



Seismic Data Management

SOFTWARE, WORKFLOWS AND SERVICES

Troika enables competitive advantage by helping to future-proof seismic libraries and deliver fast access to the right data. A comprehensive suite of software, workflows and expert support services are available to recover data and condition datasets for computing and analytics.

www.troika-int.com

Data Management Software

Troika has developed unique solutions to retrieve and repair legacy formats, merge and check navigation data, and visualise quality control attributes. The company's Magma data recovery software is the industry standard front-end for conditioning big datasets for in-house or cloud computing and analytics.

Functionality includes highly flexible data selection options during input and/or output, decoding, error checking and fault fixing to condition 2D or 3D data and related positioning information either as a stand-alone procedure or as the front-end for processing and analysis. Benefiting from its long-standing contribution to the SEG Technical Standards Committee, Troika provides systems to efficiently validate - and if necessary correct - the contents of a seismic data library's conformance to SEG-Y and SEG-D industry standard formats, thereby ensuring compliance to company or other regulatory requirements.

Troika has developed capabilities to identify and reformat an unrivalled range of legacy recording formats and media and its world-leading transcription software can handle field tapes, post-stack data and pre-stack data in a variety of sort modes, such as shot, CMP, offset or other orders. Systems have also been developed to extract seismic and related metadata from record oriented data encapsulation (RODE) format files.

Software is accessed via a highly intuitive graphical user interface (GUI), enabling geoscientists, engineers and data management personnel to quickly learn and optimally use its extensive functionality. With more than 6,500 licenses worldwide it is used by major international exploration and production (E&P) organisations, independents of all sizes, national oil companies (NOCs) and a wide range of oilfield and seismic service companies. It has been integrated as a front-end to several standard E&P systems and input and creation of GIS shapefiles.

Software can be provided as individual modules or as integrated bundles of data management utilities

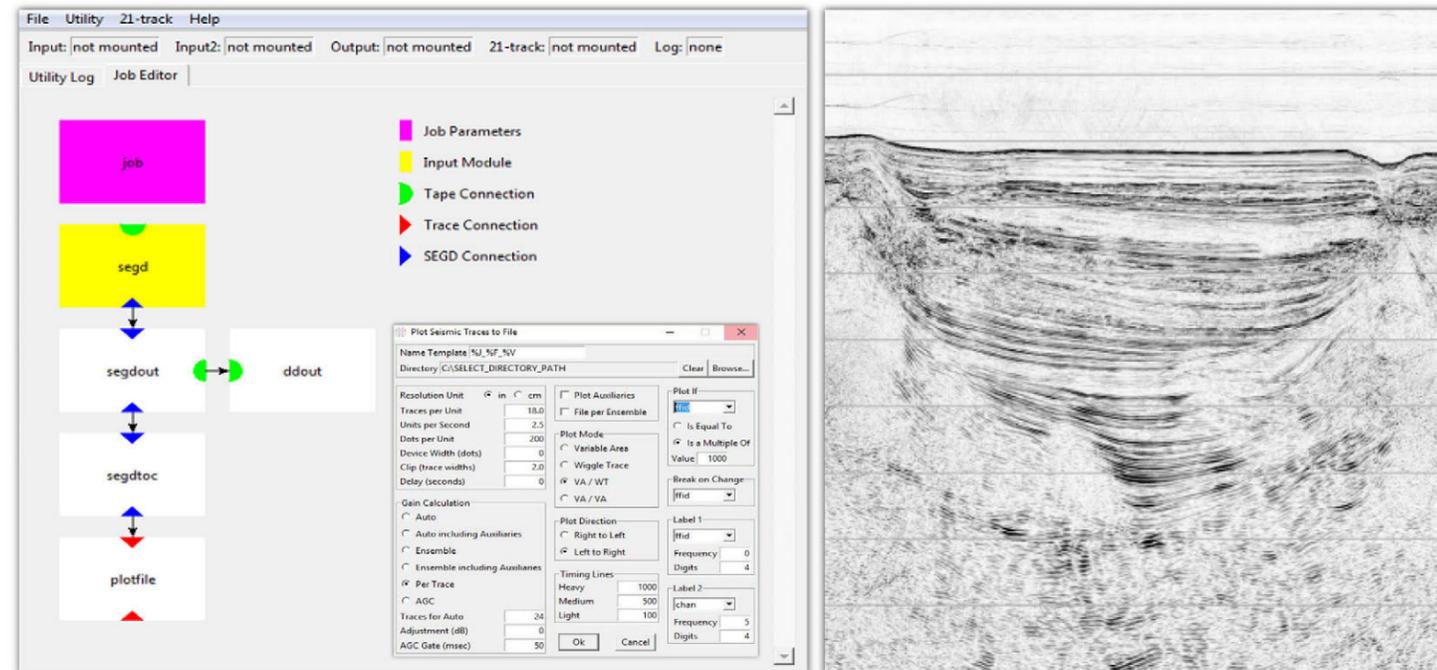
- Standardisation of workflows
- Field, pre- and post-stack data
- World-leading transcription software
- Decoding, error checking, fault fixing
- Flexible data selection, input and output
- Front-end data conditioning
- Reformatting of legacy formats
- Intuitive user interface
- Used by majors, supermajors, NOCs and service companies
- More than 6,500 licenses worldwide
- Disk data trawling and library modernisation
- Input and creation of GIS shapefiles

