

**ENERGY1 Asia - Virtual instructor-led Training (Online)**

Due to the recent developments with COVID-19 we have, for the health and safety of our speakers and attendees, our selected multi-day courses will be delivered live online led by experience practitioners. This will enable you to experience a similar engagement experience to our successful traditional classroom setting which includes exercises, answering your question and provide feedback – all without having to travel anywhere!

# **Water Chemistry for Boiler Operators**

## **(Recognize early warning signals before failure)**

A comprehensive overview on theoretical background and practical experiences of water chemistry guidelines in boiler water systems, early warning signals for trouble and types of corrosion and case studies of failed water treatment.

28<sup>th</sup> -31<sup>st</sup> March 2022 | 12:30 – 17:00 (GMT+8) Daily | ONLINE Virtual instructor-led Training



# Water Chemistry for Boiler Operators (4 Half Days)

## Online Virtual instructor-led Training

Unit efficiency, reliability, and availability can be adversely affected by improper boiler water chemistry. The results of a multi-million-dollar overhaul can be negated during start-up due to improper boiler water chemistry.

These **4 half-days Online Virtual instructor-led Training (VILT)** will focus on what needs to be monitored, why, what the limit values are and what the consequences will be from deviations. Recognize early warning signals before failure, spot design flaws and may even propose operational improvements. Keywords are reliability, availability and efficiency.

**Attendees will further improve their practical knowledge on:**

- **Boiler water chemistry guidelines:** These will help in preventing plant damage due to corrosion and deposits, also helps to choose the right materials and against possible design mistakes.
- **Early warning signals for trouble and types of corrosion** Awareness of early warning signals helps to act timely in response to plant damage mechanisms and helps to know what to look for during maintenance and operations.
- **Case studies of failed water treatment** Examples of failed water treatment illustrates the severity of deviations from the guidelines and can act as an example of what needs to be avoided.

The course focuses only on steam/water systems. This applies to systems ranging from 5 bar/150 degrees C to 300 bar 620 degrees C steam boiler systems. The course will also apply to heat exchangers like industrial steam generators/dual phase (water and steam).

This virtual training will provide the latest state of the art on the types of water treatment, what is considered best industry practices. This will be augmented by case studies.

**Advance your knowledge and learn about:**

- Understanding of the relevance of chemical parameters in boiler water.
- Corrosion effects of specific chemical parameters.
- Water chemistry in relation to design and types of boilers.
- Relevance of boiler materials in relation to water chemistry.
- Factors that affect corrosion and describe the methods to reduce or prevent corrosion and deposits.
- Ability to choose the optimum water treatment for a given type of boiler.
- Understanding of consequences of deviations from guidelines.
- Interaction of boiler design on operational practices of water treatment .
- Specific types of boiler corrosion mechanisms.
- Recognition of early warning signals, problem area's in boilers.

### **Case Studies:**

Having the ability to implement directly once you are back at your workplace is crucial for every participant. During the 4 half days online training case studies, interactive discussion with participants and relevant industry experience will be share.

**Case studies: illustrations how small deviations lead to large consequences.**

- Destructive effect of pH-excursions (FAC),
- Chemical operational difficulties by bad design flaws (both FAC and large deposits)
- Effects of bad heat distribution/heat flux on chemical operations (caustic corrosion)
- Bad use of organic boiler water chemicals (acid corrosion)
- Design flaw in a three-pressure stage CCGT
- Participant are encouraged to bring 1 – 2 cases of their own to discuss (Time permitting)

**This program is intended for:**

This comprehensive virtual course will be **valuable to professionals who work with power plant boilers, Ultra Supercritical boilers, HRSGs and other high-temperature boilers that can be found in the power industry, oil & gas plants, refineries, chemical & petrochemical plants, fertilizer & process industries.** Participants attending will need to have a general understanding of chemistry or some actual experience with operating a boiler would be great but is not mandatory. **This virtual course is a must for all chemists and boiler engineers.**

- Power Plant Chemists/Chemical analysts
- Power plant operators/shift personnel
- Boiler Engineers
- Engineers involved in the operation and maintenance of power plants.
- Managers / Maintenance personnel / Technicians
- Other technical individuals (this course is suitable for individuals who do not have a background in chemical engineering).
- Operators and maintenance personnel of other energy intensive industry operating large boiler systems.

# Water Chemistry for Boiler Operators (4 Half Days)

## Online Virtual instructor-led Training

### DAY 1

#### Boiler water chemistry guidelines:

- Relevance of boiler water treatment
- History of guidelines
- Important institutions

#### Theoretical background of the guidelines:

- Technical basis of guidelines
- Oxidelayers
  - thickness
  - morphology
  - solubility
- Deposits
- pH
- Behavior oxygen and salts
- Behavior organics and CO<sub>2</sub>
- Two-phase systems

### DAY 2

#### Boiler types and effect on treatment of water/ steam cycle

##### Boiler types:

- Water tube boilers
  - Drum
  - circulation
  - Once through
  - HRSG
  - Multiple pressure boilers
  - Types of tubing
  - Applications
  - Flame tube boilers
  - Applications
- Pressure levels
- Other relevant boiler aspects

##### Choice of materials for the water/steam system:

- Interaction materials and process-media
- Choices in the design phase versus operational phase
- Mixed metallurgy
- All ferrous systems

### DAY 3

#### Boiler water treatment options (practices):

- Types of water treatment:
  - All Volatile Treatments
    - Ammonia (low or high)
    - Ammonia/oxygen
  - Solid alkalisation treatment
    - caustic/ammonia
    - phosphate/ammonia
  - Organic treatment
    - Organic amines
    - Film forming amines
- International operational experiences

#### Monitoring of the water/steam cycle:

- What needs to be monitored?
- Parameters, working principles and background.
- Which values at which points in the cycle?
- Operating support systems

