological, geophysical, petrophysical and GIS data in a single environment. Get a deeper understanding of your subsurface with an integrated map and 3D visualization and interpretation environment. From everyday workflows like building cross sections and mapping structures and thicknesses to advanced earth modeling solutions, GVERSE Geo+ offers all the tools geoscientists need for robust, optimized and cost-effective field development.

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® FieldPlanner

- 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 GVERSE 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 2022.1 release are listed below.

Python API for GeoGraphix

- Access all data in a GeoGraphix project with the Python API for GeoGraphix.
- Easy, one-click set up that downloads and installs all requirements to run the API.
- Use data stored in GeoGraphix directly in Python scripts and push results back into the database.

GVERSE Petrophysics

- Show log curves from different curve sets on the same template at their native step rates.
- Curves names are automatically parsed as individual curves from a list of user defined comma separated curve mnemonics list.
- Select a hierarchical list of curve sets and bulk assign those curve sets as Field Data.
- Specific curves with null values can now be removed. Additionally, while creating UDE output for multiple wells, an option is introduced not to create null curves in the target curve set.
- Multiple dialogs can be resized and the application retains the size changes made by the user and opens the dialog box in exactly the same dimension the next time this dialog box is launched.
- Change colors for log display and apply transparency to interval selection in cross plot view.
- Ignore slashes in well names on import.
- Custom labels for DST, perforations and treatments.

DepthRegistration

- Digitize log curves and save to database as vector logs.
- Display and pick formation tops directly in DepthRegistration.

GVERSE Geo+

- Revamped cross section tool that matches the simplicity of XSection but elevates its functionality.
- Integrated map and 3D view, seismic back drop, multi-surface modeling, well-in-zone calculations.
- Full backward compatibility with existing XSection cross sections.
- Well/surface intersections can now be posted at the surface intercept location instead of bottom hole location to get precise information about the formation's depth.
- ZoneManager attributes can be posted as digital headers. This aids in determining the ZoneManager attributes value directly from the cross section.
- Upto 5 ZoneManager attributes can now be added to the well header and/or footer.
- Well production values can be posted above or below the well logs.
- Different sources can be set for individual cross sections.
- Non-IsoMap layers can now be created directly in GVERSE Geo+.

GVERSE Geophysics

- Auto-track horizons across 2D lines.
- Convert any time seismic section to depth on-the-fly.
- Apply GVERSE Petrophysics templates to wells on seismic sections. All template features like area fills, data postings, curve and track properties, and real-time UDE calculations are supported.
- Add up to 5 custom tracks in addition to the sonic and density tracks to display other curves from a well. Cursor tracking between tracks and configurable scales and grid lines for improved usability.
- View velocity model values on seismic sections.
- Edit log values directly in SynView.
- Despike, upscale and edit log curves in intervals.
- Import differently formatted time-depth tables.
- One-click display setting match for objects in the 3D scene.
- Create clones of interpretation objects.
- Snap interpolated picks to events when filling gaps in horizons.
- Sync active horizon and fault color between 2D and 3D views.
- Horizon, fault and geobody colors are added with the respective entities in the trees..

GVERSE Planner

- Introducing Slant Well and S-well planning methods to plan Build-Hold and Build-Hold-Build/Drop trajectories.
- Ability to plan Multi Kick-off trajectories and plan wells with multiple Build-Hold-Build/Drop sections.
- Ability to combine multiple planned sections to compute complex wellbore trajectories.
- Generate Geoprognosis reports from drilled and proposed surveys.
- Add new well plans from GeoAtlas maps.
- Add Target Points from a GeoAtlas map to compute Wellbore trajectories.
- Import and export target points from GVERSE Planner.
- Enter target points based on XY offsets.

GVERSE FieldPlanner

- Automatically generate Fishbone multi-lateral configuration from the input parameters.
- Manually edit the Fishbone configuration on the Map.
- Copy and Paste the complete Fishbone configuration at any location.