Troika's Understanding of Seismic is Second to None

The Troika team has been involved with the SEG Technical Standards Committee since 1999. Members including Bob Firth, Rune Hagelund, Jill Lewis, Victor Ancira and Jill Holliday have been driving the development, review and ratification processes of modern industry standards such as SEG-Y1, SEG-Y2, SEG-D2.1, SEG-D3 and SEG-D 3.1, and as a result we understand seismic data recording formats better than any other company.

Magma

Seismic Data Recovery Software

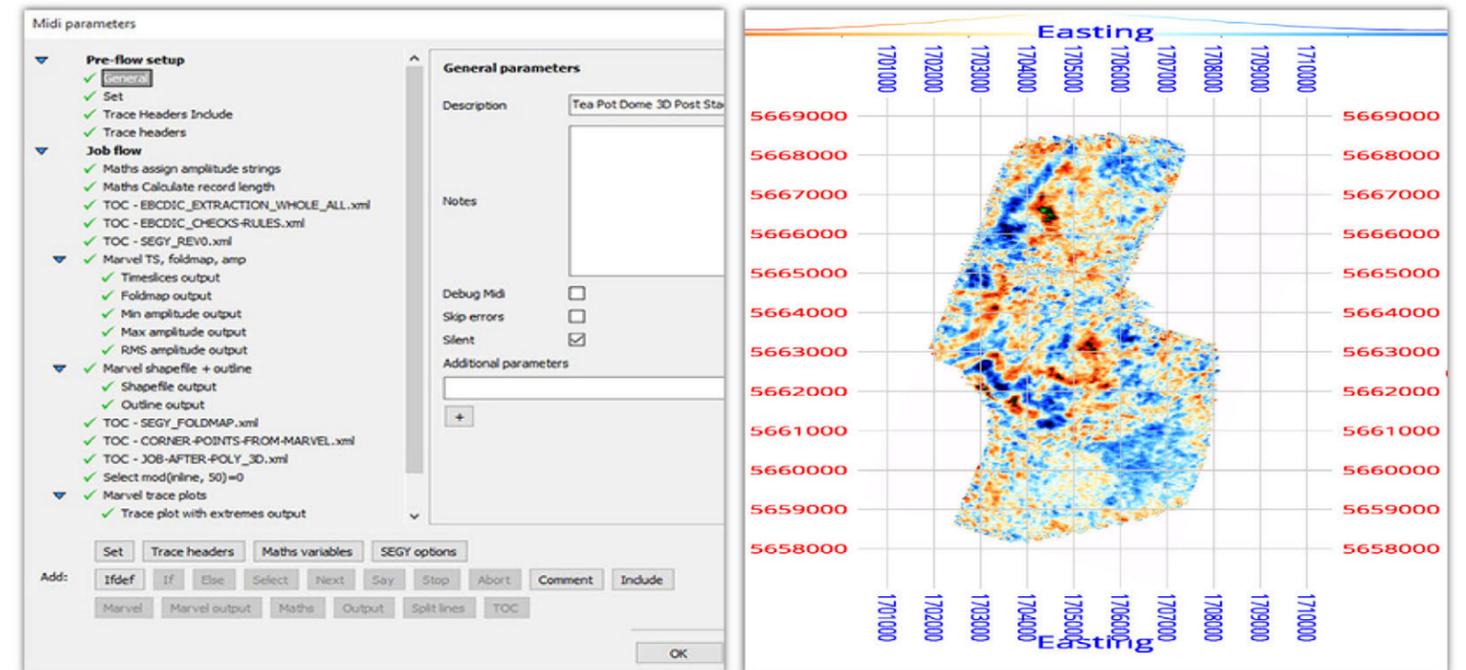


A modular transcription and data manipulation package meeting a wide range of data input, output, reformat and quality control (QC) requirements. It is a widely used industry standard