### DAY 4

#### Early warning signals for trouble and types of corrosion:

- Condensate/Feedwater system
- Evaporator
- Turbine
- Large vessels
- Monitoring rack
- Two phase systems
- Possible effects of load changes on operational chemistry

#### Case studies of failed water treatment (Root Cause failure):

- boiler water treatment: theory and practice
- typical normal operational values
- **5 case studies: illustrations how small deviations lead to large consequences.**
  - pH deviation in a large coal fired plant
  - Bad chemistry in a dual pressure CCGT
  - Design flaw in a CCGT.
  - Design flaw in a dual pressure CCGT
  - Design flaw in a triple pressure CCGT

Possibility for participants to bring 1-2 cases (Time permitting)

# Water Chemistry for Boiler Operators

(4 Half - Days) Virtual instructor-led Training

## Registration Form

Water Chemistry for Boiler Operators	Per Participant	<b>PROGRAM DETAILS</b> ONLINE Virtual instructor-led Training Date: 28 <sup>th</sup> – 31 <sup>st</sup> March 2022 Time: 12:30 – 17:00 (GMT+8)
Full 4 Half Days	USD 1999 ( )	<b>STEPS TO REGISTER:</b> Simply fill up the registration form and email it to: Email to : <a href="mailto:registration@petro1.com.my">registration@petro1.com.my</a> Call us : +603 7727 3952 Mobile /Whatsapp: +6012 568 4696 (Harn)
<ul style="list-style-type: none"><li>The above investment fee is inclusive of e-course material.</li><li>This course is limited to 15 attendees to ensure that the course can remain interactive.</li><li>Please note the Online Virtual Instructor Led Training (VILT) time zone will be as "Malaysia / Singapore" time zone (GMT+8).</li></ul>		
If you or your company is facing travel restrictions, we may be able to arrange the training at your preferred location for remote participation or conduct the training in-house with minimum 10 pax. Please contact <a href="mailto:ihtraining@petro1.com.my">ihtraining@petro1.com.my</a> to discuss this possibility.		

### Delegates Details

1. Name: \_\_\_\_\_ Mr  Mrs  Ms  Dr

Job Title: \_\_\_\_\_

Email : \_\_\_\_\_

Contact No: \_\_\_\_\_

Department: \_\_\_\_\_

2.Name: \_\_\_\_\_ Mr  Mrs  Ms  Dr

Job Title: \_\_\_\_\_

Email : \_\_\_\_\_

Contact No: \_\_\_\_\_

Department: \_\_\_\_\_

3.Name: \_\_\_\_\_ Mr  Mrs  Ms  Dr

Job Title: \_\_\_\_\_

Email : \_\_\_\_\_

Contact No: \_\_\_\_\_

Department: \_\_\_\_\_

Head of Department: \_\_\_\_\_

### Payment Method

By Direct Transfer: Please quote invoice numbers on remittance advice.

ACCOUNT NAME: PETRO1 SDN BHD

BANK : United Overseas Bank (Malaysia) BHD

ACCOUNT NO : 2609008514 (USD)

All bank charges to be borne by payers. Please ensure that PETRO1 SDN BHD received the full invoice amount.

### CREDIT CARD PAYMENT

Credit card payment will include a charge 3.1%.

**Payment Policy:** Upon receipt of a completed registration form, it confirms that the organization is registering for the seat(s) of the participant(s) to attend the conference or training workshop. Payment is required with registration and must be received prior to the event to guarantee the seat. Payment has to be received 7 working days prior to the event date to confirm registration.

### DATA PROTECTION

The information you provide will be safeguarded by Petro1 that may be used to keep you informed of relevant products and services. We take it seriously when it comes to protection of our client data.

### Sales and service Tax (SST):

Apply to Malaysia register company only.

The above investment fee is excluding of SST 6%. The SST charges of 6% will be include during issuance of the invoices.

### Cancellation & Substitutions:

Should you be unable to attend, substitutes are always welcome anytime at no additional cost. Please inform us as early as possible. Payment is non-refundable if cancellation occurs 7 working days prior to event commencement. However, delegates will receive a 100% credit on the amount paid which can be used in another PETRO1 SDN BHD training course for up to one year from the date of issuance. The credit is transferable to other persons in the same company and applicable against any future PETRO1 SDN BHD public course/ Online Live Webinar. If cancellation occurs 7 working days prior to the registration date and there is no substitute, the organizer reserves the right to charge 50% of the total investment from your organization.

In the event that, PETRO1 SDN BHD. postpones or cancels a course, delegate payments at the date of cancellation or postponement will be credited to a future PETRO1 SDN BHD course. This credit will be available for up to one year from the date of issuance, and it is transferable to other persons in the same company and applicable against any future PETRO1 SDN BHD public course.

PETRO1 SDN BHD is not responsible for any loss or damage as a result of a substitution, alteration or cancellation/postponement of an event. PETRO1 SDN BHD shall assume no liability whatsoever in the event this training course is cancelled, rescheduled or postponed due to a fortuitous event, Act of God, war, fire, labor strike, extreme weather or other emergency.

### Program Change policy:

The organizer reserves the right to make any amendments and/or changes to the webinar, Date/ time, facilitator replacements and/or modules if warranted by circumstances beyond its control.

This course information may not be copied, photocopied, reproduced, translated, or converted to any electronic or machine-readable form in whole or in part without prior written approval of PETRO1 SDN BHD.

### Invoice Details

Invoice Attention to: \_\_\_\_\_

Company: \_\_\_\_\_

Industry: \_\_\_\_\_

Address: \_\_\_\_\_

Postcode: \_\_\_\_\_ Country: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email: \_\_\_\_\_

Authorized Signature : \_\_\_\_\_