GeoAtlas

- Compute grid values from IsoMap layers for land survey polygons, generate reports and create thematic maps based on statistical parameters.
- New georeferencing tool in GeoAtlas which is especially useful for superimposing a variety of image formats on GeoAtlas maps at the correct location.
- Interval attributes can be generated along the wellbore path from the IsoMap layers to display interval attributes as curves in various GeoGraphix/GVERSE applications.
- Support for Cross Section creation from Multiple WellBase Layers.
- While selecting wells for the cross sections, only those entities are selected that are filtered through the Entity Filter Selection tool.
- While importing shapefiles for volumetric polygons, any field from the available attributes can be selected as the 'Name' field.
- Utility for bulk export of IsoMap layers in ZMap+ and ASCII XYZ formats.
- Post Key Performance Indicators such as Production normalized per 10,000 ft. lateral length on WellBase layers.
- Post First N Months Production for oil, gas or water on WellBase layers.

QueryBuilder

- Build well filters from key productions metrics (KPIs).
- Build filters using Lateral Length calculated from a user-defined Inclination Angle.
- Build well filters based on protected data.

WellBase

- View all interval and related data in the new Intervals tab in WellBase. Create custom data fields for interval types. Create and post interval curves from data fields on cross sections and templates and display color-coded wells in GeoAtlas.
- Built in KPI analysis for production data and ability to post on WellBase layers.
- Protect data for multiple wells from the List view in the WellBase Information Manager.
- Create a new Strat Column Manager from picks with sources from the selected Source List.
- Dogleg Severity (DLS) column has been added in the Survey tab of WellBase.
- Copy and paste core analysis data and column headers from the Core tab.
- User defined captions are honored in WellBase while importing data using the Import Spreadsheet tool.
- Interval data can be imported using the Import Spreadsheet tool.
- A new method is introduced in the Import Spreadsheet tool to quickly import formation tops as a column, without changing the format of user files.

WellXchangePlus

- Before transferring data between GXDB projects, a list of wells can be viewed in source project that already exist in the destination project.
- Interval data can now be transferred between projects.

XSection

- You can now post different ZoneManager attributes in the well header/footer postings.
- MD and TVD depth displays on the status bar while hovering the mouse along the wellbore in cross sections.

ZoneManager

- Various dialog boxes including the ZoneManager Edit Zones and Edit Spreadsheet can now be re-sized as required.

Common Changes

- WellXchangePlus and SeisXchange tools are now compatible with the latest Openworks 5000.10.7.0 version.

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 licenses. Refer to the GVERSE GeoGraphix Customer Support > Knowledge Center > Licenses page to request a license. For information on license requirements for GVERSE applications, refer to their respective release notes and installation documents on the GVERSE GeoGraphix Support Portal > Knowledge Center > Release Notes and Installation Guides page.
  The License Management Tool (LMT) must be installed to configure the license. Download the latest LMT from the GVERSE GeoGraphix Customer Support Portal > Downloads page. See the **Licensing** section of the Installation Guide for Release 2022.1 for more information.
- Discovery on OpenWorks is compatible with OpenWorks for Windows 5000.10.7.0 and SeisWorks 5000.10.
- Refer to the GVERSE GeoGraphix 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® 10 Professional x64 Windows® 10 Enterprise x64 Windows® 7 Professional x64 Windows® 7 Enterprise x64 Windows® 7 Ultimate x64	8 GB RAM Minimum 16+ GB RAM recommended **Note:** 32 GB RAM recommended for GVERSE Geophysics. SSD drives recommended	Core i5 Minimum Core i7 Quad-core and above with latest generation recommended

Graphics Requirements

Applications Support Level	Graphic Card Requirements
All GeoGraphix Applications including Discovery 3D, advanced 3D visualization (Pro 3D), and GVERSE Geo+	2 GB VRAM Minimum 4 GB VRAM Recommended DirectX 11 capable hardware **(see Note 2 below)**
GVERSE Geophysics	**Minimum** • Any DirectX 11.1 capable card comparable with Nvidia® GeForce GTX 430 with 1GB VRAM. DirectX is not shipped with GeoGraphix 2022.1. You must download and install it separately. • 1366 x 768 screen resolution **Recommended** • Any DirectX 11.1 capable card comparable with Nvidia® GeForce GTX 1060 with 6GB VRAM. DirectX is not shipped with GeoGraphix 2022.1. You must download and install it separately. • 1920 x 1080 screen resolution

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

Note 2: To run Discovery 3D, advanced 3D visualization (Pro 3D), and GVERSE Geo+, 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 **GVERSE GeoGraphix 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 **GVERSE GeoGraphix 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 GVERSE GeoGraphix 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 in the Downloads section of the GVERSE GeoGraphix Support Portal.

