

COURSE OVERVIEW DE0782

Drilling Fluids Chemistry

Course Title

Drilling Fluids Chemistry

Course Date/Venue

September 28-October 02, 2026/Eagle Meeting Room, VOGO Abu Dhabi Golf Resort & Spa formerly Westin Abu Dhabi Golf Resort & Spa, Abu Dhabi, UAE

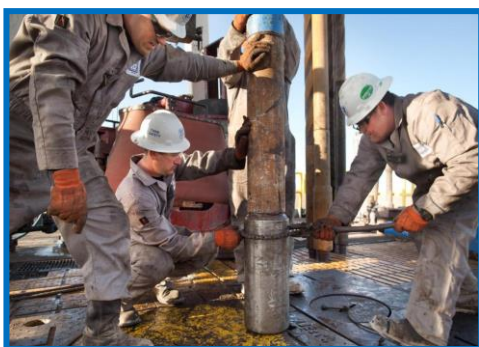
Course Reference

DE0782

Course Duration/Credits

Five days/2.75 CEUs/27.5 PDHs

Course Description



This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This intensive course provides a comprehensive understanding of the chemical principles governing drilling fluid systems used in oil and gas well construction. Participants will explore the chemistry of water-based, oil-based, synthetic-based and specialty drilling fluids, focusing on fluid formulation, additive functionality, fluid-rock interactions, contamination control, environmental considerations and laboratory testing. The course integrates theoretical concepts with field applications to enable effective drilling fluid design, optimization, troubleshooting and performance evaluation across various drilling environments.

Further, the course will also discuss the basic chemical principles for drilling fluids, water chemistry fundamentals and colloidal chemistry of drilling fluids; the clay mineral chemistry, rheology and fluid behavior and water-based mud systems; the bentonite and clay additives, polymer chemistry in drilling fluids and filtration control chemistry; the shale inhibition chemistry, alkalinity and pH control and oil-based mud fundamentals; the emulsion chemistry, surfactants and emulsifiers, synthetic-based mud systems and organophilic clay chemistry; and the electrical stability and mud integrity, weighting material chemistry, lubricants and specialty additives and drilling fluid contamination chemistry.

During this interactive course, participants will learn the contamination treatment methods, drilling fluid laboratory analysis and quality control and monitoring; the high-pressure high-temperature (HPHT) fluid chemistry, formation damage and fluid compatibility including environmental chemistry of drilling fluids; and the advanced drilling fluid technologies and troubleshooting drilling fluid problems.

Course Objectives/Outcomes & Benefits for Course Objectives/

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain a good working knowledge on drilling fluids chemistry
- Discuss the basic chemical principles for drilling fluids, water chemistry fundamentals and colloidal chemistry of drilling fluids
- Recognize clay mineral chemistry, rheology and fluid behavior and water-based mud systems
- Identify bentonite and clay additives, polymer chemistry in drilling fluids and filtration control chemistry
- Explain shale inhibition chemistry, alkalinity and pH control and oil-based mud fundamentals
- Interpret emulsion chemistry, surfactants and emulsifiers, synthetic-based mud systems and organophilic clay chemistry
- Determine electrical stability and mud integrity, weighting material chemistry, lubricants and specialty additives and drilling fluid contamination chemistry
- Employ contamination treatment methods, drilling fluid laboratory analysis and quality control and monitoring
- Discuss high-pressure high-temperature (HPHT) fluid chemistry, formation damage and fluid compatibility including environmental chemistry of drilling fluids
- Apply advanced drilling fluid technologies and troubleshooting drilling fluid problems

Exclusive Smart Training Kit - H-STK®



*Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of drilling fluids chemistry for production and reservoir engineers, drilling engineers, drilling supervisors, geologists and geoscientists, HSE and environmental professionals, procurement and supply chain personnel and other technical staff.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Haward's certificates are accredited by the following international accreditation organizations: -

-  British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international center, Haward Technology meets all of the international higher education criteria and standards set by BAC.

-  The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **2.75 CEUs** (Continuing Education Units) or **27.5 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Dr. Chris Kapetan, PhD, MSc, is a **Senior Drilling & Petroleum Engineer** with over **30 years** of international experience within the **onshore and offshore oil & gas** industry. His wide experience covers **Horizontal & Multilateral Wells, Well Completion & Stimulation, Artificial Lift System Selection & Design, Drilling Practices, Drilling Fluids Technology, Drilling Operations, Directional Drilling, Formation Damage Evaluation & Preventive, Formation Damage Remediation, Drilling & Formation Damage, Simulation Program for The International Petroleum Business, Well Testing & Analysis, Well Design, Well Testing & Oil Well Performance, Well Test Design Analysis, Well Test Operations, Well Testing & Perforation, Root Cause Analysis (RCA), RCA**

