



Transmission System Operations Series (52 NERC CE Hours/8 EOP Hours, 16 NERC Standard Hours)

Overview

The program is aimed principally at power system operators in the new ISO and power pools. However, we also expect interest from the new entrants to the power business such as brokers, traders, and independent generators. For this reason a certain amount of necessary standard practice material is included in the program to provide a base on which to build the more advanced techniques.

Program Segments

7501 Review of Fundamentals (4 CE Hours)

Units of measurement; AC generation; power and energy; effects of inductance and capacitance; reactive power; power factor; voltage drop and 3-phase systems.

7502 Power Transmission (4 CE Hours)

Characteristics of overhead lines; characteristics of high voltage cables; effect of line inductance and shunt capacitance; line voltage drop; line charging; Ferranti effect; power angle; substations; bus configurations; transformers and switchgear.

7503 System Voltage Control (4 CE Hours)

Requirement for vars; var generation; system voltage drop; voltage compensation; transformer taps; application of capacitors, reactors, synchronous condensers; static var compensators; S.I.L.; voltage collapse.

7504 System Frequency and Tie-Line Control (4 CE Hours)

Synchronism; balancing power demand and supply; frequency variation; effect of line and/or generation outages; power transfer limitations; turbine governor characteristics; isolated systems; large interconnected systems and automatic generation control.

7505 Power Dispatching (4 CE Hours)

System load flow; load forecast; scheduling daily generation; unit commitment; and stand-by capacity; spinning reserve; the cost factor (economic dispatch); unit merit order or bid price; power interchange; traditional pricing; methods of interchange and effect of variances in plant availability.

7506 System Security (4 CE Hours)

Equipment availability; effect of interruptions or outages; need for planning system configuration; equipment limitations; contingency studies; power flow studies; maintaining reserve capacity; co-ordination of planned outages and control of system switching.

7507 Operating Under Abnormal Conditions (4 CE Hours/4 EOP Hours)

Loss of generation; line interruption; load rejection; overvoltage; concurrent problems; defining operating status: normal, alert, emergency; voltage and frequency control under abnormal operating conditions, overload, instability, loss of synchronism, operator actions; load shedding, sectionalizing.

7508 System Restoration (4 CE Hours/4 EOP Hours)

Bringing reserves into service; start-up and rate of loading limitations on turbine generators; cold load pick-up inrush; switching sequence; control of islands; synchronizing islands to restore system, voltage and frequency control during restoration.

7509 Monitoring and control Communications (4 CE Hours)

Techniques of communication; speed of communication; carrier schemes; SCADA systems; RTU installations; operator interface and application software programs.

7510 Transmission System Protection (4 CE Hours)

Fault characteristics; changing parameters; objectives of protection; grounding practice; types of protection; applications to generators, transformers, bus and lines.

7511 The effect of Deregulation on System Operation (4 CE Hours)

Objectives of deregulation; the power pool; generation bidding and scheduling; calculation of pool price; bilateral agreements; hedging contracts; open access transmission; support services.

7512 Power Dispatch Under Deregulation (4 CE Hours)

Provision of and payment for availability; spinning reserve; system support; reactive power; system imbalance; compensation for transmission constraints and converting commercial transactions into dispatching operations.



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7513 Transmission Control (4 CE Hours)

FERC rules on transmission access; organization and function of ISOs; transmission pricing; contracted power transfer; degree of firmness contracted; parallel transmission paths; software programs; OASIS, and GATT.

Subject of Standard Covered by TSO	Standard Covered	TSO 7514 hours*	TSO 7516 hours*	TSO 7517 hours*	TSO 7518 hours*
Real Power Balancing Control Performance	BAL-001-0	1.0	1.0		
Disturbance Control Performance	BAL-002-0		1.0		
Frequency Response and Bias	BAL-003-0	0.5	0.5		
Time Error Correction	BAL-004-0		0.5		
Automatic Generation Control	BAL-005-0		0.5		
Inadvertent Interchange	BAL-006-0	0.5	0.5		
Urgent Action Standard 1200 — Cyber Security	Strnd 1200				
Sabotage Reporting	CJP-001-0	0.3			
Telecommunications	COM-001-0				0.3
Communications and Coordination	COM-002-0				0.3
Emergency Operations Planning	EOP-001-0				
Capacity and Energy Emergencies	EOP-002-0			0.3	
Load Shedding Plans	EOP-003-0			0.3	
Disturbance Reporting	EOP-004-0			0.3	
System Restoration Plans	EOP-005-0	0.3		0.3	0.5
Reliability Coordination — System Restoration	EOP-006-0	0.3		0.3	
Establish, Maintain, and Document a Regional Blackstart Capability Plan (Planning Standard)	EOP-007-0	0.3		0.3	
Plans for Loss of Control Center Functionality	EOP-008-0			0.3	
Interchange Transaction Tagging	INT-001-0	0.3			0.5
Interchange Transaction Tag Communication and Assessment	INT-002-0	0.3			1.0
Interchange Transaction Implementation	INT-003-0				0.5
Interchange Transaction Modifications	INT-004-0				0.5
Reliability Coordination — Responsibilities and Authorities	IRO-001-0	0.3			
Reliability Coordination — Facilities	IRO-002-0				
Reliability Coordination — Wide Area View	IRO-003-0				
Reliability Coordination — Operations Planning	IRO-004-0				0.5
Reliability Coordination — Current Day Operations	IRO-005-0				
Reliability Coordination — Transmission Loading Relief	IRO-006-1	0.3			
Procedures, Processes or Plans to Support Coordination Between Reliability Coordinators [effective date pending]	IRO-014-1				
Notifications, Information, Exchange Between Reliability Coordinators [effective date pending]	IRO-015-1				
Coordination of Real-time Activities Between Reliability Coordinators [effective date pending]	IRO-016-1				
Operating Personnel Responsibility and Authority	PER-001-0				
Operating Personnel Training	PER-002-0				
Operating Personnel Credentials	PER-003-0				
Reliability Coordination — Staffing	PER-004-0				
System Protection Coordination	PRC-001-0				
Reliability Responsibilities and Authorities	TOP-001-0				
Normal Operations Planning	TOP-002-0				
Planned Outage Coordination	TOP-003-0			0.3	
Transmission Operations	TOP-004-0			0.3	
Operational Reliability Information	TOP-005-0			0.3	
Monitoring System Conditions	TOP-006-0			0.5	
Reporting SOI and IROL Violations	TOP-007-0			0.3	
Response to Transmission Limit Violations	TOP-008-0			0.3	
Voltage and Reactive Control	VAR-001-0			0.5	
TOTAL STANDARDS TIME PER TSO MODULE		4	4	4	4

*LK-Intl_001_Trans_7514 > LK-Intl_001_Trans_7516 > LK-Intl_001_Trans_7517 > LK-Intl_001_Trans_7518