**Nodal Protocol to Nodal Operating Guides**

**Cross Reference**

**Introduction**

Because the Nodal Protocol implementation plan,21.12 Process for Transition to Nodal Market Protocol Sections, calls for effectuating Nodal Protocol sections in stages, and the fact that the Nodal Operating Guides sections do not directly correspond to the Nodal Protocol sections, some overlapping of Guides versus Protocol requirements might occur if entire sections of the Nodal Operating Guides were made effective in support of a specific Nodal Protocol section. Conflicting requirements may be avoided by only implementing the specific Nodal Guides language necessary to support a Nodal Protocol section without effectuating the entire Nodal Guides section, until such time as the effective Nodal Protocol sections support doing so.

The Nodal Protocols reference the Nodal Operating Guides for additional information and/or clarification 73 times. All but a couple of these references are of a non-specific nature in terms of where, in the Nodal Operating Guides, the information can be found. This fact leads the reader to search for supporting information on their own. What the reader finds in the Nodal Operating Guides, may or may not be the information the Protocol reference intended. Until such time as the Nodal Protocols make specific references, including section and subsection address, the actual location of these references is subject to interpretation.

The Nodal Operating Guides Review and Revision Task Force (NOGRRTF) attempted to locate the appropriate verbiage in the Nodal Operating Guides to support the implementation plan. The following cross reference is the result of this effort. The Nodal Protocol language below is presented in black font with the apparent subject of the reference underlined and the reference highlighted in yellow. The proposed supporting Nodal Operating Guides language is presented in red italicized font. The NOGRRTF makes no claim that the supporting Nodal Operating Guide language identified here is the only or complete language inferred by the Nodal Protocols.

**Nodal Protocol to Nodal Operating Guides Cross Reference:**

**SECTION 1: OVERVIEW**

1.2 Functions of ERCOT

(2) ERCOT is the Control Area Operator for the ERCOT interconnection and performs all Control Area functions as defined in the Operating Guides and the North American Electric Reliability Corporation (NERC) policies.

*2.1 Operational Duties*

*The duties of ERCOT are described in relevant sections of the ERCOT Protocols and North American Electric Reliability Corporation (NERC) Reliability Standards. These Operating Guides assume that all actions taken will be on components of, or related to, the ERCOT System unless otherwise specified. The primary operational duties of ERCOT are to ensure the reliability of the ERCOT System. In doing this ERCOT shall:*

*(1)Perform operational planning:*

*(a)Perform the Reliability Unit Commitment (RUC) processes in order to commit additional resources as needed to maintain reliability;*

*(b)Perform operational transmission grid reliability studies, including those related to generation and load interconnection responsibilities;*

*(c)Review all Outages of generating units and major transmission lines or components to identify and correct possible failure to meet credible N-1 criteria. This shall include possible failure to meet N-1 criteria not resolved through the Day-Ahead process;*

*(d)Perform load flows and security analyses of Outages submitted by Qualified Scheduling Entities (QSEs) or Transmission Service Providers (TSPs) as a basis for approval or rejection as described in Protocol Section 3.1, Outage Coordination;*

*(e)Withdraw approval of a scheduled Outage if unable to meet the applicable reliability standards after all other reasonable options are exercised as described in Protocol Section 3.1;*

*(f)Serve as the point of contact for initiation of generation interconnection to the transmission grid;*

*(g)Forecast Load and Resources for the next seven days for reliability planning; and*

*(h)Ensure that sufficient Resources in the proper location and required Ancillary Services have been committed for all expected Load on a Day-Ahead and Real-Time basis.*

*(2)Operate energy and Ancillary Service markets:*

*(a)Administer a Congestion Revenue Rights (CRR) market;*

*(b)Administer a Day-Ahead Market (DAM) including both energy and Ancillary Service;*

*(c)Administer the RUC processes;*

*(d)If necessary, administer a Supplemental Ancillary Service Market (SASM); and*

*(e)Administer a Real-Time energy market using Security-Constrained Economic Dispatch (SCED).*

*(3)Supervise the ERCOT System to meet NERC criteria:*

*(a)Monitor and evaluate ERCOT System conditions on a continuous basis;*

*(b)Coordinate with Transmission Operators (TOs), ERCOT System events to maintain or restore reliability;*

*(c)Dispatch generation via the SCED process and deployment of Ancillary Services to control frequency and congestion;*

*(d)Provide access to the ERCOT System on a nondiscriminatory basis;*

*(e)Approve schedules of interchange transactions across the Direct Current Ties (DC Ties); and*

*(f)Direct emergency operations.*

*(4)Collect and Disseminate Information:*

*(a)Collect, process, and disseminate market, operational and settlement information;*

*(b)Provide relevant operational information to Market Participants over the ERCOT Market Information System (MIS);*

*(c)Collect and maintain operational data required by the Public Utility Commission of Texas (PUCT), NERC and Protocols;*

*(d)Receive reports from TOs and QSEs and forward them to the Department of Energy (DOE) and/or NERC as required;*

*(e)Submit reports to DOE and/or NERC as required; and*

*(f)Record and report accumulated time error.*

*2.2 System Monitoring and Control*

*2.2.1 Overview*

*(1)ERCOT will maintain continuous surveillance of the status of operating conditions within ERCOT and act as a central information collection and dissemination point for Market Participants.*

*(2)ERCOT is designated to receive information required to continually monitor the operating conditions of the ERCOT System and to order individual Qualified Scheduling Entities (QSEs) and/or Transmission Operators (TOs) make changes to assure ongoing security and reliability of ERCOT.*

*(3)ERCOT shall maintain, monitor and/or direct the following in accordance with the Protocols. This includes but is not limited to:*

*(a)Resources - Monitor, deploy, commit and gather data for settlement of Resources in order to maintain reliability and accurately settle energy capacity and Ancillary Service markets as described in the following Protocol Sections:*

*(i)Protocol Section 3, Management Activities for the ERCOT System;*

*(ii)Protocol Section 4, Day-Ahead Operations;*

*(iii)Protocol Section 5, Transmission Security Analysis and Reliability Unit Commitment; and*

*(iv)Protocol Section 6, Adjustment Period and Real-Time Operations.*

*(b)ERCOT Transmission Grid:*

*(i)Monitor line loading and power transfers;*

*(ii)Coordinate Planned Outages;*

*(iii)Monitor and detect Forced Outages;*

*(iv)Perform contingency analyses and direct re-dispatch to maintain reliable operations;*

*(v)Monitor and coordinate maintenance and construction schedules;*

*(vi)Monitor and control voltage levels; and*

*(vii)Monitor Reactive Power flows.*

*(c)System Operation:*

*(i)Monitor power flows and interchange with non-ERCOT systems;*

*(ii)Maintain and monitor Ancillary Services Plans and delivery;*

*(iii)Maintain and document compliance with transmission security criteria;*

*(iv)Monitor performance of providers of Ancillary Services;*

*(v)Manage inadvertent energy account balances with non-ERCOT systems;*

*(vi)Direct Time Error correction;*

*(vii)Issue and direct Operating Condition Notices (OCNs), Advisories, Watches, and emergency Notices; and*

*(viii)Direct emergency and short supply operations.*

*(d)Information Management:*

*(i)Monitor and coordinate information for daily planning, hourly reporting and minute-by-minute operation;*

*(ii)Validate the accuracy of the Real-Time data; and*

*(iii)Operate the ERCOT Market Information System (MIS), Energy Management System (EMS) and Market Management System (MMS) to disseminate Real-Time, hourly accounting, and operations plan data between ERCOT and each QSE and TO.*

1.3.1.1 Items Considered Protected Information

(y) Alternative fuel reserve capability and firm gas availability information submitted pursuant to Section 6.5.9.3.1, Operating Condition Notice, Section 6.5.9.3.2, Advisory, and Section 6.5.9.3.3, Watch, and as defined by the Operating Guides; or

*Section 8, Attachment H, Unit Alternative Fuel Capability*

**SECTION 2: DEFINITIONS AND ACRONYMS**

Network Security Analysis

A processor used by ERCOT to monitor Transmission Elements in the ERCOT Transmission Grid for limit violations and to verify Electrical Bus voltage limits to be within a percentage tolerance as outlined in the Operating Guides.

*2.7.4.1 Maintaining System Voltage*

*(4)Except under Force Majeure conditions or ERCOT-permitted operation of the generating unit, if a Generation Resource required to provide VSS fails to maintain transmission system voltage at the point of interconnection with the TSP within 2% of the voltage profile while operating at less than the maximum reactive capability of the generating unit, ERCOT may, at its discretion, report this to the Texas Regional Entity.*

*4.3 Operation to Maintain Transmission System Security*

*(1)ERCOT Operators are responsible for operating the ERCOT System within “First Contingency” (N-1) transfer limits so that there is no overload of any significant Transmission Element whose loss could jeopardize the reliability of the ERCOT System. Whenever the ERCOT System is not engaged in emergency operation, it will be operated in such a manner that the occurrence of a Credible Single Contingency will not cause any of the following:*

*(a)Uncontrolled breakup of the transmission system;*

*(b)Loading of Transmission Facilities above defined Emergency Ratings which can not be eliminated in time to prevent damage or failure following the loss through execution of specific, predefined operating procedures;*

*(c)Transmission voltage levels outside system design limits which can not be corrected through execution of specific, predefined operating procedures before voltage instability or collapse occurs; or*

*(d)Customer Outages, except for high set interruptible and radially served loads.*

*(2)Significant Transmission Overload – ERCOT can:*

*(a)Order adjustment to unit generation schedules, switching of Transmission Elements or Load interruption to relieve a severely overloaded Transmission Element;*

*(b)Order a Transmission Element whose loss would not have a significant impact on the reliability of transmission system switched out to increase interconnected system transfers.*

*(3)Violation of “First Contingency” (N-1) Criteria – ERCOT can order changes to unit dispatch or commitment to eliminate a “First Contingency” (N-1) criteria violation. Normally these changes should be performed via the market control mechanisms of constraint management as described in the ERCOT Protocols, but ERCOT Operators have the authority to issue Verbal Dispatch Instructions (VDIs) independent of these systems.*

*(4)Violation of Voltage/Reactive Criteria – ERCOT can order changes in unit dispatch if coordinated voltage and Reactive Power criteria that are considered critical to interconnection reliability are violated for the existing or “Contingency” (N-1) conditions.*

*(5)Total or Partial System Blackout – ERCOT shall implement Black Start procedure.*

Revenue Quality Meter

For EPS Meters, a meter that complies with the Protocols and the Settlement Metering Operating Guide. For TSP- or DSP-metered Entities, a meter that complies with Governmental Authority approved meter standards, or the Protocols and the Operating Guides.

No reference found

Recommend NPRR to remove “and the Operating Guides” or clarify that it is the Settlement Metering Operating Guide.

**SECTION 3: MANAGEMENT ACTIVITIES FOR THE ERCOT SYSTEM**

3.1.4.1 Single Point of Contact

(2) The Single Point of Contact must be either a person or a position available seven days per week and 24 hours per day for each Resource Entity and TSP. The Resource Entity shall designate its QSE as its Single Point of Contact. The Single Point of Contact for the TSP must be designated under the ERCOT Operating Guides.

*3.9 Transmission Operators*

*(2)TOs must meet all requirements identified in the Protocols for TOs in addition to those requirements stated below for all Transmission Facilities represented:*

*(a)Monitor system conditions and notify ERCOT when Transmission Facility Elements reach maximum safe operating limits as soon as practicable;*

*(b)Notify ERCOT of any changes in its Transmission Facility status within ten seconds of the change of status as specified in Protocol Section*

*3.10.7.4, Telemetry Criteria;*

*(c)Operate and manage Transmission Facilities between energy sources and the point of delivery;*

*(d)Coordinate emergency communications between a represented TSP system and ERCOT;*

*(e)Monitor the loading of the transmission system(s);*

*(f)Notify ERCOT of all changes to the status of all Transmission Elements and Transmission Facilities;*

*(g)Act as single point of contact for Transmission Outages;*

*(h)Maintain continuous communication (24x7 basis) with ERCOT;*

*(i)Ensure Dispatch Instructions, received for their system or on behalf of represented TSPs or Distribution Service Providers (DSPs), are carried out as issued;*

*(j)Maintain operational metering; and*

*(k)Implement Black Start.*

3.7 Resource Parameters

(6) Seasons for seasonal parameters are defined in the Operating Guides.

3.3.1 Unit Capability Requirements

(4)In the context of generation testing requirements; seasons shall be defined as follows:

(a)Summer (May 15 – September 15)

(b)Fall (September 16 – November 30)

(c)Winter (December 1 – February 28)

(d)Spring (March 1 – May 14)

3.7.1.1 Generation Resource Parameters

(2)(b) Conversion constants to be used to convert from gross MW to net MW or net MW to gross MW in accordance with ERCOT Operating Guides, if applicable;

*Section , Attachment D SEASONAL UNIT NET REAL POWER CAPABILITY VERIFICATION*

*GENERAL INFORMATION*

*Unit Code (16 character): Location (County):*

*Unit Name: Date of test:*

*Generator’s QSE: Resource Entity:*

*TEST RESULTS*

*StartTime:*

*Start MW (Gross)\*:*

*Start MW (Net)\*\*:*

*MW 10 Minutes after Start Time (Gross)\*:*

*MW 10 Minutes after Start Time (Net)\*\*:*

*Time to Reach Maximum Generation:*

*Temperature at Plant (°F):*

*MWat Maximum Generation (Gross)\*:*

*MW at Maximum Generation (Net)\*\*:*

*MWH Net during the First Full Clock Hour after Maximum Generation is reached:*

*LimitingFactors:*

*\* Value measured at generator terminals*

*\*\* Value measured at the point of interconnection*

3.10.7.1.1 Transmission Lines

(2) For each of its transmission lines operated as part of the ERCOT Transmission Grid, each TSP shall provide ERCOT with the following information consistent with the ratings methodology prescribed in the ERCOT Operating Guides:

*3.9.4 Responsibility for Equipment Ratings*

*(1)TSPs are responsible for determining the rating of their facilities. Technical limits established for the operation of Transmission Elements and associated equipment shall be applied consistently in engineering and planning studies, Real-Time security analyses, and operator actions.*

*(2)TSPs shall provide ERCOT with three nominal Transmission Facility Ratings:*

*(a)“Continuous Rating”: Represents the continuous MVA rating of a Transmission Facility, including substation terminal equipment in series with a conductor or transformer, at the applicable ambient temperature. The Transmission Facility can operate at this rating indefinitely without damage, or violation of National Electrical Safety Code (NESC) clearances.*

*(b)“Emergency Rating”: Represents the two-hour MVA rating of a Transmission Facility, including substation terminal equipment in series with a conductor or transformer, at the applicable ambient temperature. The Transmission Facility can operate at this rating for two hours without violation of NESC clearances or equipment failure.*

*(c)“15-Minute Rating”: Represents the 15 minute MVA rating of a Transmission Facility, including substation terminal equipment in series with a conductor or transformer, at the applicable ambient temperature and with a step increase from a prior loading of 90% of the Continuous Rating. The Transmission Facility can operate at this rating for 15 minutes, assuming its pre-contingency loading was 90% of the Continuous Rating limit at the applicable ambient temperature, without violation of NESC clearances or equipment failure. This rating takes advantage of the time delay associated with heating of a conductor or transformer following a sudden increase in current.*

3.10.7.1.1 Transmission Lines

(5) The Network Operations Model must use rating categories for Transmission Elements as defined in the ERCOT Operating Guides.

*3.9.4 Responsibility for Equipment Ratings*

*(1)TSPs are responsible for determining the rating of their facilities. Technical limits established for the operation of Transmission Elements and associated equipment shall be applied consistently in engineering and planning studies, Real-Time security analyses, and operator actions.*

*(2)TSPs shall provide ERCOT with three nominal Transmission Facility Ratings:*

*(a)“Continuous Rating”: Represents the continuous MVA rating of a Transmission Facility, including substation terminal equipment in series with a conductor or transformer, at the applicable ambient temperature. The Transmission Facility can operate at this rating indefinitely without damage, or violation of National Electrical Safety Code (NESC) clearances.*

*(b)“Emergency Rating”: Represents the two-hour MVA rating of a Transmission Facility, including substation terminal equipment in series with a conductor or transformer, at the applicable ambient temperature. The Transmission Facility can operate at this rating for two hours without violation of NESC clearances or equipment failure.*

*(c)“15-Minute Rating”: Represents the 15 minute MVA rating of a Transmission Facility, including substation terminal equipment in series with a conductor or transformer, at the applicable ambient temperature and with a step increase from a prior loading of 90% of the Continuous Rating. The Transmission Facility can operate at this rating for 15 minutes, assuming its pre-contingency loading was 90% of the Continuous Rating limit at the applicable ambient temperature, without violation of NESC clearances or equipment failure. This rating takes advantage of the time delay associated with heating of a conductor or transformer following a sudden increase in current.*

3.10.7.1.5 Reactors, Capacitors, and other Reactive Controlled Sources

(3) The ERCOT Operating Guides must include parameters for standard reactor and capacitor switching plans for use in the Network Operations Model. ERCOT shall model the devices under Section 3.10.4, ERCOT Responsibilities, in all applicable ERCOT applications and systems. ERCOT shall provide copies of the switching plan to the Market Participants via the MIS Secure Area. Any change in TSP guidelines or switching plan must be provided to ERCOT before implementation (except for emergency). Any change in guidelines or switching plan must be provided in accordance with the NOMCR process or other ERCOT-prescribed process.

*2.7.4.2 Parameters for Standard Reactor and Capacitor Switching Plan*

*(1)TOs shall provide switching plans for automatically controlled reactors, capacitors, and other reactive controlled sources to ERCOT. For manually switched reactive devices, the TO shall provide its guidelines for the operation of these devices. These plans and guidelines shall be posted on the MIS Secure Area and must be provided in accordance with the Network Operations Model Change Request (NOMCR) or other ERCOT prescribed process. The parameters to be provided in the standard reactor and capacitor switching plan as required by Protocol Section 3.10.7.1.5, Reactors, Capacitors, and other Reactive Controlled Sources are as follows:*

*Device Attributes*

*(a)Transmission Element name per Protocol Section 3.10.7.1, Modeling of Transmission Elements and Parameters;*

*(b)Substation name; and*

*(c)Schedules of device:*

*(i)Time-based;*

*(ii)Voltage-based;*

*(iii)Load-based;*

*(iv)Contingency-based;*

*(v)Normal Operation;*

*(vi)Emergency Operation;*

*(vii)Seasonal; and*

*(viii)Others as required by technology.*

*(2)From a modeling perspective, ERCOT shall work with the Market Participants to ensure that the advanced application tool(s) voltage/reactive control methodology reflects actual field operation to the extent practicable.*

3.10.7.4 Definition of Special Protection Systems and Remedial Action Plans

(2) Proposed new SPSs and RAPs and proposed changes to SPSs and RAPs must be submitted to ERCOT for review and approval by ERCOT and all directly affected TSPs and Resource Entities under the applicable procedures in the Operating Guides. Once a new or changed SPS or RAP is approved by ERCOT and all directly affected TSPs and Resource Entities, the TSP shall submit the approved SPS or RAP to ERCOT using an NOMCR. The NOMCR must include a detailed description of the system conditions required to implement the SPS or RAP. Execution of an SPS or RAP must be included or assumed in the calculation of LMPs as well as the Network Operations Model. ERCOT shall post all SPSs and RAPs under consideration on the MIS Secure Area within five Business Days of receipt by ERCOT.

