

# GTS GEOTECH

## DATABASE RATIONALISATION AND DATA CLEAN UP

With the ever-increasing awareness for trusted and easily accessible data, especially with compliance legislation, can your data be relied upon?

Does your data contain errors? What if log traces are off depth, or a seismic survey and well locations incorrectly positioned? What does this mean for the success of your company's exploration?

### **What is the true cost to your organisation, partners or customers?**

GTS-Geotech (GTS) has extensive expertise in well & seismic database rationalisation and data clean up. GTS has many years experience providing Rationalisation Project Teams to major & independent oil clients in the UK and USA and documented tried and tested methodologies. GTS has the tools & technical experience to ensure the accuracy of data within a wide range of applications.

Expert geoscientists and data professionals with a wide-range of applications knowledge, plus the use of state-of-the-art data management software allow GTS to complete projects accurately and efficiently.

### **What to expect?**

A personal service tailored to meet client's exact requirements with advise on industry best-practise

Preliminary audit to determine data types, data quality and data flows, standards, naming conventions, policies and procedures.

Expert Geoscientists, Stratigraphers, Petrophysicists, Data and Information Management professionals to undertake data analysis and rationalisation

Expertise in the management of Well and Seismic data within Landmark, GeoQuest, Recall, GeoLog and other 3<sup>rd</sup> party applications.

**A typical data clean-up project may include QA and QC of the following data types:**

- Well names, position & header information
- Position logs and deviation surveys
- Well picks (markers)
- Well logs (raw and interpreted)
- Core data (conventional, reports, photographs)
- Production data (DST, PVT, well test and production data)
- Seismic (navigation, 3D positional data, horizons, faults, time/depth data)
- Seismic 3D grid analysis to ensure correct positioning



Manual or automated data rationalisation processes to fit budget and requirements

Delivery of a trusted corporate data-store with propagation of the reconciled data throughout the project databases.

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## **CASE STUDY 1: WELL DATA CLEAN UP FOR A SUPER MAJOR - UK**

The client undertook an audit, which found that data management was in a poor state. A working party was set up and a number of projects were started with the aim to improve both data quality and data accessibility, part of this was the Quality Improvement Process (QIP).

GTS supplied two Data Specialists to undertake the QIP project in Lowestoft.

### **Project Plan**

Working with data users to set up the data types and process flow structure - since adopted by the client's larger Aberdeen office.

Report on the data to be cleaned in Recall & OpenWorks

Pilot Study run on 28 wells

QIP of 450 wells – 18-month project

Cleaned data migrated from corporate to local databases

Bi-weekly meetings & videoconference with the client & users

Project close out meeting & report

To produce the process flow structure, GTS technicians analysed the relationships between data types.

### **Data Cleaned by GTS – original 5-data types marked by \***

Well Header data \*

Deviation data \*

Open hole data (Other contractor)

Picks (Client)

Interpreted curves (Client)

Cased hole data – TDT's \* and PLT's (Client)

Pressure data \*

Core data (Other contractor)

### Time depth data \*

An initial pilot study was undertaken on a representative sample of 28-wells to determine the time line for future work as well as giving a handle on the data quality.

The Pilot study revealed that major problems were occurring in the process due to bottlenecks caused by others involved with the project. In order to try and solve the bottleneck problem, GTS staff agreed to take on the tasks of dealing with Open hole data and Core data in parallel with the other contractor.

Other major findings from the Pilot study showed that changes in deviation data within the OpenWorks database affected data in the PTI gas database. This was unknown until the QIP was implemented. This resulted in the data input and storage to the PTI gas database being radically altered.

GTS agreed to QIP 450 wells spread over 6 separate fields within an 18-month period. After the QIP process, the data was migrated from corporate to local databases and the users informed of the changes and updates. The completeness of the QIP was monitored via a 3<sup>rd</sup> party Internet tracking program, so each time data was changed, migrated or loaded the tracking program was automatically updated. This allowed GTS to monitor progress and highlight problem wells.

### **GTS QIP Process**

Well header data and Pressure data checked against paper logs and end of well reports, internal electronic database and CD, as required. If no original logs or reports were available, the well was flagged in the tracking program.

