

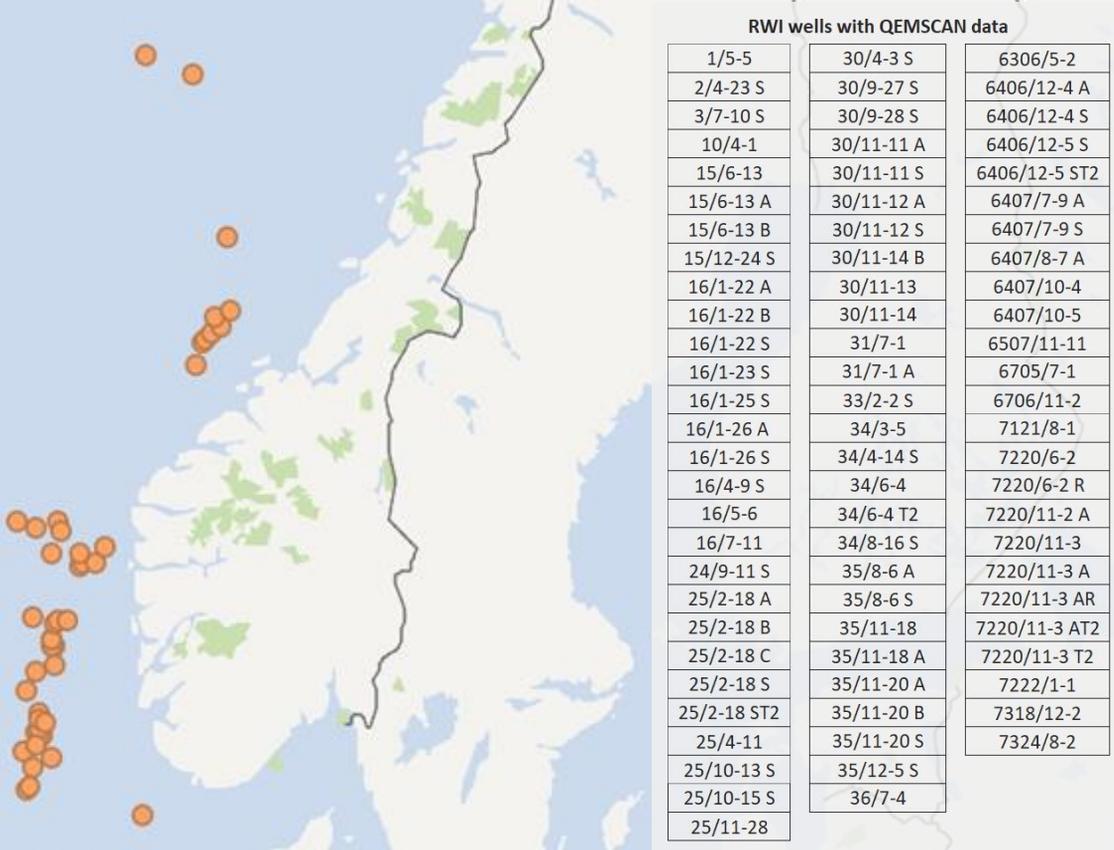
Rocktype

Norwegian Released Wells Initiative



Rocktype, in partnership with Stratum Reservoir and RockWash, has delivered QEMSCAN analysis of cutting samples for the Norwegian Released Wells Initiative, creating an extensive digital rock dataset.