*4.3.1 Remedial Action Plans (RAP)*

*(1)Generation facilities or constrained Transmission Elements that would otherwise be subject to restrictions can operate to full rating if appropriate Special Protection Systems (SPS) or Remedial Action Plans (RAPs) are in place. See Section 6.2.2, Design and Operating Requirements for ERCOT System Facilities, for SPS requirements. A RAP refers to predetermined operator actions to maintain reliability in a defined adverse operating condition. Normally, it is desirable that a Transmission Service Provider (TSP) constructs Transmission Facilities adequate to eliminate the need for any RAP; however, in some circumstances, such construction may be unachievable in the available time frame.*

*(2)A RAP may be proposed by any ERCOT Market Participant, but must be approved by ERCOT prior to implementation. RAPs must meet the following requirements:*

*(a)Be coordinated and approved with the operators of facilities included in the RAP;*

*(b)Limit use to the time required to construct replacement Transmission Facilities; however, the RAP will remain in effect if replacement Transmission Facilities have been determined by ERCOT to be impractical;*

*(c)Comply with all applicable ERCOT and North American Electric Reliability Corporation (NERC) requirements;*

*(d)Clearly define and document operator actions;*

*(e)Include the option for the transmission operator to override the procedures if the RAP will not improve system reliability;*

*(f)Operators must be trained in RAP implementation; and*

*(g)Be defined in the Network Operations Model and considered in the Security-Constrained Economic Dispatch (SCED) and Reliability Unit Commitment (RUC). RAPs that cannot be modeled using ERCOT’s existing infrastructure shall be refused or a plan developed to work around the infrastructure problem with explicit approval by the Technical Advisory Committee (TAC).*

*6.2.2 Design and Operating Requirements for ERCOT System Facilities*

*(14)The owner(s) of an existing, modified, or proposed SPS shall submit documentation of the SPS to ERCOT for review and compilation into an ERCOT SPS database. The documentation shall detail the design, operation, functional testing, and coordination of the SPS with other protection and control systems.*

*(a)ERCOT shall conduct a review of each proposed SPS and each proposed modification to an existing SPS. Additionally, it shall conduct a review of each existing SPS at least every five years as required by changes in system conditions. Each review shall proceed according to a process and timetable documented in ERCOT Procedures and posted on the ERCOT Market Information System (MIS) Secure Area.*

*(b)For a proposed Type 1 SPS, the review must be completed before the SPS is placed in service, unless ERCOT specifically determines that exemption of the proposed SPS from the review completion requirement is warranted. The timing of placing the SPS into service must be coordinated with and approved by ERCOT. The implementation schedule must be confirmed through submission of a Network Operations Model Change Request (NOMCR) to ERCOT.*

*(c)For a proposed Type 2 SPS, the SPS may be placed into service before completion of the ERCOT review, with advanced prior notice to ERCOT in the form of a NOMCR. The timing of placing the SPS into service must be coordinated with and approved by ERCOT. Existing SPSs that have already undergone at least one review shall remain in service during any subsequent review, and proposed modifications to existing SPSs may be implemented, upon notice to ERCOT, and approval of ERCOT before completion of the required ERCOT review.*

*(d)The process and schedule for placing an SPS into service must be consistent with documented ERCOT Procedures. The schedule must be coordinated among ERCOT and the owners of any facility(ies) controlled by the SPS, and shall provide sufficient time to perform any necessary testing prior to its being placed in service.*

*(e)An ERCOT SPS review shall verify that the SPS complies with the ERCOT Protocols, NERC Reliability Standards and these Operating Guides. The review shall evaluate and document the consequences of failure of a single component of the SPS, which would result in failure of the SPS to operate when required. The review shall also evaluate and document the consequences of misoperation, incorrect operation, or unintended operation of an SPS, when considered by itself, and without any other system contingency. If deficiencies are identified, a plan to correct the deficiencies shall be developed and implemented. The current review results shall be kept on file and supplied to NERC on request within 30 days.*

*(f)As part of the ERCOT review and unless judged to be unnecessary by ERCOT, the appropriate Reliability Operations Subcommittee (ROS) working groups such as the Steady State Working Group (SSWG), the Dynamics Working Group (DWG), and/or the System Protection Working Group (SPWG) shall review the SPS and report any comments, questions, or issues to ERCOT for resolution. ERCOT may work with the owner(s) of facilities controlled by the SPS as necessary to address all issues.*

*(g)ERCOT shall develop a methodology to include the SPS in Security-Constrained Economic Dispatch (SCED), outage coordination, and Reliability Unit Commitment (RUC).*

*(h)ERCOT’s review shall provide an opportunity for and include consideration of comments submitted by Market Participants affected by the SPS.*

3.11.2 Planning Criteria

(2) The technical reliability criteria are established by the ERCOT Operating Guides and the NERC planning criteria. ERCOT and TSPs shall strongly endeavor to meet these criteria, identify current and future violations thereof and initiate solutions necessary to ensure continual compliance, except that solutions requiring Transmission Facility Outages within the 12 months following development of such solution must be excluded from any reported metric on the TSP’s 12-month Outage forecasting performance under Section 3.1.3.1, Transmission Facilities.

*5.1 Planning Criteria*

*5.1.1 Introduction*

*(1)The ERCOT System consists of those generation and Transmission Facilities (60 kV and higher voltages) that are controlled by individual Market Participants (MPs) and that function as part of an integrated and coordinated power supply network. Each reference in this document to MPs includes Generation Resources. Qualified Scheduling Entities (QSEs), Competitive Retailers (CRs), Transmission Service Providers (TSPs), Distribution Service Providers (DSPs) and others that use the ERCOT Transmission Grid.*

*(2)To maintain reliable operation of the ERCOT System, it is necessary that all MPs observe and subscribe to certain minimum planning criteria. The criteria set forth herein, combined with the applicable North American Electric Reliability Corporation (NERC) Reliability Standards constitute the aforementioned minimum planning criteria. Tests outlined herein shall be performed to determine conformance to these minimum criteria; however, ERCOT recognizes that events more severe than those outlined in these criteria could cause grid separation, other tests may also be performed, if necessary, for information purposes.*

*(3)The complexity and uncertainty inherent in the planning and operation of the ERCOT System make exhaustive studies impracticable; therefore, to gain maximum benefit from the limited number of tests performed, the selection of the specific tests and the frequency of their performance will be made solely upon the basis of the expected value of the reliability information obtainable from the test.*

*(4)It is the responsibility of each Transmission Service Provider (TSP) to perform tests appropriate to ensure the reliability of its Transmission Facilities. Further the TSP may recommend additional studies by ERCOT or the Reliability Operations Subcommittee (ROS). Additional tests which may affect multiple TSPs or the ERCOT System as a whole may be studied. Upon consideration of such recommendations, ERCOT and the ROS shall coordinate the performance of such studies, as necessary, to assess the reliability of the planned ERCOT System.*

*(5)ERCOT Regional Planning Groups or ERCOT System Planning shall determine and demonstrate the need for any static and/or dynamic Reactive Power capability in excess of the explicit requirements of the ERCOT Protocols and Operating Guides that is necessary to ensure compliance with the ERCOT Planning Criteria. ERCOT Transmission Planning shall establish specific TSP responsibility for any associated facility additions.*

*(6)ERCOT, in cooperation with the TRE, will review the ERCOT Planning Criteria every three years to ensure it meets the requirements in the NERC Reliability Standards. ERCOT, in cooperation with the TRE, will periodically review the planning criteria, procedures, and practices of individual ERCOT TSPs to ensure consistency with all applicable NERC Reliability Standards and the ERCOT Planning Criteria.*

3.11.4 Transmission Planning Responsibilities

(2) ERCOT and TSP responsibilities for planning of the ERCOT Transmission Grid are

those described in Section 5, Planning, of the Operating Guides.

*Section 5: Planning*

3.14.1 Reliability Must Run

(1) RMR Service is the use by ERCOT, under contracts with Generation Entities, of capacity and energy from Generation Resources that otherwise would not operate and that are necessary to provide voltage support, stability or management of localized transmission constraints under first contingency criteria, as described in the ERCOT Operating Guides, where market solutions do not exist. This includes service provided by RMR Units and Must Run Alternative (MRA) Resources.

*4.3 Operation to Maintain Transmission System Security*

*(1)ERCOT Operators are responsible for operating the ERCOT System within “First Contingency” (N-1) transfer limits so that there is no overload of any significant Transmission Element whose loss could jeopardize the reliability of the ERCOT System. Whenever the ERCOT System is not engaged in emergency operation, it will be operated in such a manner that the occurrence of a Credible Single Contingency will not cause any of the following:*

*(a)Uncontrolled breakup of the transmission system;*

*(b)Loading of Transmission Facilities above defined Emergency Ratings which can not be eliminated in time to prevent damage or failure following the loss through execution of specific, predefined operating procedures;*

*(c)Transmission voltage levels outside system design limits which can not be corrected through execution of specific, predefined operating procedures before voltage instability or collapse occurs; or*

*(d)Customer Outages, except for high set interruptible and radially served loads.*

*(2)Significant Transmission Overload – ERCOT can:*

*(a)Order adjustment to unit generation schedules, switching of Transmission Elements or Load interruption to relieve a severely overloaded Transmission Element;*

*(b)Order a Transmission Element whose loss would not have a significant impact on the reliability of transmission system switched out to increase interconnected system transfers.*

*(3)Violation of “First Contingency” (N-1) Criteria – ERCOT can order changes to unit dispatch or commitment to eliminate a “First Contingency” (N-1) criteria violation. Normally these changes should be performed via the market control mechanisms of constraint management as described in the ERCOT Protocols, but ERCOT Operators have the authority to issue Verbal Dispatch Instructions (VDIs) independent of these systems.*

*(4)Violation of Voltage/Reactive Criteria – ERCOT can order changes in unit dispatch if coordinated voltage and Reactive Power criteria that are considered critical to interconnection reliability are violated for the existing or “Contingency” (N-1) conditions.*

*(5)Total or Partial System Blackout – ERCOT shall implement Black Start procedure.*

3.14.1 Reliability Must Run

(f) A Generation Resource is eligible for RMR status based on criteria established by ERCOT indicating its operation is necessary to support ERCOT System reliability according to the Operating Guides.

2.2.2 Security Criteria

(1)Technical limits established for the operation of transmission equipment shall be applied consistently in planning and engineering studies, Congestion Revenue Rights (CRRs), Day-Ahead studies, Real-Time security analyses, and operator actions.

(2)Unless an Emergency Condition has been declared by ERCOT, the ERCOT System shall be operated in such a manner that the occurrence of a Credible Single Contingency will not cause any of the following conditions:

(a)Uncontrolled breakup of the transmission system;

(b)Loading of Transmission Facilities above defined Emergency Ratings that can not be eliminated in time to prevent damage or failure following the loss through execution of specific, predefined operating procedures;

(c)Transmission voltage levels outside system design limits that can not be corrected through execution of specific, predefined operating procedures before voltage instability or collapse occurs; or

(d)Customer Outages, except for high set interruptible and radially served loads.

3.14.2 Black Start

(1) Each Generation Resource providing Black Start Service must meet the requirements specified in North American Electric Reliability Corporation (NERC) policy and the Operating Guides.

4.6.4 Responsibilities

(3)QSEs’, Resource Entities’, and Market Participants’ responsibilities are as follows:

(a)Shall use the ERCOT and local TO Black Start plan;

(b)Verify that associated personnel are proficient in its implementation and use; and

(c)In the event of an ERCOT System collapse, the QSEs, Resource Entities, and Market Participants will:

(i)Take immediate steps to initiate the local Black Start plan;

(ii)Supply ERCOT and/or the local TO with information on the status of generation, fuel, transmission, and communication facilities;

(iii)Follow the direction of the local TO or ERCOT in picking up local Load and starting next units; and

(iv)Provide available assistance as directed by ERCOT or the local TO.

(4)Section 8, Attachment A, Detailed Black Start Information, provides a detailed and specific Black Start information guide. Interested parties should use this information for technical reference material, Black Start testing, development of Black Start plans, and training of personnel.

Section 8, Attachment A, Detailed Black Start Information

3.14.2 Black Start

(7) ERCOT shall periodically determine and review the location and number of Black Start Resources required, as well as any special transmission or voice communication needs required. ERCOT and providers of this service shall meet the requirements as specified in the ERCOT Operating Guides and in NERC policy.

4.6.4 Responsibilities

(1)ERCOT’s responsibilities are as follows:

(a)Shall maintain a Black Start plan in accordance with NERC Reliability Standards;

(b)Coordinate and approve Planned Outage schedule for contracted Black Start Generation Resources;

(c)Train QSE, TO, Resource Entity, and Market Participant personnel in the implementation and use of the Black Start plan;

(d) Will review the plans and procedures for consistency and conformance with these Operating Guides and ensure that they are updated at least annually;

(e) Will make annual reports during the first quarter to the Reliability and Operations Subcommittee (ROS) of plan review and any testing activities of Black Start Generation Resources;

(f) Shall verify that the number, size, and location of system Black Start Generation Resources are sufficient to meet system restoration plan expectations; and

(g)In the event of an ERCOT System collapse, ERCOT will:

(i)Maintain continuous surveillance of the status of the ERCOT System;

(ii)Act as a central information collection and dissemination point for the ERCOT Region;

(iii)Coordinate reconnection of transmission;

(iv)Direct assistance for QSEs, TOs, Resource Entities, and Market Participants;

(v)Direct the distribution of reserve;

(vi)Coordinate the return of the ERCOT System to AGC.

(2)TOs’ responsibilities are as follows:

(a)Shall maintain a local Black Start plan which coordinates with the ERCOT Black Start Plan; and

(b)In event of an ERCOT or wide area blackout:

(i)Shall communicate with local Black Start units and the Black Start unit’s QSE;

(ii)Coordinate switching to next start units and local Load;

(iii)Shall implement its local Black Start plan;

(iv)Shall follow the direction of ERCOT on behalf of represented TSPs and DSPs;

(v)Shall act as the regional ERCOT representative in coordinating interconnection of units; and

(vi)Shall follow the direction of ERCOT for reconnection of islands.

3.15 Voltage Support

(1) ERCOT in coordination with the TSPs shall conduct studies to determine the normally desired predetermined distribution of desired nominal voltage set points across the ERCOT System Voltage Profile for all Electrical Buses used for Voltage Support in the ERCOT System and shall post all Voltage Profiles on the MIS Secure Area. ERCOT may temporarily modify its requirements based on Current System Conditions. ERCOT shall determine the amount of Voltage Support Service needed to provide sufficient reactive capacity in appropriate locations to provide ERCOT System security as specified in the ERCOT Operating Guides.

*2.2.2 Security Criteria*

*(1)Technical limits established for the operation of transmission equipment shall be applied consistently in planning and engineering studies, Congestion Revenue Rights (CRRs), Day-Ahead studies, Real-Time security analyses, and operator actions.*

*(2)Unless an Emergency Condition has been declared by ERCOT, the ERCOT System shall be operated in such a manner that the occurrence of a Credible Single Contingency will not cause any of the following conditions:*

*(a)Uncontrolled breakup of the transmission system;*

*(b)Loading of Transmission Facilities above defined Emergency Ratings that can not be eliminated in time to prevent damage or failure following the loss through execution of specific, predefined operating procedures;*

*(c)Transmission voltage levels outside system design limits that can not be corrected through execution of specific, predefined operating procedures before voltage instability or collapse occurs; or*

*(d)Customer Outages, except for high set interruptible and radially served loads.*

3.15 Voltage Support

(5) Qualified Renewable Generation Resources (as described in Section 14, State of Texas Renewable Energy Credit Trading Program) in operation before February 17, 2004, required to provide VSS and all other Generation Resources required to provide VSS that were in operation prior to September 1, 1999, whose current design does not allow them to meet the URL as stated above, must maintain a URL that is limited to the quantity of Reactive Power that the Generation Resource can produce at its rated capability (MW) as determined using procedures and criteria as described in the ERCOT Operating Guides.

*3.3.2.1 Corrected Unit Reactive Limits (CURL)*

*The reactive capability curve for each unit on the ERCOT System shall be submitted to ERCOT containing the most limiting elements for the leading and lagging reactive output. The limiting factors such as under-excitation limiters, over-excitation limiters, ambient temperature limitations across the MW range of the unit at the unit terminals or any other factor that limits the reactive output of the unit and is verifiable through engineering calculations or testing may be produced on the corrected reactive capability curve. The corrected reactive capability curve establishes the Corrected Unit Reactive Limits (CURL) at the unit terminals that ERCOT Planning and ERCOT Operations will use for their studies. ERCOT Operations, after reviewing the updated curves and checking them for reasonableness, will forward copies to the Steady State Working Group (SSWG) for use in modeling such capability in the ERCOT transmission planning cases. If ERCOT finds the submitted CURL unreasonable, ERCOT will follow Section 3.5, ERCOT Implementation.*

3.15 Voltage Support

(6) New generating units connected before May 17, 2005, whose owners demonstrate to ERCOT’s satisfaction that design and/or equipment procurement decisions were made prior to February 17, 2004, based upon previous standards, whose design does not allow them to meet the URL as stated above, must maintain a URL that is limited to the quantity of Reactive Power that the Generation Resource can produce at its rated capability (MW) as determined using procedures and criteria described in the ERCOT Operating Guides.

