COURSE OVERVIEW DE0543
Oil Field Scales

Course Title
Oil Field Scales

Course Date/Venue
Session 1: May 19-23, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: September 07-11, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
DE0543

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date overview of Oil Field Scales. It covers the importance of scale formation in oilfields and the common types of scales found in petroleum operations; the types of oil field scales, causes and mechanisms of scale formation and the impact of scale deposition on oilfield operations; the scale formation in different oilfield environments, laboratory analysis and field detection of scales; the proper monitoring and early detection of scale formation; and the chemical inhibitors for scale prevention and water chemistry control for scale prevention.

During this interactive course, participants will learn the scale prevention in water injection systems, mechanical scale removal techniques and chemical scale dissolution methods; the hydrothermal and electrochemical scale removal, downhole and surface scale removal strategies and safety and environmental considerations in scale removal; the advanced scale inhibitor deployment methods, scale management in enhanced oil recovery (EOR) operations and scale management in subsea and deepwater operations; the artificial intelligence (AI) and machine learning in scale management; the regulatory compliance and sustainability in scale management; and the risk assessment and troubleshooting in scale management.

Course Objectives

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

- Apply and gain an in-depth knowledge on oil field scales
- Discuss the importance of scale formation in oilfields and the common types of scales found in petroleum operations
- Identify the types of oil field scales, causes and mechanisms of scale formation and the impact of scale deposition on oilfield operations
- Recognize scale formation in different oilfield environments and apply laboratory analysis and field detection of scales
- Apply proper monitoring and early detection of scale formation as well as discuss chemical inhibitors for scale prevention and water chemistry control for scale prevention
- Carryout scale prevention in water injection systems, mechanical scale removal techniques and chemical scale dissolution methods
- Employ hydrothermal and electrochemical scale removal, downhole and surface scale removal strategies and safety and environmental considerations in scale removal
- Implement advanced scale inhibitor deployment methods, scale management in enhanced oil recovery (EOR) operations and scale management in subsea and deepwater operations
- Apply artificial intelligence (AI) and machine learning in scale management including regulatory compliance and sustainability in scale management
- Carryout risk assessment and troubleshooting in scale management

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 oil field scales for production and asset managers, corrosion engineers, production engineers, project managers in oil and gas, chemical engineers, reservoir engineers, completion engineers, petroleum geologists and geophysicists, field engineers and technicians, consultants and industry analysts.

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.

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

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**. 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 centre, 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 **3.0 CEUs** (Continuing Education Units) or **30 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.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

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. Saad Aljzwe, PhD, MEng, MSc, BSc, is a **Senior Petroleum & Reservoir Engineer** with over **25 years** of practical and academic experience in the areas of **Petroleum Economic** Analysis, **Economic** Evaluation, **Petroleum Risk** Analysis & Decision Making, **Oil Agreement**, **Exploration & Production** Sharing Agreements, Multidisciplinary Research, Economics & Property Evaluation, Conventional & Unconventional **Oil & Gas Reserves** Estimation, **Reservoir** Management, **Reservoir** Engineering, **Reservoir** Performance Analysis, **Oil Fields Subsurface** Assessment & Forecasting, **Casing** Design, **Drilling & Workover**, **PVT & Core** Analysis, **Production** Operations, **EOR/IOR**, **Field Development** Design & Evaluation, Miscible Gas Injection (**CO2 Injection**) Design & Evaluation, **Special Core Analysis** & Formation Evaluation, **EOR-CO2 Injection**, **Remaining Gas** in Place Estimation, **Material Balance** Method, **Computerized Monitoring & Processing** System Design, **Magnetic Field** Controlling, Comparative **Risk Evaluation & Sensitivity** Analysis, Critical Production Rate for Bottom Water Coning in the Majed (EE-Pool) **Reservoir**, Oil Pipeline **Black Powder Removal**, **Oil Field Water Shutoff Treatment** Methods, **Water-Based Mud Rheological & Fluid Loss Control**, **Empirical Equation**, **Water-Flooding** Performance, **Sandstone Reservoirs**, **Reservoir Fluid** Properties, **Mathematical** Modelling, **Directional Permeability Anisotropy**, **Drilling** Operational Efficiency & Well Cost Reduction, Infill Drilling Program, **Drilling** Efficiency and **Ultra-mud System** Optimization. Further, he is also well-versed in various petroleum software such as the **MBAL** (Reservoir Engineering Toolkit), **KAPPA-Saphir** (Well Testing), **KAPPA-Rubis** (Reservoir Simulation), **CMG** (Reservoir Simulation), **Merak Peep** (Economic Evaluation and Production Decline Analysis) and **Monte Carlo** Simulation.