front-end for data analysis and processing, and is the chosen plug-in to SeisSpace ProMax for Foreign Tape Input.

- Tape support including modern tape libraries, 9 and 21 track drives
- Comprehensive suite of quality control (QC) functionality
- Extensive library of seismic formats and the ability to map your own
- Standard output conforms to the latest version of SEG-Y
- Read and analyse functionality as a free utility
- Modulated so its easy to build scripts around

Midi

Seismic Data Copy, Select and QC Software

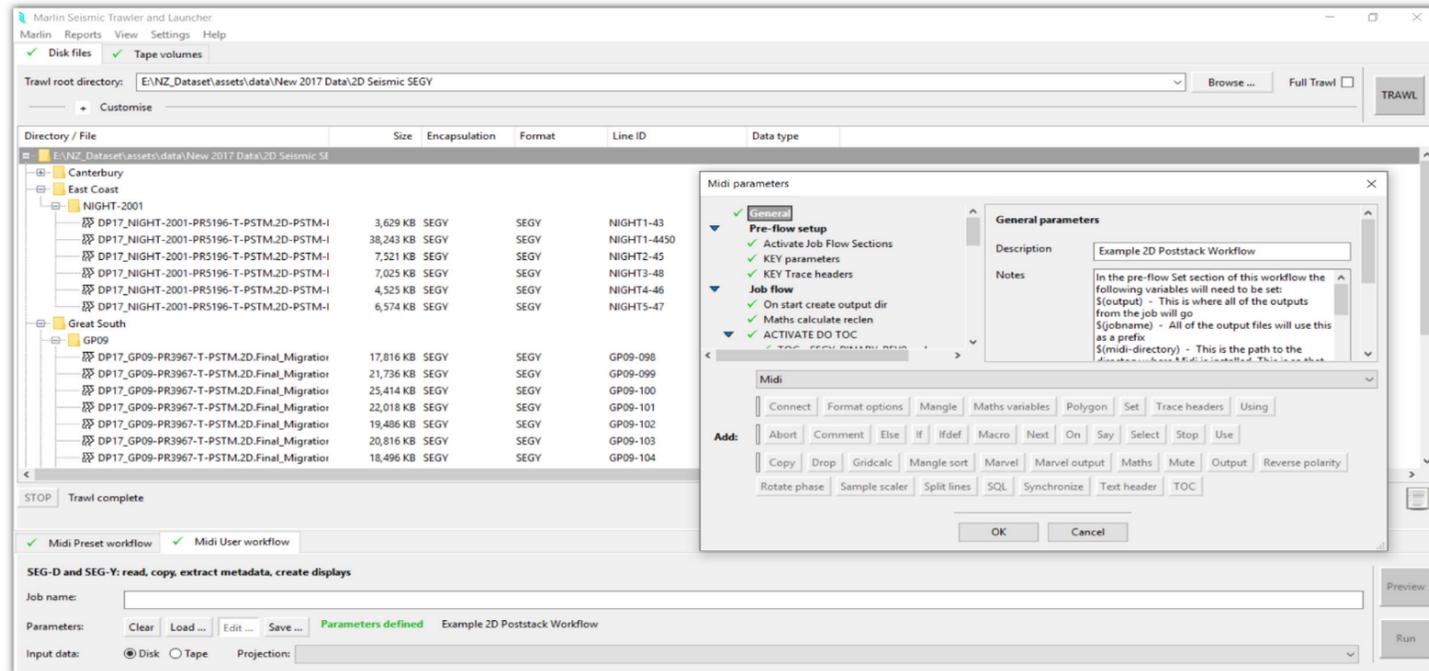


A software utility to seamlessly copy, manipulate, QC and index SEG-D and SEG-Y tape media and disk files and at the same time extract and visualize associated metadata.