*3.3.2.1 Corrected Unit Reactive Limits (CURL)*

*The reactive capability curve for each unit on the ERCOT System shall be submitted to ERCOT containing the most limiting elements for the leading and lagging reactive output. The limiting factors such as under-excitation limiters, over-excitation limiters, ambient temperature limitations across the MW range of the unit at the unit terminals or any other factor that limits the reactive output of the unit and is verifiable through engineering calculations or testing may be produced on the corrected reactive capability curve. The corrected reactive capability curve establishes the Corrected Unit Reactive Limits (CURL) at the unit terminals that ERCOT Planning and ERCOT Operations will use for their studies. ERCOT Operations, after reviewing the updated curves and checking them for reasonableness, will forward copies to the Steady State Working Group (SSWG) for use in modeling such capability in the ERCOT transmission planning cases. If ERCOT finds the submitted CURL unreasonable, ERCOT will follow Section 3.5, ERCOT Implementation.*

3.15.3 QSE Responsibilities Related to Voltage Support

(1) QSE Generation Resources required to provide VSS shall have and maintain Reactive Power capability at least equal to the Reactive Power capability requirements specified in these Protocols and the ERCOT Operating Guides.

*2.7.4 Reactive Considerations for Generation Resources*

*2.7.4.1 Maintaining System Voltage*

*(1)ERCOT will maintain a performance log of QSEs acknowledgements of Dispatch Instructions concerning scheduled voltage or scheduled Reactive output requests. QSEs responding in less than two minutes from the time of issuance of such requests shall be deemed satisfactory.*

*(2)ERCOT shall monitor the Automatic Voltage Regulator (AVR), as required in Protocol Section 6.5.5.1, Changes in Resource Status, to assure that it is on and operating automatically at least 98% of the time in which the QSE is providing the Reactive Power supply from Generation Resources required to provide Voltage Support Service (VSS). The percentage is calculated as: Time (AVR is on while providing Service) / (Total Time Providing Services) (100%).*

*(3)Except under Force Majeure conditions or ERCOT-permitted operation of the generating unit, failure of a Generation Resource required to provide VSS to provide either leading or lagging reactive up to the required capability of the unit upon request from a TO or ERCOT may, at the discretion of ERCOT, be reported to the Texas Regional Entity.*

*(4)Except under Force Majeure conditions or ERCOT-permitted operation of the generating unit, if a Generation Resource required to provide VSS fails to maintain transmission system voltage at the point of interconnection with the TSP within 2% of the voltage profile while operating at less than the maximum reactive capability of the generating unit, ERCOT may, at its discretion, report this to the Texas Regional Entity.*

*(5)The Texas Regional Entity will investigate claims of alleged non-compliance and Force Majeure conditions, and address confirmed non-compliance situations. The Texas Regional Entity will advise the Generation Resource, its QSE, ERCOT, and the TSP planning and operating staffs of the results of such investigations.*

3.15.3 QSE Responsibilities Related to Voltage Support

(2) QSE Generation Resources providing VSS shall be compliant with the ERCOT Operating Guides for response to transient voltage disturbance.

*2.2.3 Response to Transient Voltage Disturbance*

*QSE generators should be designed in accordance with Section 6.2, System Protective Relaying, in order to properly respond to transient voltage disturbances.*

*6.2.5.1.6 Analysis of System Performance and Associated Protection Systems*

*(1)Relay operation and settings shall be reviewed periodically and whenever significant changes in generating sources, transmission facilities, or operating conditions are anticipated.*

*(2)Naturally occurring faults and other system disturbances should be analyzed as a source of information as to the health of relay schemes in the facility owner’s system and the ERCOT System. Sources of information usually available are:*

*(a)Short circuit study for the exact conditions of the fault;*

*(b)Fault recorder traces;*

*(c)Sequence of events data recording the opening and closing of contacts in the protective relay scheme and associated communication equipment;*

*(d)Fault locator data;*

*(e)SCADA logger output of breaker operation and alarms;*

*(f)Interviews with operating personnel and/or other witnesses;*

*(g)Field report of relay flags and breaker counter changes;*

*(h)Field report of the fault location, if found;*

*(i)Records of relay setting, relay testing, trip check and energize procedures as carried out, in-service measurements, relay wiring diagrams and schematics, manufacturers' information;*

*(j)Other utility personnel and System Protection Working Group (SPWG) members; and*

*(k)Manufacturers' application and design engineers.*

*(3)Steps that may be followed in analyzing a disturbance include:*

*(a)Gather data;*

*(b)Create a time line consisting of events and periods between events;*

*(c)Compare actual and calculated values of current and voltage during the periods between events;*

*(d)Compare actual and expected breaker operations and flags;*

*(e)Choose the least complicated explanation for contradictory information and to fill in missing information;*

*(f)Gather additional information as indicated to prove or disprove explanations;*

*(g)Iterate;*

*(h)Document by issuing a report of all findings, changes, and recommendations; and*

*(i)After a reasonable time, check back to see if the recommendations have been carried out.*

3.16 Standards for Determining Ancillary Service Quantities

(1) ERCOT shall comply with the requirements for determining Ancillary Service quantities as specified in these Protocols and the ERCOT Operating Guides.

*2.3.1 Responsive Reserve (RRS)*

*2.3.1.1 Obligation*

*ERCOT operating reserve requirements are more restrictive than North American Electric Corporation (NERC) Standards. The ERCOT Responsive Reserve obligation is a minimum of 2300 MW.*

3.16 Standards for Determining Ancillary Service Quantities

(4) If ERCOT determines a need for additional Ancillary Service Resources under these Protocols or the ERCOT Operating Guides, after an Ancillary Service Plan for a specified day has been posted, ERCOT shall inform the market by posting notice on the MIS Secure Area, of ERCOT’s intent to procure additional Ancillary Service Resources under Section 6.4.8.2, Supplemental Ancillary Service Market. ERCOT shall post the reliability reason for the increase in service requirements.

No reference found

Recommend NPRR to remove “or the ERCOT Operating Guides”

3.17.2 Responsive Reserve Service

(2) RRS may be provided through one or more of the following means:

(a) By using frequency-dependent response from On-Line Resources as prescribed in the Operating Guides to help restore the frequency within the first few seconds of an event that causes a significant frequency deviation in the ERCOT System; and

2.3.1.2 Additional Operational Details for Responsive Reserve Providers

(1)ERCOT shall specify the minimum amount of RRS provided by Generation Resources. QSE’s Generation Resources providing RRS must be On-line and capable of ramping to the awarded output level within ten minutes of the notice to deploy energy, must be immediately responsive to system frequency, and must be able to maintain the scheduled level for the period of service commitment.

(2)RRS provided by a QSE shall meet the requirements as defined in item (5), Protocol Section 3.18, Resource Limits in Providing Ancillary Service.

(3)Load Resources providing RRS must be controlled by under-frequency relays for automatic interruption. For eligibility to participate as a RRS provider, reference Protocol Section 8.1.2.2.3, Responsive Reserve Service. Load Resources shall also complete the following requirements:

(a)The under-frequency relay must have a delay of no more than 20 cycles (or 0.33 seconds for relays that do not count cycles). Total time from the time frequency first decays to a value low enough to initiate action of the under frequency relay(s) to the time Load is interrupted should be no more than 30 cycles, including all relay and breaker operating times;

(b)The initiation setting of the under-frequency relay shall not be any lower than 59.7 Hz; and

(c)Load Resource must be able to remain interrupted during actual event until replaced by other net dependable capability. In no case may interrupted Load be restored to service without the approval of the ERCOT Operator.

(4)To become and remain fully qualified as a provider of RRS, the Load shall complete the requirements above and the following:

(a)Pass simulated or actual testing according to ERCOT Procedure; and,

(b)Perform verification testing as described in Section 8, Attachment G, Load Resource Tests.

3.17.2 Responsive Reserve Service

(4)(e) Hydro Responsive Reserves as defined in the Operating Guides; and

*2.3.1.2 Additional Operational Details for Responsive Reserve Providers*

*(1)ERCOT shall specify the minimum amount of RRS provided by Generation Resources. QSE’s Generation Resources providing RRS must be On-line and capable of ramping to the awarded output level within ten minutes of the notice to deploy energy, must be immediately responsive to system frequency, and must be able to maintain the scheduled level for the period of service commitment.*

*(2)RRS provided by a QSE shall meet the requirements as defined in item (5), Protocol Section 3.18, Resource Limits in Providing Ancillary Service.*

*(3)Load Resources providing RRS must be controlled by under-frequency relays for automatic interruption. For eligibility to participate as a RRS provider, reference Protocol Section 8.1.2.2.3, Responsive Reserve Service. Load Resources shall also complete the following requirements:*

*(a)The under-frequency relay must have a delay of no more than 20 cycles (or 0.33 seconds for relays that do not count cycles). Total time from the time frequency first decays to a value low enough to initiate action of the under frequency relay(s) to the time Load is interrupted should be no more than 30 cycles, including all relay and breaker operating times;*

*(b)The initiation setting of the under-frequency relay shall not be any lower than 59.7 Hz; and*

*(c)Load Resource must be able to remain interrupted during actual event until replaced by other net dependable capability. In no case may interrupted Load be restored to service without the approval of the ERCOT Operator.*

*(4)To become and remain fully qualified as a provider of RRS, the Load shall complete the requirements above and the following:*

*(a)Pass simulated or actual testing according to ERCOT Procedure; and,*

*(b)Perform verification testing as described in Section 8, Attachment G, Load Resource Tests.*

3.17.2 Responsive Reserve Service

(4) (f) Direct Current Tie (DC Tie) response that stops frequency decay as defined in the Operating Guides.

*2.3.1.2 Additional Operational Details for Responsive Reserve Providers*

*(6)Hydro Unit(s) – Modes of RRS that will be counted:*

*(a)Synchronous condenser fast response mode - described in item (5), Protocol Section 3.18, Resource Limits in Providing Ancillary Service;*

*(b)Generation MW mode - For any hydro powered resource with a 5% droop setting operating as a generator, the amount of RRS provided may never be more than 20% of the High Sustained Limit (HSL);*

*(c)Synchronous Condenser on Under Frequency Relays in Megavar Supply Mode - A verbal dispatch from ERCOT is required to operate in this mode. However, during an under-frequency event, Vars are unloaded in no more than 30 seconds. Once unloaded, then Megawatts are delivered. Once deployed these units are frequency responsive;*

*(d)Synchronous Condenser Mode in “Manual” Dispatch Mode - Units will supply Megawatts based on operator action within the 10-minute Protocol requirement for supplying RRS. Once deployed these units are frequency responsive; and*

*(e)A Real-Time signal of the MW capacity of hydro units being operated in any of the synchronous condenser modes is telemetered to ERCOT.*

**Section 5:** **5 Transmission Security Analysis and Reliability Unit Commitment (RUC)**

5.5.1 Security Sequence

(5) ERCOT shall analyze base configuration, select n-1 contingencies and select n-2 contingencies under the Operating Guides.

*2 SYSTEM OPERATIONS AND CONTROL REQUIREMENTS*

*2.1 Operational Duties*

*The duties of ERCOT are described in relevant sections of the ERCOT Protocols and North American Electric Reliability Corporation (NERC) Reliability Standards. These Operating Guides assume that all actions taken will be on components of, or related to, the ERCOT System unless otherwise specified. The primary operational duties of ERCOT are to ensure the reliability of the ERCOT System. In doing this ERCOT shall:*

*(1) Perform operational planning:*

*(a) Perform the Reliability Unit Commitment (RUC) processes in order to commit additional resources as needed to maintain reliability;*

*(b) Perform operational transmission grid reliability studies, including those related to generation and load interconnection responsibilities;*

*(c) Review all Outages of generating units and major transmission lines or components to identify and correct possible failure to meet credible N-1 criteria. This shall include possible failure to meet N-1 criteria not resolved through the Day-Ahead process;*

*(d) Perform load flows and security analyses of Outages submitted by Qualified Scheduling Entities (QSEs) or Transmission Service Providers (TSPs) as a basis for approval or rejection as described in Protocol Section 3.1, Outage Coordination;*

*(e) Withdraw approval of a scheduled Outage if unable to meet the applicable reliability standards after all other reasonable options are exercised as described in Protocol Section 3.1;*

*(f) Serve as the point of contact for initiation of generation interconnection to the transmission grid;*

*(g) Forecast Load and Resources for the next seven days for reliability planning; and*

*(h) Ensure that sufficient Resources in the proper location and required Ancillary Services have been committed for all expected Load on a Day-Ahead and Real-Time basis.*

*(2) Operate energy and Ancillary Service markets:*

*(a) Administer a Congestion Revenue Rights (CRR) market;*

*(b) Administer a Day-Ahead Market (DAM) including both energy and Ancillary Service;*

*(c) Administer the RUC processes;*

*(d) If necessary, administer a Supplemental Ancillary Service Market (SASM); and*

*(e) Administer a Real-Time energy market using Security-Constrained Economic Dispatch (SCED).*

*(3) Supervise the ERCOT System to meet NERC criteria:*

*(a) Monitor and evaluate ERCOT System conditions on a continuous basis;*

*(b) Coordinate with Transmission Operators (TOs), ERCOT System events to maintain or restore reliability;*

*(c) Dispatch generation via the SCED process and deployment of Ancillary Services to control frequency and congestion;*

*(d) Provide access to the ERCOT System on a nondiscriminatory basis;*

*(e) Approve schedules of interchange transactions across the Direct Current Ties (DC Ties); and*

*(f) Direct emergency operations.*

*(4) Collect and Disseminate Information:*

*(a) Collect, process, and disseminate market, operational and settlement information;*

*(b) Provide relevant operational information to Market Participants over the ERCOT Market Information System (MIS);*

*(c) Collect and maintain operational data required by the Public Utility Commission of Texas (PUCT), NERC and Protocols;*

*(d) Receive reports from TOs and QSEs and forward them to the Department of Energy (DOE) and/or NERC as required;*

*(e) Submit reports to DOE and/or NERC as required; and*

*(f) Record and report accumulated time error.*

*2.2 System Monitoring and Control*

*2.2.1 Overview*

*(1) ERCOT will maintain continuous surveillance of the status of operating conditions within ERCOT and act as a central information collection and dissemination point for Market Participants.*

*(2) ERCOT is designated to receive information required to continually monitor the operating conditions of the ERCOT System and to order individual Qualified Scheduling Entities (QSEs) and/or Transmission Operators (TOs) make changes to assure ongoing security and reliability of ERCOT.*

*(3) ERCOT shall maintain, monitor and/or direct the following in accordance with the Protocols. This includes but is not limited to:*

*(a) Resources - Monitor, deploy, commit and gather data for settlement of Resources in order to maintain reliability and accurately settle energy capacity and Ancillary Service markets as described in the following Protocol Sections:*

*(i) Protocol Section 3, Management Activities for the ERCOT System;*

*(ii) Protocol Section 4, Day-Ahead Operations;*

*(iii) Protocol Section 5, Transmission Security Analysis and Reliability Unit Commitment; and*

*(iv) Protocol Section 6, Adjustment Period and Real-Time Operations.*

*(b) ERCOT Transmission Grid:*

*(i) Monitor line loading and power transfers;*

*(ii) Coordinate Planned Outages;*

*(iii) Monitor and detect Forced Outages;*

*(iv) Perform contingency analyses and direct re-dispatch to maintain reliable operations;*

*(v) Monitor and coordinate maintenance and construction schedules;*

*(vi) Monitor and control voltage levels; and*

*(vii) Monitor Reactive Power flows.*

*(c) System Operation:*

*(i) Monitor power flows and interchange with non-ERCOT systems;*

*(ii) Maintain and monitor Ancillary Services Plans and delivery;*

*(iii) Maintain and document compliance with transmission security criteria;*

*(iv) Monitor performance of providers of Ancillary Services;*

*(v) Manage inadvertent energy account balances with non-ERCOT systems;*

*(vi) Direct Time Error correction;*

*(vii) Issue and direct Operating Condition Notices (OCNs), Advisories, Watches, and emergency Notices; and*

*(viii) Direct emergency and short supply operations.*

*(d) Information Management:*

*(i) Monitor and coordinate information for daily planning, hourly reporting and minute-by-minute operation;*

*(ii) Validate the accuracy of the Real-Time data; and*

*(iii) Operate the ERCOT Market Information System (MIS), Energy Management System (EMS) and Market Management System (MMS) to disseminate Real-Time, hourly accounting, and operations plan data between ERCOT and each QSE and TO.*

*2.2.2 Security Criteria*

*(1) Technical limits established for the operation of transmission equipment shall be applied consistently in planning and engineering studies, Congestion Revenue Rights (CRRs), Day-Ahead studies, Real-Time security analyses, and operator actions.*

*(2) Unless an Emergency Condition has been declared by ERCOT, the ERCOT System shall be operated in such a manner that the occurrence of a Credible Single Contingency will not cause any of the following conditions:*

*(a) Uncontrolled breakup of the transmission system;*

*(b) Loading of Transmission Facilities above defined Emergency Ratings that can not be eliminated in time to prevent damage or failure following the loss through execution of specific, predefined operating procedures;*

*(c) Transmission voltage levels outside system design limits that can not be corrected through execution of specific, predefined operating procedures before voltage instability or collapse occurs; or*

*(d) Customer Outages, except for high set interruptible and radially served loads.*

The Operating Guides must also specify the criteria by which ERCOT may remove contingencies from the list.

*2.5 Reliability Unit Commitment (RUC)*

*Reliability Unit Commitment (RUC) is a process to ensure that there is adequate Resource capacity and Ancillary Service capacity committed in the proper locations to serve ERCOT forecasted Load.*

*2.5.1 Criteria for Removing Contingencies from the RUC Analyses*

*(a) Contingency is known to produce post-contingency results that are incorrect;*

*(b) Contingency has been producing in Real-Time contingency results which cannot be eliminated or significantly improved by generation adjustment. ERCOT will study this type of contingency to determine if a Remedial Action Plan (RAP)/Mitigation Plan proposal is possible; and*

*(c) Contingency is known to produce a non-convergent contingency result which may cause the RUC processes to fail. ERCOT shall create a generic constraint if non-convergent case represents a voltage collapse.*

ERCOT shall post to the MIS Secure Area the standard contingency list, including identification of changes from previous versions before being used in the Security Sequence. ERCOT shall evaluate the need for Resource-specific deployments during Real-Time operations for management of congestion consistent with the Operating Guides.

