



Well Decommissioning

Decom North Sea – L&L 29 Nov 2016

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Well P&A is a large part of Decommissioning expenditure (40-50%) and potentially an area for significant cost savings

Organised and QC'd data are essential to compile the well design input data sheets and to optimise the P&A strategy of each well

Subsurface teams in charge of well P&A spend half of their time looking for data and understanding their quality

DataCo uses powerful DataCo IQ technologies to identify, manage, collate and clean up your Data & Information

GeoRes has the expertise to quality control and compile all well data and information relevant to well abandonment

DataCo GeoRes can speed up the process of finding, QC'ing and compiling all well data, allowing the Operator's teams to focus on the operations and decisions relevant to well P&A

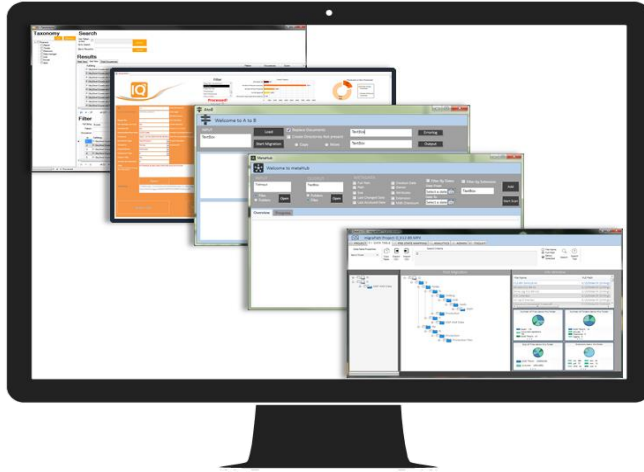


Oil & Gas UK Abandonment Guidelines

- Apply to all Exploration, Appraisal and Development Wells
- Each well-bore is unique and assessed on an individual basis
- Objective is to isolate all formations with flow potential:
 - Flow units to be isolated from each other and from surface
 - Defined by permeability and a pressure differential
 - Low permeability rocks that may be fractured
 - Future scenarios (eg. re-development) to be accounted for
 - Two barriers required for hydrocarbon bearing zones
 - Same applies to over-pressured water bearing zones



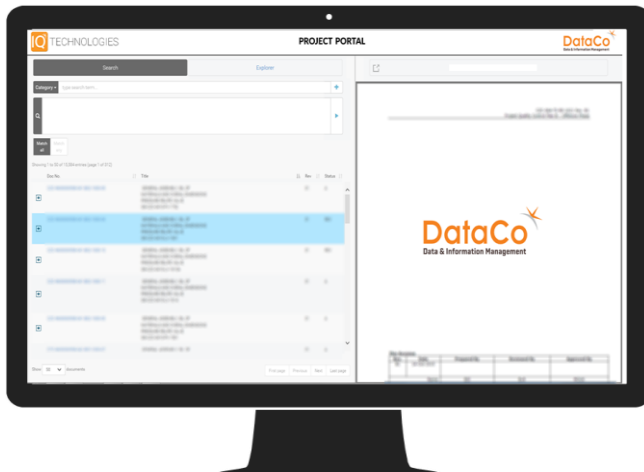
IQ PROPRIETARY SUITE



Technological support across 4 steps of data migration:

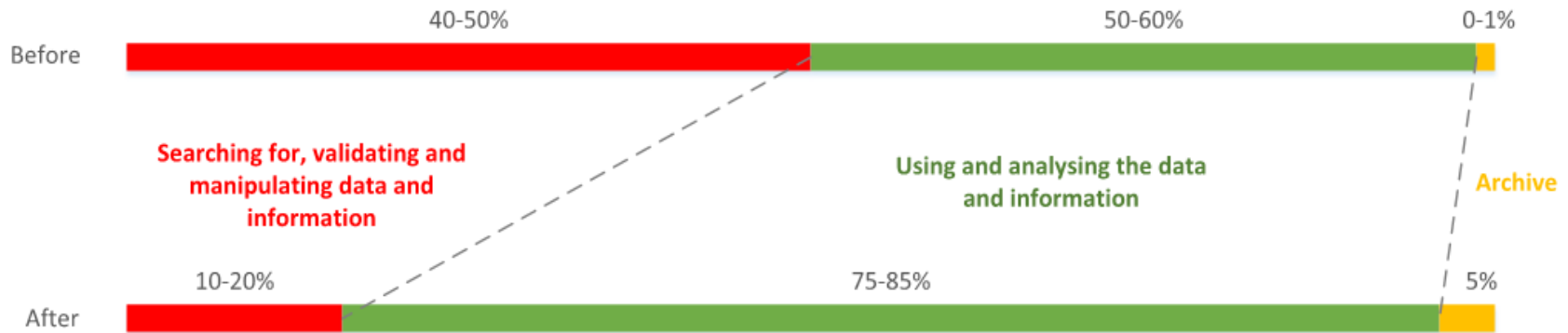
- Data gathering
- Data rationalisation (identifies duplicates)
- Data processing (adds metadata for cataloguing)
- Data migration and reporting (audit trail)

