RELEASE NOTES

Inversion

Enhanced interpretation, reservoir prediction and geosteering*

Release Notes for GVERSE Inversion 2017.3

*Powered by FracGeo

GVERSE®

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Introduction

LMKR is pleased to announce the release of the GVERSE® Inversion 2017.3 plug-in for enhanced interpretation, reservoir prediction and geosteering*.

This document provides an introduction to the Inversion plug-in features and benefits. It also lists the system requirements necessary to install and run the plug-in.

What is GVERSE Inversion?

This plug-in is a colored inversion solution that provides a rapid, yet robust, way to derive geological details in the form of relative or absolute impedance (rock hardness). When geosteering through a reservoir, the high resolution impedances calculated by the colored inversion ensure that the well is drilled through the ideal reservoir. This plug-in is part of the GVERSE application suite by LMKR (http://www.lmkr.com/gverse).

LMKR GVERSE consists of geoscience and engineering solutions focused on workflow optimization and enhancing productivity of teams working on diverse geological and geophysical projects. These applications help cut the processing time required for interpretations resulting in fast, easy to use scalable tools that are inter-operable with other known geoscience software suites; enabling a connected multi skilled workforce.

Main Features

Data Loading and Management

- Direct access to the required well data and seismic data from your GeoGraphix® projects
- Resulting impedance volume can be saved into GeoGraphix project database

Colored Inversion

- Minimizes the input required from user
- Calculates an operator to transform the seismic data to equivalent impedance cube
- Real-time inversion operator calibration by:
  - Displaying the amplitude spectrums of the seismic data and acoustic impedance logs used to construct the colored inversion operator
  - Previewing the resulting impedance on a given inline, crossline, or closest line to a selected well before launching the calculation over the area of interest.

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Benefits

- **High Resolution Results for Better Well Planning, Geosteering, and Completions**
  Impedance (rock hardness) data provides a high resolution view of the reservoir and landing zone with the spatial resolution that inherently comes with seismic data. This information can be used to determine the best wells to drill, the optimum landing zones, and provide a better understanding of where and how completions should take place along a well.
- **Simple, Fast, and Robust Algorithm**
  The only inputs for this inversion are the acoustic impedance logs and seismic data to use. With this information, an inversion operator is constructed to quickly transform the seismic amplitude into impedance volume.
- **Capability of GeoGraphix with FracGeo Technology**
  Integration of GVERSE Inversion into GeoGraphix allows one to easily create and view the resulting impedance volume and use the derived reservoir information to easily optimize any well location, geosteering or completion plans.

System Requirements

The following sections list the system requirements for the Inversion plug-in.

Software

The software that must be installed on the system running the Inversion plug-in are as follows:

- GeoGraphix Discovery 2017.3
- LMKR License Management Tool 2016.1 for Inversion license
  The LMKR License Management Tool (LMT) must be installed to configure the Inversion license.
- Microsoft®.Net Framework 4.6.1
  The Microsoft Net Framework 4.6.1 is packaged with the GVERSE Inversion installer. It is installed automatically during the installation process.
- Adobe Reader for selected help files (optional)

Operating System

To run the Inversion plug-in, you need one of the following operating systems installed on your system:

- Windows® 7 Professional x64
- Windows® 7 Enterprise x64
- Windows® 7 Ultimate x64
- Windows® 10 Professional x64
- Windows® 10 Enterprise x64

Note: It is recommend to use the latest Microsoft® service packs and security patches.

Hardware

The hardware requirements are as follows:

Minimum

- 2.4 GHz 64-bit processor
- 8 GB RAM
- NVidia GeForce 400 series
  or ATI Radeon HD 5000 Series
  or Intel HD Graphics in Intel Haswell processors
- 19-inch monitor

Recommended

- Quad 3.1 GHz 64-bit Intel class or better
- 16 GB RAM or greater
- NVidia GeForce GTX 970
- Dual 21-inch monitors