- Extensive filters and options to produce the best representation of your data
- Preset workflows providing the end user with the key information required for the job
- Mass metadata extraction and data QC in one pass over the data
- Batch processing of large volumes of data
- Build business rules in to a job for contract compliance
- Make changes to the data while it is being processed
- Create error reports and loading files

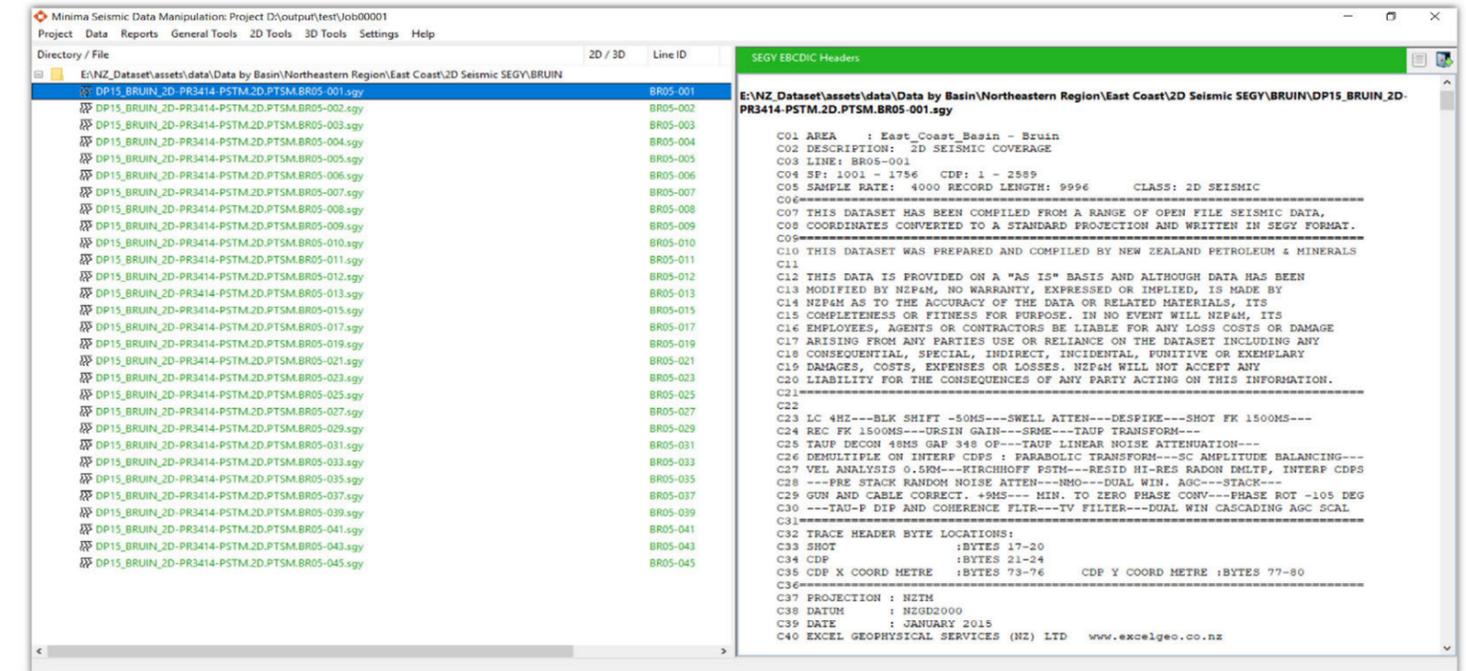
Marlin

Seismic Data Trawler



Minima

QC and Rationalise SEG-Y and Navigation Data



An intelligent disk trawler for identifying seismic file information and extracting basic metadata. The software launches Midi and Minima software as and when required for data transcription and/or QC.