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 GVERSE GeoGraphix Support Portal.

Microsoft .NET Framework 4.7.2

Discovery 2022.1 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 2022.1.

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 through 10.8.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 Geo+ 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.

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, 2016 or 2019 (32 or 64 bit), including Office 365 (offline version). In case the macros are not working in Excel, ensure the **gxdb.xla** 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 5000.10.7.0 – 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 or 10.7.x or 10.8.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 2016 Windows® Server 2019	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 **GVERSE GeoGraphix 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, GVERSE GeoGraphix 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.

We perform 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, compatibility testing is performed 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 we do not anticipate any integration issue, in these cases it is recommended that customers also verify compatibility in their own environment.

GVERSE GeoGraphix supports the versions listed as Release in the table. However, while we have completed compatibility testing, GVERSE 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, GVERSE GeoGraphix Support works on a best effort basis to troubleshoot any issues, and if an issue needs additional attention, GVERSE GeoGraphix Support reports such issues to GVERSE GeoGraphix Research & Development. The GVERSE 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 GVERSE GeoGraphix Technical Support Solution Document KBA-65218-F9D7D5.

Compatibility Matrix

Discovery on OpenWorks (DOW)

OpenWorks Version	OW License 5000	DOW License 5000.02							
	GeoGraphix Version	**2022.1**	**2019.4**	**2019.3**	**2019.2**	**2019.1**	**2017.3**	**2017.2**	**2017.1**
	OW 5000.10.7.0	**C**							
	OW 5000.10.6.03		**C**	**R**	**R**	**R**	**R**	**R**	**R**
	OW 5000.10.3.02		**U**	**C**	**C**	**C**	**C**	**R**	**R**
	OW 5000.10.1.05								
	OW 5000.8.3.01								
	OW 5000.8.1.1								
	OW 5000.8.0.0								
	OW 5000.0.3.5								

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 2022.1 release.

Python API for GeoGraphix

Leverage machine learning and artificial intelligence on your data in GeoGraphix projects through Python. Run scripts written in the Python programming language on well, grid, and seismic data.

GVERSE Petrophysics

Curve Set Independence for Log Templates

Show log curves from different curve sets on the same template at their native step rates.

Comma separated list when importing mnemonics

Curves names are automatically parsed as individual curves from a list of user defined comma separated curve mnemonics list.

Hierarchical field data curve set assignment

You can now select a hierarchical list of curve sets and bulk assign those curve sets as Field Data.

Restrict output of NULL curves for UDE Export

Specific curves with null values can now be removed. Additionally, while creating UDE output for multiple wells, an option is introduced not to create null curves in the target curve set.

Resizable dialogs

Multiple dialogs can be resized and the application retains the size changes made by the user and opens the dialog box in exactly the same dimension the next time this dialog box is launched.

Other Features

- Change colors for log display and apply transparency to interval selection in cross plot view.
- Ignore slashes in well names on import.
- Custom labels for DST, perforations and treatments.

DepthRegistration

Log Curve Digitization

Create vector curves out of raster logs with the new log curve digitization toolset. Create new logs or QC existing logs by overlaying on the raster. Save to the database in new or existing curve sets.

Pick Formation Tops

Display, add or edit formation picks directly in DepthRegistration. Full picking functionality available including source management and hierarchy.

GVERSE Geo+/smartSECTION

Revamped Cross Section Tool

A revamped, cross section tool that matches the simplicity but elevates the functionality of XSection. The new tool is fully backward compatible and offers additional features like integrated map & 3D view, integration with GeoAtlas and Geophysics, 3D surface modeling, well-in-zone calculations, better handling of deviated wells, better picking tools, undo/redo, improved usability and much more.