Open hole logs within Recall renamed to match the logging run, and then the curves were spliced to form composites.

New composite curves were migrated to OpenWorks for access by other users.

Conventional core data was checked and cleaned using 8 separate jobs within Recall. Composited and shifted curves were then created. If Shift curves were not available this was flagged and the Petrophysicist notified.

TDT data was renamed following the correct convention so that the type and date of the logging run was included. Missing data was highlighted and if possible downloaded from CDA and sent for reloading.

After the PTI gas database was converted, deviation data was loaded into OpenWorks. All partner wells needed to be individually loaded from specially formatted ASCII files.

GTS technicians managed the QIP reporting to the client with bi-weekly meetings and regular videoconferences with the IM group management in Aberdeen. Each week a progress update was emailed to interested parties. GTS technicians were also actively involved in giving presentations at data management 'open days'.

The Client was impressed by GTS 's willingness to take on tasks above and beyond the initial job requirements. As well as the two extra data types, GTS agreed to clean up the petrophysicist's Logic database and populate it with new curves from the QIP, as well as creating complete composite logs.

## **CASE STUDY 2: SEISMIC RATIONALISATION PROJECT MAJOR OIL COMPANY - HOUSTON, USA**

GTS was asked to provide a Seismic Data Specialist team to head up a Landmark seismic clean up project for a major oil company in Houston, Texas. The aim of the project was to standardise seismic volumes, faults, horizons and naming conventions, prior to a company merger and delete or archive non-essential data.

### **Project Plan**

- Initial consultancy - to determine the number of seismic volumes, faults, horizons and quality of the data requiring cleaning up

- Report on the number of data items to be cleaned – over 550 seismic projects

- Checks run on the projects - duplicate data within the projects highlighted for deletion.

- Liasing with 150 users to determine what data could be kept/deleted

- Development of scripts within Knowledge Documented/WOW - deletion and/or renaming of Landmark horizons, faults and .3dv files

- QC of the various data types comparing data between Knowledge Documenter and Landmark OpenWorks/SeisWorks

- QC of naming standards

- Archival of any non-active projects

- Project close out meeting and report

Any Unix error messages that were generated during the clean up were captured and reported to the Landmark system administration team onsite in order to fix problems.

When the projects were cleaned and GTS had sign off from the users, scripts were run on each Landmark project in order to make all changes permanent within OpenWorks and SeisWorks.



GTS undertook a careful QC on each Landmark project to ensure they met the correct naming standards defined by the client. The GTS team assisted users with any problems encountered within the completed projects.

The GTS team remained onsite after the clean up project to provide user support & mentoring during the company merger.

## **CASE STUDY 3: WELL DATA RECONCILIATION IN OPENWORKS & RECALL - LONDON**

GTS supplied a Data & Petrophysical Specialist team to a major oil company's London office to develop and implement a clean up of Well, Log and Curve data as part of a 2.5 year regional data reconciliation project.

The main objective was to improve data access for geoscientists in Exploration, Development and Production to enable all to work more effectively and efficiently in term of time and costs.

### **Project Phases**

1. Define the high level strategy of the project
2. Review the existing data types; prioritise the data types by area. Determine the requirements for data type cleanup and time forward procedures
3. Implement both data reconciliation of each data type and time forward procedures to cleanup the data

GTS was brought in from phase two to advise specifically on the high priority Well-Log-Curve data.

### **GTS' Detailed Technical Processes**

Data migration to the central repository (Recall database)

Data synchronisation with the master well repository (in-house application)

Merge all heritage data into regionally defined projects

Quality Control data to remove duplication and apply standard naming conventions to the data

Create a definitive set of raw and interpreted curves for each Well

Each stage required the development of Quality Control forms and detailed audits. Regular reports were produced for update meetings using custom-built scripts, written by GTS.



GTS managed the administration of the Recall database and its data dictionary, which was customised to meet the client's specific needs. GTS personnel worked closely with Petrophysicists and Geologists to ensure all database adjustments were reviewed and agreed before implementation.