Method for Process Plant, RCA Techniques, Control Well-Flow Lines Parameters, Decision Analytic Modelling Methods for Economic Evaluation, Probabilistic Risk Analysis (Monte Carlo Simulator) Risk Analysis Foundations, Sulphur, Sour Natural Gas, Natural Gas Sweetening, Petroleum Production, Field Layout, Production Techniques & Control, Surface Production Operations, Project Risk Analysis, Feasibility Analysis Techniques, Capital Operational Costs, Flowmetering & Custody Transfer and Oil Refinery. Further, he is also well-versed in **Enhanced Oil Recovery (EOR), Electrical Submersible Pumps (ESP), Oil Industries Orientation, Geophysics, Cased Hole Formation Evaluation, Cased Hole Applications, Cased Hole Logs, Production Wells Operations, Production Facilities Management, Perforating Methods & Design, Perforating Operations, Fishing Operations, Well & Reservoir Testing, Reservoir Stimulation, Hydraulic Fracturing, Carbonate Acidizing, Sandstone Acidizing, Drilling Fluids Technology, Drilling Operations, Directional Drilling, Artificial Lift, Gas Lift Design, Gas Lift Operations, Petroleum Business, Petroleum Economics, Field Development Planning, Gas Lift Valve Changing & Installation, Well Completion Design & Operation, Well Surveillance, Well Testing, Well Stimulation & Control and Workover Planning, Completions & Workover, Rig Sizing, Hole Cleaning & Logging, Well Completion, Servicing & Work-Over Operations, Practical Reservoir Engineering, X-mas Tree & Wellhead Operations, Maintenance & Testing, Advanced Petrophysics/Interpretation of Well Composite, Construction Integrity & Completion, Coiled Tubing Technology, Corrosion Control, Slickline, Wireline & Coil Tubing, Pipeline Pigging, Corrosion Monitoring, Cathodic Protection as well as Root Cause Analysis (RCA), Root Cause Failure Analysis (RCFA), Gas Conditioning & Process Technology, Production Safety and Delusion of Asphalt.** Currently, he is the **Operations Consultant & the Technical Advisor at GEOTECH** and an independent **Drilling Operations Consultant** of various engineering services providers to the international clients as he offers his expertise in many areas of the **drilling & petroleum discipline** and is well **recognized & respected** for his process and procedural expertise as well as ongoing participation, interest and experience in continuing to promote technology to producers around the world.

Throughout his long career life, Dr. Chris has worked for many international companies and has spent several years **managing technically complex wellbore interventions** in both **drilling & servicing**. He is a **well-regarded** for his **process and procedural expertise**. Further, he was the **Operations Manager at ETP Crude Oil Pipeline Services** where he was fully responsible for optimum operations of crude oil pipeline, **workover** and **directional drilling, drilling rigs** and equipment, drilling of various geothermal deep wells and **exploration wells**. Dr. Chris was the **Drilling & Workover Manager & Superintendent for Kavala Oil** wherein he was responsible for supervision of **drilling operations and offshore exploration**, quality control of performance of **rigs, coiled tubing, crude oil transportation via pipeline and abandonment of well** as per the API requirements. He had occupied various key positions as the **Drilling Operations Consultant, Site Manager, Branch Manager, Senior Drilling & Workover Manager & Engineer, Drilling & Workover Engineer, Process Engineer, Operations Consultant and Technical Advisor** in several petroleum companies responsible mainly on an **offshore sour oil field (under water flood and gas lift) and a gas field**. Further, Dr. Chris has been a **Professor of the Oil Technology College**.

Dr. Chris has **PhD in Reservoir Engineering** and a **Master's degree in Drilling & Production Engineering** from the **Petrol-Gaze Din Ploiesti University**. Further, he is a **Certified Surfaced BOP Stack Supervisor** of **IWCF**, a **Certified Instructor/Trainer, a Certified Trainer/Assessor/Internal Verifier** by the **Institute of Leadership & Management (ILM)** and has conducted numerous short courses, seminars and workshops and has published several technical books on **Production Logging, Safety Drilling Rigs and Oil Reservoir**.