IQ - Portal



- Easy and intuitive search interface supersedes the functionality of EDMS search engines
- Inline Document Viewer allows users to check documentation is correct instantly
- Explorer view creates virtual folders for speed

Improving efficiency through DataCo IQ



Increase in value added time by 25-35%

All figures are based on user feedback from a survey carried out with an existing Supermajor Oil Company Client



Deliverables: Well Design Input Data Sheet & Flow Zone Tables

Company ABC		Stratigraphy Summary		Well XYZ		Rotary Table MSL xxx ft Water Depth MSL xxx ft	
System	Formation / Member	Lithology Fluid Type	Stratigraphy Summary	Pressure Summary	PPFG		
QUATERNARY	Sea bed (Coal Pit Fm): -258 ft Fisher Fm -318 ft Ling Bank Fm: -443 ft Aberdeen Ground Fm: -814 ft		<p>Formation Top TVDSSs are based on the XXXX-X well but vary from well to well. The Lithological interpretation is based on the FE logs and cuttings from all XXX and XXX wells (including discovery wells) and the XXX shallow hazard report.</p> <p>No returns above -XXX ft TVDSS. Lithology inferred from GR log and XXX shallow hazard survey prognosis</p> <p>-XXX to -XXXX ft TVDSS: gas may be present in this interbedded clay and sand section as indicated by high levels of drilled gas (up to 10%) in wells XXXX-X and YYYY-Y while drilling with sea water. Gas is noted to decrease from -XXXX in well YYYY-Y. Sands have flow potential.</p>	<p>Pore pressures are modelled and not measured.</p> <p>Normally pressured (hydrostatic gradient) to approximately -XXXX ft TVDSS.</p>	<p>Draft version of the PPFG data only. To be replaced with the Final version when available.</p>		
	Base Aberdeen Ground Fm: -XXXX ft		<p>Undifferentiated Tertiary</p> <p>Formation tops above the Lark Fm are prognosed (from XXX shallow hazard survey) and not observed tops</p>	<p>Undifferentiated Tertiary (below -XXXX ft TVDSS): claystone, locally sandy. Occasional limestone stringers are also present. No zones with flow potential identified.</p>	<p>Start of overpressure at -XXXX ft TVDSS</p> <p>Pore pressure at -XXXX ft TVDSS: 2409 psi</p>		

Formation Fluids Key For Zones With Flow Potential

	Indeterminate Hydrocarbon type
	Gas
	Water
	Oil
	No interpretation

A zone of low density claystone is present from approximately -XXXX to -XXXX ft TVDSS. This zone appears to have porosity with corresponding increase in drilled gas. Permeability, flow potential and actual fluid type cannot be determined. This zone is overpressured.

Lark Fm: claystone with limestone stringers. No zones with potential to flow identified.