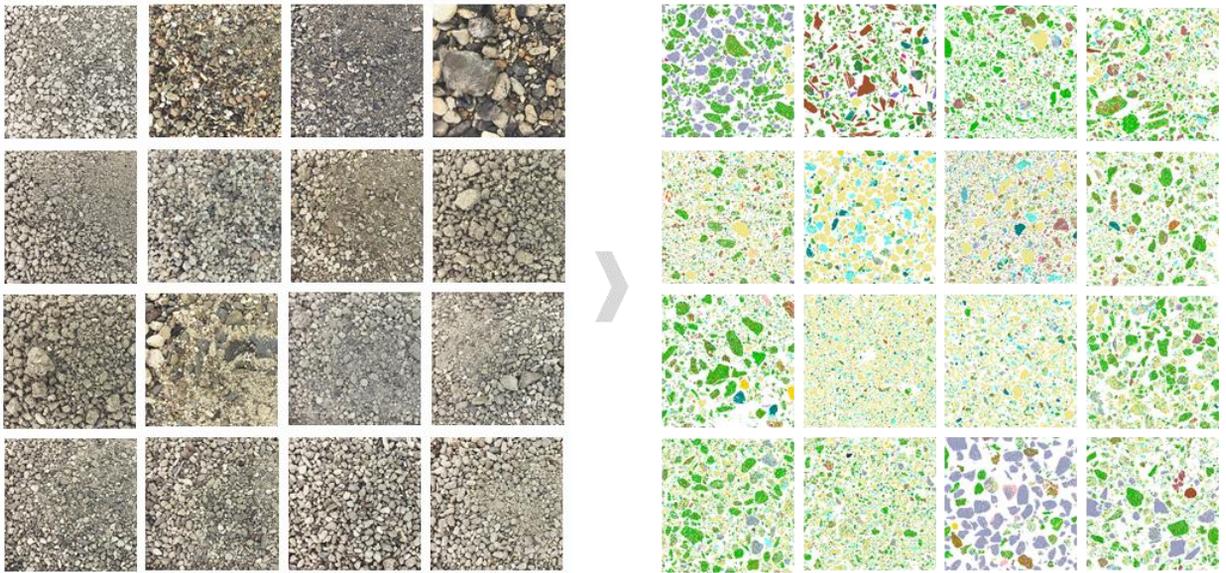
80 Wells **25,000 Samples** **5 Lithotypes** **133 Mineral phases**



Samples and Analysis

The Released Wells Initiative, organised by The Norwegian Oil and Gas Association, is a 27 company joint industry project analysing cuttings samples from **1900 exploration and appraisal wells** drilled across the Norwegian Continental Shelf.

All samples were washed, photographed in white and UV light and XRF analysed. In addition to QEMSCAN, further analysis performed on the 80 wells selected included SpecCam, TOC and XRD.



Physical and digital cuttings samples from Faroese well 6004/12-1, courtesy of Jarðfeingi (the Faroese Geological Survey). Samples were set in resin mounts, polished and carbon coated before QEMSCAN analysis at 50 µm resolution.

The data has been delivered in a Grouped Mineral List of **30 phases** commonly used for Oil and Gas projects. This list is optimised for visualisation as mineral map images and charts, and has been further classified across **5 lithotypes**.

Quartz	Biotite	Kaolinite	Rutile_Anatase	Ankerite	Barite
KFeldspar	Muscovite	Smectite	Apatite	Marl	Anhydrite
Albite	Glauconite	OtherClays	Calcite	Siderite	Halite
Oligoclase	Illite	QuartzClayMix	Dolomite	FeOxides	OtherPhases
AndesineAnorthite	Chlorite	Zircon	FeDolomite	Pyrite	Unclassified