### **Data Dictionary Customisation**

- Standard naming conventions for Logs and Curves

- Standard units

- Standard well attributes

- Data loading lookup tables

GTS provided the technical support for the Recall application for the whole region (UK & Europe) and provided training classes and ad-hoc user mentoring in the use of the application and general Unix environment.

GTS remained on-site co-ordinating and performing the clean up as well as refining the time forward procedures for loading new data.

GTS represented the Log-Curve specialist on several committees at office, regional and corporate levels advising on techniques, procedures and constraints for the data cleanup.

After the success of the first project, which finished on time and to budget, GTS was awarded a second clean up project for Russian data.

## **CASE STUDY 4: GEOFRAME WELL DATA CLEAN UP MAJOR INDEPENDENT OIL COMPANY - LONDON**

An independent oil company asked GTS to supply a Data Specialist team for a 4-months project to undertake a GeoFrame database clean up for the Brazil exploration asset team.

The team had a number of GeoFrame well master projects and GeoLog projects that needed to be reconciled and cleaned up. The clean raw and interpreted curve data was then to be moved into new GeoFrame well master projects for storage before the data was finally moved into the new Recall corporate database

### **Project Plan**

- Initial consultancy - to determine the volumes and quality of the data requiring cleaning up

- Report on the number of project, wells and curves to be cleaned

- Checks run on the projects - duplicate data within the projects was highlighted for deletion.

- Transfer of well headers, tops, check shots & deviation curves into new GeoFrame Well Master project

- Splicing of curves using Recall and GeoLog to form composites

- Deletion of duplicate data

- Copying of data into corporate data store

- Project close out meeting and report

GTS found 11 GeoFrame Well Master Projects containing 266 wells, a total of 16 Interpreter projects and 2 GeoLog to be cleaned, many comprising raw log curves, which required splicing.

The GTS technician began by transferring all well data into a brand new GeoFrame Well master project. Raw log curves were spliced to form the desired

composite set. Where curve types were missing, the technician located a similar curve type by cross checking all the GeoFrame and GeoLog projects.

All spliced interpreted curves were moved into the GeoFrame Well Master project containing the cleaned up interpretation data. Duplicate well data and curves were deleted after consultation with the client.

All remaining curve data, unspliced, and/or non-borehole corrected and all curves not specified in the original composite sets, were moved into another new GeoFrame Well Master Project for storage before it was finally moved into the corporate data store, Recall.

Finally, GTS organised a project close out meeting with the client to discuss the project and present the findings and conclusion in a report.

## **CASE STUDY 5: RECALL & OPENWORKS DATA CLEAN UP PROJECT – UXBRIDGE**

GTS won a contract with Schlumberger to provide a Data Specialist team to a major oil company, to undertake a well clean up project. The project required GTS to provide two data specialists (Petrophysicists) to undertake the clean up and petrophysical work, while Schlumberger were to provide a Service Delivery Manager to oversee the work and final QC.

### **Project Plan**

Initial Audit to determine the number of wells that required cleaning

Working with Data Managers to set up the process workflow

Using process workflow – clean and process wells in Recall

Create Audit trail in Excel – displayed on company intranet so users could be kept up-to-date with project

Process sheets (clean up record) filled in for each well documenting details and issues

Transfer cleaned wells into OpenWorks with assigned interpreter – defining confidence in the data