HEALTH FLAG	DEPTH FT MD	GAS OBSERVATIONS	FLUID COMMENT	FORMATION	COMMENT	DATA SOURCE
3	Sealed to XXX ft	No Gas data	NA	Undifferentiated Quaternary /	Returns to seabed. GR log indicates the potential for sand rich layers in this interval	Comp Log
3	XXXX -XXXX ft	Background gas between 0.5 to 1.5 % with peaks up to 2.5 % (@1050 ft)	HC based on gas peak @ 1050 but limited data	Undifferentiated Quaternary / Tertiary	Claystone with interbeds of sandstone and occasionally grading into siltstone. Might have potential to flow. No oil show was noted. High gas seems to correlate with thin sandlayers (5 to 40 ft thick) based on the gamma ray. Sand is described as well sorted, associated gas peaks @ 1050 ft, 1210 ft.	Comp Log & FEL
2	XXXX -XXXX ft	Elevated background gas between 2 and 3 % with peaks up to 4.75 %. Suspected relation with ROP.	Cannot confirm fluid type due to lack of data	Undifferentiated Quaternary / Tertiary	Claystone with interbeds of sandstone (1805 - 1878 ft) and occasionally grading into siltstone. Might have potential to flow. No show was noted. Changes in Total gas level appears to be related to ROP changes (intervals of higher ROP appear to yield higher gas) rather than lithology. Example: Gas peak @1975, 2055, 2355 ft. Background gas through the sands @2.2 % MW: 10.1	Comp Log & FEL
2	XXXX -XXXX ft	Background gas ~ 0.5% with peaks up to 1.5 %	NA	Undifferentiated Tertiary	Claystone, occasionally grading into Siltstone. Can be carbonaceous. MW: 10.2	Comp Log & FEL
2	XXXX -XXXX ft	Background gas ~ 0.5%	NA	Undifferentiated Tertiary	Claystone with no expected potential to flow	Comp Log & FEL
2	XXXX -XXXX ft	Background gas increases from 0.5% to 2.5 % with C2 coming in @ 4730	NA	Undifferentiated Tertiary	Lower Gamma ray indicates less shaly interval, resistivity reduces, suggesting the formation contains more water indicating the formation is either undercompacted or is more porous. Acoustic log slows down which may indicate that the formation is more porous.	Comp Log & FEL
2	XXXX -XXXX ft	Background gas ~2.5% with presence of C2 and C3 @ 6080 ft. C4 present between 6525 and 6630. Gas decreases @6740 to 0.5% due to ROP changes. C4 present from 9450 ft.	NA	Undifferentiated Tertiary	Claystone with Limestone stringers. Claystone locally grading into siltstone and can be carbonaceous. Limestone described as being argillaceous with no visible porosity and are considered to be tight.	Comp Log & FEL
2	XXXX -XXXX ft	Background gas ~ 0.2% with trca C2 and C3	HC?	Balder	Claystone with tuff. Tuff is known to be able to retain porosity/potential to flow. Noted drop in GR, increase of resistivity. Statement needed.	Comp Log & FEL