Templates for Well in Zone Calculation

The Calculate Well(s) in Zone dialog preserves the user settings and reloads them when the dialog is re-launched.

Show/Hide all XY Points or Wells on Cross Sections

All wells and/or X/Y points can now be shown or hidden from the cross section with a single click.

Display Well/Surface Intersections on Map

Well/surface intersections can now be posted at the surface intercept location instead of bottom hole location to get precise information about the formation's depth.

Add ZoneManager Attributes to Well Header

ZoneManager attributes can be posted as digital headers. This aids in determining the ZoneManager attributes value directly from the cross section.

Allow Duplicates in Well Header and Footer

Upto 5 ZoneManager attributes can now be added to the well header and/or footer.

Post production values above or below well logs

Well production values can be posted above or below the well logs.

Source Handling for Individual Cross Sections

Different sources can be set for individual cross sections.

Create Non-IsoMap Layers

Non-IsoMap layers can now be created directly in GVERSE Geo+.

GVERSE Geophysics

Autopicker for 2D Lines

Use the new 2D line horizon tracker to automatically track and pick events across intersecting 2D lines. The tracker honors any time, phase or amplitude shifts applied to the data.

Depth Mode for Time Interpretations

See how a seismic line would appear in depth using the new Depth Mode view. All data including seismic and any horizons, faults and wells are converted on-the-fly using the velocity model.

Log Template on Seismic Sections

Apply GVERSE Petrophysics templates to wells on seismic sections. All template features like area fills, data postings, curve and track properties, and real-time UDE calculations are supported.

Custom Tracks and Scales for SynView

Add up to 5 custom tracks in addition to the sonic and density tracks to display other curves from a well. Cursor tracking between tracks and configurable scales and grid lines for improved usability.

Other Features

- View velocity model values on seismic sections.
- Edit log values directly in SynView.
- Despike, upscale and edit log curves in intervals.
- Import differently formatted time-depth tables.
- One-click display setting match for objects in the 3D scene.
- Create clones of interpretation objects.
- Snap interpolated picks to events when filling gaps in horizons.
- Sync active horizon and fault color between 2D and 3D views.
- Horizon, fault and geobody colors are added with the respective entities in the trees.

GVERSE Planner

The following features have been introduced in this release:

- Introducing Slant Well and S-well planning methods to plan Build-Hold and Build-Hold-Build/Drop trajectories.
- Ability to plan Multi Kick-off trajectories and plan wells with multiple Build-Hold-Build/Drop sections.
- Ability to combine multiple planned sections to compute complex wellbore trajectories.
- Generate Geoprognosis reports from drilled and proposed surveys.
- Add new well plans from GeoAtlas maps.
- Add Target Points from a GeoAtlas map to compute Wellbore trajectories.
- Import and export target points from GVERSE Planner.
- Enter target points based on XY offsets.

GVERSE FieldPlanner

Fishbone Multi-Lateral Configuration

In this release, Fishbone multi-lateral configuration planning is introduced. Using this feature, the following actions can be performed:

- Automatically generate Fishbone multi-lateral configuration from the input parameters.
- Manually edit the Fishbone configuration on the Map.
- Copy and paste the complete Fishbone configuration at any location.

GeoAtlas™

Calculate Grid Statistics

Compute grid values from IsoMap layers for land survey polygons, generate reports and create thematic maps based on statistical parameters.

Georeference an Image

Users can now georeference an image in GeoAtlas which is specially useful in superimposing the user's maps in image format on GeoAtlas maps at the correct location..

Generate Interval Attributes from IsoMap Layers

Interval attributes can be generated along the wellbore path from the IsoMap layers to display interval attributes as curves in various GeoGraphix/GVERSE applications.

Cross Section from Multiple WellBase Layers

Support for cross section creation from multiple WellBase layers.

Honoring Entity Filter Selection while Creating Cross Sections

While selecting wells for the cross section, only those entities are selected that are filtered through the Entity Filter Selection tool.