Training Methodology

Our courses employ an interactive, learner-centred methodology that integrates theoretical knowledge with practical application. The training is delivered through a suitable combination of some or all of the following methods, selected according to the course content and learning objectives:

- Instructor-led presentations and facilitated discussions
- Practical workshops and participant presentations
- Hands-on exercises and real-world case studies
- Equipment demonstrations and technical drawings
- Hardware- and software-based simulations
- Gamification & Role Play in soft-skills courses only
- Virtual Reality (VR) and Augmented Reality (AR)
- Instructional videos and other relevant training resources

This blended approach encourages active participation, strengthens practical skills and supports the effective application of acquired knowledge in the workplace.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

Course Fee

US\$ 8,000 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: Monday, 28th of September 2026

0800 – 0830	<i>Registration & Coffee</i>
0830 – 0845	<i>Welcome & Introduction</i>
0845 – 0900	PRE-TEST
0900 – 0930	Introduction to Drilling Fluids <i>Functions and Objectives of Drilling Fluids • Evolution of Drilling Fluid Technology • Types of Drilling Fluid Systems • Role of Chemistry in Drilling Performance</i>
0930 – 0945	<i>Break</i>
0945 – 1030	Basic Chemical Principles for Drilling Fluids <i>Atomic Structure and Chemical Bonding • Acids, Bases, and pH Concepts • Ionic Interactions in Fluid Systems • Chemical Equilibrium Principles</i>
1030 – 1100	Water Chemistry Fundamentals <i>Freshwater and Seawater Characteristics • Water Hardness and Alkalinity • Dissolved Solids and Ionic Composition • Water Quality Requirements for Mud Preparation</i>



1100 – 1200	Colloidal Chemistry of Drilling Fluids Colloidal Systems and Dispersions • Surface Charge and Zeta Potential • Particle Stability Mechanisms • Flocculation and Deflocculation Processes
1200 – 1215	Break
1215 – 1300	Clay Mineral Chemistry Structure of Clay Minerals • Bentonite Hydration Mechanisms • Smectite, Illite and Kaolinite Characteristics • Clay-Fluid Interaction Chemistry
1300 – 1350	Rheology & Fluid Behavior Viscosity Fundamentals • Gel Strength Development • Yield Point and Shear Stress Concepts • Chemical Factors Affecting Rheology
1350 – 1400	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1400	Lunch & End of Day One

Day 2: Tuesday, 29th of September 2026

0800 – 0930	Water-Based Mud Systems Classification of WBM Systems • Inhibited and Non-Inhibited Muds • Polymer-Based Drilling Fluids • Performance Characteristics of WBMs
0930 – 0945	Break
0945 – 1030	Bentonite & Clay Additives Bentonite Chemistry and Properties • Hydration and Swelling Mechanisms • Clay Dispersion Control • Yield Enhancement Techniques
1030 – 1100	Polymer Chemistry in Drilling Fluids Natural and Synthetic Polymers • Polymer Hydration Mechanisms • Rheology Modification Applications • Thermal Stability of Polymers
1100 – 1200	Filtration Control Chemistry Filter Cake Formation Mechanisms • Fluid Loss Control Additives • Starch and Cellulose Derivatives • Polymer-Based Filtration Reducers
1200 – 1215	Break
1215 – 1300	Shale Inhibition Chemistry Clay Swelling Mechanisms • Potassium-Based Inhibition Systems • Glycol Inhibition Technologies • Amine-Based Shale Stabilizers
1300 – 1350	Alkalinity & pH Control Caustic Soda Applications • Lime Treatment Chemistry • Buffer Systems in Drilling Fluids • Effects of pH on Mud Performance
1350 – 1400	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1400	Lunch & End of Day Two

Day 3: Wednesday, 30th of September 2026

0800 – 0930	Oil-Based Mud Fundamentals Composition of Oil-Based Muds • Invert Emulsion Systems • Continuous and Dispersed Phases • Advantages and Limitations of OBMs
0930 – 0945	Break
0945 – 1030	Emulsion Chemistry Emulsion Formation Principles • Water-in-Oil Emulsion Stability • Emulsifier Functionality • Emulsion Breaking Mechanisms
1030 – 1100	Surfactants & Emulsifiers Surfactant Molecular Structure • Hydrophilic-Lipophilic Balance (HLB) • Primary and Secondary Emulsifiers • Wetting Agent Chemistry



1100 – 1200	Synthetic-Based Mud Systems <i>Synthetic Fluid Classifications • Ester-Based Fluid Chemistry • Olefin and Paraffin Systems • Environmental Performance Characteristics</i>
1200 – 1215	<i>Break</i>
1215 – 1300	Organophilic Clay Chemistry <i>Organoclay Production Methods • Rheology Control Mechanisms • Suspension Properties • High-Temperature Applications</i>
1300 – 1350	Electrical Stability & Mud Integrity <i>Electrical Stability Measurements • Emulsion Quality Indicators • Water Phase Activity Control • Chemical Factors Affecting Stability</i>
1350 – 1400	Recap <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow</i>
1400	<i>Lunch & End of Day Three</i>