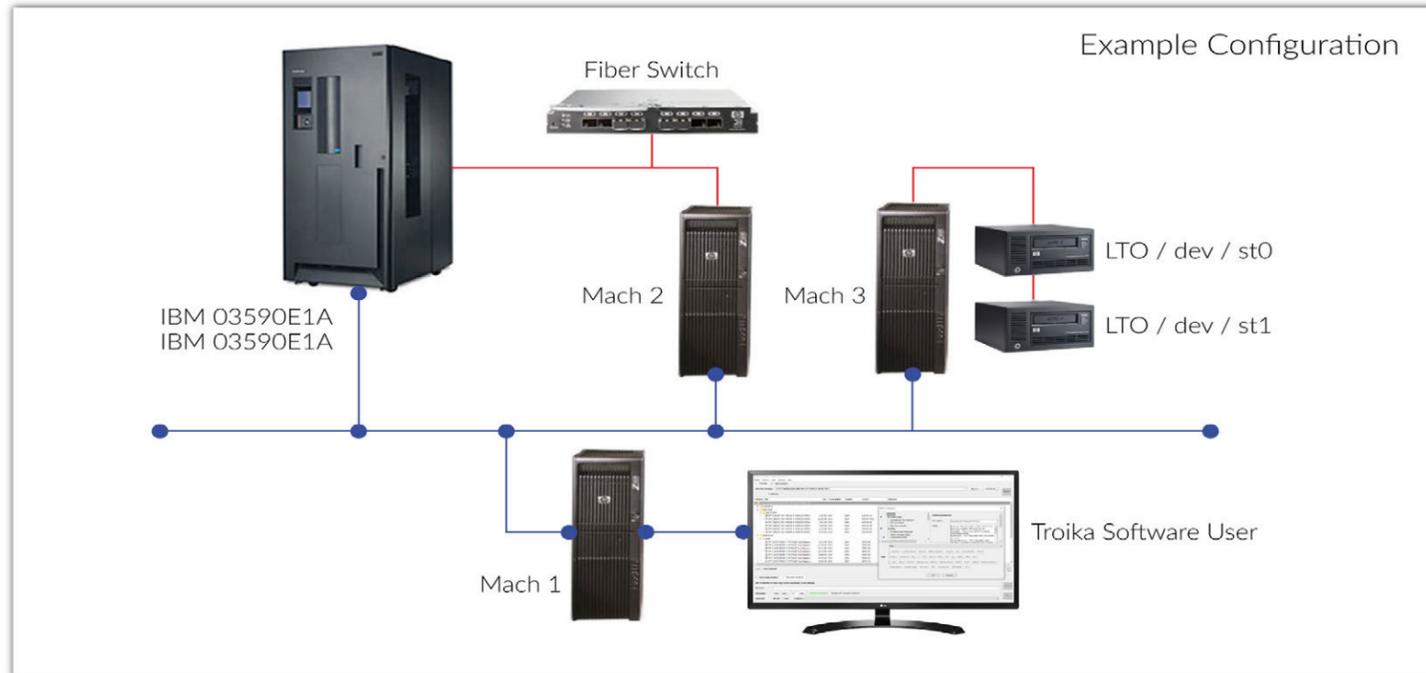
- Efficiently identifies your seismic data
- Search by file or line name, encapsulation, format
- Report on possible duplicates
- A GUI to build and run Midi jobs
- Run prebuilt Midi workflows
- Build and run custom Midi jobs
- Launch Minima for interactive QC

Rationalizes 2D and 3D SEG-Y data on disk and provides the opportunity to repair datasets to prepare them for problem-free uploading to workstations for processing, analysis, interpretation and other applications.

- An interactive view on your data, display sections and slices
- View and compare locations from 2D seismic and navigation files
- Report and highlight data inconsistencies
- Produce 2D and 3D shapefiles
- Condition the data
- Commit changes to original files or write new volumes
- Create navigation files from seismic headers

