COURSE OVERVIEW DE0086
CO2 Surface Facilities & Injection System

Course Title
CO2 Surface Facilities & Injection System

Course Date/Venue
Session 1: February 23-27, 2025/Meeting
Plus 8, City Centre Rotana
Doha Hotel, Doha, Qatar
Session 2: August 24-28, 2025/Meeting
Plus 8, City Centre Rotana
Doha Hotel, Doha, Qatar

Course Reference
DE0086

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

Course Description

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

When an oil reservoir is first produced, the pressure that exists in the subsurface provides the energy for moving the oil, gas and water that is in the rock to the surface. After a while, the pressure dissipates and pumps must be used to remove additional volumes of oil. Depending on the characteristics of the rock and the oil, a considerable amount of the original oil in place may be left behind (perhaps 60 percent or more) as residual oil.

As the production decline phase begins, it is carefully managed to extract every last drop of oil possible using enhanced oil recovery techniques, such as waterflooding and CO_2 injection. Where CO_2 enhanced recovery operations are employed, they typically take place after the less expensive waterflooding option has already been implemented, although the remaining oil saturation in the post-waterflood reservoir is still significant, perhaps 50 percent of the original oil in place.

In a typical CO_2 flood operation, a pipeline delivers the CO_2 to the field at a pressure and density high enough for the project requirements and a meter is used to measure the volume of gas purchased. This CO_2 is directed to injection wells strategically placed within the pattern of wells to optimize the areal sweep of the reservoir. The injected CO_2 enters the reservoir and moves through the pore spaces of the rock, encountering residual droplets of crude oil, becoming miscible with the oil, and forming a concentrated oil bank that is swept towards the producing wells.

This course is designed to provide delegates with a detailed and up-to-date overview of CO_2 surface facilities and injection system. It covers the CO_2 injection and process facilities; the heavy emphasis on CO_2 for enhanced oil recovery; the physical and thermodynamic properties of CO_2 and high CO_2 mixtures; the materials selection and design consideration in CO_2 systems; the process vessel specification, pumps and compressors; the fluid flow and special pipeline design considerations that includes control of ductile fractures; the dehydration of CO_2 and CO_2 rich gases; and the general overview of processes to treat/recover CO_2.

Course Objectives

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

- Apply and gain a comprehensive knowledge on CO2 surface facilities and injection system
- Discuss CO_2 injection and process facilities
- Recognize the heavy emphasis on CO_2 for enhanced oil recovery
- Identify the physical and thermodynamic properties of CO_2 and high CO_2 mixtures
- Carryout materials selection and design consideration in CO_2 systems
- Recognize process vessel specification, pumps and compressors
- Apply fluid flow and special pipeline design considerations that includes control of ductile fractures
- Explain dehydration of CO_2 and CO_2 rich gases and the general overview of processes to treat/recover CO_2

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 CO_2 surface facilities and injection system for engineers and senior operating personnel involved with carbon dioxide, natural gas, CO_2 and EOR systems.

Course Fee

US$ 8,500 per Delegate. 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: -

- 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.

- 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.

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 Petroleum Engineer & Well Completions Specialist** with over **25 years** of **offshore** and **onshore** experience in the **Oil** & **Gas**, **Refinery** & **Petrochemical** industries. His wide expertise includes **Surface Facilities & Injection System**, **Workovers & Completions**, **Petroleum Risk & Decision Analysis**, **Acidizing Application** in **Sandstone** & **Carbonate**, **Well Testing Analysis**, **Stimulation Operations**, **Reserves Evaluation**, **Reservoir Fluid Properties**, **Reservoir Engineering & Simulation Studies**, **Reservoir Monitoring**, **Artificial Lift Design**, **Gas Operations**, **Workover/Remedial Operations** & **Heavy Oil Technology**, **Applied Water Technology**, **Oil & Gas Production**, **X-mas Tree** & **Wellhead Operations** & **Testing**, **Artificial Lift Systems** (**Gas Lift**, **ESP**, and **Rod Pumping**), **Well Cementing**, **Production Optimization**, **Well Completion Design**, **Sand Control**, **PLT Correlation**, **Slickline Operations**, **Acid Stimulation**, **Well testing**, **Production Logging**, **Project Evaluation** & **Economic Analysis**. Further, he is actively involved in **Project Management** with special emphasis in production technology and field optimization, performing conceptual studies, economic analysis with risk assessment and field development planning. He is currently the **Senior Petroleum Engineer & Consultant** of **National Oil Company** 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**, **Technical Supervisor** & **Contracts Manager**, **Production 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.

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 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	***CO_2 Injection & Process Facilities***
0930 – 0945	*Break*
0945 – 1030	***CO_2 Injection & Process Facilities (cont'd)***
1030 – 1230	***Heavy Emphasis on CO_2 for Enhanced Oil Recovery***
1230 – 1245	*Break*
1245 – 1420	***Heavy Emphasis on CO_2 for Enhanced Oil Recovery (cont'd)***
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Physical & Thermodynamic Properties of CO_2 & High CO_2 Mixtures***
0930 – 0945	*Break*
0945 – 1100	***Physical & Thermodynamic Properties of CO_2 & High CO_2 Mixtures (cont'd)***
1100 – 1230	***Physical & Thermodynamic Properties of CO_2 & High CO_2 Mixtures (cont'd)***
1230 – 1245	*Break*
1245 – 1420	***Physical & Thermodynamic Properties of CO_2 & High CO_2 Mixtures (cont'd)***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Materials Selection & Design Consideration in CO_2 Systems***
0930 – 0945	*Break*
0945 – 1100	***Materials Selection & Design Consideration in CO_2 Systems (cont'd)***
1100 – 1230	***Process Vessel Specification***
1230 – 1245	*Break*

1245 – 1420	***Process Vessel Specification (cont'd)***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Pumps & Compressors***
0930 – 0945	*Break*
0945 – 1100	***Pumps & Compressors (cont'd)***
1100 – 1230	***Fluid Flow & Special Pipeline Design Considerations Such as the Control of Ductile Fractures***
1230 – 1245	*Break*
1245 – 1420	***Fluid Flow & Special Pipeline Design Considerations Such as the Control of Ductile Fractures (cont'd)***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***Dehydration of CO_2 & CO_2-Rich Gases***
0930 – 0945	*Break*
0945 – 1100	***Dehydration of CO_2 & CO_2-Rich Gases (cont'd)***
1100 – 1230	***Processes to Treat/Recover CO_2***
1230 – 1245	*Break*
1245 – 1345	***Processes to Treat/Recover CO_2 (cont'd)***
1345 – 1400	***Course Conclusion***
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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