Day 4: Thursday, 01st of October 2026

0800 – 0930	Weighting Material Chemistry <i>Barite Chemical Properties • Hematite and Alternative Weighting Agents • Sagging Mechanisms and Prevention • Particle Size Distribution Effects</i>
0930 – 0945	<i>Break</i>
0945 – 1030	Lubricants & Specialty Additives <i>Lubricant Chemical Compositions • Torque and Drag Reduction Mechanisms • Extreme Pressure Additives • Specialty Chemical Treatments</i>
1030 – 1100	Drilling Fluid Contamination Chemistry <i>Cement Contamination Effects • Salt Contamination Mechanisms • Anhydrite and Gypsum Contamination • Acid Gas Contamination Sources</i>
1100 – 1200	Contamination Treatment Methods <i>Chemical Treatment Strategies • Precipitation Reactions • Neutralization Techniques • Corrective Maintenance Programs</i>
1200 – 1215	<i>Break</i>
1215 – 1300	Drilling Fluid Laboratory Analysis <i>Mud Testing Standards • Chemical Analysis Procedures • Rheological Property Measurements • Filtration Testing Methods</i>
1300 – 1350	Quality Control & Monitoring <i>Field Laboratory Operations • Sampling and Testing Frequency • Data Interpretation Techniques • Fluid Maintenance Programs</i>
1350 – 1400	Recap <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow</i>
1400	<i>Lunch & End of Day Four</i>

Day 5: Friday, 02nd of October 2026

0730 – 0830	High-Pressure High-Temperature (HPHT) Fluid Chemistry <i>Thermal Degradation Mechanisms • High-Temperature Stabilizers • Pressure Effects on Fluid Properties • HPHT Fluid Design Considerations</i>
0830 – 0930	Formation Damage & Fluid Compatibility <i>Formation-Fluid Interaction Mechanisms • Clay Migration Effects • Emulsion Block Formation • Compatibility Testing Procedures</i>
0930 – 0945	<i>Break</i>



0945 – 1030	Environmental Chemistry of Drilling Fluids <i>Environmental Regulations and Standards • Toxicity Assessment Methods • Biodegradability Requirements • Waste Management Practices</i>
1030 – 1100	Advanced Drilling Fluid Technologies <i>Nanotechnology Applications • Smart Drilling Fluid Systems • Environmentally Friendly Additives • Emerging Chemical Innovations</i>
1100 – 1200	Troubleshooting Drilling Fluid Problems <i>Rheology Instability Diagnosis • Excessive Fluid Loss Issues • Emulsion Failure Investigation • Contamination Troubleshooting Workflows</i>
1200 – 1215	Break
1215 – 1315	Industry Case Studies & Best Practices <i>Deepwater Drilling Fluid Applications • HPHT Well Fluid Design Cases • Shale Drilling Performance Optimization • Lessons Learned and Operational Best Practices</i>
1315 – 1330	Course Conclusion <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course</i>
1330 – 1345	POST-TEST
1345 – 1400	<i>Presentation of Course Certificates</i>
1400	<i>Lunch & End of Course</i>

Course Learning Outcomes

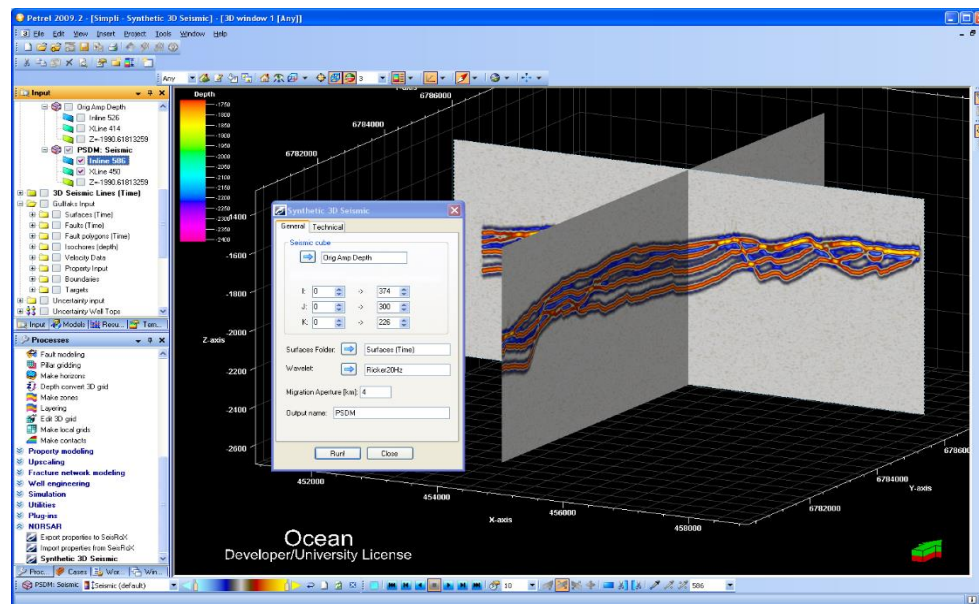
Upon completion of this course, participants will be able to:

- Understand the chemical principles governing drilling fluid performance
- Explain the chemistry of water-based, oil-based, and synthetic-based drilling fluids
- Select and optimize drilling fluid additives based on operational requirements
- Evaluate clay-fluid interactions and shale inhibition mechanisms
- Design drilling fluids for challenging drilling environments, including HPHT wells
- Identify and treat common drilling fluid contamination problems
- Conduct and interpret drilling fluid laboratory tests
- Assess formation damage risks and fluid compatibility issues
- Apply environmental and regulatory requirements to drilling fluid management
- Troubleshoot drilling fluid problems using chemical and operational approaches
- Implement best practices for drilling fluid formulation, monitoring, and optimization

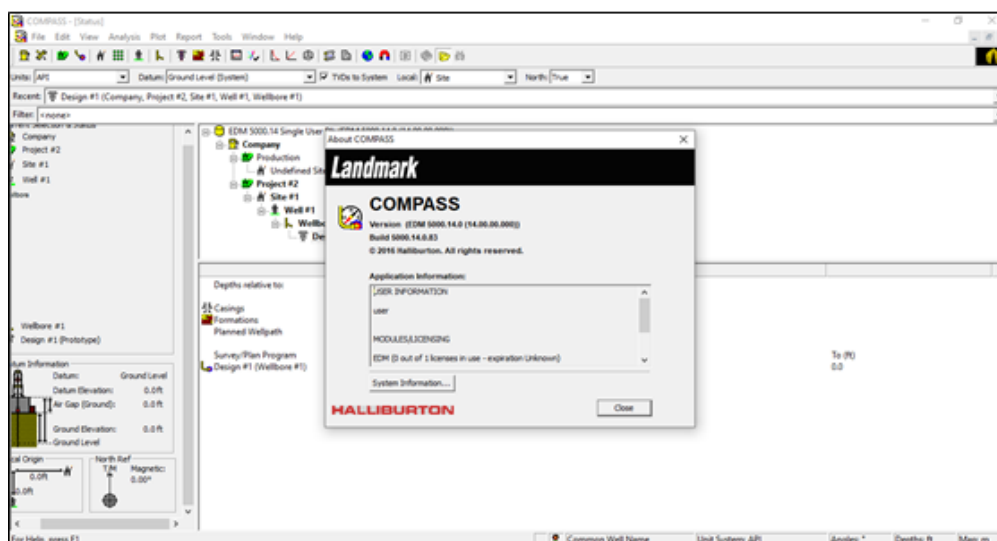


Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the “PyScripter with Python”, “Petrel Software”, “COMPASS”, “Monte Carlo”, “Interactive Petrophysics (IP)”, “ECRIN”, “Eclipse Software”, “PVTsim Software”, “PETEX IPM Suite” software’s, “*CEMPRO + Integrated Cementing*” and “PIPESIM”.