*2.1 Operational Duties*

*The duties of ERCOT are described in relevant sections of the ERCOT Protocols and North American Electric Reliability Corporation (NERC) Reliability Standards. These Operating Guides assume that all actions taken will be on components of, or related to, the ERCOT System unless otherwise specified. The primary operational duties of ERCOT are to ensure the reliability of the ERCOT System. In doing this ERCOT shall:*

*(3) Supervise the ERCOT System to meet NERC criteria:*

*(c) Dispatch generation via the SCED process and deployment of Ancillary Services to control frequency and congestion;*

**SECTION 6: ADJUSTMENT PERIOD AND REAL-TIME OPERATIONS**

6.5.1.1 ERCOT Control Area Authority

ERCOT, as Control Area Operator (CAO), is authorized to perform the following actions for the limited purpose of securely operating the ERCOT Transmission Grid under the standards specified in North American Electric Reliability Corporation (NERC) Standards, the Operating Guides and these Protocols, including:

(a) Direct the physical operation of the ERCOT Transmission Grid, including circuit breakers, switches, voltage control equipment, and Load-shedding equipment;

(b) Dispatch Resources that have committed to provide Ancillary Services;

(c) Direct changes in the operation of voltage control equipment;

(d) Direct the implementation of Reliability Must-Run (RMR) Service, Remedial Action Plans (RAPs), Special Protection Systems (SPSs), and transmission switching to prevent the violation of ERCOT Transmission Grid security limits; and

(e) Perform additional actions required to prevent an imminent Emergency Condition or to restore the ERCOT Transmission Grid to a secure state in the event of an ERCOT Transmission Grid Emergency Condition.

*2 SYSTEM OPERATIONS AND CONTROL REQUIREMENTS*

*2.1 Operational Duties*

*The duties of ERCOT are described in relevant sections of the ERCOT Protocols and North American Electric Reliability Corporation (NERC) Reliability Standards. These Operating Guides assume that all actions taken will be on components of, or related to, the ERCOT System unless otherwise specified. The primary operational duties of ERCOT are to ensure the reliability of the ERCOT System. In doing this ERCOT shall:*

*(1) Perform operational planning:*

*(a) Perform the Reliability Unit Commitment (RUC) processes in order to commit additional resources as needed to maintain reliability;*

*(b) Perform operational transmission grid reliability studies, including those related to generation and load interconnection responsibilities;*

*(c) Review all Outages of generating units and major transmission lines or components to identify and correct possible failure to meet credible N-1 criteria. This shall include possible failure to meet N-1 criteria not resolved through the Day-Ahead process;*

*(d) Perform load flows and security analyses of Outages submitted by Qualified Scheduling Entities (QSEs) or Transmission Service Providers (TSPs) as a basis for approval or rejection as described in Protocol Section 3.1, Outage Coordination;*

*(e) Withdraw approval of a scheduled Outage if unable to meet the applicable reliability standards after all other reasonable options are exercised as described in Protocol Section 3.1;*

*(f) Serve as the point of contact for initiation of generation interconnection to the transmission grid;*

*(g) Forecast Load and Resources for the next seven days for reliability planning; and*

*(h) Ensure that sufficient Resources in the proper location and required Ancillary Services have been committed for all expected Load on a Day-Ahead and Real-Time basis.*

*(2) Operate energy and Ancillary Service markets:*

*(a) Administer a Congestion Revenue Rights (CRR) market;*

*(b) Administer a Day-Ahead Market (DAM) including both energy and Ancillary Service;*

*(c) Administer the RUC processes;*

*(d) If necessary, administer a Supplemental Ancillary Service Market (SASM); and*

*(e) Administer a Real-Time energy market using Security-Constrained Economic Dispatch (SCED).*

*(3) Supervise the ERCOT System to meet NERC criteria:*

*(a) Monitor and evaluate ERCOT System conditions on a continuous basis;*

*(b) Coordinate with Transmission Operators (TOs), ERCOT System events to maintain or restore reliability;*

*(c) Dispatch generation via the SCED process and deployment of Ancillary Services to control frequency and congestion;*

*(d) Provide access to the ERCOT System on a nondiscriminatory basis;*

*(e) Approve schedules of interchange transactions across the Direct Current Ties (DC Ties); and*

*(f) Direct emergency operations.*

*(4) Collect and Disseminate Information:*

*(a) Collect, process, and disseminate market, operational and settlement information;*

*(b) Provide relevant operational information to Market Participants over the ERCOT Market Information System (MIS);*

*(c) Collect and maintain operational data required by the Public Utility Commission of Texas (PUCT), NERC and Protocols;*

*(d) Receive reports from TOs and QSEs and forward them to the Department of Energy (DOE) and/or NERC as required;*

*(e) Submit reports to DOE and/or NERC as required; and*

*(f) Record and report accumulated time error.*

*2.2 System Monitoring and Control*

*2.2.1 Overview*

*(1) ERCOT will maintain continuous surveillance of the status of operating conditions within ERCOT and act as a central information collection and dissemination point for Market Participants.*

*(2) ERCOT is designated to receive information required to continually monitor the operating conditions of the ERCOT System and to order individual Qualified Scheduling Entities (QSEs) and/or Transmission Operators (TOs) make changes to assure ongoing security and reliability of ERCOT.*

*(3) ERCOT shall maintain, monitor and/or direct the following in accordance with the Protocols. This includes but is not limited to:*

*(a) Resources - Monitor, deploy, commit and gather data for settlement of Resources in order to maintain reliability and accurately settle energy capacity and Ancillary Service markets as described in the following Protocol Sections:*

*(i) Protocol Section 3, Management Activities for the ERCOT System;*

*(ii) Protocol Section 4, Day-Ahead Operations;*

*(iii) Protocol Section 5, Transmission Security Analysis and Reliability Unit Commitment; and*

*(iv) Protocol Section 6, Adjustment Period and Real-Time Operations.*

*(b) ERCOT Transmission Grid:*

*(i) Monitor line loading and power transfers;*

*(ii) Coordinate Planned Outages;*

*(iii) Monitor and detect Forced Outages;*

*(iv) Perform contingency analyses and direct re-dispatch to maintain reliable operations;*

*(v) Monitor and coordinate maintenance and construction schedules;*

*(vi) Monitor and control voltage levels; and*

*(vii) Monitor Reactive Power flows.*

*(c) System Operation:*

*(i) Monitor power flows and interchange with non-ERCOT systems;*

*(ii) Maintain and monitor Ancillary Services Plans and delivery;*

*(iii) Maintain and document compliance with transmission security criteria;*

*(iv) Monitor performance of providers of Ancillary Services;*

*(v) Manage inadvertent energy account balances with non-ERCOT systems;*

*(vi) Direct Time Error correction;*

*(vii) Issue and direct Operating Condition Notices (OCNs), Advisories, Watches, and emergency Notices; and*

*(viii) Direct emergency and short supply operations.*

*(d) Information Management:*

*(i) Monitor and coordinate information for daily planning, hourly reporting and minute-by-minute operation;*

*(ii) Validate the accuracy of the Real-Time data; and*

*(iii) Operate the ERCOT Market Information System (MIS), Energy Management System (EMS) and Market Management System (MMS) to disseminate Real-Time, hourly accounting, and operations plan data between ERCOT and each QSE and TO.*

*4.3 Operation to Maintain Transmission System Security*

*(2) Significant Transmission Overload – ERCOT can:*

*(a) Order adjustment to unit generation schedules, switching of Transmission Elements or Load interruption to relieve a severely overloaded Transmission Element;*

*(b) Order a Transmission Element whose loss would not have a significant impact on the reliability of transmission system switched out to increase interconnected system transfers.*

*(3) Violation of “First Contingency” (N-1) Criteria – ERCOT can order changes to unit dispatch or commitment to eliminate a “First Contingency” (N-1) criteria violation. Normally these changes should be performed via the market control mechanisms of constraint management as described in the ERCOT Protocols, but ERCOT Operators have the authority to issue Verbal Dispatch Instructions (VDIs) independent of these systems.*

*(4) Violation of Voltage/Reactive Criteria – ERCOT can order changes in unit dispatch if coordinated voltage and Reactive Power criteria that are considered critical to interconnection reliability are violated for the existing or “Contingency” (N-1) conditions.*

*(5) Total or Partial System Blackout – ERCOT shall implement Black Start procedure.*

*4.4 Block Load Transfers between ERCOT and Non-ERCOT System*

*Under Watch, Energy Emergency Alert (EEA) conditions, or for local transmission constraints, it may become necessary to implement Block Load Transfer (BLT) schemes which will transfer Loads normally located in ERCOT to a non-ERCOT System. Similarly, when a non-ERCOT System experiences certain transmission contingency or short supply conditions, ERCOT may be requested to transfer Loads normally located in the non-ERCOT System to ERCOT. All BLTs must comply with Protocol Section 6.5.9.5, Block Load Transfers between ERCOT and Non-ERCOT Control Areas.*

*4.5 Energy Emergency Alert (EEA)*

*4.5.1 General*

*(1) At times it may be necessary to reduce ERCOT System demand because of a temporary decrease in available electricity supply. The reduction in supply could be caused by emergency Outages of generators, transmission equipment, or other critical facilities; by short-term unavailability of fuel or generation; or by requirements or orders of government agencies. To provide an orderly, predetermined procedures for curtailing Demand during such emergencies, ERCOT shall initiate and coordinate the implementation of the Energy Emergency Alert (EEA) in accordance with Protocol Section 6.5.9.4, Energy Emergency Alert .*

*(2) The goal of the EEA is to provide for maximum possible continuity of service while maintaining the integrity of the ERCOT System to reduce the chance of cascading Outages.*

*4.5.2 Operating Procedures*

*(1) The ERCOT System Operators have the authority to make and carry through decisions that are required to operate the ERCOT System during emergency or adverse conditions. ERCOT will have sufficiently detailed operating procedures for emergency or short supply situations and for restoration of service in the event of a partial or complete system shutdown. These procedures will be distributed to the personnel responsible for performing specified tasks to handle emergencies, remedy short supply situations, or restore service. Transmission Service Providers (TSPs) will develop procedures to be filed with ERCOT describing implementation of ERCOT requests in emergency and short supply situations, including interrupting Load, notifying others and restoration of service.*

*(2) ERCOT and each TSP will endeavor to maintain transmission ties intact if at all possible. This will:*

*(a) Permit rendering the maximum assistance to an area experiencing a deficiency in generation;*

*(b) Minimize the possibility of cascading loss to other parts of the system; and*

*(c) Assist in restoring operation to normal.*

*(3) ERCOT's operating procedures will meet the following goals while continuing to respect the confidentiality of market sensitive data. If all goals cannot be respected simultaneously then the priority order listed below shall be respected:*

*(a) Maintain station service for nuclear generating facilities;*

*(b) Securing startup power for power generating plants;*

*(c) Operating generating plants isolated from ERCOT without communication;*

*(d) Restoration of service to critical Loads such as:*

*(i) Military facilities;*

*(ii) Facilities necessary to restore the electric utility system;*

*(iii) Law enforcement organizations and facilities affecting public health; and*

*(iv) Communication facilities*

*(e) Maximum utilization of ERCOT System capability;*

*(f) Utilization of Responsive Reserve (RRS) services and other Ancillary Services to the extent permitted by ERCOT System conditions;*

*(g) Utilization of the market to the fullest extent practicable without jeopardizing the reliability of the ERCOT System; and*

*(h) Restoration of service to all Customers following major system disturbances, giving priority to the larger group of Customers.*

*4.5.3 Implementation*

*(1) ERCOT shall be responsible for monitoring system conditions, initiating the EEA levels below, notifying all Qualified Scheduling Entities (QSEs) and Transmission Operators (TOs), and coordinating the implementation of the EEA conditions while maintaining transmission security limits. QSEs and TOs will notify all the Market Participants they represent of each declared EEA level.*

*(2) During the EEA, ERCOT has the authority to obtain energy from non-ERCOT Control Areas using Direct Current Tie(s) (DC Tie(s)) or by using Block Load Transfers (BLTs) to move load to non-ERCOT Control Areas. ERCOT maintains the authority to curtail energy schedules flowing into or out of the ERCOT System across the DC Ties in accordance with North American Electric Reliability Corporation (NERC) scheduling guidelines.*

*(3) ERCOT, at management’s discretion, may at any time issue an ERCOT-wide appeal through the public news media for voluntary energy conservation.*

*(4) There may be insufficient time to implement all levels in sequence. ERCOT may immediately implement Level 3 of the EEA any time the steady-state system frequency is below 59.8 Hz and shall immediately implement Level 3 any time the steady-state frequency is below 59.5 Hz.*

*(5) Percentages for Level 3 Load shedding will be based on the previous year’s TSP peak Loads, as reported to ERCOT, and will be reviewed by ERCOT and modified annually.*

*(6) The ERCOT System Operator shall declare the EEA levels to be taken by QSEs and TSPs. QSEs and TSPs shall implement actions under that level (and all above if not previously accomplished) and if ordered by the ERCOT Shift Supervisor or his designate, shall report back to the ERCOT System Operator when the requested level has been completed.*

*(7) During EEA Level 3, ERCOT must be capable of shedding sufficient firm Load to arrest frequency decay and to prevent generator tripping. The amount of firm Load to be shed may vary depending on ERCOT grid conditions during the event. Each TSP will be capable of shedding its allocation of firm Load, without delay. The maximum time for the TSP to interrupt firm Load will depend on how much Load is to be shed and whether the Load is to be interrupted by Supervisory Control and Data Acquisition (SCADA) or by the dispatch of personnel to substations. Since the need for firm Load shed is immediate, interruption by SCADA is preferred. The following requirements apply for an ERCOT instruction to shed firm Load:*

*(a) Load interrupted by SCADA will be shed without delay and in a time period not to exceed 30 minutes;*

*(b) Load interrupted by dispatch of personnel to substations to manually shed Load will be implemented within a time period not to exceed one hour;*

*(c) The initial clock on the firm Load shed shall apply only to Load shed amounts up to 1000 MW total. Load shed amount requests exceeding 1000 MW on the initial clock may take longer to implement; and*

*(d) If, after the first Load shed instruction, ERCOT determines that an additional amount of firm Load should be shed, another clock will begin anew. The time frames mentioned above will apply.*

*(8) Each TSP, or its designated agent, will provide ERCOT a status report of Load shed progress within 30 minutes of the time of ERCOT’s instruction or upon ERCOT’s request.*

*4.5.3.1 General Procedures Prior to EEA Operations*

*Prior to declaring EEA Level 1 detailed in Section 4.5.3.3, EEA Levels, ERCOT may perform the following operations consistent with Good Utility Practice:*

*(1) Provide Dispatch Instructions to QSEs for specific Resources to operate at an Emergency Base Point to maximize Resource deployment so as to increase Responsive Reserve levels on other Resources;*

*(2) Commit available Resources as necessary that can respond in the timeframe of the emergency. Such commitments will be settled using the Hourly Reliability Unit Commitment (HRUC) process;*

*(3) Start Reliability Must-Run (RMR) Units available in the time frame of the emergency. RMR Units should be loaded to full capability;*

*(4) Issue Dispatch Instructions to QSEs to suspend any ongoing ERCOT-required generating unit testing or Resource performance testing;*

*(5) Utilize available resources providing Non-Spinning Reserve (Non-Spin) services as required; and*

*(6) ERCOT shall use the Physical Responsive Capability (PRC) to determine the appropriate emergency Notification and EEA levels.*

*4.5.3.2 General Procedures During EEA Operations*

*ERCOT Control Area Authority will re-emphasize the following operational practices during EEA operations to minimize non-performance issues that may result from the pressures of the emergency situation.*

*(1) ERCOT shall suspend Ancillary Service obligations that it deems to be contrary to reliability needs;*

*(2) ERCOT shall notify each QSE and TO via Hotline of declared EEA level;*

*(3) QSEs and TOs shall notify each represented Market Participant of declared EEA level;*

*(4) ERCOT, QSEs and TSPs shall continue to respect confidential market sensitive data;*

*(5) QSEs shall update Resource plans to limit or remove capacity when unexpected start-up delays occur or when ramp limitations are encountered;*

*(6) QSEs shall report when On-Line or available capacity is at risk due to adverse circumstances;*

*(7) QSEs, TSPs, and all other Entities must not suspend efforts toward expeditious compliance with the applicable EEA level declared by ERCOT nor initiate any reversals of required actions without ERCOT authorization; and*

*(8) ERCOT shall define procedures for determining the proper redistribution of reserves during EEA operations.*

*4.5.3.3 EEA Levels*

*(1) EEA Level 1 – Maintain a sum total of 2,300 MW that results from adding the amount of ERCOT Physical Responsive Capability (PRC) MW (Protocol Section 6.5.7.5, Ancillary Services Capacity Monitor) and the amount of RRS MW which is supplied from Load Resources.*

*(a) ERCOT will:*

*(i) Notify the Southwest Power Pool (SPP) Reliability Coordinator;*

*(ii) Initiate manual HRUC Dispatch Instructions to Generation Resources available and off-line that can perform within the expected timeframe of the emergency; and;*

*(iii) Use available DC Tie import capacity that is not already being used and inquire about availability of BLTs.*

*(b) QSEs will notify ERCOT of any Resources uncommitted but available in the timeframe of the emergency.*

*(2) Level 2A – Maintain a sum total of 1,750 MW that results from adding the amount of ERCOT Physical Responsive Capability (PRC) MW (Protocol Section 6.5.7.5) and the amount of RRS MW which is supplied from Load Resources.*

*(a) In addition to measures associate with Level 1, ERCOT:*

*(i) Will instruct TSPs and Distribution Service Providers (DSPs) to reduce Customers’ Load by using distribution voltage reduction measures, if deemed beneficial by the TSP or DSP;*

*(ii) Will instruct QSEs to deploy all Responsive Reserve (RRS) that is supplied from Load Resources (controlled by high-set under-frequency relays) in accordance with the following:*

*(A) Instruct QSEs to deploy half of the Responsive Reserve that is supplied from Load Resources (controlled by high-set under-frequency relays) by instructing the QSE representing the specific Load Resource to interrupt Group 1 Load Resources providing Responsive Reserve. QSEs shall deploy Load Resources according to the group designation and will be given some discretion to deploy additional Load Resources from Group 2 if Load Resource operational considerations require such. ERCOT shall issue notification of the deployment via XML message. ERCOT shall follow this XML notification with a Hotline Verbal Dispatch Instruction (VDI), which shall initiate the ten-minute deployment period;*

*(B) At the discretion of the ERCOT Operator, instruct QSEs to deploy the remaining Responsive Reserve that is supplied from Load Resources (controlled by high-set under-frequency relays) by instructing the QSE representing the specific Load Resource to interrupt Group 2 Load Resources providing Responsive Reserve. ERCOT shall issue notification of the deployment via XML message. ERCOT shall follow this XML notification with a Hotline VDI, which shall initiate the ten-minute deployment period;*

*(C) The ERCOT Operator may deploy both of the groups of Load Resources providing Responsive Reserves at the same time. ERCOT shall issue notification of the deployment via XML message. ERCOT shall follow this XML notification with a Hotline VDI, which shall initiate the ten-minute deployment period; and*