Licenses

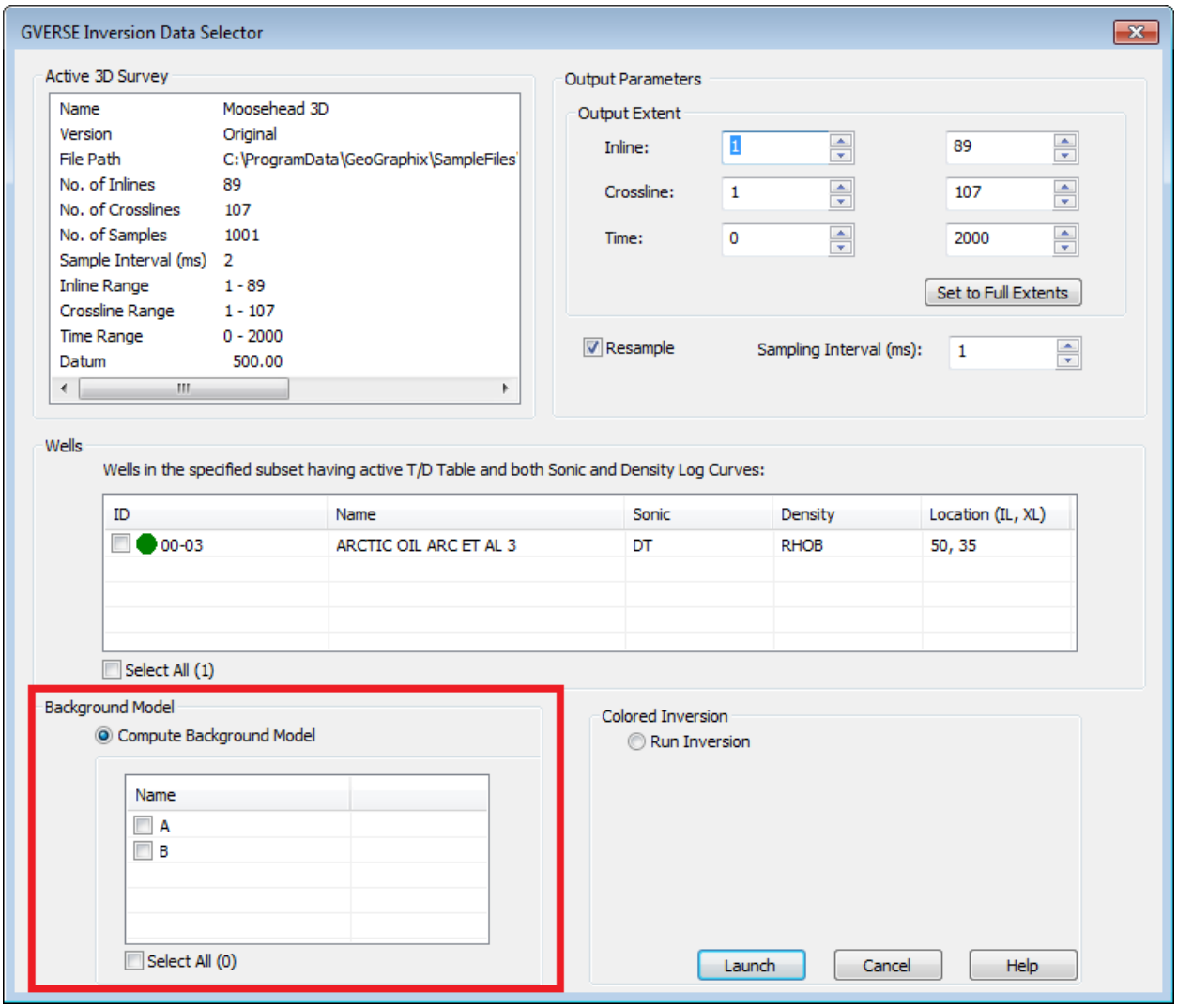
The following licenses are required to run the Inversion plug-in:

- GeoGraphix Discovery license version 2017.1
- GVERSE Inversion license version 2017.1

Note: Refer to the LMKR Customer Support > Knowledge Center > System Requirements page for up-to-date information on the requirements.

What's New in GVERSE® Inversion 2017.3?

GVERSE® Inversion supports absolute impedance computation using Background Model option. You can use the Colored Inversion plug-in to derive geological details in the form of absolute impedance (rock hardness).