During Dr. Saad's career, he gained his thorough practical experience through several challenging positions such as the **Senior Lecturer**, **Head** of Petroleum Engineering Department, **Head** of Chemical Engineering Department, **Head** of the Union of Faculty Members, **Assistant Professor**, **Teaching Assistant**, **Researcher** and **Academic Coordinator** from various international well-renowned companies such as the **University of Wyoming**, **Colorado School of Mines**, **American University of Ras Al Khaimah**, **Australian College of Kuwait**, Sirt University and Bright Star University of Technology.

Dr. Saad has a **PhD** and **Master** degree in **Petroleum Engineering** from the **University of Wyoming** and **Colorado School of Mines**, **USA**, respectively as well as **Master** degrees in **Petroleum Economics & Management** and **Reservoir Geosciences & Engineering** from the **Instituit Francias du Petrole**, France and a **Bachelor** degree in **Petroleum Engineering**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and a member of the American Society of Petroleum Engineering (**SPE**), Society of Petroleum Resources Economists (**SPRE**), Association of Professional Engineering of Libya, Libyan Society of Earth Science and the Environment Friends Association of Libya. Moreover, he is an **author/co-author** and published **various research papers** in local and international scientific journals and conferences. He has further delivered numerous trainings, courses, workshops, seminars and conferences globally.

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 course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Oil Field Scale Deposition*** *Definition and Importance of Scale Formation in Oilfields • Common Types of Scales Found in Petroleum Operations • Mechanisms of Scale Formation in Reservoirs, Pipelines, and Facilities • Approach to Scale Management*
0930 - 0945	*Break*
0945 - 1045	***Types of Oil Field Scales*** *Carbonate Scales (Calcium Carbonate, Iron Carbonate) • Sulfate Scales (Barium Sulfate, Strontium Sulfate, Calcium Sulfate) • Silica and Silicate Scales • Mixed and Complex Scales in Production Systems*
1045 - 1130	***Causes & Mechanisms of Scale Formation*** *Changes in Pressure, Temperature, and Water Chemistry • Mixing of Incompatible Waters (Formation vs. Injection Water) • Evaporation and Degassing Effects on Scaling • Role of pH and Dissolved Gas Content in Scale Formation*
1130 - 1230	***Impact of Scale Deposition on Oilfield Operations*** *Production Loss Due to Tubing and Pipeline Blockage • Equipment Damage and Increased Maintenance Costs • Reduced Efficiency in Heat Exchangers and Processing Facilities • Impact on Enhanced Oil Recovery (EOR) Processes*
1230 - 1245	*Break*
1245 - 1330	***Scale Formation in Different Oilfield Environments*** *Scale Deposition in Downhole Tubulars and Wellbores • Surface Facility Scaling (Separators, Heat Exchangers, Tanks) • Subsea Pipeline Scaling and Deepwater Production Challenges • Scale Formation in Water Injection and Disposal Systems*
1330 – 1420	***Laboratory Analysis & Field Detection of Scales*** *Chemical and Mineralogical Analysis of Scale Deposits • Scale Solubility and Predictive Modeling Techniques • Core Flood and Flow Loop Experiments for Scale Evaluation • Laboratory Procedures for Scale Identification*
1420 - 1430	***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*
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Scale Prediction Models & Software*** *Overview of Scale Prediction Techniques • Thermodynamic vs. Kinetic Scale Modeling • Commercial Scale Prediction Software (ScaleChem, MultiScale, OLI) • Case Studies on Predictive Modeling Fields*

0830 – 0930	***Monitoring & Early Detection of Scale Formation*** *Real-Time Scale Monitoring Techniques • Use of Acoustic and Ultrasonic Sensors for Scale Detection • Chemical Analysis of Produced Water for Scaling Tendencies • Role of Downhole and Surface Instrumentation in Scale Monitoring*
0930 – 0945	*Break*
0945 – 1100	***Chemical Inhibitors for Scale Prevention*** *Types of Scale Inhibitors (Phosphonates, Polymers, Chelating Agents) • Mechanism of Action for Scale Prevention Chemicals • Scale Inhibitor Selection Criteria Based on Field Conditions • Chemical Treatment Strategies for Scale Control*
1100 – 1230	***Water Chemistry Control for Scale Prevention*** *Controlling Calcium, Sulfate, and Bicarbonate Levels in Injection Water • Adjusting pH to Reduce Scaling Risks • Impact of Temperature and Pressure on Water Chemistry • Compatibility Testing of Water Sources to Prevent Scaling*
1230 – 1245	*Break*
1245 – 1330	***Scale Prevention in Water Injection Systems*** *Water Compatibility Assessment Before Injection • Pre-Treatment Methods (Softening, Desalination, Filtration) • Continuous vs. Batch Scale Inhibitor Injection Strategies • Best Practices for Managing Scaling in Injection Wells*
1330 – 1420	***Case Studies on Scale Prevention in Oilfield Operations*** *Successful Implementation of Scale Inhibition Programs • Challenges and Lessons Learned from Field Applications • Economic Impact of Proactive vs. Reactive Scale Management • Future Improvements in Scale Prevention Strategies*
1420 - 1430	***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*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Mechanical Scale Removal Techniques*** *Coiled Tubing Descaling Operations • High-Pressure Jetting for Scale Removal • Mechanical Scrapers and Milling Tools for Hard Scales • Limitations and Risks Associated with Mechanical Descaling*
0830 – 0930	***Chemical Scale Dissolution Methods*** *Acid-Based Treatments (HCl, Organic Acids, Blended Acids) • Chelating Agents for Sulfate Scale Dissolution • Scale Dissolvers for Complex Mixed-Scale Removal • Chemical Treatment Protocols for Scale Remediation*
0930 – 0945	*Break*
0945 – 1100	***Hydrothermal & Electrochemical Scale Removal*** *Superheated Water and Steam Cleaning for Scale Removal • Electrochemical Methods for Breaking Down Scale Deposits • Advantages and Limitations of Alternative Scale Removal Methods • Field Applications of Hydrothermal Descaling*
1100 – 1230	***Downhole & Surface Scale Removal Strategies*** *Treatment Options for Downhole Scale Remediation • Managing Scale Deposition in Separators and Pipelines • Integration of Mechanical and Chemical Methods for Optimal Results • Scale Removal Planning and Operational Best Practices*
1230 – 1245	*Break*