Magnet

Remote Tape Access Software

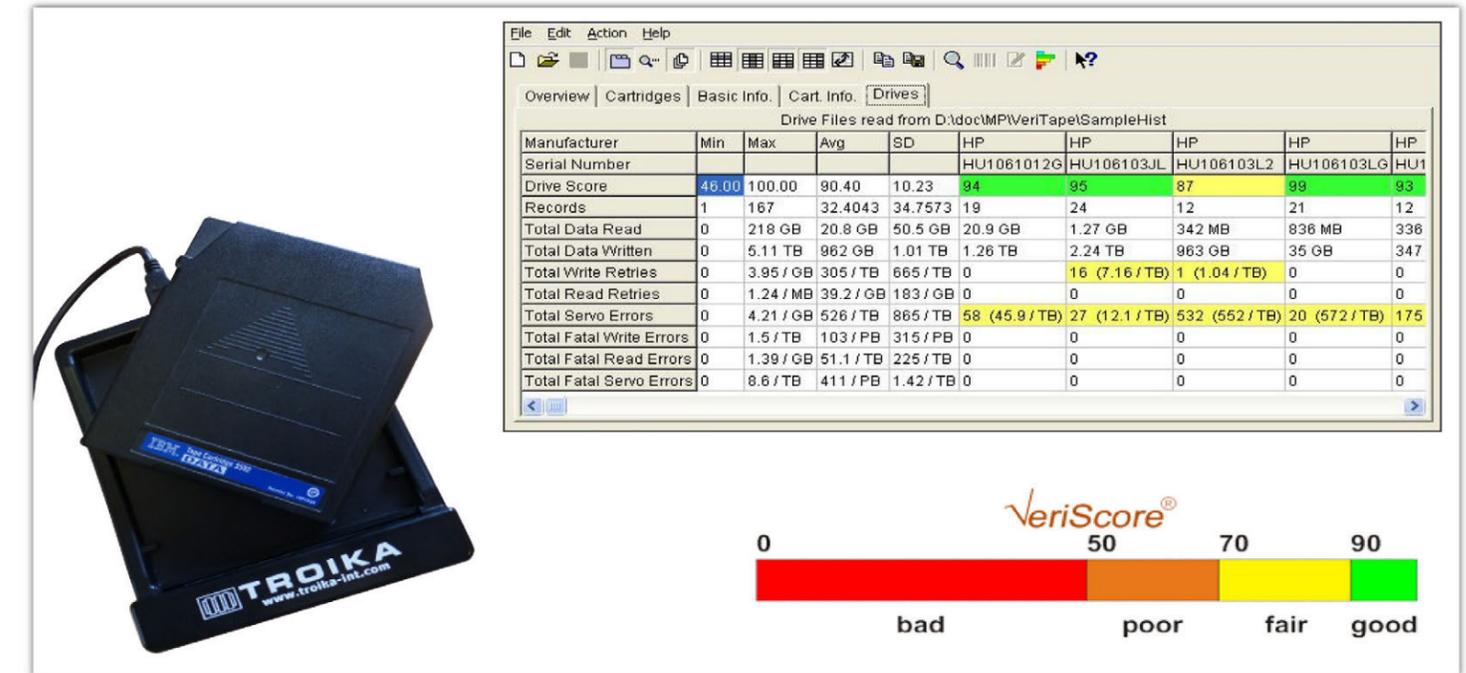


System-wide access to all of an organization's tape drives via an intuitive web-enabled graphical user interface.

- Provides access to local and remote tape devices and libraries across the network
- Provides highly efficient read and write capabilities
- Circumvents the need to access the device as an administrator
- Works in Windows or Linux environments
- Support for robotic devices and standard SCSI tape libraries

VeriTape

Seismic Data Cartridge Quality Checker



The image shows a VeriTape reader device on the left, which is a black handheld unit with a blue tape cartridge inserted. To the right is a screenshot of the VeriScore software interface. The interface displays a table of drive statistics for five different HP tape drives. Below the table is a "VeriScore" color-coded scale ranging from 0 (red, bad) to 90 (green, good).

Manufacturer	Min	Max	Avg	SD	HP	HP	HP	HP	HP
Serial Number					HU1061012G	HU106103JL	HU106103L2	HU106103LG	HU106103LH
Drive Score	46.00	100.00	90.40	10.23	94	95	87	99	93
Records	1	167	32.4043	34.7573	19	24	12	21	12
Total Data Read	0	218 GB	20.8 GB	50.5 GB	20.9 GB	1.27 GB	342 MB	836 MB	336
Total Data Written	0	5.11 TB	982 GB	1.01 TB	1.26 TB	2.24 TB	963 GB	35 GB	347
Total Write Retries	0	3.95 / GB	305 / TB	665 / TB	0	16 (7.16 / TB)	1 (1.04 / TB)	0	0
Total Read Retries	0	1.24 / MB	39.2 / GB	183 / GB	0	0	0	0	0
Total Servo Errors	0	4.21 / GB	526 / TB	865 / TB	58 (45.9 / TB)	27 (12.1 / TB)	532 (552 / TB)	20 (572 / TB)	175
Total Fatal Write Errors	0	1.5 / TB	103 / PB	315 / PB	0	0	0	0	0
Total Fatal Read Errors	0	1.39 / GB	51.1 / TB	225 / TB	0	0	0	0	0
Total Fatal Servo Errors	0	8.6 / TB	411 / PB	1.42 / TB	0	0	0	0	0

VeriScore scale: 0 (red, bad) - 50 (orange, poor) - 70 (yellow, fair) - 90 (green, good)

Troika are sole agents in the seismic industry for the VeriTape® reader, a premier tool for diagnosing the health of linear tape open (LTO) and 3592 tape cartridges. Defective units can be retired before they fail, avoiding potential loss of data.