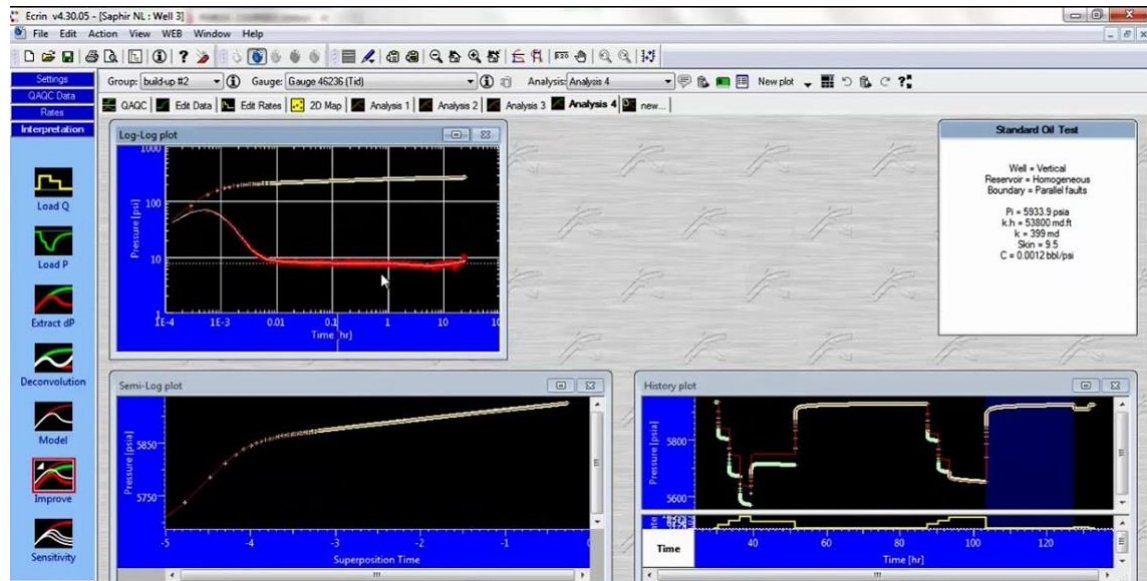


Petrel Software

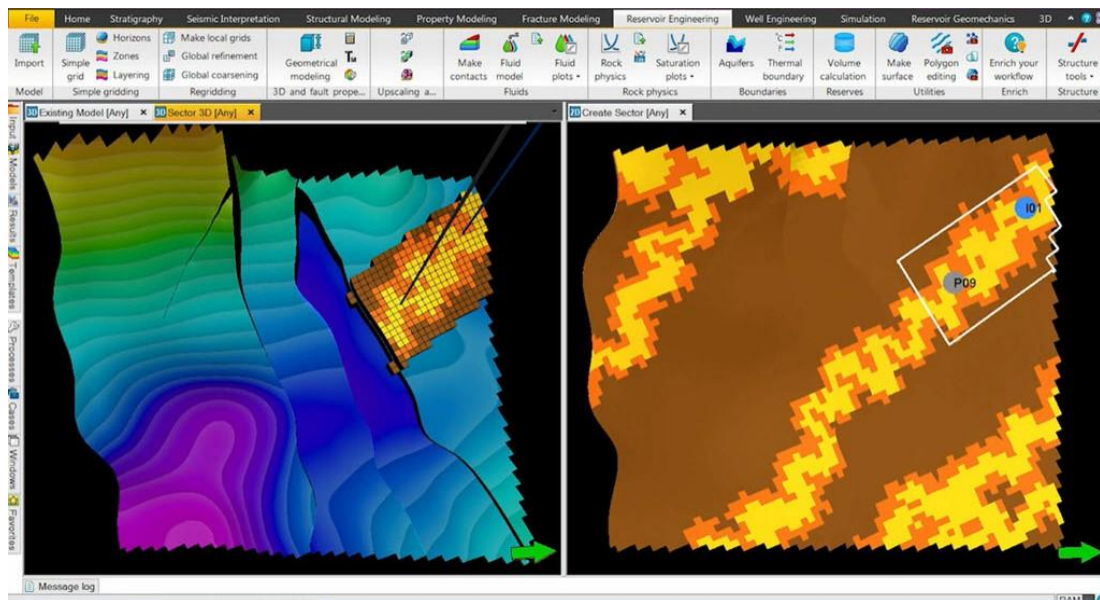


