



DE428: Well Integrity - Cased Hole Logging and Monitoring

Training Objectives:

By the end of the training, participants will be able to:

This intensive training course teaches how to monitor and diagnose wellbore integrity with the aid of cased hole logging tools. Participants will learn to:

- ✓ Identify and quantify leak detection, leaks inside and behind the casing.
- ✓ Evaluate inter-zone cross flow caused by uneven depletion,
- ✓ Theory and interpretations of the various cement evaluation tools offered by all the vendors.
- ✓ Detailed field examples covering every aspect of poor cement bonding and the applications/limitations of each tool.
- ✓ Understand the various mechanisms causing corrosion and the factors that induces these various mechanisms.
- ✓ Corrosion Monitoring: Will cover a whole range of corrosion monitoring tools available from the various vendors. This includes EMT, MTD, Ultrasonic Casing Thickness (UCT), MultiFinder calliper and flux-leakage tools.
- ✓ Cathodic Protection: How to design and evaluate cathodic protection systems.
- ✓ Perforation conveyance, perforation types and perforation efficiency.

Training Designed for:

This course is intended for all production and completion engineers. Petrophysicists will benefit greatly from this course that covers most of the cased hole data acquisition. The interpretation processes of the various data used, involves little mathematics. No previous cased hole knowledge, or special expertise is needed.

Prerequisite:

Greater than 2 years of experience interpreting cased hole logs or attendance in the Intermediate Production Logging and Reservoir Monitoring course is recommended.

Training Requirement:

"Hand's on practical sessions, equipment and software will be applied during the course if required and as per the client's request."

This training course is available upon request in English or Arabic, virtual online live or face to face public/inhouse. Content, location and duration can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client's learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

- ❖ Introduction to Well Integrity: Why Monitor Well Integrity?
- ❖ Overview: Problems causing well integrity
- ❖ Depth control in cased hole
- ❖ Well Head Pressure Control
 - Well Head pressure variations with time, caused by depletion, gas lift and the variations in the borehole fluid contents.



- ❖ Leak Detection tools:
 - Noise logs
 - Temperature logs
 - Oxygen activation to measure water flow
 - Communication Testing to check zonal isolation
- ❖ Spontaneous Potential Electro-Kinetic anomalies
- ❖ Borehole spinner
- ❖ Practical Session/Case studies on leak detection

DAY TWO:

- ❖ Primary Cementing
- ❖ Squeeze Cementing
- ❖ Cement Evaluation Tools. This includes:
 - Basic Cement Bond Log and Variable Density Log
 - BHGE Family of tools: SBT, INTeX, RAL
 - Ultrasonic Imaging
 - Isolation Scanner
 - Through Tubing Cement Evaluation (SCMT)
- ❖ Field Examples of cement evaluations
- ❖ Most (90%) of corrosion takes place on the casing outer wall. Cement quality effects on initiation corrosion and on the rate of corrosion
- ❖ Practical Session/Case studies on Cement Evaluation

DAY THREE:

- ❖ Corrosion Mechanisms: Various Corrosion Mechanisms
 - Galvanic Corrosion: Includes galvanic, pitting, crevice and uniform corrosion
 - Chemical Corrosion- this is mainly caused by H₂S and CO₂ Corrosion
 - Stress corrosion: the effect of casing stresses on corrosion propagation
- ❖ Multimedia display of the various corrosion mechanisms
- ❖ Outline of the various factors that initiates and propagates the various corrosion mechanisms
- ❖ Corrosion Monitoring
- ❖ The physics of the various corrosion Monitoring Tools: This includes-
 - Electromagnetic thickness measurement; this includes the EMT tool of Schlumberger and the Gowell Magnetic Thickness Tool (MTD)
 - UCT: Ultrasonic Casing Thickness imager
- ❖ Flux Leakage Tools
- ❖ Electric Current Leakage tool:
- ❖ This covers the Cathodic Protection and Evaluation Tool (CPET)
- ❖ Cathodic Protection:
 - Outline of the theory and applications of cathodic protection
 - Detailed field examples
- ❖ Perforation:
 - Types of explosives; hardware, primary and secondary explosives
 - Perforation conveyance
 - Perforations Efficiency
 - Overbalanced and underbalanced perforations

❖ Practical Session/Case studies on Cathodic Protection

DAY FOUR:

- ❖ Temperature Logging Tools and their applications under shut-in and flowing conditions
 - Temperature signatures
 - Temperature data base application
 - Signatures in Lost circulation zones
 - Temperature modelling used to estimate flowrates in oil and water producing zones
- ❖ Permanent Temperature sensors
- ❖ Fibre Optics temperature sensors
- ❖ Theory and applications
- ❖ Field Examples
- ❖ Practical Session/Case studies on temperature profiling

DAY FIVE:

- ❖ Uneven Depletion and resulting Crossflow:
 - Causes of uneven depletion
 - Modelling of uneven depletion
- ❖ Basic Production Logging
- ❖ Spinner Calibrations
- ❖ Using 2 chokes to estimate Productivity Index
- ❖ Estimating Productivity index (PI) and reservoir pressure (Pr) for each zone
- ❖ Estimating the inter-zone crossflow caused by uneven depletion
- ❖ Water and Gas Coning:
 - Basics of water and gas coning
 - Detection of coning
 - Coning evaluations and field examples
- ❖ Practical Session/Case studies on Uneven Depletion and on Coning
- ❖ Course Conclusion
- ❖ POST-TEST and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

As per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

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