CORE CONCEPT

Seawater Intake and Outfall Systems Course: Screens, Biofouling, Chlorination and Jellyfish Events

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Introduction:

Seawater intake and outfall systems, from screens and biofouling control to chlorination and jellyfish events, is a 1-week course for intake operation, maintenance and process units at desalination and power plants that ends with an Intake Reliability and Marine Event Response Plan for a case organisation. Plants lose output and trip pumps when screens blind, mussels narrow intake pipes, hypochlorite dosing drifts or jellyfish swarms arrive unannounced. Nominees already run or maintain intake structures, and learning is by inspection walkthrough of screens, sumps, dosing skids and event logs. CoreConcept Training Center delivers this seawater intake and outfall systems course.

Course Objectives:

- Compare open, subsurface and beach well intakes by raw water quality, marine life impact, energy demand and vulnerability to marine events
- Inspect and adjust trash racks, travelling band screens and drum screens, wash water and debris handling to keep differential level within limits
- Set continuous and pulse chlorination and electrochlorination regimes that suppress mussel and barnacle settlement while limiting residual oxidant at the outfall
- Operate intake pump stations and sumps to avoid vortices, sediment build-up and cavitation, and plan intake pipe cleaning
- Detect and respond to red tide, jellyfish swarm and debris surge events using early warning indicators, staged load reduction and screen protection steps
- Assemble an Intake Reliability and Marine Event Response Plan with inspection routines, dosing set points, trigger levels and outfall monitoring checks

Target Audience:

- Intake operation units responsible for screens, pumps, sumps and the intake control room
- Maintenance units responsible for travelling screens, drum screens, intake pumps, valves and intake pipelines
- Process and water chemistry units responsible for hypochlorite dosing, residual oxidant and raw seawater quality
- Electrochlorination plant units responsible for electrolyser cells, hydrogen venting and hypochlorite storage
- Environmental monitoring units responsible for impingement records, outfall sampling and marine event reporting

Course Outline:

Day 1: Seawater Intake Types, Raw Water Risks and Site Baseline

- Open Intake Towers, Channels and Velocity Cap Arrangements
- Subsurface Intakes and Beach Wells Compared With Open Intakes
- Impingement and Entrainment Pathways for Fish and Plankton
- Raw Seawater Turbidity, Temperature and Algal Count Trend Review
- Intake Asset Register and Outage History Baseline Sheet

Day 2: Screening Systems, Debris Handling and Fish Return

- Trash Rack Bar Spacing, Raking and Blockage Checks
- Travelling Band Screen Mesh, Speed and Spray Wash Settings
- Drum Screen Seals, Carryover and Differential Level Control
- Debris Trough, Fish Return Channel and Screenings Disposal
- Screen Differential Level Alarms and Automatic Wash Sequences

Day 3: Marine Growth Control, Chlorination and Electrochlorination

- Mussel, Barnacle and Hydroid Settlement Seasons and Fouling Surveys
- Continuous Versus Pulse Chlorination Regimes for Macrofouling Control
- Electrochlorination Cell Operation, Hypochlorite Strength and Acid Cleaning
- Hydrogen Degassing Tank Venting and Hazardous Area Risk Assessment
- Residual Oxidant Measurement From Intake Head to Outfall

Day 4: Intake Pump Stations, Marine Events and Outfall Checks

- Pump Sump Vortex, Submergence and Sediment Accumulation Checks
- Intake Pipeline Pigging, Heat Treatment and Diver Inspection Planning
- Red Tide Early Warning Indicators and Load Reduction Steps
- Jellyfish Swarm Ingress Response With Bubble Curtains and Screen Boosting
- Outfall Plume Temperature and Residual Chlorine Monitoring Points

Day 5: Inspection Walkthrough and the Intake Reliability and Marine Event Response Plan

- Case Plant Screen and Sump Inspection Walkthrough Findings
- Case Plant Chlorination Dosing Log and Fouling Survey Review
- Case Plant Jellyfish Swarm Timeline and Trip Root Cause
- Marine Event Trigger Levels and Response Roles Matrix
- Intake Reliability and Marine Event Response Plan Completion

Skills You Will Gain:

- Intake Option Appraisal
- Screen Condition Inspection
- Macrofouling Survey Interpretation
- Hypochlorite Dosing Control
- Electrolyser Cell Care
- Pump Sump Hydraulic Checks
- Marine Event Early Warning
- Residual Oxidant Monitoring

Why Attend This Course:

- Present an Intake Reliability and Marine Event Response Plan for a case organisation to the plant manager and the operations superintendent
- Decide when to switch from continuous to pulse chlorination, boost screen speed or reduce plant load ahead of a marine event
- Avoid pump trips, blinded screens, choked intake pipes and excess residual chlorine at the outfall during swarm and bloom seasons
- Equip shift and maintenance colleagues with the screen inspection checklist, dosing log template and event trigger matrix built during the course

Conclusion:

Back at work, the participant gives the plant manager and the operations superintendent an Intake Reliability and Marine Event Response Plan covering screen inspection routines, chlorination set points, pump sump checks, event trigger levels and outfall monitoring points. Shift teams use it to act on early warning signs, maintenance units use it to schedule screen and pipeline work, and chemists use it to tune dosing. After the first jellyfish swarm, red tide or fouling season under the plan, the unit should compare trips, screen alarms and residual readings with the plan targets and revise trigger levels.

Frequently Asked Questions FAQ:

What should participants know before a seawater intake and outfall systems course?

Participants should already operate, maintain or monitor seawater intake structures, screens, pumps or dosing systems and be able to read plant logs and alarm lists. Bringing anonymised screen alarm records, dosing logs or event reports helps them apply the walkthrough to their own intake.

How does a seawater intake and outfall systems course differ from a desalination plant operation course?

It stays at the plant boundary with the sea. A desalination plant operation course covers pretreatment, membranes and distillers, while this course covers intake structures, screens, marine growth control, pump sumps and marine events, with outfall checks limited to temperature and residual oxidant monitoring.

Why do seawater intake and outfall systems use pulse chlorination instead of continuous dosing?

Pulse chlorination can disturb mussel and barnacle larvae enough to stop settlement while using less hypochlorite than continuous dosing. It lowers chemical cost and residual oxidant at the outfall, but needs fouling surveys to confirm that the chosen pulse pattern still works each season.

What do participants take back from the seawater intake and outfall systems course?

Participants take back an Intake Reliability and Marine Event Response Plan for a case organisation, with a screen inspection checklist, chlorination dosing log template, pump sump check sheet, marine event trigger matrix and outfall monitoring point list.