



Power Plant Water Chemistry Course: Steam Cycle Treatment and Corrosion Control



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Introduction:

Power plant water chemistry, covering steam cycle treatment and corrosion control, is the subject of this 5-day course for plant chemists, chemistry technicians and operations engineers in thermal and combined cycle plants, who produce a Cycle Chemistry Manual and Excursion Response Plan for a case plant. Poor treatment choices, unnoticed contaminant ingress and slow alarm responses cause flow-accelerated corrosion, tube failures and turbine deposits that force unplanned outages. Nominees already sample, analyse or act on chemistry results; teaching is by case study on analyser trends and laboratory data. CoreConcept Training Center delivers this power plant water chemistry course.

Course Objectives:

- Explain water-steam cycle chemistry objectives and how oxide layers, impurity ingress and core parameters govern corrosion and deposit risk
- Select make-up water treatment, feedwater regimes and boiler or HRSG water treatment suited to a unit's metallurgy and design
- Operate condensate polishing, on-line analysers and sample conditioning so that chemistry results are representative and trusted
- Diagnose flow-accelerated corrosion, under-deposit corrosion, pitting and turbine deposits from chemistry and inspection data
- Apply action levels, excursion responses, layup and start-up hold points and chemical cleaning criteria to live unit conditions
- Produce a cycle chemistry manual and excursion response plan with KPIs and audit checks for a case plant

Target Audience:

- Plant chemists responsible for setting cycle chemistry limits and interpreting laboratory and analyser results
 - Chemistry technicians who sample, analyse and calibrate on-line instruments on shift
 - Operations engineers who act on chemistry alarms during start-up, load changes and shutdown
 - Water treatment plant staff who run reverse osmosis, demineralisation and condensate polishing units
 - Inspection and reliability staff who track corrosion and deposit findings during outages
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Course Outline:

Day 1: Water-Steam Cycle Chemistry Foundations and Plant Chemistry Baseline

- Water-Steam Cycle Chemistry Objectives for Drum and Once-Through Units
- Magnetite and Haematite Oxide Layers on Feedwater and Evaporator Surfaces
- Impurity Ingress Routes From Make-Up, Condenser Leaks and Air
- Cation Conductivity, pH, Sodium and Silica as Core Parameters
- Cycle Chemistry Baseline Survey of Sample Points and Logs

Day 2: Make-Up Treatment, Feedwater Regimes and International Cycle Chemistry Guidance

- Reverse Osmosis, Mixed-Bed Demineralisation and EDI Make-Up Trains
- AVTR Reducing Treatment With Oxygen Scavenger Selection Criteria
- AVTO and Oxygenated Treatment for All-Ferrous Feedwater Circuits
- Phosphate, Caustic and All-Volatile Boiler Water Treatment Selection
- International Cycle Chemistry Guidance Documents on Volatile and Phosphate Treatments

Day 3: HRSG Chemistry, Condensate Polishing, Instrumentation and Sampling Practice

- Multi-Pressure HRSG Drum Chemistry Targets and Phosphate Hideout Checks
- Condensate Polishing Plant Resin Regeneration and Ammonium Form Operation
- On-Line Analysers for Cation Conductivity, Dissolved Oxygen and Sodium
- Sample Conditioning Panels, Flow Rates and Representative Sampling Rules
- Steam Purity Limits and Turbine Deposit Risk From Carryover

Day 4: Corrosion Mechanisms, Chemistry Excursions, Layup and Chemical Cleaning

- Flow-Accelerated Corrosion Diagnosis Using Iron Transport Monitoring
- Under-Deposit Corrosion, Hydrogen Damage and Pitting Root Cause Review
- Action Levels and Excursion Response for Condenser Tube Leaks
- Wet and Dry Layup Methods With Start-Up Chemistry Hold Points
- Deposit Weight Density Sampling and Chemical Cleaning Decision Criteria

Day 5: Case Study on a Cycle Chemistry Manual and Excursion Response Plan

- Case Plant Chemistry Data Review Against Action Level Tables
 - Condenser Cooling Water Interface and Leak Detection Responsibilities
 - Chemistry KPI Dashboard With Cycle Chemistry Audit Checklist
 - Excursion Response Plan With Escalation Roles and Shutdown Triggers
 - Cycle Chemistry Manual and Excursion Response Plan Completion
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Skills You Will Gain:

- Cycle Chemistry Parameter Interpretation
- Feedwater Regime Selection
- Condensate Polishing Control
- On-Line Analyser Verification
- Flow-Accelerated Corrosion Assessment
- Chemistry Excursion Response
- Layup Chemistry Planning
- Chemistry KPI Auditing

Why Attend This Course:

- Deliver a Cycle Chemistry Manual and Excursion Response Plan to the plant manager and the chemistry and operations leads
- Decide when a chemistry excursion calls for closer monitoring, load reduction or a controlled unit shutdown
- Avoid repeat tube failures, turbine deposits and slow start-ups caused by poor layup and late excursion response
- Share action level tables, sampling checklists and KPI dashboards with laboratory, shift and water treatment teams

Conclusion:

Back at work, the participant hands the Cycle Chemistry Manual and Excursion Response Plan to the plant manager, the chemistry lead and shift operations, who use it to set treatment regimes, action levels and the steps to take when cation conductivity, sodium or dissolved oxygen leave their limits. Laboratory and water treatment teams can apply the sampling checklist and KPI dashboard on every unit. After the first real excursion or unit start-up, the unit should review response times, iron transport results and analyser availability against the plan before approving revisions.

Frequently Asked Questions FAQ:

What do participants need before a power plant water chemistry course?

Participants should already sample, analyse or act on cycle chemistry results in a thermal or combined cycle plant and know basic pH and conductivity measurement. Bringing anonymised analyser trends, laboratory logs or past excursion reports helps them apply the case work to their own units.

How does power plant water chemistry differ from a boiler operation or cooling tower course?

It centres on water-steam cycle chemistry itself: treatment regimes, polishing, sampling, corrosion mechanisms and excursion response. Boiler controls, combined cycle heat rate and cooling tower mechanics belong to neighbouring courses and appear here only where they touch cycle chemistry.

Why does cation conductivity matter in power plant water chemistry?

Cation conductivity removes the effect of ammonia or amine dosing and reveals anionic contaminants such as chloride, sulphate and organic acids. It is the fastest indicator of a condenser leak or resin breakthrough and drives most action level decisions in steam cycle treatment.

What do participants take back from the power plant water chemistry course?

Participants return with a Cycle Chemistry Manual and Excursion Response Plan for a case plant, covering treatment regimes, sample points, action levels, layup and start-up hold points, chemical cleaning criteria, chemistry KPIs and audit checks.