Name Field Selection for Imported Volumetric Polygons

While importing shapefiles for volumetric polygons, any field from the available attributes can be selected as the 'Name' field.

ZMap+ and ASCII XYZ Bulk Export for IsoMap Layers

IsoMap layers can now be bulk exported in ZMap+ and ASCII XYZ formats.

Post Production KPIs on WellBase Layers

Post the Key Performance Indicators such as Production normalized per 10,000 ft. laterals on WellBase layers.

Post Production Statistics for a Specific Period on WellBase Layers

Post First N Months Production for oil, gas or water on WellBase layers.

ProjectExplorer™

Python SDK for GeoGraphix

Leverage machine learning and artificial intelligence on your data in GeoGraphix projects through Python. Run scripts written in the Python programming language on well, grids, and seismic.

QueryBuilder

Filter Wells by Key Performance Indicators (KPIs)

Wells can be filtered based on values determined from various key production metrics (KPIs).

Filter Wells by Lateral Length

Wells can also be filtered based on Lateral Length calculated from a user-defined Inclination Angle.

Filter Wells by Protected Data

You can now filter wells based on different types of protected data.

WellBase

Interval Data Management

View all interval and related data in the new Intervals tab in WellBase. Create custom data fields for interval types. Create and post interval curves from data fields on cross sections and templates and display color-coded wells in GeoAtlas.

Production Metrics in Filters and Layers

Built in KPI analysis for production data and ability to post on WellBase layers.

Protect Well Data

Protect well data for multiple wells and fields by utilizing List view of the WellBase Information Manager.

Strat Column Manager from Picks

Create a new Strat Column Manager from picks with sources from the selected Source List.

DLS Column

Dogleg severity (DLS) column has been added in the Survey tab of WellBase.

Copy Header Data

You can now copy and paste core analysis data and column headers from the Core tab.

Honor User Defined Captions while Importing Data

User defined captions are honored in WellBase while importing data using the Import Spreadsheet tool.

Import Interval Data

Interval data can be imported using the Import Spreadsheet tool.

New Formation Tops Import Method

A new method is introduced in the Import Spreadsheet tool to quickly import formation tops as a column, without changing the format of user files.

XSection

Post ZoneManager Attributes in Well Header/Footer

You can now post different ZoneManager attributes in the well header/footer postings.

Display Depth on Status Bar in Cross Sections

MD and TVD depth displays on the status bar while hovering the mouse along the wellbore in cross sections.

ZoneManager

Resizable Dialog Boxes

Various dialog boxes including the ZoneManager Edit Zones and Edit Spreadsheet can now be re-sized as required.

Common Changes

Support for OpenWorks 5000.10.7.0

WellXchange and SeisXchange tools are now compatible with the latest Openworks 5000.10.7.0 version.

Fixed Issues

The following customer reported issues were fixed in this release.

GVERSE Geo+

ID	Description
212463	Generating report for a large number of wells (greater than 13000) from the Calculate Wells in Zone dialog box resulted in application crash. Data loading has been optimized by reducing the number of database connections and this issue has been fixed.
212214	User defined captions updated in **WellBase** did not reflect on-the-fly in **Cross Section Display Preferences > Digital Headers tab** field list. This issue has been fixed.

GVERSE Petrophysics

ID	Description
239025	In the Graphical Curve Normalization tool, curve samples exceeding 60,000 resulted in chopping of curves and the intervals were not properly normalized. This issue has been fixed.
234449	In the Graphical Curve Normalization tool, applying the interval to limit the reference well and input curve was not working while batch processing. This issue has been fixed by adding new options allowing the users to choose whether to apply the interval on output curves or not.
230736	Completion type has a character limit of 12. However, the completion type name was being truncated to 11 characters. This issue has been fixed.
226329	Text track data was deleted when setting up a new cluster analysis. This issue has been fixed.
225804	Multi-well UDE output for ZoneManager Zone interval does not export curves to the Field Data curve set. This is intimated to the user through an error message. The information in the error message was incomplete. This issue has been fixed by adding the appropriate information in the error message.