COMPASS

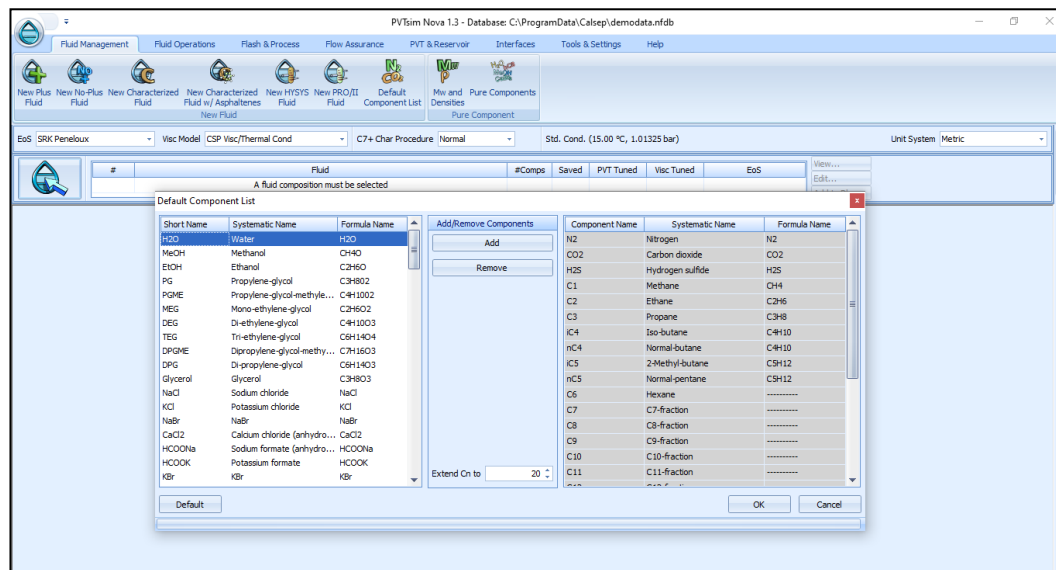
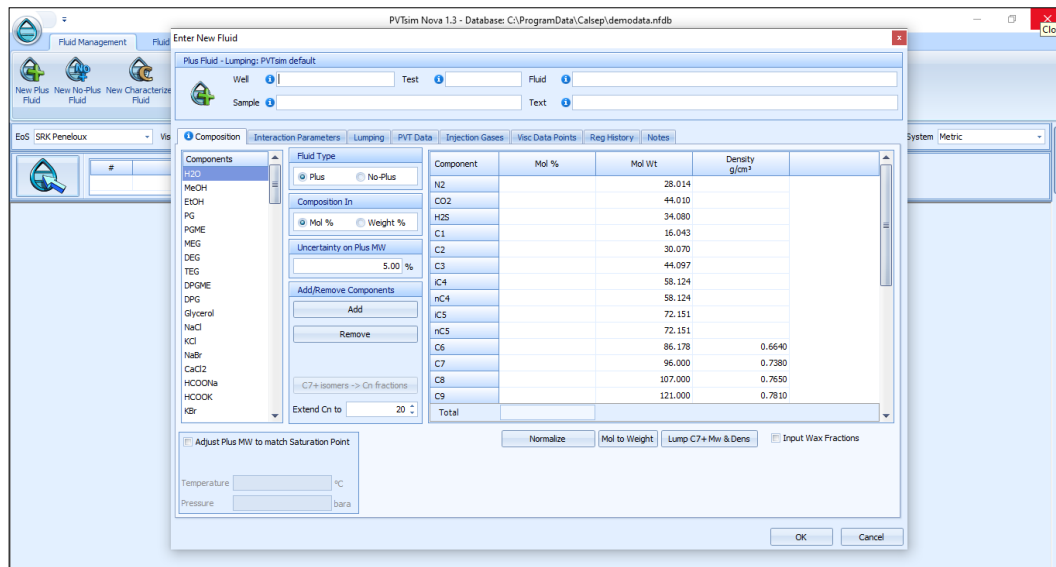