*(D) ERCOT shall post a list of Load Resources on the Market Information System (MIS) Certified Area immediately following the Day-Ahead Reliability Unit Commitment (DRUC) for each QSE with a Load Resource obligation which may be deployed to interrupt under paragraph (A), Group 1 and paragraph (B), Group 2. ERCOT shall develop a process for determining which individual Load Resource to place in Group 1 and which to place in Group 2. ERCOT procedures shall select Group 1 and Group 2 based on a random sampling of individual Load Resources. At ERCOT’s discretion, ERCOT may deploy all Load Resources at any given time during EEA Level 2A; and*

*(iii) With approval of the affected non-ERCOT Control Area, may instruct TSPs or DSPs to implement BLTs, which transfer Load from the ERCOT Control Area to non-ERCOT Control Areas. Use of BLT will be defined in the ERCOT Operating Guides.*

*(b) Confidentiality requirements regarding transmission operations and system capacity information will be lifted, as needed to restore reliability.*

*(3) Level 2B – Maintain System frequency at 60 Hz. Following deployment of the measures associated with EEA Levels 1 and 2A, ERCOT will deploy available contracted EILS Loads, via a single VDI to the all-QSE Hotline; as follows:*

*(a) If less than 500 MW of EILS is available for deployment, ERCOT shall deploy all Emergency Interruptible Load Service (EILS) Loads as a single block.*

*(b) If the amount of EILS available for deployment equals or exceeds 500 MW, ERCOT may deploy EILS Loads as a single block or may deploy EILS Loads sequentially in two groups of approximately equal size as designated by ERCOT. For a sequential group deployment, ERCOT shall instruct QSEs to deploy Group 1 immediately and to deploy Group 2 at a specified time in the future. ERCOT shall develop a random selection methodology for determining which individual EILS Loads to place in Group 1 and which to place in Group 2, and shall describe the methodology in a document posted to the MIS Public Area. Prior to an EILS Contract Period ERCOT shall notify QSEs representing EILS Loads of their EILS Loads’ Group assignments.*

*(c) QSEs shall instruct the EILS Loads to curtail Load consistent with their commitments.*

*(d) EILS may be deployed at any time in a Settlement Interval.*

*(e) Once ERCOT has deployed EILS, EILS Loads shall remain reduced until ERCOT specifically releases the EILS deployment via a VDI to the all-QSE Hotline.*

*(f) Unless scheduled to go Off-Line, due either to an EILS Time Period transition or a previously scheduled period of unavailability, an EILS Load deployed for EILS shall return to its committed operating level as soon as practical following an ERCOT recall. All EILS Load shall return to normal within ten hours of being recalled.*

*(g) Unless a media appeal is already in effect, ERCOT shall issue an appeal through the public news media for voluntary energy conservation.*

*(4) EEA Level 3 - Maintain System frequency at 59.8 Hz or greater*

*(a) In addition to measures associated with EEA Levels 1, 2A, and 2B, ERCOT shall direct all TSPs and DSPs or their agents to shed firm load, in 100 MW blocks, distributed as documented in these ERCOT Operating Guides in order to maintain a steady state system frequency of 59.8 Hz.*

*(b) In addition to measures under EEA Levels 1 2A, and 2B, TSPs and DSPs will keep in mind the need to protect the safety and health of the community and the essential human needs of the citizens. Whenever possible, TSPs and DSPs shall not manually drop load connected to under-frequency relays during the implementation of the EEA;*

*4.5.3.5 EEA Termination*

*(1) ERCOT shall:*

*(a) Continue EEA until sufficient Resources are available to ERCOT to eliminate the shortfall and restore adequate reserves;*

*(b) Restore full reserve requirements (normally 2300 MW);*

*(c) Terminate the levels in reverse order, where practical;*

*(d) Notify each QSE and TO of EEA level termination; and*

*(e) Maintain a stable ERCOT System frequency when restoring Load.*

*(2) QSEs and TOs shall:*

*(a) Implement actions to terminate previous actions as EEA levels are released in accordance with these Operating Guides;*

*(b) Notify represented Market Participants of EEA levels changes;*

*(c) Report back to the ERCOT System Operator when each level is accomplished; and*

*(d) Loads will be restored when specifically authorized by the ERCOT.*

*4.6 Black Start Service*

*(1) This section provides general guidelines to be followed in the event of a partial or complete collapse of the ERCOT System. Timely implementation of a restoration plan compiled according to these Operating Guides should facilitate coordination between ERCOT, Qualified Scheduling Entities (QSEs), Resource Entities, and Transmission Operators (TOs) and ensure restoration of service to the ERCOT System at the earliest possible time. Those QSEs representing contracted Black Start Resources will provide ERCOT with the individual plant start-up procedures for coordination of their activities with those of the appropriate TO.*

*(2) Pre-established plans and procedures cannot foresee all the possible combinations of system problems that may occur after a major failure. It is the responsibility of ERCOT to restore the system to normal, applying the principles, strategies, and priorities outlined in the ERCOT Black Start Plan.*

*4.6.1 Principles*

*(1) In order to minimize the time required, ERCOT will develop the Black Start Plan to utilize the principles, strategies, and priorities outlined in this Guide. The ERCOT Black Start Plan shall be coordinated with local TO Black Start plans, to provide a coordinated Black Start reference.*

*(2) ERCOT shall establish and maintain a system Black Start capability plan that shall be coordinated, as appropriate, with the Black Start capability plans of neighboring regions. Documentation of system Black Start capability plans shall be provided to the North American Electric Reliability Corporation (NERC) on request.*

*(3) Each contracted Black Start Resource and each QSE with contracted Black Start Resource(s) will have readily accessible and sufficiently detailed current operating procedures to assist in an orderly recovery.*

*(4) Mutual assistance and cooperation will be essential during the restoration. Deliberate, careful action by each QSE, TO, and Resource Entity is necessary to minimize the length of time required for restoration and to avoid the reoccurrence of a partial or complete system collapse.*

*(5) Throughout the restoration, recovery will depend on ERCOT receiving an accurate assessment of system conditions and status from each QSE, TO, and Resource Entity throughout the restoration. Adequate and reliable communications must be available within the ERCOT System. During Black Start recovery, communication restrictions are lifted to enable the sharing of that information that pertains to reliability including status information and recovery activities.*

*4.6.2 Strategies*

*In the event of a partial or complete system blackout, immediate steps must be taken to return the interconnected network to normal as quickly as possible. For detailed Black Start information, refer to Section 8, Attachment A, Detailed Black Start Information.*

*(1) Each TO shall immediately initiate its portion of the ERCOT Black Start Plan and attempt to establish contact with ERCOT. If communications with ERCOT are unavailable the TO shall immediately establish communications with its interconnected Black Start Resource(s) and the Black Start Resource’s QSE.*

*(2) Each QSE with representing Black Start Resources should initiate communications with its Black Start Resources and immediately notify ERCOT and the appropriate TO of their condition and status.*

*(3) Available Black Start Resources should immediately start their isolation and startup procedures and attempt to establish communications with the local TO.*

*(4) As generating and transmission capabilities become available, systematic restoration of ERCOT Load with respect to priorities should begin in accordance with the local TO Black Start plans, taking care to balance Load and generating capability while maintaining an acceptable frequency.*

*(5) Appropriate voltage levels and reactive control must be maintained during the restoration. Consideration should be given to connecting islands at locations having communications, frequency control, voltage control, synchronization facilities, and adequate transmission capacity. ERCOT will coordinate the return to full Automatic Generation Control (AGC) in the interconnection.*

*4.6.3 Priorities*

*Priorities for an ERCOT System Black Start recovery are listed below:*

*(1) Secure and/or stabilize generating units where necessary.*

*(2) Prepare transmission corridors as necessary to support restoration.*

*(3) Assess ERCOT System condition, and available communication facilities.*

*(4) Restore and maintain communication facilities to the extent possible.*

*(5) Bring units with contracted Black Start capability On-Line.*

*(6) Provide service to critical facilities:*

*(a) Provide station service for nuclear generating facilities;*

*(b) Provide critical power to as many power plants as possible to prevent equipment damage;*

*(c) Secure or provide startup power for generating plants that do not have Black Start capability; and*

*(d) Supply station service to critical substations where necessary.*

*(7) Connect islands at designated synchronization points taking care to avoid recurrence of a partial or complete system collapse.*

*(8) Restore service to critical Loads such as:*

*(a) Military facilities;*

*(b) Facilities necessary to restore the electric utility system, including fuel sources;*

*(c) Law enforcement organizations and facilities affecting public health; and*

*(d) Public communication facilities.*

*(9) Restore service to the remaining Customers. Attention should be given to restoring feeders with under-frequency relay protection.*

*4.6.4 Responsibilities*

*(1) ERCOT’s responsibilities are as follows:*

*(a) Shall maintain a Black Start plan in accordance with NERC Reliability Standards;*

*(b) Coordinate and approve Planned Outage schedule for contracted Black Start Generation Resources;*

*(c) Train QSE, TO, Resource Entity, and Market Participant personnel in the implementation and use of the Black Start plan;*

*(d) Will review the plans and procedures for consistency and conformance with these Operating Guides and ensure that they are updated at least annually;*

*(e) Will make annual reports during the first quarter to the Reliability and Operations Subcommittee (ROS) of plan review and any testing activities of Black Start Generation Resources;*

*(f) Shall verify that the number, size, and location of system Black Start Generation Resources are sufficient to meet system restoration plan expectations; and*

*(g) In the event of an ERCOT System collapse, ERCOT will:*

*(i) Maintain continuous surveillance of the status of the ERCOT System;*

*(ii) Act as a central information collection and dissemination point for the ERCOT Region;*

*(iii) Coordinate reconnection of transmission;*

*(iv) Direct assistance for QSEs, TOs, Resource Entities, and Market Participants;*

*(v) Direct the distribution of reserve;*

*(vi) Coordinate the return of the ERCOT System to AGC.*

*(2) TOs’ responsibilities are as follows:*

*(a) Shall maintain a local Black Start plan which coordinates with the ERCOT Black Start Plan; and*

*(b) In event of an ERCOT or wide area blackout:*

*(i) Shall communicate with local Black Start units and the Black Start unit’s QSE;*

*(ii) Coordinate switching to next start units and local Load;*

*(iii) Shall implement its local Black Start plan;*

*(iv) Shall follow the direction of ERCOT on behalf of represented TSPs and DSPs;*

*(v) Shall act as the regional ERCOT representative in coordinating interconnection of units; and*

*(vi) Shall follow the direction of ERCOT for reconnection of islands.*

*(3) QSEs’, Resource Entities’, and Market Participants’ responsibilities are as follows:*

*(a) Shall use the ERCOT and local TO Black Start plan;*

*(b) Verify that associated personnel are proficient in its implementation and use; and*

*(c) In the event of an ERCOT System collapse, the QSEs, Resource Entities, and Market Participants will:*

*(i) Take immediate steps to initiate the local Black Start plan;*

*(ii) Supply ERCOT and/or the local TO with information on the status of generation, fuel, transmission, and communication facilities;*

*(iii) Follow the direction of the local TO or ERCOT in picking up local Load and starting next units; and*

*(iv) Provide available assistance as directed by ERCOT or the local TO.*

*(4) Section 8, Attachment A, Detailed Black Start Information, provides a detailed and specific Black Start information guide. Interested parties should use this information for technical reference material, Black Start testing, development of Black Start plans, and training of personnel.*

*Section 8, Attachment A, Detailed Black Start Information*

6.5.1.2 Centralized Dispatch

(3) ERCOT is the regional security coordinator for the ERCOT Region and is responsible for all regional security coordination as defined in the NERC Operating Manual and applicable ERCOT operating manuals or Operating Guides.

*2.2.1 Overview*

*(1) ERCOT will maintain continuous surveillance of the status of operating conditions within ERCOT and act as a central information collection and dissemination point for Market Participants.*

*(2) ERCOT is designated to receive information required to continually monitor the operating conditions of the ERCOT System and to order individual Qualified Scheduling Entities (QSEs) and/or Transmission Operators (TOs) make changes to assure ongoing security and reliability of ERCOT.*

6.5.4 Inadvertent Energy Account

ERCOT shall track any differences between the scheduled net interchange and the actual net interchange at each Direct Current Tie (DC Tie) in an “Inadvertent Energy Account” between ERCOT and each interconnected non-ERCOT Control Area. ERCOT shall coordinate operation of each DC Tie with the DC Tie operator such that the Inadvertent Energy Account is maintained as close to zero as possible. Corrections of inadvertent energy between ERCOT and the other NERC-interconnected non-ERCOT Control Areas must comply with the NERC scheduling protocols and the ERCOT Operating Guides.

*2.8 Operation of Direct Current Ties (DC Ties)*

*(1) ERCOT will confirm interconnected non-ERCOT balancing authority schedule profiles with the Direct Current Tie (DC Tie) operator, who will control the tie to the schedules agreed to by both the designated security coordinator for the interconnected non-ERCOT balancing authority and ERCOT.*

*(2) Any changes in the DC Tie schedules due to a de-rating of the DC Tie or transmission/generation capabilities in the non-ERCOT balancing authority will be communicated to ERCOT by the DC Tie Operator or designated security coordinator for the interconnected non-ERCOT balancing authority.*

*(3) ERCOT will coordinate operation of the DC Tie(s) with the DC Tie operator such that the Inadvertent Energy Account as defined in Protocol Section 6.5.4, Inadvertent Energy Account, is maintained as close to zero as practicable.*

*2.8.1 Inadvertent Interchange Management*

*The only inadvertent energy will be between ERCOT and the Southwest Power Pool (SPP and/or Comision Federal de Electricidad (CFE)). ERCOT shall track any differences between the net of scheduled energy across each DC Tie and the actual metered value at that DC Tie in an Inadvertent Energy Account between ERCOT and each interconnected non-ERCOT balancing authority as per Protocol Section 6.5.4, Inadvertent Energy Account. Accounting / payback will be handled according to North American Electric Reliability Corporation (NERC) Standards. All inadvertent energy is placed in an inadvertent payback account to be paid back in kind.*

6.5.5.2 Operational Data Requirements

(2) (a) Net real power (in MW) as measured by installed power metering or as calculated in accordance with ERCOT Operating Guides based on metered gross real power and conversion constants determined by the Resource Entity and provided to ERCOT as a result of Section 3.7, Resource Parameters.

*Section 8, Attachment D, Seasonal Unit Net Real Power Capability Verification*

6.5.5.2 Operational Data Requirements

(2)(b) Gross real power (in MW) as measured by installed power metering or as calculated in accordance with ERCOT Operating Guides based on metered real power, which may include Supervisory Control and Data Acquisition (SCADA) metering, and conversions constants determined by the Resource Entity and provided to ERCOT as a result of Section 3.7;

*Section 8, Attachment D, Seasonal Unit Net Real Power Capability Verification*

6.5.7.1.10 Network Security Analysis Processor and Security Violation Alarm

(1) Using the input provided by the State Estimator, ERCOT shall use the NSA processor to perform analysis of all contingencies remaining in the active list. For each contingency, ERCOT shall use the NSA processor to monitor the elements for limit violations. ERCOT shall use the NSA processor to verify Electrical Bus voltage limits to be within a percentage tolerance as outlined in the ERCOT Operating Guides. Contingency security violations for transmission lines and transformers occur if:

*2.7.4.1 Maintaining System Voltage*

*(1) ERCOT will maintain a performance log of QSEs acknowledgements of Dispatch Instructions concerning scheduled voltage or scheduled Reactive output requests. QSEs responding in less than two minutes from the time of issuance of such requests shall be deemed satisfactory.*

*(2) ERCOT shall monitor the Automatic Voltage Regulator (AVR), as required in Protocol Section 6.5.5.1, Changes in Resource Status, to assure that it is on and operating automatically at least 98% of the time in which the QSE is providing the Reactive Power supply from Generation Resources required to provide Voltage Support Service (VSS). The percentage is calculated as: Time (AVR is on while providing Service) / (Total Time Providing Services) (100%).*

*(3) Except under Force Majeure conditions or ERCOT-permitted operation of the generating unit, failure of a Generation Resource required to provide VSS to provide either leading or lagging reactive up to the required capability of the unit upon request from a TO or ERCOT may, at the discretion of ERCOT, be reported to the Texas Regional Entity.*

*(4) Except under Force Majeure conditions or ERCOT-permitted operation of the generating unit, if a Generation Resource required to provide VSS fails to maintain transmission system voltage at the point of interconnection with the TSP within 2% of the voltage profile while operating at less than the maximum reactive capability of the generating unit, ERCOT may, at its discretion, report this to the Texas Regional Entity.*

*(5) The Texas Regional Entity will investigate claims of alleged non-compliance and Force Majeure conditions, and address confirmed non-compliance situations. The Texas Regional Entity will advise the Generation Resource, its QSE, ERCOT, and the TSP planning and operating staffs of the results of such investigations.*

6.5.7.6.2.1 Deployment of Regulation Service

(1) ERCOT shall deploy Reg-Up and Reg-Down necessary to maintain ERCOT System frequency to meet NERC Control Area and other Control Area performance criteria as specified in these Protocols and the Operating Guides.

*2.3 Ancillary Services*

*The types of Ancillary Services required by ERCOT are described below:*



*2.2.4 Load Frequency Control*

*(1) ERCOT shall operate the Load Frequency Control (LFC) system to maintain the scheduled frequency at 60 Hz (correcting periodically for time error) and to minimize the use of energy from Resources providing Regulation Service.*

*(2) The ERCOT LFC system shall deploy regulation and Responsive Reserve energy as necessary in accordance with Protocol Section 6.5.7.6, Load Frequency Control, to meet North American Electric Reliability Corporation (NERC) Standards. ERCOT shall purchase sufficient regulation Resources to provide satisfactory frequency control performance for the ERCOT Region. ERCOT shall determine the satisfactory amount of Regulation Service, required by statistical analysis of possible unit Outages and load forecast error, to expect operation of 95% of hours without deploying Responsive Reserve Service.*

*(3) QSEs shall use Automatic Generation Control (AGC) to direct the output of generation facilities providing Regulation and Responsive Reserve Service.*

6.5.7.6.2.1 Deployment of Regulation Service

(2) Reg-Up is a deployment or recall of a deployment referenced to the Resource’s Base Point in response to a change (up or down) in ERCOT System frequency to maintain the target ERCOT System frequency within predetermined limits according to the Operating Guides.