GVERSE Geophysics

ID	Description
237966	GeoQuest 3D horizon with names exceeding 16 characters could not be imported to a GVERSE Geophysics interpretation. This issue has been fixed.
235721	Seismic data for the displayed version could not be subset to minimum time. This issue has been fixed.
230073	In certain scenarios, scrolling arbitrary lines to different position on Main Map View in GVERSE Geophysics caused the application to crash due to a memory leak. This issue has been fixed.
230062	Setting a default color palette for all horizons using the Default Color Map Settings dialog did not work for newly created horizons. This issue has been fixed.
216001	In a specific case, there was an issue in time to depth computation. This resulted in a mismatch between depth converted horizon and seismic. This issue has been fixed.

GeoAtlas

ID	Description
54124	In certain cases, proportional pies were drawn incorrectly where single slice was making the entire circle instead of multiple slices. This issue has been fixed.
212338	At times, editing entities using the Erase tool broke the shapefiles and layers were not updated. This issue has been fixed.
213429	While editing, contours, polygons and polylines could not be decimated. This issue has been fixed by adding a new Decimation tool which decimates the nodes of contours, polygons and polylines efficiently.
214430	ZoneManager attributes names for conditional pies could not be selected. This issue has been fixed.
215536	Importing an ESRI ArcGIS Georeferenced Image file in GeoAtlas resulted in a black colored image without any data. This issue has been fixed.
221005	While creating cross sections in GeoAtlas, entities selected in Entity Filter Selection tool were not honored. This issue has been fixed.

IsoMap

ID	Description
213604	Hand drawn contour layer became corrupt if the Pencil tool was activated while the Data Point entity was selected as the active entity but no points were drawn. This issue has been fixed.
231810	IsoMap Build Surface did not recognize and reflect any changes updated in the Active User Strat Column unless GeoAtlas was restarted. This issue has been fixed.
232785	The centerline faults were not applied on the contours. This issue has been fixed by collecting the complete data points for fault nodes.
233511	The centerline faults were not honored. This issue has been fixed by collecting the complete data points for fault nodes.

ProjectExplorer

ID	Description
233178	In certain scenarios on network projects, the client machine gets out of sync with the server machine. This results in new layers not being visible to either the client, server, or both machines. This issue has been fixed.

QueryBuilder

ID	Description
28395	QueryBuilder did not honor Active Strat Column and Source List. This issue has been fixed.
213800	When a query results were exported in QueryBuilder, aliased caption names were not written to the exported CSV file. It was honoring the default captions. This issue has been fixed.
231205	The message returning results for large queries did not include the well count, along with the record count. This issue has been fixed and now both counts display with every query result.
231344	The QueryBuilder filter results were not sorted. This issue has been fixed.
231567	QueryBuilder could not filter results honoring the Active Source List. This issue has been fixed.

WellBase

ID	Description
77499	The Historical Production (F) records are not averaged by number of wells in the lease if they are not followed by Monthly Production (G) records. This issue has been fixed.
80210	Proposed Survey Bottom Hole (BH) Latitude and Longitude fields were missing and could not be imported using the Excel Spreadsheet Import tool. This issue has been fixed.
84907	DST Mud table was missing and could not be imported using the Excel Spreadsheet Import tool. This issue has been fixed.
111072	Formation definition was missing IT record for IP Treatments in ASCII4 and ASCII5 formats. This issue has been fixed.
180137	In certain cases, incorrect data was imported using the Excel Spreadsheet Import tool. This was due to coordinate transformation not getting applied during the import. This issue has been fixed by converting the Lat/Long values to the database coordinate system during the import process.
211337	With any WellBase filter activated, changing the Spud Date or Permit Date values manually resulted in changes applied to the first well in the project. This issue has been fixed and now changes are made only in the chosen well.
213331	The Delete Duplicate Data option was accessible to users even when the GGX_Import_Role was revoked. This issue has been fixed by disabling all the bulk delete options for users with GGX_Import_Role revoked.
213571	The Replace All feature in the Find and Replace tool did not honor the active WellBase filter. This issue has been fixed.
214143	Making changes in the Well Headers fields and then selecting/changing a WellBase filter copied the Well Headers fields to the first well in the Well List. This issue has been fixed.
214661	If users rename a Scout Ticket field in WellBase, the Quick Filter tool did not honor the captions during the search. This issue has been fixed and now modified captions are honored as labels.
223400	In certain scenarios, Formation Tops postings such as Subsea Value were incorrectly calculated and displayed due to a rounding issue. This issue has been fixed.
224559	In the Quick Filter tool, the Not Equal To (<>) operator excluded any null records during the search. This issue has been fixed by adding a new option that allows users to include null records while filtering wells.