1245 – 1420	***Safety & Environmental Considerations in Scale Removal*** *Handling of Acidizing Chemicals and Safety Protocols • Waste Disposal and Environmental Impact of Chemical Treatments • Risk Assessment and Mitigation Strategies • Compliance with Environmental Regulations in Scale Management*
1420 - 1430	***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*
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Case Studies on Scale Removal in Oilfield Operations*** *Field Challenges and Solutions for Major Scaling Issues • Successful Applications of Mechanical and Chemical Removal Methods • Removal Projects • Future Advancements in Scale Treatment Technologies*
0930 – 0945	*Break*
0945 – 1100	***Advanced Scale Inhibitor Deployment Methods*** *Continuous Injection vs. Squeeze Treatment Techniques • Nano-Scale Inhibitors and Advanced Chemical Formulations • Smart Inhibitor Release Technologies for Long-Term Protection • Case Studies on Advanced Chemical Deployment*
1100 – 1230	***Scale Management in Enhanced Oil Recovery (EOR) Operations*** *Scaling Risks in Thermal EOR (Steam Flooding) • Managing Scale Deposition in Polymer and Surfactant Flooding • CO_2 EOR and Associated Scale Challenges • Best Practices for Scale Control in EOR Projects*
1230 – 1245	*Break*
1245 – 1330	***Scale Management in Subsea & Deepwater Operations*** *Unique Challenges of Scaling in Deepwater Fields • Subsea Pipeline Scaling and Remediation Strategies • Smart Monitoring Technologies for Remote Scale Detection • Case Study on Scale Control in Operations*
1330 – 1420	***Artificial Intelligence (AI) & Machine Learning in Scale Management*** *AI-Driven Scale Prediction and Monitoring Systems • Real-Time Scale Inhibitor Dosage Optimization Using Big Data • Case Studies on AI Applications in Oilfield Scale Control • Future of Predictive Analytics in Scale Management*
1420 - 1430	***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*
1430	*Lunch & End of Day Four*

Day 5

0730 – 0830	***Regulatory Compliance & Sustainability in Scale Management*** *Regulatory Framework for Scale Treatment and Disposal • Environmental Impact Assessment of Scale Treatment Methods • Sustainable Alternatives to Conventional Chemical Treatments • Future Regulatory Trends in Oilfield Scaling*
0830 – 0930	***Case Studies on Industry Innovations in Scale Management*** *Research and Development Initiatives in Scale Control • Lessons Learned from Global Oil and Gas Operations • Future Trends and Emerging Technologies in Scale Prevention • Best Practices for Long-Term Scale Management Planning*
0930 – 0945	*Break*
0945 – 1100	***Scale Analysis & Testing*** *Laboratory Testing of Scale Composition and Solubility • Scale Inhibitor Selection and Performance Testing • Practical Exercises in Chemical Scale Dissolution Methods • Data Interpretation and Scale Monitoring Analysis*

1100 – 1230	***Scale Prevention & Removal Techniques*** *Demonstration of Scale Inhibitor Deployment Techniques • Acidizing and Chelating Treatment Simulation • Mechanical Scale Removal Exercises Using Field Equipment • Evaluation of Treatment Effectiveness in Different Conditions*
1230 - 1245	*Break*
1245 – 1345	***Risk Assessment & Troubleshooting in Scale Management*** *Identifying Scaling Risks in Different Operational Environments • Troubleshooting Scale-Related Production Losses • Case Study-Based Problem-Solving Exercise • Group Discussions on Field Challenges and Solutions*
1345 - 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 - 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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