



MAESTRO
CONSULTANTS

WATER INJECTION TREATMENT

COURSE OUTLINE 2020

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TRAINING TITLE

WATER INJECTION TREATMENT

VENUE

Dubai, UAE

DURATION

5 Days

DATES

20 - 24 September 2020

PRICE

US\$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet daily.

TRAINING INTRODUCTION

This course is designed to provide participants with an overview on the different types of water treatment methods, for water injection systems either by produced water or seawater as found in today's oil and gas industry.

In most offshore oil and gas reservoirs, oil and gas collects above large volumes of formation water. Participants will be provided with the knowledge to enhance their understanding of these reservoirs as well as the process of how seawater may be pumped into the reservoir to maintain pressure and help the oil and gas to flow from the reservoir to a production platform or facility. They will also gain knowledge of the water treatment systems and injection pumps that have been installed on the processing decks of these offshore platforms to send filtered and sterilized seawater into the reservoirs.

Managing water quality for oil and gas production and processing is a complicated industry issue. Participants of this course will learn the preferred source of injection water in an offshore environment is seawater and that drilling a new well is very expensive. The course provides knowledge necessary to gain and enhance their aptitude in the area of water for injection and how it has to be of a very high quality to avoid plugging and scaling of the injection equipment. The course also provides information on souring which can occur when water containing oxygen and bacteria is injected and can reduce the produced hydrocarbons' value.

TRAINING OBJECTIVES

The aim of this course is to provide the participants with a complete and up-to-date overview of the area of Water Injection Treatment. Upon the successful completion of this course, the participant should 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.

TRAINING AUDIENCE

All engineers and technical staff (Superintendents, Supervisors & Foremen) 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.

COURSE OUTLINE

Enhanced Oil Recovery - Preamble:-

Function of EOR. Reservoir structure. Types of reservoir drive: solution gas, gas cap, water. Permeability and porosity. EOR options available: water, polymer, microbial, gas re-injection. Secondary recovery options.

Enhanced Oil Recovery -Injectivity:-

Injectivity requirements. Breakthrough. Fracturing. Loss of Injectivity (Z-curves). Recovering injectivity by acid treatments. Scale formation. Prevention of scale formation.

Water Injection Systems - Water Source:-

Water source: aquifers, seawater, produced water. Nature and composition of waters. Variability of seawater. Matching reservoir requirements. Water compatibilities and scale.

Water Injection Systems - Basic Water Treatment:-

Basic water treatment: filtration and deaeration. Water depth selection. Prevention of macrofouling. Winning pumps. Chlorination.

Water Injection Systems - Filters & Deaeration:-

Types of filters: cartridge, gravity, upflow, mixed media, rotating drum.

Filter aids: iron salts, bentonite, polyelectrolyte. Chlorination and upfilter biocide treatments. Deaeration: gas stripping and mechanical vacuum deaeration. 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.

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. Flow tubing: mortar lined c-steel, duplex, titanium, cunifer. Filter containers and coatings. Deaeration towers and coatings. Downstream flowline systems. Injection tubing.

Buried and Subsea Pipelines:-

Soil corrosiveness. Enhanced corrosion around water pipelines. Seawater corrosiveness. Seabed sediment corrosiveness. External coatings. Cathodic protection. Coating and CP interactions. External damage to pipelines. Internal coating of pipelines. Refurbishment of pipelines. Repair of pipelines. Replacement of pipelines.

Microbiological Growth and Corrosion:-

Structure and growth of diatoms, bacteria and algae. Growth requirements. Interactions between organisms. Microbiological corrosion. Sessile bacteria. Planktonic bacteria. Biofouling in filters, deaerators, flowlines. Injectivity loss. Reservoir souring.

Water Quality:-

Intake water. Measuring particle counts. Millipore filtration. Post filtration water quality. Residual chlorine after filtration. 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.

Tests used to Evaluate Water Quality:-

Lab tests and field tests. Test frequency. Particle counts. Filtration efficiency. Millipore filtration tests. Chlorine. Oxygen. Oxygen scavenger. Total iron. Residual biocide. Hydrogen sulphide. SRB. GAB. pH. Test points. Collecting samples. Transport of samples

Water Treatment Chemicals used in Water Injection Systems:-

Chlorine. Bentonite. Polyelectrolyte. Filter aids. Scavenger. Biocides. Selection of biocides: time to kill, field tests.

Inspection of Facilities:-

Using iron counts to evaluate corrosion. Effects of flow. Areas of corrosion. Typical corrosion patterns. Weld decay. Ultrasonic testing. X-radiography. Internally coated vessels and lines. Endoscopes. Visual inspection. Inspection frequency.

Pigging and Cleaning of Pipelines

Identifying the need to pig. Types of pigs. Risks involved. Pig alerts. Frequency of pigging. Effectiveness. Cleaning of pipelines. Measuring effectiveness. Intelligent pigging. Evaluation of data.

TRAINING CERTIFICATE

MAESTRO CONSULTANTS Certificate of Completion for delegates who attend and complete the training course

METHODOLOGY

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of “real life” issues in their organizations. The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.