

COURSE OVERVIEW TE0135
Water Injection Treatment Technology

Course Title

Water Injection Treatment Technology

Course Date/Venue

Session 1: August 11-15, 2024/Al Aziziya Hall,
 The Proud Hotel Al Khobar, Al Khobar,
 KSA

Session 2: October 27-31, 2024/Boardroom 1,
 Elite Byblos Hotel Al Barsha, Sheikh
 Zayed Road, Dubai, UAE



Course Reference

TE0135

Course Duration/Credits

Five days/3.0 CEUs/30 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 course is designed to provide the participants with a complete and up-to-date overview of the water injection treatment technology. It covers the preamble and injectivity of enhanced oil recovery and water injection systems that include water source, basic water treatment, filter and deaeration.



The course will further discuss the management of seawater corrosion, buried and subsea pipelines, microbiological growth and corrosion; the tests used to evaluate water quality; the water treatment chemicals used in water injection systems; and the inspection of facilities as well as pigging and cleaning of pipelines.

At the completion of the course, participants will have a solid grounding in the understanding of the purpose, operation and inspection of water injection systems for enhanced oil recovery. The course will illustrate potential problems and their resolution.

Course Objectives

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

- Apply and gain an in-depth knowledge on water injection treatment technology
- Discuss the preamble and injectivity of enhanced oil recovery
- Recognize water injection systems covering water source, basic water treatment, filter and deaeration
- Manage seawater corrosion, buried and subsea pipelines and microbiological growth and corrosion
- Use various tests to evaluate water quality
- Identify water treatment chemicals used in water injection systems
- Perform inspection of facilities as well as pigging and cleaning of pipelines

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 a complete and up-to-date overview of water injection treatment technology for all engineers and technical staff whose responsibilities include the safe and cost-effective operation of water injection systems. Management will also benefit by increasing their awareness of the cost-effective use of treatment chemicals and by developing their skills in analysis of water quality data. Further, this course is suitable for corrosion personnel, W.I. personnel, lab personnel, chemists and chemical engineers.

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 Certificate(s)

(1) Internationally recognized Wall Competency Certificates and Plastic Wallet Cards will be issued to participants who completed a minimum of 80% of the total tuition hours and successfully passed the exam at the end of the course. Certificates are valid for 5 years.

Recertification is FOC for a Lifetime.

Sample of Certificates

The following are samples of the certificates that will be awarded to course participants:-



- (2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course.

* Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology *



Haward Technology Middle East

Continuing Professional Development (HTME-CPD)

CEUs

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CEU Official Transcript of Records

TOR Issuance Date: 14-Nov-19

HTME No. 8667-2014-9020-2555

Participant Name: Ali Al Hajri

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
TE0135-3D-IH	Water Injection Treatment Technology	November 12-14, 2019	12	1.2

Total No. of CEU's Earned as of TOR Issuance Date **1.2**

TRUE COPY



Maricel De Guzman
Academic Director

Haward Technology has been approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this approval, Haward Technology has demonstrated that it complies with the ANSI/IACET 1-2013 Standard which is widely recognized as the standard of good practice internationally. As a result of their Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for programs that qualify under the ANSI/IACET 1-2013 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 Association 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 is accredited by










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Certificate Accreditations


Certificates are accredited by the following international accreditation organizations: -

- 
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.

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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.

Course Fee

US\$ 5,500 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 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:



Mr. Konstantin Zorbalas, MSc, BSc, is a **Senior Water Engineer** with over **30 years of offshore and onshore** experience in the **Oil & Gas, Refinery & Petroleum** industries. His wide expertise includes **Water Desalination Technologies, Water Reservoirs, Water Storage Tanks, Water Treatment**, Extended Activated Sludge Treatment, **Water Analysis, Water Treatment Technology, Water Loss Reduction, Leaking Pipelines & Installation, Pipes & Fittings Supply, Excavation, Domestic Water Meters Supply & Installation, Wells & Water Networks Rehabilitation, MBBR, Hydraulic Design, Hydraulic Network System, Water Pipeline System, Water Distribution System, Watershed Management, Water Quality Analysis, Steam Boiler, Hydro-Treating Technology, Waste Water Effluent Treating Facilities, Waste Water Treatment, Best Practice in Sewage & Industrial Waste Water Treatment & Environmental Protection, Advanced Waste Water Treatment Operation & Process, Water Storage Tanks, Water Leak Detection, Leakage Verification, Leakage Prevention, Leakage Detection Methods, Leak Noise Identification, Leak Repairs, Structural & Pinpoint Leaks, Pipe Materials & Failure, Sound Transmission & Sounding Techniques, Using Listening Devices, Water Fittings Regulation & Standards, Water System Design & Installation, Surface Water Hydrology, Water & Wastewater Projects, Water Desalination Technologies, Water Distribution & Pump Station, Best Water Equipment Selection & Inspection, Hydraulic Modelling for Water Network Design, Water Utility Industry, Water Desalination Technologies & New Development, Water Hydrology, Water Conveyors, Water Networks Rehabilitation, Water Fittings Regulations & Standards, Fittings & Valves, Couplings & Pressure Testing, Water Distribution Systems, Water Networking, Hydraulic Modelling Systems and Pumping Stations.** He is currently the **Senior Petroleum Engineer & Consultant of Abu Dhabi National Oil Company (ADNOC)** Group of companies wherein he is involved in the mega-mature fields in the Arabian Gulf, predominantly carbonate reservoirs; designing the acid stimulation treatments with post-drilling rigless operations; utilizing CT with tractors and DTS systems; and he is responsible for gas production and preparing for reservoir engineering and simulation studies, well testing activities, field and reservoir monitoring, production logging and optimization and well completion design.

During his career life, Mr. Zorbalas worked as a **Senior Production Engineer, Well Completion Specialist, Production Manager, Project Manager, Technical Manager, Trainer, Technical Supervisor & Contracts Manager, Production Engineer, Water Engineer, Production Supervisor, Production Technologist, Technical Specialist, Business Development Analyst, Field Production Engineer and Field Engineer.** He worked for many **world-class oil/gas companies** such as **ZADCO, ADMA-OPCO, Oilfield International Ltd, Burlington Resources** (later acquired by **Conoco Phillips**), **MOBIL E&P, Saudi Aramco, Pluspetrol E&P SA, Wintershall, Taylor Energy, Schlumberger, Rowan Drilling and Yukos EP** where he was in-charge of the **design and technical analysis** of a gas plant with capacity **1.8 billion m³/yr gas**. His achievements include **boosting oil production 17.2% per year** since 1999 using **ESP and Gas Lift systems**.

Mr. Zorbalas has **Master and Bachelor** degrees in **Petroleum Engineering** from the **Mississippi State University, USA**. Further, he is an **SPE Certified Petroleum Engineer, Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)**, an active member of the Society of Petroleum Engineers (**SPE**) and has numerous scientific and technical publications and delivered innumerable training courses, seminars and workshops worldwide.