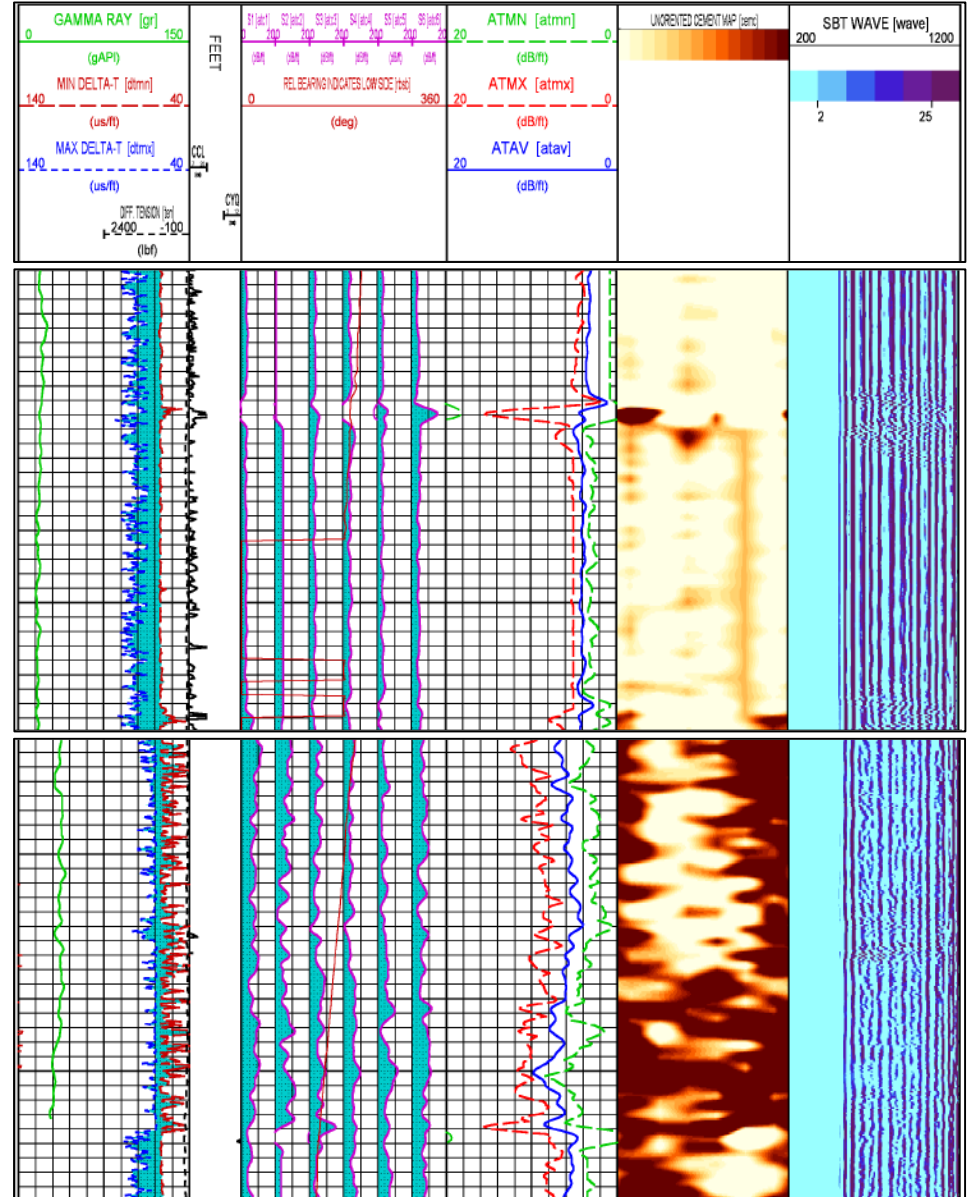


Evaluation of Cement Bond Logs

Example of SBT log in 13 3/8" casing

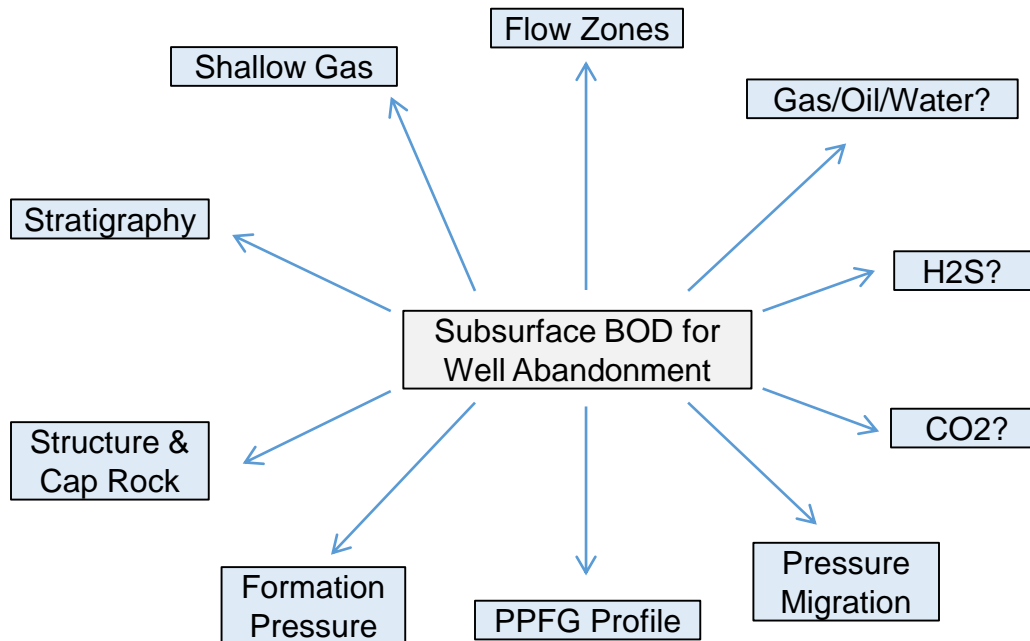
9.5 PPG Water Based Mud

Class G cement 16/12 PPG bottom/top



Objective of Subsurface input to well abandonment:

Provide the Drilling department with a clear and concise reference document to plan and execute the abandonment of each well.



Subsurface Basis of Design for Abandonment

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Subsurface input to well decommissioning

DataCo GeoRes can provide:

1. Data Management: identify, clean-up, organise all well data
2. Compile well input datasheets with all information for P&A
3. Subsurface Basis Of Design for abandonment of all wells

All services enable regulatory compliance with CDA - NHDA



Thank you