*2.2.4 Load Frequency Control*

*(1) ERCOT shall operate the Load Frequency Control (LFC) system to maintain the scheduled frequency at 60 Hz (correcting periodically for time error) and to minimize the use of energy from Resources providing Regulation Service.*

*(2) The ERCOT LFC system shall deploy regulation and Responsive Reserve energy as necessary in accordance with Protocol Section 6.5.7.6, Load Frequency Control, to meet North American Electric Reliability Corporation (NERC) Standards. ERCOT shall purchase sufficient regulation Resources to provide satisfactory frequency control performance for the ERCOT Region. ERCOT shall determine the satisfactory amount of Regulation Service, required by statistical analysis of possible unit Outages and load forecast error, to expect operation of 95% of hours without deploying Responsive Reserve Service.*

*(3) QSEs shall use Automatic Generation Control (AGC) to direct the output of generation facilities providing Regulation and Responsive Reserve Service.*

6.5.7.6.2.1 Deployment of Regulation Service

(3) Reg-Down is a deployment or recall of a deployment referenced to the Resource’s Base Point in response to a change (up or down) in ERCOT System frequency to maintain the target ERCOT System frequency within predetermined limits according to the Operating Guides.

*2.2.4 Load Frequency Control*

*(1) ERCOT shall operate the Load Frequency Control (LFC) system to maintain the scheduled frequency at 60 Hz (correcting periodically for time error) and to minimize the use of energy from Resources providing Regulation Service.*

*(2) The ERCOT LFC system shall deploy regulation and Responsive Reserve energy as necessary in accordance with Protocol Section 6.5.7.6, Load Frequency Control, to meet North American Electric Reliability Corporation (NERC) Standards. ERCOT shall purchase sufficient regulation Resources to provide satisfactory frequency control performance for the ERCOT Region. ERCOT shall determine the satisfactory amount of Regulation Service, required by statistical analysis of possible unit Outages and load forecast error, to expect operation of 95% of hours without deploying Responsive Reserve Service.*

*(3) QSEs shall use Automatic Generation Control (AGC) to direct the output of generation facilities providing Regulation and Responsive Reserve Service.*

6.5.7.6.2.2 Deployment of Responsive Reserve Service

(2) ERCOT shall deploy RRS to meet NERC Control Area performance standards and other Control Area performance criteria as specified in these Protocols and the Operating Guides, by one or more of the following:

*2.2.4 Load Frequency Control*

*(1) ERCOT shall operate the Load Frequency Control (LFC) system to maintain the scheduled frequency at 60 Hz (correcting periodically for time error) and to minimize the use of energy from Resources providing Regulation Service.*

*(2) The ERCOT LFC system shall deploy regulation and Responsive Reserve energy as necessary in accordance with Protocol Section 6.5.7.6, Load Frequency Control, to meet North American Electric Reliability Corporation (NERC) Standards. ERCOT shall purchase sufficient regulation Resources to provide satisfactory frequency control performance for the ERCOT Region. ERCOT shall determine the satisfactory amount of Regulation Service, required by statistical analysis of possible unit Outages and load forecast error, to expect operation of 95% of hours without deploying Responsive Reserve Service.*

*(3) QSEs shall use Automatic Generation Control (AGC) to direct the output of generation facilities providing Regulation and Responsive Reserve Service.*



6.5.7.6.2.2 Deployment of Responsive Reserve Service

(4) ERCOT may deploy Responsive Reserve in response to NERC Disturbance Control Assistance requirements as specified in the Operating Guides if no additional energy is available to be dispatched from SCED as determined by the Ancillary Service Capacity Monitor.

*2.2.4 Load Frequency Control*

*(1) ERCOT shall operate the Load Frequency Control (LFC) system to maintain the scheduled frequency at 60 Hz (correcting periodically for time error) and to minimize the use of energy from Resources providing Regulation Service.*

*(2) The ERCOT LFC system shall deploy regulation and Responsive Reserve energy as necessary in accordance with Protocol Section 6.5.7.6, Load Frequency Control, to meet North American Electric Reliability Corporation (NERC) Standards. ERCOT shall purchase sufficient regulation Resources to provide satisfactory frequency control performance for the ERCOT Region. ERCOT shall determine the satisfactory amount of Regulation Service, required by statistical analysis of possible unit Outages and load forecast error, to expect operation of 95% of hours without deploying Responsive Reserve Service.*

*(3) QSEs shall use Automatic Generation Control (AGC) to direct the output of generation facilities providing Regulation and Responsive Reserve Service.*



6.5.9.1 Emergency and Short Supply Operation

(1) ERCOT, as the single CAO, is responsible for maintaining reliability in normal and emergency operating conditions. The Operating Guides are intended to ensure that minimum standards for reliability are maintained. Minimum standards for reliability are defined by the Operating Guides and the NERC standards and include, but are not limited to:

(a) Minimum operating reserve levels;

(b) Criteria for determining acceptable operation of the frequency control system;

(c) Criteria for determining and maintaining system voltages within acceptable limits;

(d) Criteria for maximum acceptable transmission equipment loading levels; and

(e) Criteria for determining when ERCOT is subject to unacceptable risk of widespread cascading Outages.

*2.2.2 Security Criteria*

*(1) Technical limits established for the operation of transmission equipment shall be applied consistently in planning and engineering studies, Congestion Revenue Rights (CRRs), Day-Ahead studies, Real-Time security analyses, and operator actions.*

*(2) Unless an Emergency Condition has been declared by ERCOT, the ERCOT System shall be operated in such a manner that the occurrence of a Credible Single Contingency will not cause any of the following conditions:*

*(a) Uncontrolled breakup of the transmission system;*

*(b) Loading of Transmission Facilities above defined Emergency Ratings that can not be eliminated in time to prevent damage or failure following the loss through execution of specific, predefined operating procedures;*

*(c) Transmission voltage levels outside system design limits that can not be corrected through execution of specific, predefined operating procedures before voltage instability or collapse occurs; or*

*(d) Customer Outages, except for high set interruptible and radially served loads.*

6.5.9.1 Emergency and Short Supply Operation

(3) Under an Emergency Condition, the ERCOT Operator may relax transmission constraints to provide additional generation at the expense of temporarily creating a security violation as long as the violation does not physically overload any single Transmission Element above its emergency limit, as defined in the ERCOT Operating Guides. ERCOT shall report any NERC or Federal Energy Regulatory Commission (FERC) penalties assessed for violating those constraints to Market Participants and the Public Utility Commission of Texas (PUCT).

*3.9.4 Responsibility for Equipment Ratings*

*(1) TSPs are responsible for determining the rating of their facilities. Technical limits established for the operation of Transmission Elements and associated equipment shall be applied consistently in engineering and planning studies, Real-Time security analyses, and operator actions.*

*(2) TSPs shall provide ERCOT with three nominal Transmission Facility Ratings:*

*(a) “Continuous Rating”: Represents the continuous MVA rating of a Transmission Facility, including substation terminal equipment in series with a conductor or transformer, at the applicable ambient temperature. The Transmission Facility can operate at this rating indefinitely without damage, or violation of National Electrical Safety Code (NESC) clearances.*

*(b) “Emergency Rating”: Represents the two-hour MVA rating of a Transmission Facility, including substation terminal equipment in series with a conductor or transformer, at the applicable ambient temperature. The Transmission Facility can operate at this rating for two hours without violation of NESC clearances or equipment failure.*

*(c) “15-Minute Rating”: Represents the 15 minute MVA rating of a Transmission Facility, including substation terminal equipment in series with a conductor or transformer, at the applicable ambient temperature and with a step increase from a prior loading of 90% of the Continuous Rating. The Transmission Facility can operate at this rating for 15 minutes, assuming its pre-contingency loading was 90% of the Continuous Rating limit at the applicable ambient temperature, without violation of NESC clearances or equipment failure. This rating takes advantage of the time delay associated with heating of a conductor or transformer following a sudden increase in current.*

6.5.9.3.1 Operating Condition Notice

(4) ERCOT will monitor actual and forecasted weather for the ERCOT Region and adjacent NERC regions. When adverse weather conditions are expected, ERCOT may confer with TSPs and QSEs regarding the potential for adverse reliability impacts and contingency preparedness. Based on its assessment of the potential for adverse conditions, ERCOT may require information from QSEs representing Resources regarding the Resources’ fuel capabilities. Requests for this type of information shall be for a time period of no more than seven days from the date of the request. The specific information that may be requested shall be defined in the Operating Guides.

*4.2.1 Operating Condition Notice*

*(2) ERCOT may require information from Qualified Scheduling Entities (QSEs) and Transmission Operators (TOs). Typical information requested may include, but is not limited to:*

*(a) Resource fuel capabilities;*

*(b) Resource condition details; and*

*(c) Actual weather conditions.*

6.5.9.3.2 Advisory

(2) (d) When ERCOT Transmission Grid conditions are such that operations within first contingency criteria as defined in the Operating Guides are not likely or possible because of Forced Outages or other conditions.

*2.2.2 Security Criteria*

*(1) Technical limits established for the operation of transmission equipment shall be applied consistently in planning and engineering studies, Congestion Revenue Rights (CRRs), Day-Ahead studies, Real-Time security analyses, and operator actions.*

*(2) Unless an Emergency Condition has been declared by ERCOT, the ERCOT System shall be operated in such a manner that the occurrence of a Credible Single Contingency will not cause any of the following conditions:*

*(a) Uncontrolled breakup of the transmission system;*

*(b) Loading of Transmission Facilities above defined Emergency Ratings that can not be eliminated in time to prevent damage or failure following the loss through execution of specific, predefined operating procedures;*

*(c) Transmission voltage levels outside system design limits that can not be corrected through execution of specific, predefined operating procedures before voltage instability or collapse occurs; or*

*(d) Customer Outages, except for high set interruptible and radially served loads.*

6.5.9.3.3 Watch(7) ERCOT shall post the Watch message electronically to the MIS Secure Area and shall provide verbal notice to all TSPs and QSEs via the Hotline. Corrective actions identified by ERCOT must be communicated through Dispatch Instructions to all TSPs, DSPs and QSEs required to implement the corrective action. Each QSE shall immediately notify the Market Participants that it represents of the Watch. To minimize the effects on the ERCOT System, each TSP or DSP shall identify and prepare to implement actions, including restoration of transmission lines as appropriate and preparing for Load shedding. ERCOT may instruct TSPs or DSPs to reconfigure ERCOT System elements as necessary to improve the reliability of the ERCOT System. On notice of a Watch, each QSE, TSP, and DSP shall prepare for an emergency in case conditions worsen. ERCOT may require information from QSEs representing Resources regarding the Resources’ fuel capabilities. Requests for this type of information shall be for a time period of no more than seven days from the date of the request. The specific information that may be requested shall be defined in the Operating Guides.

*4.2.3 Watch*

*(2) ERCOT may require information from QSEs and TOs. Typical information requested may include, but is not limited to:*

*(a) Resource fuel capabilities;*

*(b) Resource condition details; and*

*(c) Actual weather conditions.*

6.5.9.4 Energy Emergency Alert

(3) (g) Restoration of service to Loads in the manner defined in the Operating Guides.

*4.5.3.5 EEA Termination*

*(1) ERCOT shall:*

*(a) Continue EEA until sufficient Resources are available to ERCOT to eliminate the shortfall and restore adequate reserves;*

*(b) Restore full reserve requirements (normally 2300 MW);*

*(c) Terminate the levels in reverse order, where practical;*

*(d) Notify each QSE and TO of EEA level termination; and*

*(e) Maintain a stable ERCOT System frequency when restoring Load.*

*(2) QSEs and TOs shall:*

*(a) Implement actions to terminate previous actions as EEA levels are released in accordance with these Operating Guides;*

*(b) Notify represented Market Participants of EEA levels changes;*

*(c) Report back to the ERCOT System Operator when each level is accomplished; and*

*(d) Loads will be restored when specifically authorized by the ERCOT.*

6.5.9.4.2 EEA Levels

(2)(a)(iii) (iii) With the approval of the affected non-ERCOT Control Area, may instruct TSPs or DSPs to implement BLTs, which transfer Load from the ERCOT Control Area to non-ERCOT Control Areas. Use of a BLT will be defined in the ERCOT Operating Guides.

*4.4 Block Load Transfers between ERCOT and Non-ERCOT System*

*Under Watch, Energy Emergency Alert (EEA) conditions, or for local transmission constraints, it may become necessary to implement Block Load Transfer (BLT) schemes which will transfer Loads normally located in ERCOT to a non-ERCOT System. Similarly, when a non-ERCOT System experiences certain transmission contingency or short supply conditions, ERCOT may be requested to transfer Loads normally located in the non-ERCOT System to ERCOT. All BLTs must comply with Protocol Section 6.5.9.5, Block Load Transfers between ERCOT and Non-ERCOT Control Areas.*

6.5.9.4.2 EEA Levels

(4)(a) (a) In addition to measures associated with EEA Levels 1, 2A and 2B, ERCOT will direct all TSPs and DSPs or their agents to shed firm load, in 100 MW blocks, as documented in the ERCOT Operating Guides in order to maintain a steady state system frequency of 59.8 Hz.

*4.5.3 Implementation*

*(7) During EEA Level 3, ERCOT must be capable of shedding sufficient firm Load to arrest frequency decay and to prevent generator tripping. The amount of firm Load to be shed may vary depending on ERCOT grid conditions during the event. Each TSP will be capable of shedding its allocation of firm Load, without delay. The maximum time for the TSP to interrupt firm Load will depend on how much Load is to be shed and whether the Load is to be interrupted by Supervisory Control and Data Acquisition (SCADA) or by the dispatch of personnel to substations. Since the need for firm Load shed is immediate, interruption by SCADA is preferred. The following requirements apply for an ERCOT instruction to shed firm Load:*

*(a) Load interrupted by SCADA will be shed without delay and in a time period not to exceed 30 minutes;*

*(b) Load interrupted by dispatch of personnel to substations to manually shed Load will be implemented within a time period not to exceed one hour;*

*(c) The initial clock on the firm Load shed shall apply only to Load shed amounts up to 1000 MW total. Load shed amount requests exceeding 1000 MW on the initial clock may take longer to implement; and*

*(d) If, after the first Load shed instruction, ERCOT determines that an additional amount of firm Load should be shed, another clock will begin anew. The time frames mentioned above will apply.*

*4.5.3.3 EEA Levels*

*(4) EEA Level 3 - Maintain System frequency at 59.8 Hz or greater*

*(a) In addition to measures associated with EEA Levels 1, 2A, and 2B, ERCOT shall direct all TSPs and DSPs or their agents to shed firm load, in 100 MW blocks, distributed as documented in these ERCOT Operating Guides in order to maintain a steady state system frequency of 59.8 Hz.*

*(b) In addition to measures under EEA Levels 1 2A, and 2B, TSPs and DSPs will keep in mind the need to protect the safety and health of the community and the essential human needs of the citizens. Whenever possible, TSPs and DSPs shall not manually drop load connected to under-frequency relays during the implementation of the EEA;*

*4.5.3.4 Load Shed Obligation*

*Obligation for Load shed is by Distribution Service Provider (DSP). Load shedding obligations need to be represented by an Entity with 24x7 operations and hotline communications with ERCOT and control over breakers. (Use TOs as list of Entities).*

*ERCOT Load Shed Table*





**Section 7: Congestion Revenue Rights**

7.5.1 Nature and Timing

(2) (c) ERCOT’s criteria for determining if an Outage should be in the CRR Network Model shall be in accordance with these Protocols and described in the ERCOT Operating Guides.

*5.5 System Modeling Information*

*Information on existing and future ERCOT System components and topology is necessary for ERCOT to create databases and perform tests as outlined in these criteria. To ensure that such information is made available to ERCOT, the following actions by Market Participants (MPs) are required:*

*(1) Each TSP, or its Designated Agent, shall provide accurate modeling information for all ERCOT Transmission Facilities owned or planned by the Transmission Service Provider (TSP). The information provided shall include, but not be limited to, the following:*

*(a) Information necessary to represent the TSP’s Transmission Facilities in any model of the ERCOT Transmission Grid whose creation has been approved by ERCOT, including modeling information detailed in procedures of the Steady State Working Group (SSWG), Dynamics Working Group (DWG), and System Protection Working Group (SPWG);*

*(b) Identification of a designated contact person, generally regarded as the working group TSP representative, responsible for providing answers to questions ERCOT may have regarding the information provided; and*

*(c) TSP owned or operated Transmission Facility data provided and used to accurately represent a Transmission Facility in a model shall be consistent to the*

*extent practicable with data provided and used to represent that same Transmission Facility in any other model created to represent a time period during which the Transmission Facility is expected to be physically identical. All existing transmission lines’ and transformers’ impedances, or equivalent branch circuit impedance, and ratings - Normal and Emergency - shall be identical, to the extent practicable. If all normally closed breakers and switches are closed and normally open breakers and switches are open in the Network Operations Model, the calculated line flows between substations in the Annual Planning Model shall be consistent, when all models use the same load magnitude and distribution, generation commitment and dispatch, and voltage profile. ..*

*(2) Any long-term changes to the reactive capability must be provided by the facility owner to ERCOT, as planned at least 30 days prior to implementation and as built no later than 30 days after implementation, as changes or upgrades are made during the life of the Reactive Power facilities.*

*(3) Further, each TSP owning or planning Transmission Facilities or its Designated Agent shall attend the scheduled meetings and otherwise participate in the activities of the SSWG, DWG, and the SPWG, unless specifically exempted from these activities by ERCOT.*

*(4) Each Generation Resource, or its Designated Agent, shall provide accurate modeling information for each existing or publicly-announced ERCOT generating unit for which it is the majority owner. The information provided shall include, but not be limited to, the following:*

*(a) Information necessary to represent the Generation Resource’s generation and interconnection facilities in any model of the ERCOT System whose creation has been approved by ERCOT, including modeling information detailed in procedures of the SSWG, DWG, and SPWG; and*

*(b) Identification of a designated contact person responsible for providing answers to questions ERCOT may have regarding the information provided.*

*(5) Typical or representative information may be provided for planned facility additions or modifications, but such information shall be revised using actual design or construction information no later than 90 days after the facility has been energized or otherwise placed into service.*

*(6) Congestion Revenue Rights (CRR) Network Model Outage determination uses network topology of the CRR Network Model identified by ERCOT Staff. This must include Planned Outages of Transmission Elements approved by ERCOT at the time the CRR Network Model is being built and that demonstrate significant impact to the transfer capability during the effective period. ERCOT Staff will consider including Outages in the CRR Network Model that are scheduled to occur in the relevant time period and meet one or more of the following criteria:*

*(a) Consecutive or continuous approved Outages greater than or equal to five days;*

*(b) Approved Outages which include Transmission Elements included in the definition of a Hub;*

*(c) Approved Outages which include Transmission Elements in a 345 kV Transmission Facility;*

*(d) Approved Outages that require the use of a Block Load Transfer (BLT); and*

*(e) Any other approved Outage that has been determined by ERCOT Staff to carry a substantial risk of causing significant congestion.*

*All Outages included in the CRR Network Model shall be posted on the Market Information System (MIS) Secure Area consistent with the model posting requirements and with accompanying cause and duration information, as indicated in the Outage Scheduler in Protocol Section 7.5.1, Nature and Timing.*

**SECTION 8: PERFORMANCE MONITORING**

8.1 QSE and Resource Performance Monitoring

(1) ERCOT shall develop a Technical Advisory Committee (TAC)- and ERCOT Board approved

Qualified Scheduling Entity (QSE) and Resource monitoring program to be included in the Operating Guides prior to the Texas Nodal Market Implementation Date. Nothing in this Section changes the process for amending the Operating Guides.