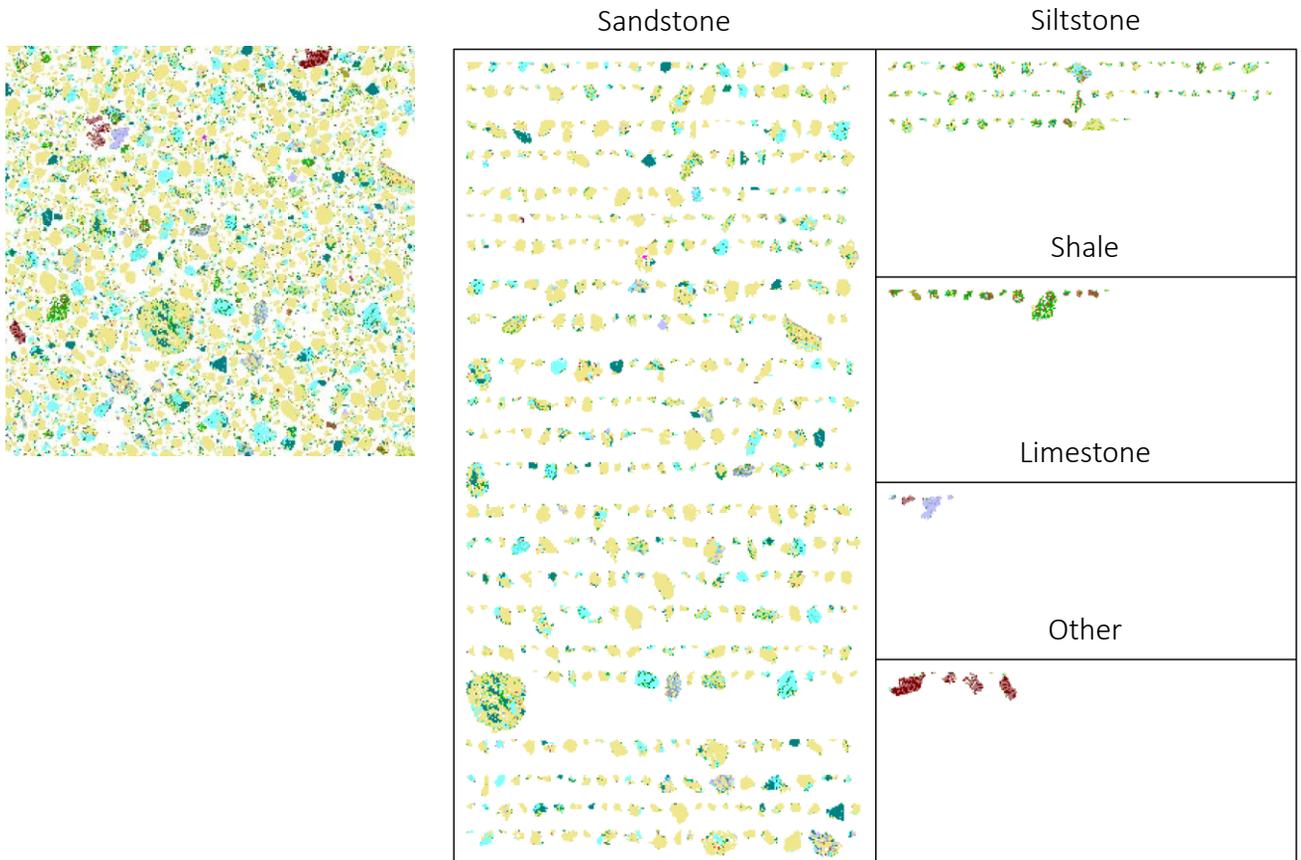
A Detailed Mineral List of **133 phases** is also included, which is ideal for image processing and machine learning applications.

Captured with an automated and repeatable process, this structured and rich data set is also used in our QS Cuttings full-well service.

Cutting Lithotyping

Cuttings samples are a valuable resource with samples typically available for the whole well. But interpreting cuttings data can be challenging due to issues of lag times, potential cave-ins and mixing of material from the cuttings depth interval.

QEMSCAN technology is uniquely able to address these issues through lithotyping, made possible by the spatially discrete data from 40 000 analysis points.



Each cuttings particle is assigned a lithotype based on its mineral composition. **Left:** The original sample as scanned. **Right:** Each cuttings particle is assigned a lithotype.

