



Power System Operation Course: Control Room Security, Emergency States and Restoration Drills

20 – 24 December 2026

Riyadh - KAFD district five-star



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Introduction:

Power system operation in the control room, with its security checks, emergency states and restoration drills, is the subject of this 5-day course for transmission and generation control room operators, shift supervisors and operations planners, who produce a Contingency and Restoration Drill Shift Report. Grid operators lose margin when alarms flood the desk, outage requests collide with N-1 limits and restoration steps sit in binders that nobody has rehearsed. Nominees already stand shifts or prepare operating plans, and teaching is by simulation of unfolding contingencies on a training grid. CoreConcept Training Center delivers this power system operation course.

Course Objectives:

- Assess the system operating state from EMS, SCADA and alarm information at shift start and record it in the operating log
- Validate state estimator and real-time contingency analysis results and act on N-1 violations before they become overloads
- Deploy reserves, voltage controls and congestion relief actions to keep frequency, voltages and line flows within operating limits
- Prepare and execute switching programmes and assess outage requests against real-time security margins
- Direct alert and emergency actions, manual load shedding and black start restoration steps with clear instructions to plants and neighbouring control centres
- Run a simulator drill and write a shift report that records events, decisions and follow-up actions

Target Audience:

- Transmission control room staff who supervise network security, switching and alarms on shift
 - Generation control room staff who follow dispatch instructions, reserve calls and black start orders
 - Shift supervisors who hold operating authority and sign off handovers and emergency decisions
 - Operations planning staff who assess outage requests and prepare next-day security studies
 - Control centre trainers who design simulator scenarios and operator readiness drills
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Course Outline:

Day 1: Control Centre Roles, Operating States and Shift Situational Awareness

- Control Centre Hierarchy of Transmission, Generation and Neighbouring Desks
- Normal, Alert, Emergency and Restorative State Criteria for Operators
- Shift Handover Briefing Checklist and Operating Log Entries
- Three-Level Situational Awareness Model Applied to Grid Desks
- Current-State Review of Desk Procedures, Displays and Alarm Volumes

Day 2: EMS and SCADA Tools for Real-Time Security Assessment

- SCADA Telemetry, Breaker Status and Alarm Priority Handling
- EMS State Estimator Residuals, Bad Data and Observability Checks
- Real-Time Contingency Analysis Screening Against the N-1 Criterion
- Automatic Generation Control Area Error and Regulation Reserve Monitoring
- Network Topology Processor and One-Line Display Navigation Drills

Day 3: Frequency, Voltage, Congestion and Outage Coordination in Daily Operation

- Operating Reserve Deployment After Generator Trips and Infeed Losses
- Voltage Schedules, Reactor Switching and Generator Reactive Instructions
- Thermal Overload Relief by Redispatch, Topology Change and Phase Shifters
- Switching Programme Preparation, Verification and Remote Execution Sequence
- Outage Request Assessment, Approval Window and Recall Conditions

Day 4: Alert and Emergency Operation, Defence Actions and Restoration Execution

- Emergency Operating Procedure Activation and Dispatcher Instruction Authority
- Manual Load Shedding Orders and Automatic Scheme Arming Status
- Black Start Unit Readiness Checks and Cranking Path Energisation
- Island Frequency Holding, Load Pickup Blocks and Resynchronisation Checks
- Three-Part Communication and Instruction Logging With Plants and Neighbours

Day 5: Simulation Drill and Contingency and Restoration Shift Report

- Dispatcher Training Simulator Scenario Briefing and Team Role Allocation
 - Cascading Contingency Drill With N-1 Recovery and Reserve Calls
 - Partial Blackout Restoration Drill From Black Start Sources
 - Human Performance Debrief Using Error Traps and Peer Checks
 - Contingency and Restoration Drill Shift Report Completion
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Skills You Will Gain:

- Operating State Assessment
- State Estimator Validation
- Contingency Screening
- Reserve and Voltage Control
- Switching Programme Execution
- Outage Coordination
- Emergency Instruction Communication
- Restoration Sequencing

Why Attend This Course:

- Deliver a Contingency and Restoration Drill Shift Report to the control centre manager and the operator training lead
- Decide when to declare an alert or emergency state, call reserves or order load shedding without waiting for escalation
- Avoid switching errors, outage approvals that breach N-1 margins and slow restoration caused by unrehearsed procedures
- Share handover checklists, three-part communication rules and drill scenarios with other shift teams

Conclusion:

Back at work, the participant gives the Contingency and Restoration Drill Shift Report to the control centre manager and the operator training lead, who use it to decide which emergency procedures, switching programmes and restoration steps need revision and which scenarios enter the next simulator cycle. Shift teams can adopt the handover checklist and three-part communication rules on live desks. After the first real disturbance or scheduled drill, the unit should compare response times, instruction errors and restoration progress with the report and update the procedures.

Frequently Asked Questions FAQ:

What should participants know before a power system operation course on control room security and emergency states?

Participants should already work shifts in a transmission or generation control room or prepare operating plans, and read one-line diagrams, alarm lists and EMS displays. Bringing anonymised switching programmes, handover logs or emergency procedures helps them apply the drills to their own desk.

How does this power system operation course differ from a power system stability course or a distribution network operation course?

It centres on what operators do on shift: reading EMS tools, handling N-1 violations, switching, outage coordination, emergency instructions and restoration drills. Stability theory, defence scheme design, feeder switching and dispatch optimisation belong to neighbouring courses and appear only where operators act on them.

Why does power system operation rely on simulator drills for emergency states and restoration?

Emergency states and restoration happen rarely, so operators seldom practise them on live networks. Simulator drills let shift teams rehearse instructions, communication and decision timing on an unfolding scenario, exposing procedure gaps and human error traps before a real disturbance tests them.

What do participants take back from the power system operation course?

Participants return with a Contingency and Restoration Drill Shift Report from a simulated event, covering the event timeline, N-1 recovery actions, reserve and load shedding decisions, the restoration sequence, the communication log and follow-up actions for procedures and training.