- Extremely quick access to tape statistics from the cartridge chip
- It tells you how many times the tape has been mounted in a drive
- Can be used to QC tape outputs
- Creates a summary to monitor the drives reading the tapes
- It is simple to use and can be attached to workstations or laptops

Workflows

Troika software enables building of efficient workflows to populate, verify, index and future-proof corporate and national seismic data repositories and restore confidence in data management databases. Solutions are also provided for remote robotic tape management and verifying datasets for workstation use. The company's seismic data management experts are available to deliver and support packaged solutions using appropriate Troika software modules, optionally integrated with user's existing systems, to meet specific requirements.

Software is available to perform detailed quality control, including visualisation of relevant seismic attributes, extraction and repair of metadata and GIS-ready navigation merge. Tools are available to easily and efficiently remotely-control data input and output data from multiple tape devices in different locations. Disk data trawling and seismic library modernisation can be performed extremely efficiently using automated workflow capabilities. The software can confirm or - when required - implement compliance to industry standards; enable de-duplication to optimise storage efficiency and verify datasets for problem-free workstation uploading.

- Easy to use predefined workflows
- Quality control and attribute visualisation
- GIS-ready navigation merge and shapefiles
- Flexible data selection and metadata extraction
- Contract compliance to industry standards
- Front-end data conditioning for workstation loading
- Identification of potential duplicate files
- Disk data trawling and library modernisation

Navigation Merge

Adding and/or verifying positional information in field, pre-stack or post-stack data while also assuring conformance to SEG standards. A variety of maps and QC attributes can be produced to enhance confidence in geographical accuracy.

Data Trawling

Utilities to review the contents of a seismic dataset or an entire repository including features such as analysis of seismic trace headers and sample data displays.

Field Data QC

Verification of the reliability and quality of newly acquired or legacy datasets.

Data Conditioning and QC

Especially appropriate for older datasets, this workflow includes analysis of existing formats and, as required, remastering to minimize potential conflicts during input to processing or interpretation.

Life of Field Seismic Repeatability

Troika provides robust software workflows and related independent 3rd party services to measure repeatability between surveys through a responsive interface to QC attributes of seismic and positioning data. This can be performed post-project or during acquisition to provide in-time action to resolve discrepancies between planned and actual survey parameters. This service can be particularly valuable when operators use different acquisition suppliers from one 4D survey to the next.

Contract Compliance

Benefiting from its long-standing contribution to the SEG Technical Standards Committee, Troika provides systems to efficiently validate - and if necessary correct - the contents of a seismic data library's conformance to SEG-Y and SEG-D industry standard formats, thereby ensuring compliance to company or other regulatory requirements.

Specialist Services

Troika provides expert consultancy services to support specific seismic data management projects. Combinations of software modules - optionally including customised add-ons and tailored automated workflows - can be assembled, installed in user's facilities and supported as required. Leveraging decades of specialised industry experience, customised modular in-house or hosted training courses can be provided addressing topics such as legacy and modern seismic tape media and formats and the efficient use of data management software.

Troika has built a range of capabilities for independent 3rd party quality control of legacy data transcription and life-of-field seismic (LoFS) 4D acquisition. QC of transcription projects is typically based on checking a representative sample of input and output tapes, database accuracy and reliability and expert analysis of the transcription procedures. For LoFS acquisition projects, Troika provides independent 3rd party services to remotely measure repeatability between surveys through a responsive interface to QC attributes. Versatile automated software workflows running 24/7 via remote transfer of data to and from vessels or rigs enable in-time response to E&P companies in the event of discrepancies between planned and actual survey parameters. This service can be particularly valuable when operators use different acquisition suppliers from one 4D survey to the next.

