Biostratigraphy and Micropalaeontology: Microfossil Zonation, Age Dating and Biosteering



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Introduction:

Biostratigraphy gives drilling and development teams their age control, yet microfossil picks are often issued without preparation notes, caving checks or palaeoecological context, so boreholes are mis-matched and sidetracks land in the wrong biozone. This Core Concept course trains geoscience staff to process, identify and interpret foraminifera, calcareous nannofossils and palynomorphs, erect biozonations, estimate palaeobathymetry, read palynofacies, support rigsite biosteering and tie microfossil datums to flooding horizons and gamma ray signatures. Participants produce a Bioevent Chronostratigraphic Chart and Age-Palaeoenvironment Report for a set of exercise boreholes.

Course Objectives:

- Select the microfossil group and laboratory route that will give dependable age and palaeoenvironment control for a given lithology and borehole interval
- Identify diagnostic foraminifera, calcareous nannofossil and palynomorph taxa and log highest and lowest occurrences on a distribution chart
- Erect a biozonation from first appearance, last appearance, acme and assemblage datums and assign stage ages to a borehole succession
- Interpret palaeobathymetry, salinity and depositional setting from benthic assemblages, planktonic ratios and palynofacies
- Run rigsite micropalaeontology for biosteering by screening ditch samples for caving, reworking and mud additive contamination under drilling time pressure
- Match exercise boreholes by tying bioevents to maximum flooding horizons and gamma ray signatures and grade the confidence of every datum

Target Audience:

- Biostratigraphers and micropalaeontologists who identify taxa and issue age and biozone picks for exploration and appraisal boreholes
- Operations geologists at the rig who receive ditch samples, call stratigraphic markers and advise drillers on landing and sidetrack points
- Stratigraphers who erect zonations and chronostratigraphic frameworks across fields and basins
- Biostratigraphy laboratory technicians who process ditch samples, sidewall plugs and outcrop material into slides and residues
- Development geologists who use microfossil datums to steer horizontal boreholes and refine layer schemes

Course Outline:

Day 1: Biostratigraphic Principles and Microfossil Groups

- Index Fossil Criteria: Short Vertical Span, Wide Dispersal and Rapid Evolution
- Calcareous, Siliceous and Organic-Walled Microfossil Classification
- Planktonic and Benthic Foraminifera Test Morphology and Wall Structure
- Calcareous Nannofossil Coccoliths and Nannoliths Under Cross-Polarised Light
- Palynomorph Families: Pollen, Spores, Dinoflagellate Cysts, Acritarchs and Chitinozoans

Day 2: Laboratory Processing by Fossil Group

- Ditch Sample, Sidewall Plug and Outcrop Sampling Density Plans
- Foraminifera Residues: Disaggregation, Wet Sieving and Picking Trays
- Nannofossil Smear Slides and Settling Techniques for Fine Fractions
- Palynology Acid Maceration with HCl and HF, Oxidation and Heavy-Liquid Separation
- Laboratory HF Safety, Sample Tracking and Slide Archive Control

Day 3: Biozonation, Age Dating and Palaeoecology

- Distribution Charts with Highest and Lowest Occurrence Datums
- Taxon, Concurrent, Interval, Lineage and Abundance Biozone Definitions
- Stage Age Calibration of Bioevents Against the Geological Time Scale
- Palaeobathymetry from Benthic Foraminifera Assemblages and Planktonic to Benthic Ratios
- Palynofacies Kerogen Categories and Spore Colour for Setting and Maturity Indications

Day 4: Rigsite Biosteering and Interpretation Traps

- Rigsite Micropalaeontology Kit, Rapid Processing and Turnaround Targets
- Caving, Reworking and Mud Additive Contamination Screening Rules
- Biosteering Horizontal Boreholes with High-Resolution Bioevent Markers
- Tying Bioevents to Maximum Flooding Horizons, Condensed Intervals and Gamma Ray Peaks
- Diachronous Datums, Barren Intervals and Facies-Controlled Taxa as Dating Traps

Day 5: Exercise Boreholes Bioevent Chart and Reporting

- Exercise Data Pack: Distribution Charts, Abundance Counts and Wireline Logs
- Bioevent Pick Confidence Grading and Data Quality Control Checklist
- Bioevent Chronostratigraphic Chart Build Across the Exercise Boreholes
- Age-Palaeoenvironment Report Drafting with Zonal Tables and Interpretation Notes
- Chart Presentation and Peer Stratigraphic Challenge

Skills You Will Gain:

- Microfossil Identification
- Micropalaeontology Sample Processing
- Biozonation Design
- Bioevent Age Calibration
- Palaeobathymetric Interpretation
- Palynofacies Analysis
- Rigsite Biosteering
- Biostratigraphic Data Quality Control

Why Attend This Course:

- Leave with a Bioevent Chronostratigraphic Chart and Age-Palaeoenvironment Report built from distribution charts, abundance counts and logs
- See how processing choices for foraminifera, nannofossils and palynomorphs change the age picks a borehole report can support
- Practise catching caved and reworked specimens before they shift a stratigraphic marker or a horizontal borehole path
- Compare microfossil zonation practice with peers working carbonate, siliciclastic, shelf and deep-marine successions

Conclusion:

Dependable age control in a borehole rests on the right microfossil group, a clean laboratory route and bioevents screened for caving and reworking before they are used. The one week move from microfossil groups and processing through biozonation, stage age calibration, palaeobathymetry and palynofacies to rigsite biosteering and ties to flooding horizons and gamma ray signatures. The exercise work ends with a Bioevent Chronostratigraphic Chart and Age-Palaeoenvironment Report that participants can reuse on their next drilling programme.