226451	With the Zones tab active in WellBase, sending a well from GeoAtlas to WellBase by double clicking the well, the Zones tab did not refresh to show information of the new well. This issue has been fixed.
226497	The Available and Selected panes in the Select Formation dialog while creating a new Strat Column did not show complete formation names. This issue has been fixed by introducing the option to resize this dialog.
227275	In certain cases, duplicate data was not being deleted for DST and IP records using the Delete Duplicate Data button in WellBase. This issue has been fixed.
227854	In the Change Source Owner dialog box, clicking OK without selecting a source closed the dialog box and automatically assigned PUBLIC as the source. However, no picks could be made using the PUBLIC source. This issue has been fixed by prompting a message informing users that they have not selected a source from the Change Source Owner dialog box when they attempt to close it.
229249	Using the Calc XYZ Data and Calc All Zones options from the WellBase Zones tab were not aware of the filter applied in ZoneManager. This issue has been fixed.
230737	The Well Curve Summary dialog box displayed the minimum and maximum values of the entire curve set, instead of individual curves. This issue has been fixed.
231629	When wells were navigated using the FIND tool, the Hot List did not refresh the document URLs for the wells. This issue has been fixed.
232784	In the Production tab, value for NGL was not added in the Total Fluids field. This issue has been fixed by adding the NGL values in the Total Fluids field.
233049	There was an issue while importing historical production data related to F records. This issue has been fixed.
240018	The proposed batch survey calculation was using the surface latitude/longitude values for the first calculated well and then used that value for all the wells. The issue has been fixed and now the latitude/longitude values are correctly calculated for each well.

WellXchangePlus

ID	Description
226521	Logs could not be transferred between two GXDB projects. This issue has been fixed.

ZoneManager

ID	Description
226785	In certain cases, interpolating tops using the Create Interpolated Tops tool in ZoneManager were not calculated for deviated wells. This issue has been fixed.
235264	Spatial filter could not be activated in ZoneManager. This issue has been fixed.
235683	In the All Attributes spreadsheet, column sorting stopped working once the Well ID field was frozen. This issue has been fixed.
235804	In the All Attributes spreadsheet, freezing the Well ID column and modifying a record with no Well ID resulted in an error. This issue has been fixed.

Documentation

ID	Description
212864	Certain information was missing for the Boundary entity action option in the Imports/Exports help file. This issue has been fixed.
235679	The Well Common Name field's information under the Well Header table for ASCII3 Format was missing in the Data Formats help file. This issue has been fixed.

Known Issues

This section lists the known issues in this release.

Python API

ID	Description
235954	When any notebook file is launched from the Jupyter notebook, Python API hangs and shows an 'Invalid Argument' message. This is because the required version of 'pyzmq' library is not installed. **Workaround:** Download and install VC Runtime from any of the following links: - https://docs.microsoft.com/en-us/cpp/windows/latest-supported-vc-redist?view=msvc-170 - https://aka.ms/vs/17/release/vc_redist.x86.exe - https://aka.ms/vs/17/release/vc_redist.x64.exe Restart the machine and run Python API. If the issue still persists, enter the following command using Administrator rights in command console: *netsh winsock reset*

GVERSE Petrophysics

ID	Description
239397	With the removal of **Data Interval** option, Completion curves cannot be displayed for depths with no curve data.
239336	Display and data interval functionalities are not available in **Report View**. **Workaround**: Use the **Edit Report Zone** feature to apply the data intervals.
239619	When the Data Interval option is applied for the current well, UDE Output cannot be generated for Field Data curve set.