*2.3.3 Ancillary Services Monitoring Program*

*RESERVED*

*Section 9.1*

*This Section sets forth formats and data needed for reporting to comply with Protocol Section 8, Performance Monitoring. These performance monitoring and compliance requirements apply as set forth below to Qualified Scheduling Entities (QSEs), Resources, Transmission Service Providers (TSPs) and ERCOT. Reports defined in this Section will be posted on the Market Information System (MIS) Secure Area unless otherwise stated.*

8.1 QSE and Resource Performance Monitoring

(2) Each QSE and Resource shall meet performance measures as described in this Section and in the Operating Guides.

*Section 9.1*

*This Section sets forth formats and data needed for reporting to comply with Protocol Section 8, Performance Monitoring. These performance monitoring and compliance requirements apply as set forth below to Qualified Scheduling Entities (QSEs), Resources, Transmission Service Providers (TSPs) and ERCOT. Reports defined in this Section will be posted on the Market Information System (MIS) Secure Area unless otherwise stated.*

*9.3.2 System and Resource Control*

*The following reports shall be posted on the MIS Secure Area:*

*(1) Resource control metrics:*

*(a) Total Regulation Up Service (Reg-Up) and Regulation Down Service (Reg-Down) per interval - ERCOT shall develop a monthly report detailing the total amount of Reg-Up energy deployed in the Settlement Interval and by hour and the total amount of Reg-Down energy deployed for each Settlement Interval and by hour of the Operating Day.*

*(2) Reserve monitoring:*

*(a) ERCOT shall prepare monthly reports describing the dates and associated duration that ERCOT operated without sufficient operating reserves as defined in the Protocols.*

*(3) Reliability Unit Commitments (RUCs) and deployments:*

*(a) For each month, ERCOT shall report, Generation Resources committed in each RUC process, the reason for the commitment, Resource name and intervals* *9.4 Ancillary Services Monitoring Program*

*9.4.1 Hydro Responsive Testing*

*9.4.2 Black Start Service Requirements for TSPs, QSEs, and Generation Resources*

*9.4.3 Resource-Specific Responsive Reserve Performance*

*9.4.4 Constant Frequency Control*

*9.4.5 Resource-specific Non-Spinning Reserve*

8.1 QSE and Resource Performance Monitoring

(3) (n) 24 hours per day, seven days per week qualified staffing requirement, as described in the Operating Guides, for QSEs;

*3.3 Resource Entities* *(5) When scheduled to ERCOT, Resource Entities shall be staffed or monitored 24 hours per day, by personnel capable of making operating decisions. Each Resource Entity shall designate an Authorized Representative as defined in Protocol Section 2, Definitions and Acronyms. This applies to all:*

*(a) Generation Resources greater than 10 MW; )*

*9.1.8 Qualified Staffing Requirement*

*A QSE shall maintain a continuously operating scheduling center staffed with qualified personnel with the authority to commit and bind the QSE. ERCOT shall report to the Texas Regional Entity (TRE), instances of suspected non-performance.*

8.1.1 QSE Ancillary Service Performance Standards

Each QSE and its Resources that provide Ancillary Service must meet performance measures set out in these Protocols and the Operating Guides.

*9.4 Ancillary Services Monitoring Program*

*9.4.1 Hydro Responsive Testing*

*9.4.2 Black Start Service Requirements for TSPs, QSEs, and Generation Resources*

*9.4.3 Resource-Specific Responsive Reserve Performance*

*9.4.4 Constant Frequency Control*

*9.4.5 Resource-specific Non-Spinning Reserve*

8.1.1.1 Ancillary Service Qualification and Testing

(1) Each QSE and the Resource providing Ancillary Service must meet qualification criteria to operate satisfactorily with ERCOT. ERCOT shall use the Ancillary Service qualification and testing program that is approved by TAC and included in the Operating Guides.

*3.2.4 Ancillary Service Qualification and Testing Program*

*(1) Resources designated to provide Ancillary Services must qualify with ERCOT prior to participation in the Ancillary Service market.*

*(2) ERCOT shall reject offers to provide Ancillary Services received from an unqualified Resource and shall notify the appropriate QSE that the Resource is not qualified.*

*(3) ERCOT, at its sole discretion, may provisionally qualify Load Resources to provide Ancillary Services, without completion of a qualification test, for 90 days.*

*(4) ERCOT shall evaluate the actual performance of all Resources providing Ancillary Services in accordance with Protocol Section 8, Performance Monitoring and Compliance. ERCOT shall notify the QSE of a Resource failing to meet the performance requirements as specified in Protocol Section 8. A Resource failing to meet the performance requirements for two consecutive months shall be required to develop and implement a corrective action plan to address its failure as specified in Protocol Section 8.4, Non-Compliance.*

*(5) ERCOT shall, in accordance with Protocol Section 8.4, revoke the qualification to provide Ancillary Services for any Resource failing an Ancillary Service performance standard for four consecutive months.*

*(6) Any Resource with a revoked Ancillary Service qualification may be re-tested at the sole discretion of ERCOT only after demonstrating and implementing a corrective action plan as described in Protocol Section 8.4.*

8.1.1.2.1.1 Regulation Service Qualification

(2) A QSE shall demonstrate to ERCOT that they have the ability to switch control to constant frequency operation as specified in the Operating Guides. ERCOT’s direction to the QSE to operate on constant frequency will be considered a Dispatch Instruction.

*3.2.4 Ancillary Service Qualification and Testing Program*

*(1) Resources designated to provide Ancillary Services must qualify with ERCOT prior to participation in the Ancillary Service market.*

*(2) ERCOT shall reject offers to provide Ancillary Services received from an unqualified Resource and shall notify the appropriate QSE that the Resource is not qualified.*

*(3) ERCOT, at its sole discretion, may provisionally qualify Load Resources to provide Ancillary Services, without completion of a qualification test, for 90 days.*

*(4) ERCOT shall evaluate the actual performance of all Resources providing Ancillary Services in accordance with Protocol Section 8, Performance Monitoring and Compliance. ERCOT shall notify the QSE of a Resource failing to meet the performance requirements as specified in Protocol Section 8. A Resource failing to meet the performance requirements for two consecutive months shall be required to develop and implement a corrective action plan to address its failure as specified in Protocol Section 8.4, Non-Compliance.*

*(5) ERCOT shall, in accordance with Protocol Section 8.4, revoke the qualification to provide Ancillary Services for any Resource failing an Ancillary Service performance standard for four consecutive months.*

*(6) Any Resource with a revoked Ancillary Service qualification may be re-tested at the sole discretion of ERCOT only after demonstrating and implementing a corrective action plan as described in Protocol Section 8.4.*

8.1.1.2.1.2 Responsive Reserve Service Qualification

(2) The amount of RRS provided by individual Generation Resources and Controllable Load Resources is specified in the Operating Guides. Each Resource providing RRS must be On-Line and capable of ramping the Resource’s Ancillary Service Resources Responsibility for RRS within ten minutes of the notice to deploy RRS, must be immediately responsive to system frequency, and must be able to maintain the scheduled level of deployment for the period of service commitment. The amount of RRS on a

Generation Resource may be further limited by requirements of the Operating Guides.

*2.3.1.2 Additional Operational Details for Responsive Reserve Providers*

*Section 8 F, G*

*9.3.2 System and Resource Control*

8.1.1.2.1.2 Responsive Reserve Service Qualification

(3) A QSE’s Load Resource must be loaded and capable of unloading the scheduled amount of RRS within ten minutes of instruction by ERCOT and must either be immediately responsive to system frequency or be interrupted by action of under-frequency relays with settings as specified by the Operating Guides.

*2.3 Ancillary Services*

*2.3.1 Responsive Reserve (RRS)*

*2.3.1.2 Additional Operational Details for Responsive Reserve Providers*

8.1.1.2.1.4 Voltage Support Service (VSS) Qualification

(1) The Generation Entity must verify and maintain its stated Reactive Power capability for each of its Generation Resources providing VSS, as required by the Operating Guides. Generation Resources providing VSS reactive capability limits shall be specified considering nominal substation voltage.

2.2.5 Automatic Voltage Regulators

Generation Entities shall conduct performance tests on AVRs or verify AVR performance through comparison with operational data a minimum of every five years per item (5) of Protocol Section 8.1.2.2.5, Reactive Supply from Generation Resources Providing Voltage Support Service (VSS), or if equipment characteristics are knowingly modified, within 30 days of the modification. The test reports should include the minimum and maximum excitation limiters, volts/hertz settings, gain and time constants, type of voltage regulator control function, date tested, and voltage regulator control setting.

2.3 Ancillary Services

|  |
| --- |
| Voltage Support  Reference: Protocol Section 3.15, Voltage Support  Reactive capability of a Generation Resource that is required to maintain transmission and distribution voltages on the ERCOT Transmission Grid within acceptable limits. All Generation Resources with a gross generating unit rating greater than 20 MVA shall provide Voltage Support Service (VSS).  2.7.4.1 Maintaining System Voltage  Direct the scheduling of VSS by providing Voltage Profiles at the high voltage side of generator busses. The Generation Resource is obligated to maintain the published voltage profile within its Corrected Unit Reactive Limit (CURL).  6.2.5.3.6 Automatic Under-Voltage Load Shedding (UVLS) Protection Systems  (9) Generating Resources required to provide Voltage Support Service shall have and maintain the following capability:  (a) Over-excitation limiters shall be provided and coordinated with the thermal capability of the generator field winding and protective relays in order to permit short-term reactive capability that allows at least 80% of the unit design standard (ANSI C50.13-1989), as follows:  Time (seconds) 10 30 60 120  Field Voltage % 208 146 125 112  After allowing temporary field current overload, the limiter shall operate through the automatic AC voltage regulator to reduce field current to the continuous rating. Return to normal AC voltage regulation after current reduction shall be automatic. The over-excitation limiter shall be coordinated with the over- excitation protection so that over-excitation protection only operates for failure of the voltage regulator/limiter.  (b) Under-excitation limiters shall be provided and coordinated with loss-of-field protection to eliminate unnecessary generating unit disconnection as a result of operator error or equipment malfunction. |
| 9.1.9 Automatic Voltage Regulator (AVR)  ERCOT shall produce a monthly report listing the Generation Resources that are not meeting AVR availability for periods in which they are required to provide Voltage Support Service (VSS) as described in paragraph (4) of Protocol Section 3.15.3, QSE  9.3.2 System and Resource Control  (3) Reliability Unit Commitments (RUCs) and deployments:  (a) For each month, ERCOT shall report, Generation Resources committed in each RUC process, the reason for the commitment, Resource name and intervals deployed, and the hours committed for Voltage Support Service (VSS). |

8.1.1.2.1.4 Voltage Support Service (VSS) Qualification

(5) The Generation Resource Entity shall perform the Resource AVR tests and shall supply AVR data as specified in the Operating Guides. The AVR tests must be performed on initial qualification. The AVR tests must be conducted at a time agreed on in advance by the Generation Resource Entity, its QSE, the applicable TSP and ERCOT.

*2.2.5 Automatic Voltage Regulators*

*(2) Generation Entities shall conduct performance tests on AVRs or verify AVR performance through comparison with operational data a minimum of every five years per item (5) of Protocol Section 8.1.2.2.5, Reactive Supply from Generation Resources Providing Voltage Support Service (VSS), or if equipment characteristics are knowingly modified, within 30 days of the modification. The test reports should include the minimum and maximum excitation limiters, volts/hertz settings, gain and time constants, type of voltage regulator control function, date tested, and voltage regulator control setting.*

*2.7.4.1 Maintaining System Voltage*

*(2) ERCOT shall monitor the Automatic Voltage Regulator (AVR), as required in Protocol Section 6.5.5.1, Changes in Resource Status, to assure that it is on and operating automatically at least 98% of the time in which the QSE is providing the Reactive Power supply from Generation Resources required to provide Voltage Support Service (VSS). The percentage is calculated as: Time (AVR is on while providing Service) / (Total Time Providing Services) (100%).*

*3. Resource Testing and Qualification Procedures*

*3.7 Enforcement of Automatic Voltage Regulator (AVR) Testing*

*Details of the enforcement for reactive capability testing can be found in the Compliance Template located on the ERCOT MIS Public Area.*

*9.1.9 Automatic Voltage Regulator (AVR)*

*(1) ERCOT shall record QSE provided Automatic Voltage Regulator (AVR) test reports for Resources which must include:*

*(a) The minimum and maximum excitation limiters settings and associated time limits;*

*(b) Volts/hertz settings;*

*(c) Gain and time constants;*

*(d) Date tested; and*

*(e) Voltage regulator control mode;*

*(2) ERCOT shall produce a monthly report that will identify Resources for which test reports have not been submitted within the last 60 months.*

*(3) ERCOT shall produce a monthly report listing the Generation Resources that are not meeting AVR availability for periods in which they are required to provide Voltage Support Service (VSS) as described in paragraph (4) of Protocol Section 3.15.3, QSE*

8.1.1.4.2 Responsive Reserve Service Energy Deployment Criteria

(2) For all frequency deviations exceeding 0.1 Hz, ERCOT shall use the recorded data for each two-second scan rate value of real power output for each Resource providing Responsive Reserve. ERCOT shall use the recorded MW data beginning one minute before the start of the frequency excursion event until ten minutes after the start of the frequency excursion event. Satisfactory performance must be measured by comparing the actual response to the frequency response capability required in the Operating Guides.

*2.2.8 Performance/Disturbance/Compliance Analysis*

*(1) Performance/Disturbance/Compliance analysis shall be performed by ERCOT for the purpose of ensuring conformance to the Protocols. All generators except wind and nuclear powered must respond to frequency disturbances with a governor droop of 5% or less unless limited by a High Sustained Limit (HSL) or other limits filed with ERCOT including duct burning on Combined-Cycle units.*

*(2) ERCOT shall make a regular report on selected system disturbances, documenting the response of individual QSEs, together with a summary. In addition, Resource Entities, QSEs, and individual members of the Performance Disturbance Compliance Working Group (PDCWG) are encouraged to work within their respective companies to enhance the performance of individual generating resources control systems through application of the results of the PDCWG studies.*

*2.3.1.2 Additional Operational Details for Responsive Reserve Providers*

*(2) RRS provided by a QSE shall meet the requirements as defined in item (5), Protocol Section 3.18, Resource Limits in Providing Ancillary Service.*

*SECTION 8(G): LOAD RESOURCE TESTS*

*Biennial Test for Load Resource’s Providing Responsive Reserve Service*

*VERIFICATION OF TELEMTERED RESPONSE TO AN ACTUAL EVENT*

*9.3.2 System and Resource Control*

*(6) ERCOT-wide Governor Response to Measurable Events:*

*(a) ERCOT shall develop monthly reports detailing ERCOT’s System-wide governor response to each Measureable Event. ERCOT shall meet at all times the governor response criteria as described in Protocol Section 8.5.2, Primary Frequency Control Measurements.*

8.1.1.4.2 Responsive Reserve Service Energy Deployment Criteria

(3) ERCOT shall monitor the frequency response that is delivered during major frequency disturbances primarily based on a droop calculation for generators and Controllable Load Resources, a relay response for Loads and hydro Responsive Reserve. Frequency response performance must be analyzed by TAC and a performance metric must be provided in the Operating Guides.

*2.3.1.2 Additional Operational Details for Responsive Reserve Providers*

*(3) Load Resources providing RRS must be controlled by under-frequency relays for automatic interruption. For eligibility to participate as a RRS provider, reference Protocol Section 8.1.2.2.3, Responsive Reserve Service. Load Resources shall also complete the following requirements:*

*(a) The under-frequency relay must have a delay of no more than 20 cycles (or 0.33 seconds for relays that do not count cycles). Total time from the time frequency first decays to a value low enough to initiate action of the under frequency relay(s) to the time Load is interrupted should be no more than 30 cycles, including all relay and breaker operating times;*

*(b) The initiation setting of the under-frequency relay shall not be any lower than 59.7 Hz; and*

*(c) Load Resource must be able to remain interrupted during actual event until replaced by other net dependable capability. In no case may interrupted Load be restored to service without the approval of the ERCOT Operator.*

*(4) To become and remain fully qualified as a provider of RRS, the Load shall complete the requirements above and the following:*

*(a) Pass simulated or actual testing according to ERCOT Procedure; and,*

*b) Perform verification testing as described in Section 8, Attachment G, Load Resource Tests.*

*((6) Hydro Unit(s) – Modes of RRS that will be counted:*

*(a) Synchronous condenser fast response mode - described in item (5), Protocol Section 3.18, Resource Limits in Providing Ancillary Service;*

*(b) Generation MW mode - For any hydro powered resource with a 5% droop setting operating as a generator, the amount of RRS provided may never be more than 20% of the High Sustained Limit (HSL);*

*(c) Synchronous Condenser on Under Frequency Relays in Megavar Supply Mode - A verbal dispatch from ERCOT is required to operate in this mode. However, during an under-frequency event, Vars are unloaded in no more than 30 seconds. Once unloaded, then Megawatts are delivered. Once deployed these units are frequency responsive;*

*(d) Synchronous Condenser Mode in “Manual” Dispatch Mode - Units will supply Megawatts based on operator action within the 10-minute Protocol requirement for supplying RRS. Once deployed these units are frequency responsive; and*

*(e) A Real-Time signal of the MW capacity of hydro units being operated in any of the synchronous condenser modes is telemetered to ERCOT.*

*3.2.4 Ancillary Service Qualification and Testing Program*

*(4) ERCOT shall evaluate the actual performance of all Resources providing Ancillary Services in accordance with Protocol Section 8, Performance Monitoring and Compliance. ERCOT shall notify the QSE of a Resource failing to meet the performance requirements as specified in Protocol Section 8. A Resource failing to meet the performance requirements for two consecutive months shall be required to develop and implement a corrective action plan to address its failure as specified in Protocol Section 8.4, Non-Compliance.*

*9.3.2 System and Resource Control*

8.3 TSP Performance Monitoring and Compliance

(1) ERCOT shall develop a Technical Advisory Committee (TAC)- and ERCOT Board approved

Transmission Service Provider (TSP) monitoring program to be included in the Operating Guides for TSPs prior to the Texas Nodal Market Implementation Date, which shall include the following:

*9.2 TSP Monitoring Program*

*9.2.1 Rating Methodology Reporting Program*

*9.2.2 Real-Time Data Monitor*

*9.2.3 Transmission Outage Reporting*

*9.2.4 Transmission Service Provider (TSP) Network Operations Model Update Implementation Monitor*

*9.2.5 Backup Control for TSPs .*

8.5.1.2 Reporting

(1) Each Generation Entity shall conduct applicable generating governor speed regulation tests on each of its Generation Resources as specified in the Operating Guides. Test results and other relevant information shall be reported to ERCOT and ERCOT shall forward results to the appropriate Transmission Service Providers (TSPs).