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	Enhanced Oil Recovery - Preamble Types of Reservoirs: Limestone and Sandstone • Function of EOR: Pressure Maintenance and Displacement • Options Available: Gas Injection and Re-injection (including Carbon Dioxide), Water, Polymer, Microbial
0930 – 0945	Break
0945 – 1030	Enhanced Oil Recovery - Injectivity Injectivity Requirements and Limitations • Breakthrough • Fracturing • Loss of Injectivity • Scale Formation • Prevention of Scale Formation • Recovering Injectivity by Acid Treatments
1030 – 1230	Water Injection Systems - Water Source Water Source: Produced Water, Aquifers and Seawater • Nature and Composition of Waters and Seawater • Matching Reservoir Requirements • Water Compatibilities and Scale
1230 – 1245	Break
1245 – 1420	Water Injection Systems - Basic Water Treatment Basic Seawater Treatment: Filtration and Deaeration • Water Depth Selection • Prevention of Macrofouling • Winning Pumps • Chlorination
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 – 0930	Water Injection Systems - Filters & Deaeration Types of Filters: Cartridge, Gravity, Upflow, Mixed Media, Rotating Drum • Filter Aids: Ferric Salts, Bentonite, Polyelectrolyte • Chlorination and Upfilter Biocide Treatments • Deaeration: Gas Stripping and Mechanical Vacuum Deaeration
0930 – 0945	Break
0945 – 1100	Water Injection Systems - Filters & Deaeration (cont'd) Chemical Scavengers and Catalysts • Effect of Temperature • Interaction of Chlorine and Scavenger • Bacterial Growth • Through Plant Chlorination • Biocide Treatment • Types of Biocide • Variations in Biocide Use • Interaction of Scavenger and Biocide
1100 – 1230	Seawater Corrosion Corrosiveness of Seawater • Typical Corrosion Rates • Oxygen Corrosion • Effect of Flow • Effect of Temperature When Seawater Used as Primary Coolant • Winning Pumps • Annular Restrictions Around Winning Pumps
1230 – 1245	Break



1245 – 1420	Seawater Corrosion (cont'd) Flow Tubing: Mortar Lined Carbon Steel, Duplex Stainless Steels, Titanium, Copper Nickel Alloys, Non-Metallic Materials • Filter Containers and Coatings • Deaeration Towers and Coatings • Downstream Flowline Systems • Injection Tubing
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 – 0930	Buried & Subsea Pipelines Soil Corrosiveness • Enhanced Corrosion Around Water Pipelines • Seawater Corrosiveness • Seabed Sediment Corrosiveness • External Coatings and Cathodic Protection to Prevent Corrosion
0930 – 0945	Break
0945 – 1100	Buried & Subsea Pipelines (cont'd) Coating and CP Interactions • External Damage to Pipelines • Internal Coating of Pipelines • Refurbishment of Pipelines • Repair of Pipelines • Replacement of Pipelines
1100 – 1230	Microbiological Growth & Corrosion Structure and Growth of Diatoms, Bacteria and Algae • Growth Requirements. Interactions Between Organisms • Microbiological Corrosion
1230 – 1245	Break
1245 – 1420	Microbiological Growth & Corrosion (cont'd) Sessile and Planktonic Bacteria • Biofouling in Filers, Deaerators, Flowlines • Injectivity Loss • Reservoir Souring
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	Water Quality Quality Issues and Associated Risk • Intake Water • Measuring Particle Counts • Millipore Filtration • Post-Filtration Water Quality • Residual Chlorine After Filtration
0930 – 0945	Break
0945 – 1100	Water Quality (cont'd) Residual Oxygen After Deaeration. Residual Scavenger • Water Quality at Receiving Wells • Effect of Injection Water Quality on Injectivity • Total Iron and Corrosion • Millipore Filtration at the Injection Wells • Calculating Volumes and Quantities
1100 – 1230	Tests Used to Evaluate Water Quality Lab Tests and Field Tests • Test Points • Collecting Samples • Transport of Samples Test Frequencies for Particle Counts, Filtration Efficiency



1230 – 1245	Break
1245 – 1420	Tests Used to Evaluate Water Quality (cont'd) Millipore Filtration Tests, Chlorine, Oxygen, Residual Oxygen Scavenger, Total Iron • Treatment Issues: Residual Biocide, Hydrogen Sulphide, Sulphate-Reducing Bacteria (SRB), General Aerobic Bacteria (GAB), pH
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 – 0930	Water Treatment Chemicals Used in Water Injection Systems Chlorine. Bentonite • Polyelectrolyte • Filter Aids • Scavenger • Biocides • Selection of Biocides: Time to Kill, Field Tests
0930 – 0945	Break
0945 – 1100	Inspection of Facilities Using Iron Counts to Evaluate Corrosion • Effects of Flow • Areas of Corrosion • Typical Corrosion Patterns • Weld Decay
1100 – 1230	Inspection of Facilities (cont'd) Ultrasonic Testing • X-radiography • Internally Coated Vessels and Lines • Endoscopes • Visual Inspection • Inspection Frequency
1230 – 1245	Break
1245 – 1330	Pigging & Cleaning of Pipelines Identifying the Need to Pig • Types of Pigs • Risks Involved • Pig Alerts • Frequency of Pigging and Effectiveness • Cleaning of Pipelines • Measuring Effectiveness • Intelligent Pigging • Evaluation of Data
1300 - 1315	Course Conclusion Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics
1315 – 1415	COMPETENCY EXAM
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Simulator (Hands-on Practical Sessions)