GVERSE Geo+

ID	Description
237421	Cross sections created using the **Structural Raster Image.xst** template in **XSection** does not display correctly when opened in **GVERSE Geo+**. **Workaround**: In **XSection**, remove data interval from **Cross-Section Display Preferences dialog >> Layout tab**.

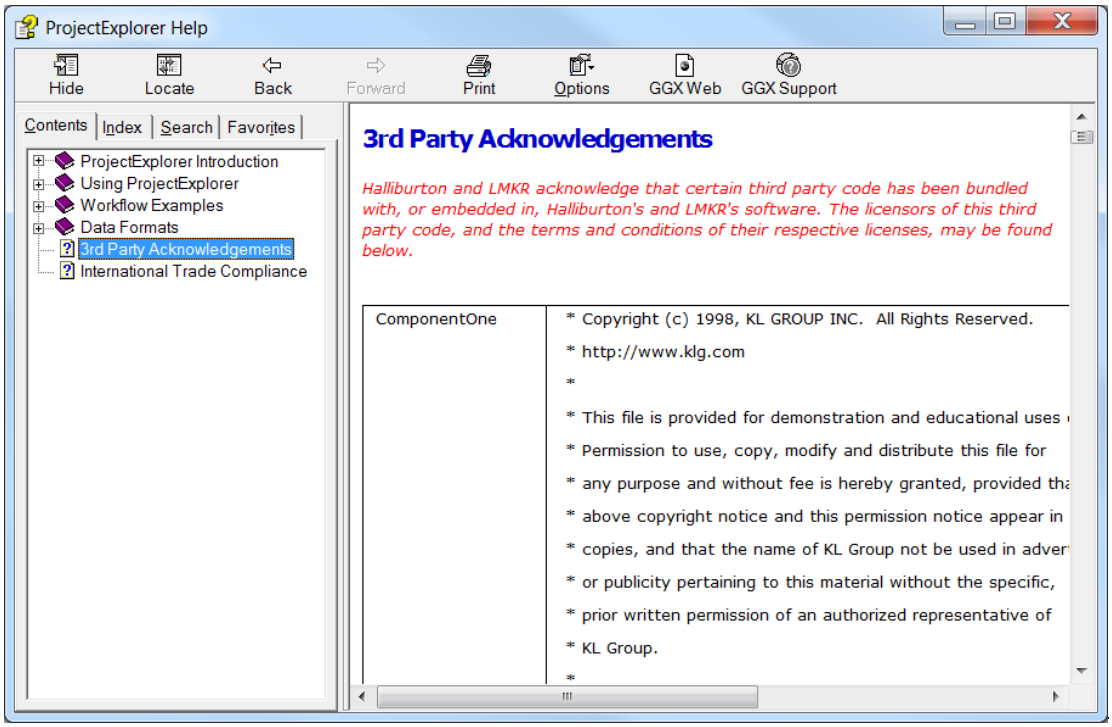
Third Party Applications

We use various third-party applications in the development of our software.

We acknowledge that certain third party code has been bundled with, or embedded in, our 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.



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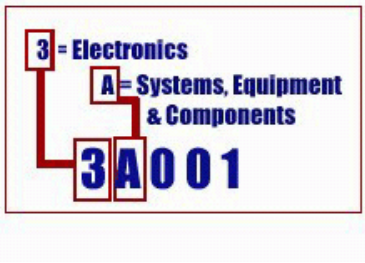
This application is manufactured or designed using U.S. origin technology and is therefore subject to the export control laws of the United States. Any use or further disposition of such items is subject to U.S. law. Exports from the United States and any re-export thereafter may require a formal export 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 our 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 GVERSE GeoGraphix Support

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 GVERSE GeoGraphix Support

We are 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 GVERSE GeoGraphix 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 GVERSE GeoGraphix 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
GVERSE GeoGraphix Home page	http://www.gverse.com/geographix