Third Party Acknowledgements

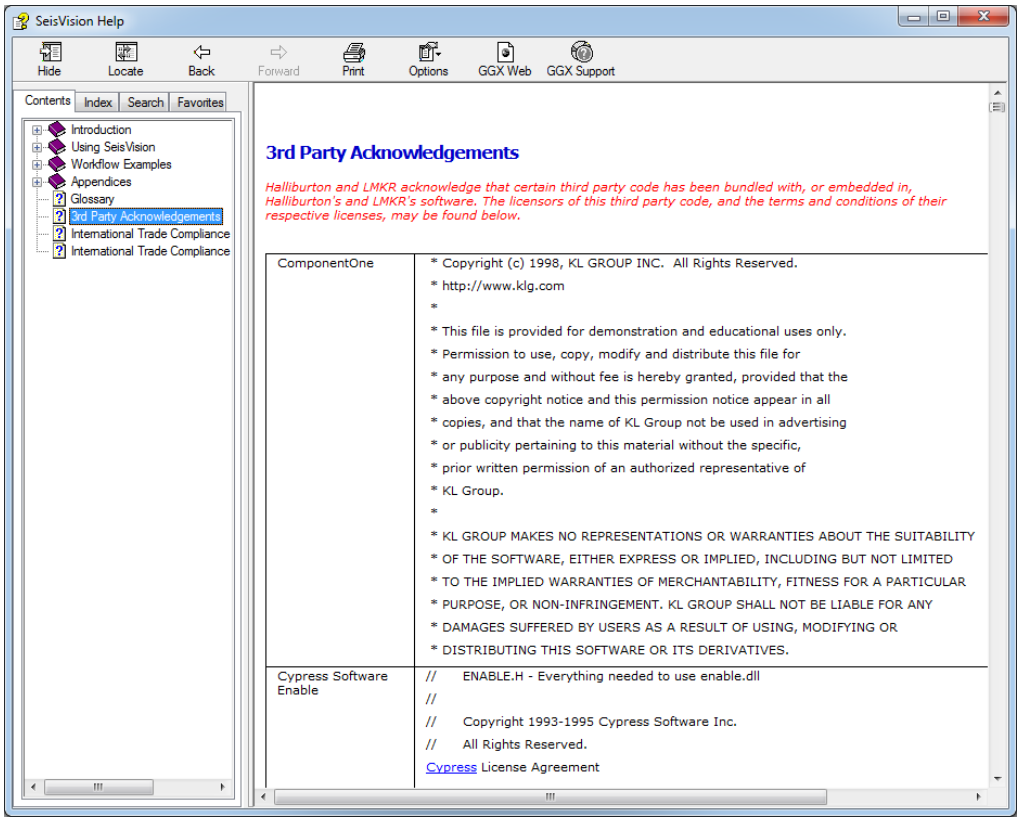
LMKR acknowledges that certain third party code has been bundled with, or embedded in, its software. The licensors of this third party code, and the terms and conditions of their respective licenses, may be found in the help file.

To access the 3rd party license agreements:

1. To access the online help, click the **Help** menu located on the SeisVision menu bar.

   The Help window displays.

2. In the **Contents** pane, locate the **3rd Party Acknowledgements** help topic as shown in the image below.



International Trade Compliance

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

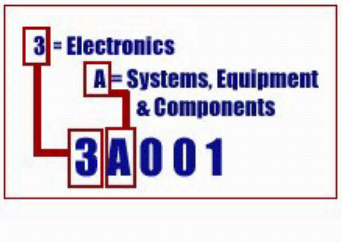
The ECCNs provided here (if available) represent LMKR's opinion of the correct classification for the product today (based on the original software and/or original hardware). Classifications are subject to change. If you have any questions or need assistance please contact us at support@lmkr.com.

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	EAR Number	License	Last Updated On
GVERSE Inversion	EAR99	EAR	08/06/2017

Contacting LMKR Support

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

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

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

Helpful Links

Name	Website Address
LMKR Homepage	http://www.lmkr.com
LMKR GVERSE	http://www.lmkr.com/gverse
LMKR Support Portal	http://support.lmkr.com