Regular project meetings with the client & users

Project close out meeting & report

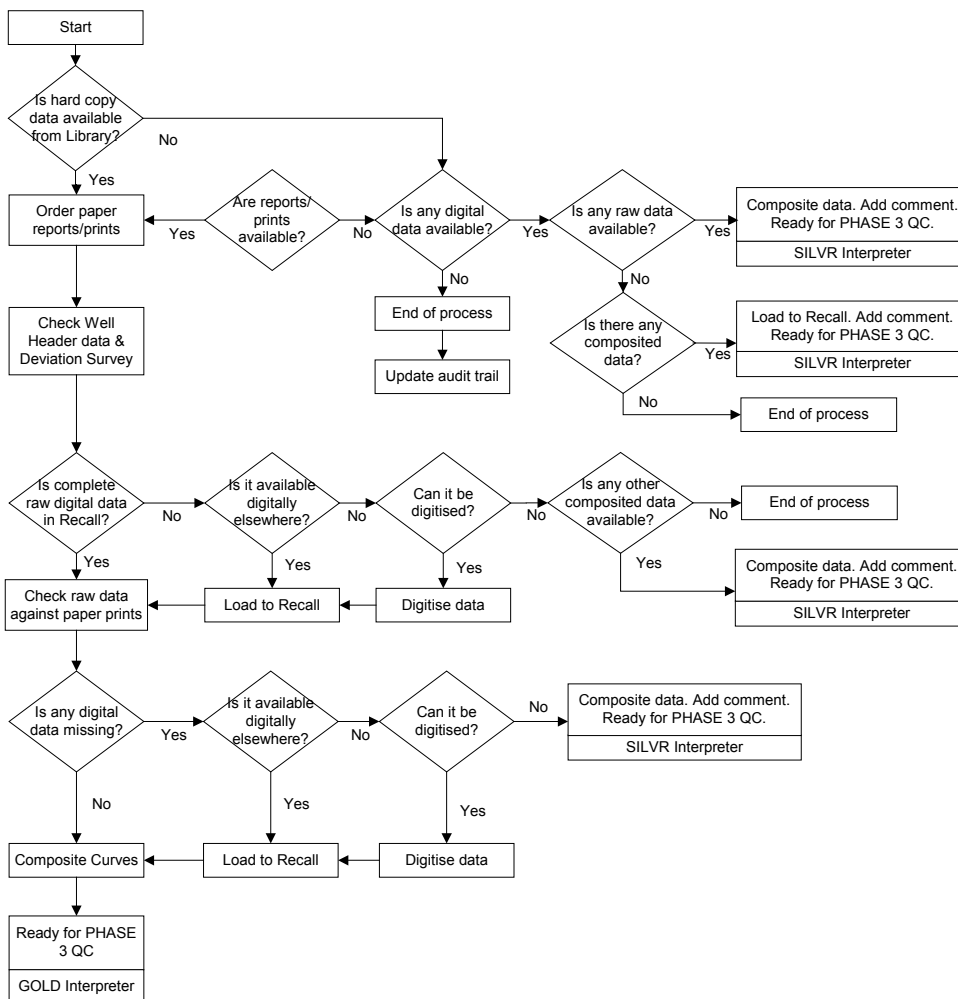
The GTS data specialists drew up and executed the following process workflow:

### **GTS Process workflow**

- Compiling well header data – Data type, database, exact source and comments were recorded
- Load raw curves to Recall – from OpenWorks, Tigress, Petrologic CD's, Lynx CD's, 9-track tapes, original well tapes
- Quality control & digitising missing data

- Digitised logs loaded to DIGIT logs in Recall
- Raw logs assigned a service name for identification – i.e. main log, repeat section etc.
- Log editing, splicing & processing – creating composites
- Assign GOLD or SILVER interpreter (OpenWorks) - GOLD = well processed with complete QC all data was available, SILVER = well processed but only a “best effort” due to incomplete data set

**Process Workflow Flow-Chart**



The GTS data specialists used the following procedure to correct the log curve data:

Depth shifting - depth mismatches between runs and alignment between all the curves

Sonic log filtering and despiking

Manually removing obvious artefacts by hand editing and/or despiking algorithms in Recall - removal of end effects, top and tailing at tool pick ups, removal of bad data around casing points/logs through casing if poor signal

Splicing - creation of the COMPOSITE log, to upload to OpenWorks

Curve resample

Hybrid spliced resistivities renamed DRES (deep), MRES (medium), SRES (shallow) for depth of investigation

Splicing records were entered in Excel, and also recorded automatically in the "*Curve Audit Trail*" in Recall

Recall log type set to "MERGE"

Any gaps/issues documented

Correct UWI assigned to cleaned wells

Composite log exported in .LAS format

All processing issues were highlighted to the client and fully documented throughout the project so the client had a full audit trail. GTS then advised the client on data management best practise for the newly cleaned data, suggesting ways to keep the data integrity going forward.

A formal project close out meeting was arranged and a presentation was given to the client.