- Remote near real time quality control of acquisition
- Quality control of 3rd party transcription
- Customised dashboard for QC results
- Tailored automated workflows for batch processing
- Expert project support
- Data management consultancy
- Customised training

Consultancy

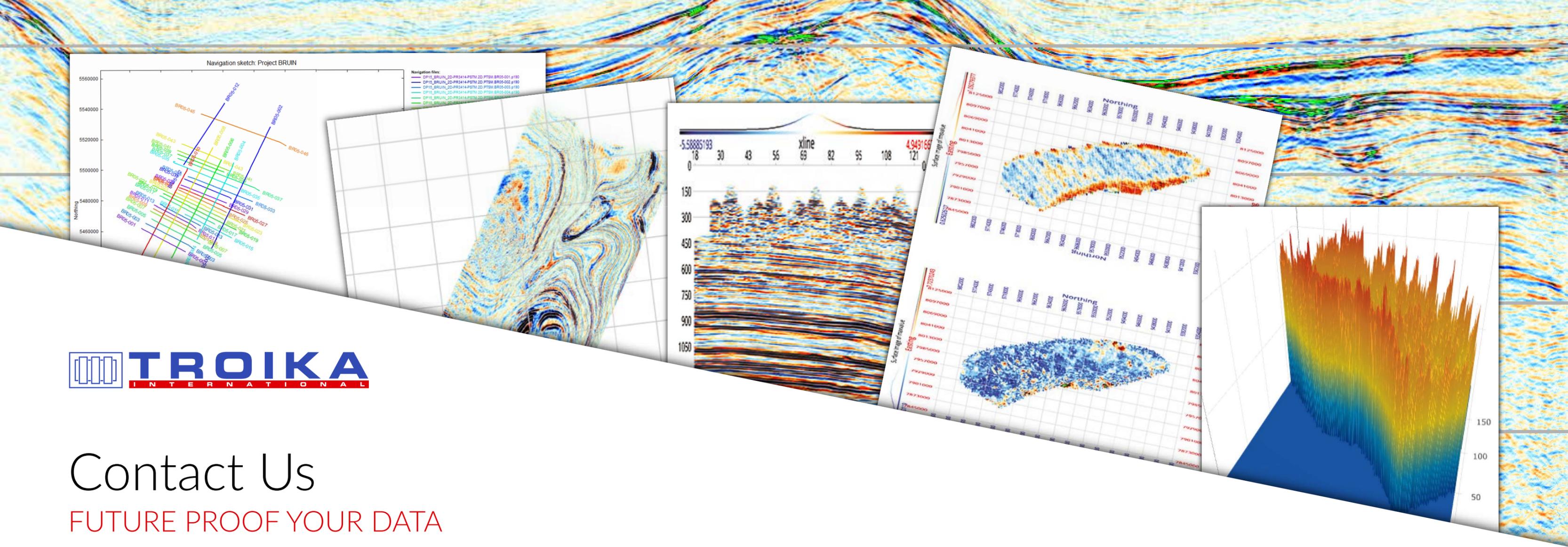
Troika provides support from industry professionals experienced in seismic issues ranging from acquisition, data loading, processing and uploading to workstations for analysis and interpretation. The company's experts will take a pragmatic approach to address your particular seismic data management challenges and will make practical recommendations to ensure the long-term sustainability of your valuable data assets.

Quality Control and Validation

Troika software provides efficient tools to ensure that seismic datasets are contract-compliant and adhere to the guidelines set by the SEG Technical Standards Committee. It can also help in adapting processing workflows to provide exploration and production (E&P) operators and other users with more fully and accurately populated datasets. Troika also has the expertise and knowledge to provide advice and support to companies embarking on tape transcription projects by helping in the formulation of tenders, evaluating bids and offering third party QC on the resulting data and processes. This service helps data owners to have increased confidence that their data transition has been managed correctly and securely.

Training

Troika offers modular training courses addressing issues including the basics of the seismic data lifecycle, current and legacy media, data structure and formats as well as theoretical and practical methods for quality control and reporting. Teaching modules also cover the fundamentals for 2D and 3D data loading and are supported by hands-on practical sessions using a variety of input media. Troika also offers training in the efficient use of its software to optimally meet the specific requirements of transcription, analysis and related projects. Tailored courses, provided either in group sessions or on a one-to-one basis, can be provided at our special training facility in Tunbridge Wells or at your on-site locations.



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