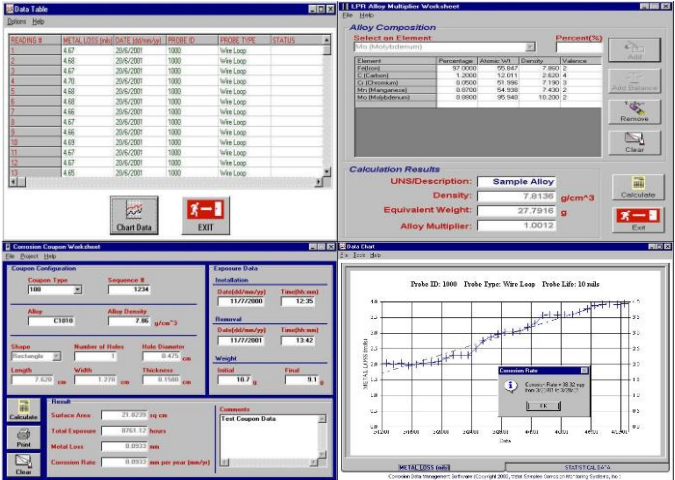
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the simulators “IntegriWISE™”, “Corrosion Data Management Software (CDMS)” and “Electronic Corrosion Engineer (ECE®) 5”.



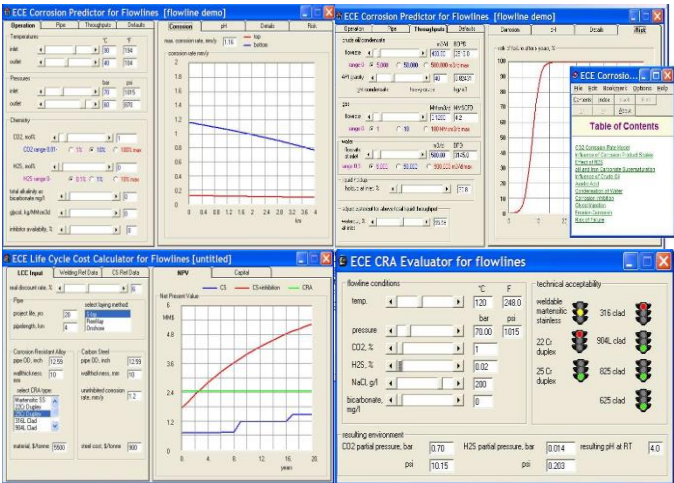
The image displays two screenshots of the IntegriWISE software interface. The top screenshot shows the main application window with a menu bar (Home, Tool, Help) and a toolbar containing icons for New Assessment, Site, Facility, Equipment, Component, and Exit. Below the toolbar is a search bar labeled 'Items' and a large central area displaying the 'IntegriWISE™ Fitness-for-Service Assessment Tool' logo. The bottom status bar indicates the user, server, database, and application version.

The bottom screenshot shows the same main window with an 'Equipment' dialog box open. The dialog box is titled 'Equipment' and contains the following fields: Equipment Number*, Equipment Type*, Equipment Name, Design Code, Description, Site*, Facility*, Manufacturer*, Design Pressure (MPa), Design Temperature (°C), Minimum Temperature (°C), and Hydrotest Pressure (MPa). The dialog box also includes 'OK' and 'Cancel' buttons at the bottom.

IntegriWISE™



Corrosion Data Management Software (CDMS)



Electronic Corrosion Engineer (ECE®) 5

Course Coordinator

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