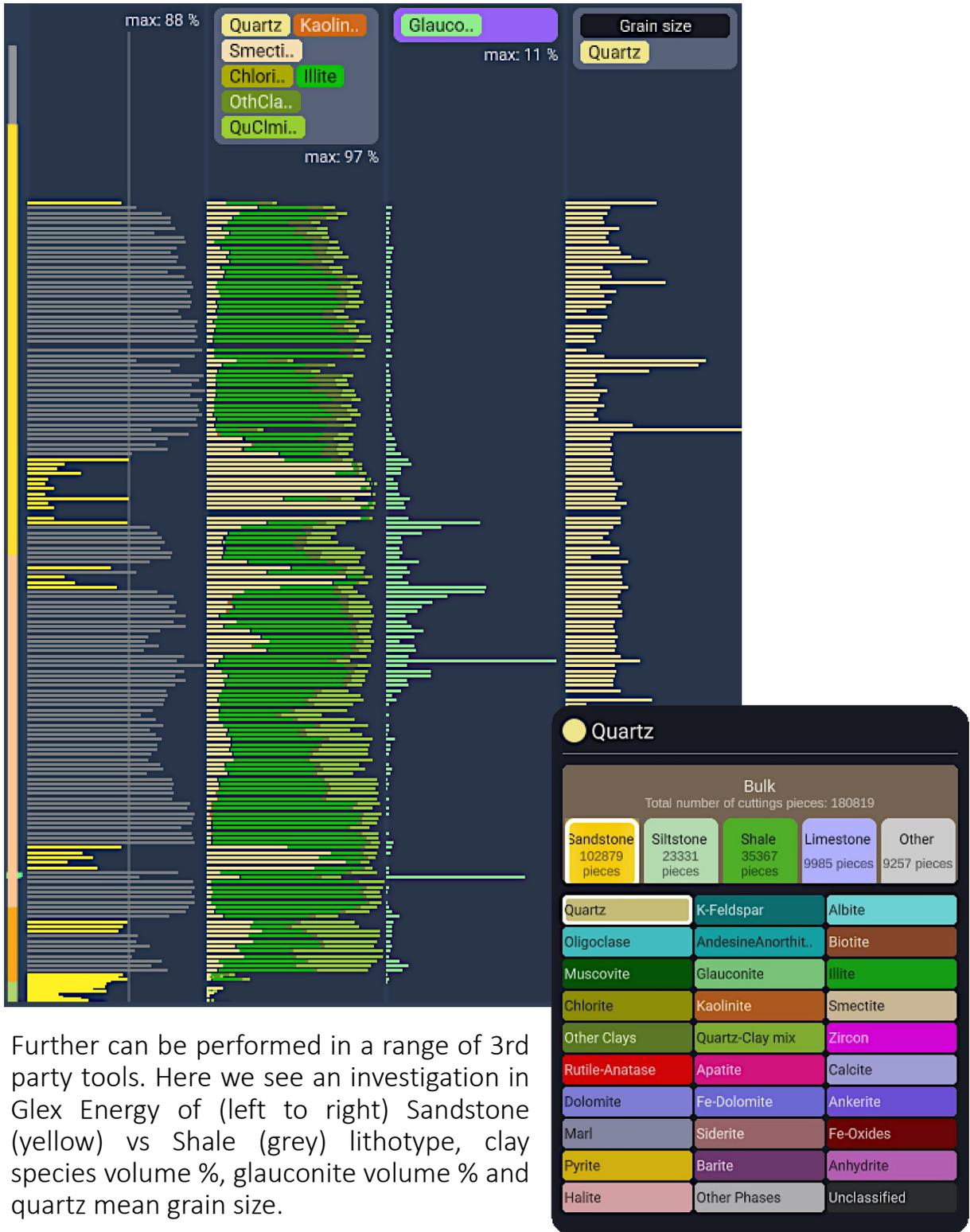
Lithotyping is the classification of a sample into a specific rock type or lithology. With QS Cuttings, each individual cutting in a sample is assigned a lithotype, enabling forms of analysis not available with other data sets.

Key values like mineralogy, cutting size, grain size and log response can therefore be reported separately from each lithotype, or from the bulk sample, to compare with other techniques. Raw data is also provided, enabling clients to perform custom lithotyping if needed.



Visualisations of the QEMSCAN data by lithotype and depth (m) for a single well. **Left:** Percentage volume of the Sandstone lithotype, highlighted in yellow if over 20%. **Middle:** Associated modal mineralogy (quartz-feldspar) and **Right:** Average quartz grain sizes. Plot produced with Spotfire from Rocktype data.

Advanced Analysis



Further can be performed in a range of 3rd party tools. Here we see an investigation in Glex Energy of (left to right) Sandstone (yellow) vs Shale (grey) lithotype, clay species volume %, glauconite volume % and quartz mean grain size.

Our data can be used in the evaluation of sediment provenance and transport pathways, reservoir quality or petrophysical analysis.

Delivered by Rocktype

Visual mineral map	50 µm resolution mineral map PNG showing the 30 phases of the Grouped Mineral List , with colour legend, scale bar and on-image metadata
Raw mineral map	50 µm resolution mineral map PNG showing the 133 phases of the Detailed Mineral List , with embedded metadata, ideal for AI applications
Cuttings lithotyping	Each cuttings particle is assigned 1 of 5 lithotypes
Modal mineralogy	Per sample and per lithotype
Cuttings size index	Per sample and per lithotype
Average grain size	Per mineral phase, per sample and per lithotype
Calculated log values	Includes gamma ray, Vclay, density and neutron, per sample and per lithotype

The RWI project with QEMSCAN highlights the untapped value of cuttings in understanding subsurface geology and for reducing exploration risk. In short it represents a new frontier in rock digitalisation.

The data set can be used in a range of subsurface workflows, including the evaluation of sediment transport pathways, provenance or reservoir quality. The QEMSCAN component in particular adds rich detail such as grain size distributions, cement types and mineral assemblages.

All deliverables are available on DISKOS to project subscribers
(The Norwegian National Data Repository for Petroleum data)

Delivered in partnership with Stratum Reservoir and RockWash Geodata.

v 1.0

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