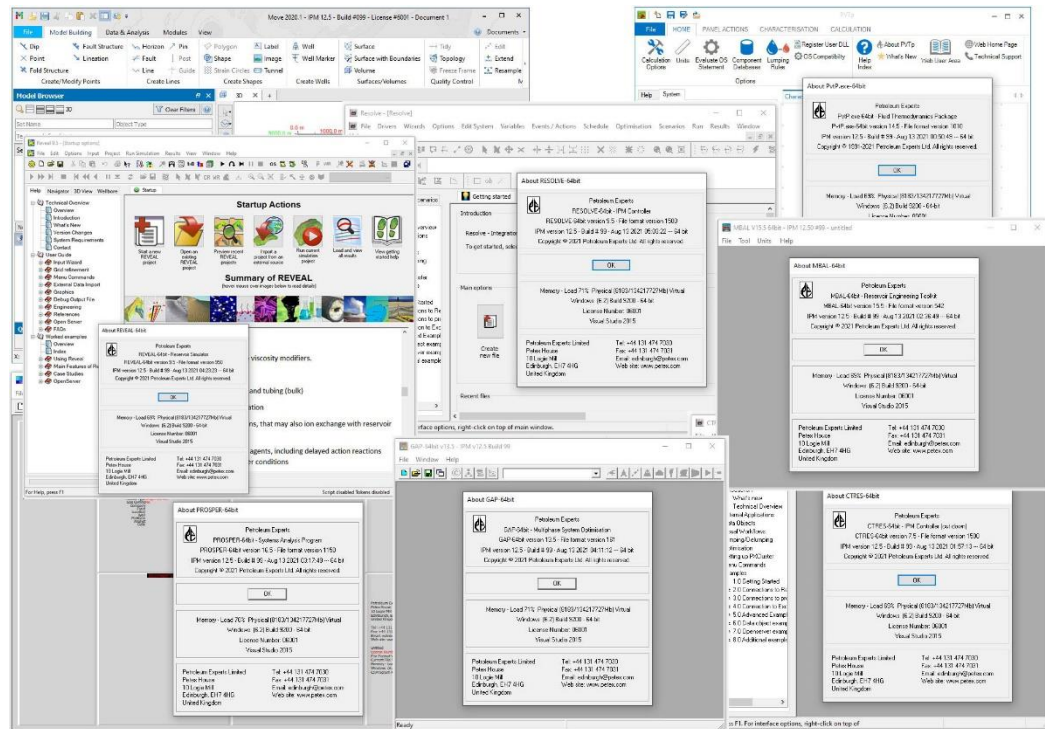
ECRIN Software



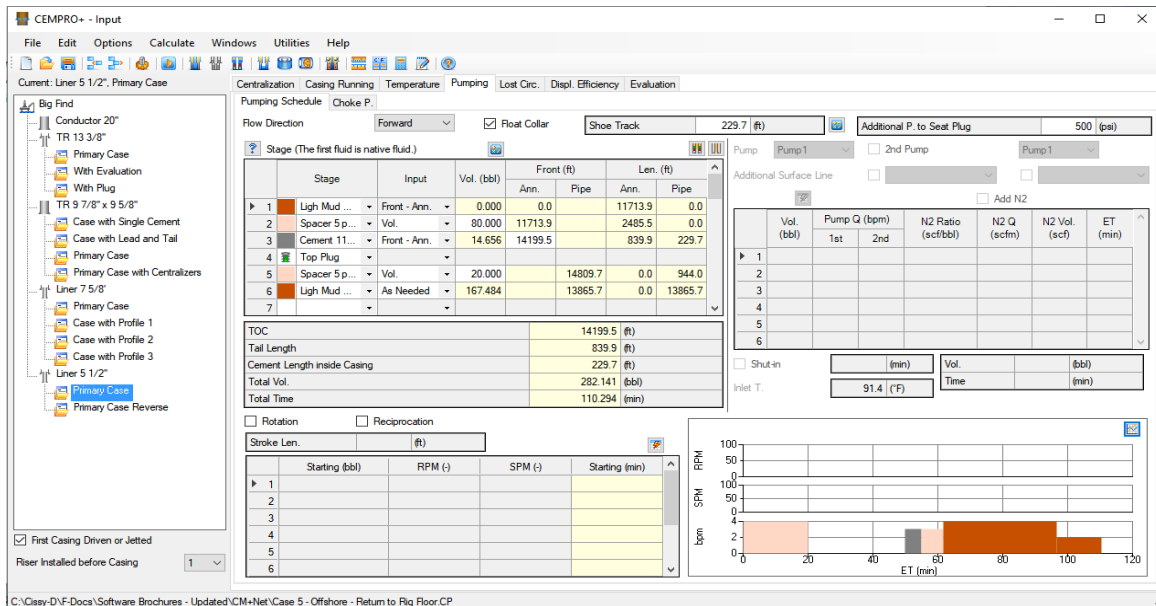
Eclipse Software



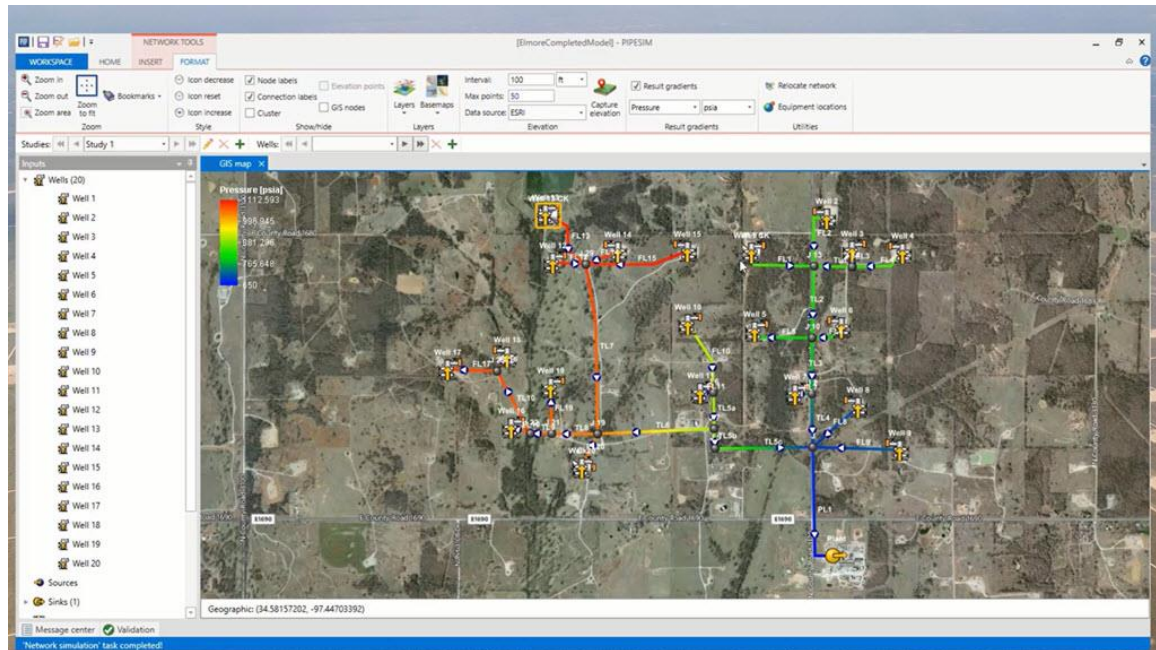
PVTsim Software



PETEX IPM Suite



CEMPRO+ Integrated Cementing Software



PIPESIM

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org