*2.2.7 Turbine Speed Governors*

*(2) Governor performance tests for mechanical hydraulic governors or electro-hydraulic governors shall be conducted at least every two years unless a written exception is obtained from ERCOT. The test forms are located in Section 8, Attachment C, Turbine Governor Speed Tests. Maintenance and tests on governors shall demonstrate calibration for operation with a 5% droop characteristic and dead band no greater than +/- 0.0.36 Hz.*

*Section 8 , Attachment C , Turbine Governor Speed Tests*

8.5.1.2 Reporting

(2) Generation Resource governor modeling information required in the ERCOT planning criteria must be determined from actual Generation Resource testing described in the Operating Guides. Within 30 days of ERCOT’s request, the results of the latest test performed must be supplied to ERCOT and the connected TSP.

*6.2.2 Design and Operating Requirements for ERCOT System Facilities*

*(10) Upon ERCOT’s request, within 30 days, Resource Entities shall provide ERCOT with the operating characteristics of any generator’s equipment protective relay system or controls that may respond to temporary excursions in voltage, frequency, or loading with actions that could lead to tripping of the generator.*

*(11) Upon ERCOT’s request, within 30 days, Generation Entities shall provide ERCOT with information that describes how generator controls coordinate with the generator’s short-term capabilities and the protective relay system.*

**SECTION 10:METERING**

10.2.2 TSP and DSP Metered Entities

(2) Each TSP and DSP is responsible for the following: (a) Compliance with the procedures and standards in this Section, the Settlement Metering Operating Guides (SMOG) and the Operating Guides;

*3.9 Transmission Operators*

*(1) Transmission Operators (TOs) shall follow ERCOT instructions related to ERCOT responsibilities:*

*(a) Performing the physical operation of the ERCOT Transmission Grid, including circuit breakers, switches, voltage control equipment, protective relays, metering and load shedding equipment;*

*(b) Directing changes in the operation of transmission voltage control equipment;*

*(c) Managing Voltage Profiles established by ERCOT. TOs, under the direction of ERCOT, will coordinate Transmission Service Provider (TSP) static device switching with QSE dynamic reactive device operation. Static reactive devices will be brought On-Line before predicted daily maximum Load growth or dynamic reactive Resources reach operating limits. Static reactive devices will be taken Off-Line during daily Load decline and before dynamic reactive Resources reach operating limits. ERCOT will coordinate Automatic Voltage Regulator (AVR), dynamic and static reactive device Outages to ensure adequate reactive reserves are maintained; and*

*(d) Taking those additional actions required to prevent an imminent Emergency Condition or to restore the ERCOT Transmission Grid to a secure state in the event of a system emergency.*

*(2) TOs must meet all requirements identified in the Protocols for TOs in addition to those requirements stated below for all Transmission Facilities represented:*

*(a) Monitor system conditions and notify ERCOT when Transmission Facility Elements reach maximum safe operating limits as soon as practicable;*

*(b) Notify ERCOT of any changes in its Transmission Facility status within ten seconds of the change of status as specified in Protocol Section 3.10.7.4, Telemetry Criteria;*

*(c) Operate and manage Transmission Facilities between energy sources and the point of delivery;*

*(d) Coordinate emergency communications between a represented TSP system and ERCOT;*

*(e) Monitor the loading of the transmission system(s);*

*(f) Notify ERCOT of all changes to the status of all Transmission Elements and Transmission Facilities;*

*(g) Act as single point of contact for Transmission Outages;*

*(h) Maintain continuous communication (24x7 basis) with ERCOT;*

*(i) Ensure Dispatch Instructions, received for their system or on behalf of represented TSPs or Distribution Service Providers (DSPs), are carried out as issued;*

*(j) Maintain operational metering; and*

*(k) Implement Black Start.*

*7.1.2 QSE and TSP Responsibilities*

*QSE and TSP Responsibilities include the following:*

*(1) TSPs and QSEs whose facilities connect to the ERCOT WAN are required to sign an agreement with ERCOT governing installation, operation and maintenance of the WAN hardware. Appropriate WAN documents can be obtained by contacting the ERCOT Account Manager*

*(2) ERCOT WAN participants shall provide physical security systems compliant with the applicable Critical Infrastructure Protection (CIP) requirement of the North American Electric Reliability Corporation (NERC) Reliability Standards.*

*(3) Any TSP or QSE facility, whether primary or back-up, will be required to connect directly to the ERCOT WAN; this includes connectivity to both the MPLS and PTP networks. The WAN connection will terminate at the Market Participant’s control center.*

*(4) Market Participants that serve both TSP and QSE functions at one location will only require one ERCOT WAN connection as defined in Section 7.1, ERCOT Wide Area Network, at that location.*

*(5) If a TSP and QSE share a centralized private branch exchange (PBX), separate OPX circuits will be terminated for each participant.*

*(6) Each Market Participant is required to extend the ERCOT OPX and Hotline voice circuits into its system operations desk that is staffed continuously. ERCOT will deliver the OPX and Hotline to a channel bank provided by the Market Participant. The OPX and Hotline voice circuits are transported on separate Digital Signal Level 0 (DS0) channels. In the event a Market Participant represents other Entities through an agency agreement approved by ERCOT, each Entity represented must have dedicated OPX circuits. In these cases, a single Hotline button will be used for the Market Participant and all of the represented Entities. It is the Market Participant’s responsibility to deliver the Hotline and the OPX to the Market Participant’s system operations desk in a manner that reasonably assures continuous communication with ERCOT and is not affected by PBX features such as automatic transfer or roll to voice mail. The demarcation point for all voice circuits is the Market Participant’s channel bank.*

*(7) Each TSP and QSE must provide internal facilities and communications to collect and furnish data and voice signals to the ERCOT WAN as required by the ERCOT Protocols. For TSPs these include, but may not be limited to, voice communications, ICCP, and Supervisory Control And Data Acquisition (SCADA) for substations and other Transmission Facilities. For QSEs these include, but may not be limited to, voice communications, ICCP, and SCADA for Resources.*

*(8) QSEs and TSPs shall supply, implement, and maintain all data and voice communication facilities required to fulfill the obligations set forth in these Operating Guides.*

*(9) ERCOT WAN participants shall provide adequate physical facilities to support the ERCOT WAN communications equipment. The physical facilities and communications equipment requirements include:*

*(a) Provide an analog business phone line or PBX analog extension for troubleshooting and maintenance of equipment;*

*(b) Provide a height of 24” of rack space in a 19” wide rack;*

*(c) Provide two separate UPS single-phase 115 VAC 20 amp circuits, each with four receptacles in the 19” rack listed above;*

*(d) Provide building wiring from circuit termination to equipment rack;*

*(e) Within 24-hours notice, provide ERCOT employees or contractors access to the communication facility;*

*(f) Within one-hour notice, provide emergency access to the facility to ERCOT employees or contractors;*

*(g) Provide on site personnel to escort ERCOT employees or contractors;*

*(h) Provide a firewall or router, located at the Market Participant site, for the network address translation of internal Market Participant addresses to external addresses on the ERCOT LAN;*

*(i) Provide connectivity from Market Participant firewall or router to ERCOT LAN located at Market Participant site. Market Participants are responsible for their own security through this connection;*

*(j) Provide a channel bank with at least one T1 interface and four Foreign Exchange Station (FXS) ports. Connect FXS (e.g. PBX, key system) to the appropriate equipment. On the digital T1 stream, levels for voice are zero dpm for transmit and receive;*

*(k) Dual cable entrances to Market Participant, connecting to different Telco Central Offices is highly recommended; and*

*(l) Provide ERCOT with internal IP addressing scheme as needed for network design. This will be kept confidential.*

*CSU/DSUCSU/DSU*

*Figure 1 ERCOT Wide Area Network Overview*

*7.1.3 Joint Responsibilities (Maintenance and Restoration)*

*Joint responsibility of ERCOT WAN-connected Market Participants and ERCOT include the following:*

*(1) Coordinate maintenance and restoration activities so its reliability is not compromised;*

*(2) All primary and back-up circuits shall be tested annually or as otherwise requested by ERCOT for end-to-end performance;*

*(3) ERCOT will specify test procedures for hotline and any back-up or alternate path voice circuits;*

*(4) A Market Participant must be able to transmit and receive test voice signals. The test equipment must be capable of transmitting, receiving, and measuring frequency and decibel SECTION 7: TELEMETRY AND COMMUNICATION ERCOT NODAL OPERATING GUIDES – APRIL 1, 2009 (EFFECTIVE UPON TEXAS NODAL MARKET IMPLEMENTATION) PUBLIC 7-5*

*level. This will allow ERCOT and the Market Participant to isolate circuit and equipment problems for quick resolution and restoration of voice communication; and*

*(5) Scheduled maintenance of any WAN hardware/software shall be coordinated between ERCOT and the affected Market Participant. The Market Participant shall provide reasonable outage windows for ERCOT support personnel to upgrade and repair equipment.*

### *7.3.3 Data from QSEs and TSPs to ERCOT*

*(1) Each TSP and QSE shall provide telemetered measurements on modeled Transmission Elements as required by the Protocols and the ERCOT Nodal ICCP Communications Handbook.*

*(2) QSEs and TSPs shall provide Real-Time monitoring of power system quantities to ERCOT as defined in the Protocols and the ERCOT Nodal ICCP Communications Handbook. ERCOT shall work with TSPs and QSEs to determine the required data using the methodology presented in the Protocols. Transmission Element status and analog measurements that the TSPs and QSEs define in the Network Operations Model shall, at a minimum, be provided to ERCOT. Ultimately, it is the responsibility of the TSPs and QSEs to provide all data requested by ERCOT.*

*(3) Real Time telemetry data from QSEs used to supply power or Ancillary Services shall be integrated by ERCOT and checked against settlement meter values on a monthly basis.*

*(4) Each QSE and TSP shall notify ERCOT as soon as practicable when telemetry will not be available or is unreliable for operational purposes. When ERCOT receives notification, the associated points shall be removed from the TAC approved Telemetry Standard performance metrics calculations.*

*(5) Each QSE and TSP shall notify ERCOT as soon as practicable when telemetry is returned to normal state.*

#### 7.3.3.1 Weather Zone Data

*(1) A TSP that is responsible for providing Weather Zone tie-line measurement data to ERCOT is required to establish a backup to the primary source.*

*(2) TSPs having an Energy Management System (EMS) with a native ICCP application capable of four second periodic data set transfers with minimum 300 points per data set, and hot standby backup ICCP servers with automatic fail-over capability, shall provide an additional ICCP association across the ERCOT WAN for the transfer of Weather Zone tie line measurements. ICCP nodes should exist at primary and backup facilities.*

### *7.3.4 TSP and QSE Telemetry Restoration*

*Real Time telemetry data shall be restored using criteria and procedures as established by the TAC approved Telemetry Standard.*

### *7.3.5 General Telemetry Performance Criterion*

*All Real Time telemetry as required by the Protocols shall meet the State Estimator Performance and the TAC approved Telemetry Standards.*

## *7.4 Calibration and Testing of Telemetry Responsibilities*

*It is the responsibility of the owner of telemetry equipment to ensure that calibration, testing and other routine maintenance of equipment is performed consistently with the provisions of the Protocols, the Technical Advisory Committee (TAC) approved Telemetry Standards, and Good Utility Practice.*

**SECTION 11: DATA ACQUISITION AND AGGREGATION**

11.1.5 Loss Compensation of ERCOT Polled Settlement Meter Data

(3) TSPs and/or DSPs requesting loss compensation for a specific meter will comply with Section 10, Metering, and the Operating Guides.

*7.3.3 Data from QSEs and TSPs to ERCOT*

*(1) Each TSP and QSE shall provide telemetered measurements on modeled Transmission Elements as required by the Protocols and the ERCOT Nodal ICCP Communications Handbook.*

*(2) QSEs and TSPs shall provide Real-Time monitoring of power system quantities to ERCOT as defined in the Protocols and the ERCOT Nodal ICCP Communications Handbook. ERCOT shall work with TSPs and QSEs to determine the required data using the methodology presented in the Protocols. Transmission Element status and analog measurements that the TSPs and QSEs define in the Network Operations Model shall, at a minimum, be provided to ERCOT. Ultimately, it is the responsibility of the TSPs and QSEs to provide all data requested by ERCOT.*

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*(4) Each QSE and TSP shall notify ERCOT as soon as practicable when telemetry will not be available or is unreliable for operational purposes. When ERCOT receives notification, the associated points shall be removed from the TAC approved Telemetry Standard performance metrics calculations.*

*(5) Each QSE and TSP shall notify ERCOT as soon as practicable when telemetry is returned to normal state.*

**SECTION 16: REGISTRATION AND QUALIFICATION OF MARKET PARTICIPANTS**

16.2.1 Criteria for Qualification as a Qualified Scheduling Entity

(1)(e) Demonstrate to ERCOT’s reasonable satisfaction that the Entity is capable of

complying with the requirements of all ERCOT Protocols and Operating Guides;

*3.2.1 Operating Obligations*

*(1) A QSE shall maintain a 24x7 scheduling center with qualified personnel with the authority to commit and bind the QSE. QSEs shall communicate with ERCOT for the purpose of meeting their obligations specified in the ERCOT Protocols and these Operating Guides. Each QSE shall designate an Authorized Representative as defined in Protocol Section 2, Definitions and Acronyms.*

*(2) Each QSE shall provide ERCOT with a written back-up plan to continue operation in the event the QSE’s scheduling center becomes inoperable.*

*(3) Each back-up plan shall be reviewed and updated annually and shall include as a minimum, the following:*

*(a) Description of actions to be taken by QSE personnel to avoid placing a prolonged burden on ERCOT and other Market Participants (MPs), while operating in back-up control mode;*

*(b) Description of specific functions and responsibilities to be performed to continue operations from an alternate location;*

*(c) Procedures and responsibilities for maintaining basic voice communications capabilities with ERCOT; and*

*(d) Procedures for back-up control function testing and the training of personnel.*

*(4) As an option, the back-up plan may include arrangements made with another Entity to provide the minimum back-up control functions in the event the QSE’s primary functions are interrupted.*

*(5) For connectivity requirements for back-up sites, refer to Section 7, Telemetry and Communication.*

*7.1.2 QSE and TSP Responsibilities*

*QSE and TSP Responsibilities include the following:*

*(1) TSPs and QSEs whose facilities connect to the ERCOT WAN are required to sign an agreement with ERCOT governing installation, operation and maintenance of the WAN hardware. Appropriate WAN documents can be obtained by contacting the ERCOT Account Manager*

*(2) ERCOT WAN participants shall provide physical security systems compliant with the applicable Critical Infrastructure Protection (CIP) requirement of the North American Electric Reliability Corporation (NERC) Reliability Standards.*

*(3) Any TSP or QSE facility, whether primary or back-up, will be required to connect directly to the ERCOT WAN; this includes connectivity to both the MPLS and PTP networks. The WAN connection will terminate at the Market Participant’s control center.*

*(4) Market Participants that serve both TSP and QSE functions at one location will only require one ERCOT WAN connection as defined in Section 7.1, ERCOT Wide Area Network, at that location.*

*(5) If a TSP and QSE share a centralized private branch exchange (PBX), separate OPX circuits will be terminated for each participant.*

*(6) Each Market Participant is required to extend the ERCOT OPX and Hotline voice circuits into its system operations desk that is staffed continuously. ERCOT will deliver the OPX and Hotline to a channel bank provided by the Market Participant. The OPX and Hotline voice circuits are transported on separate Digital Signal Level 0 (DS0) channels. In the event a Market Participant represents other Entities through an agency agreement approved by ERCOT, each Entity represented must have dedicated OPX circuits. In these cases, a single Hotline button will be used for the Market Participant and all of the represented Entities. It is the Market Participant’s responsibility to deliver the Hotline and the OPX to the Market Participant’s system operations desk in a manner that reasonably assures continuous communication with ERCOT and is not affected by PBX features such as automatic transfer or roll to voice mail. The demarcation point for all voice circuits is the Market Participant’s channel bank.*

*(7) Each TSP and QSE must provide internal facilities and communications to collect and furnish data and voice signals to the ERCOT WAN as required by the ERCOT Protocols. For TSPs these include, but may not be limited to, voice communications, ICCP, and Supervisory Control And Data Acquisition (SCADA) for substations and other Transmission Facilities. For QSEs these include, but may not be limited to, voice communications, ICCP, and SCADA for Resources.*

*(8) QSEs and TSPs shall supply, implement, and maintain all data and voice communication facilities required to fulfill the obligations set forth in these Operating Guides.*

*(9) ERCOT WAN participants shall provide adequate physical facilities to support the ERCOT WAN communications equipment. The physical facilities and communications equipment requirements include:*

*(a) Provide an analog business phone line or PBX analog extension for troubleshooting and maintenance of equipment;*

*(b) Provide a height of 24” of rack space in a 19” wide rack;*

*(c) Provide two separate UPS single-phase 115 VAC 20 amp circuits, each with four receptacles in the 19” rack listed above;*

*(d) Provide building wiring from circuit termination to equipment rack;*

*(e) Within 24-hours notice, provide ERCOT employees or contractors access to the communication facility;*

*(f) Within one-hour notice, provide emergency access to the facility to ERCOT employees or contractors;*

*(g) Provide on site personnel to escort ERCOT employees or contractors;*

*(h) Provide a firewall or router, located at the Market Participant site, for the network address translation of internal Market Participant addresses to external addresses on the ERCOT LAN;*

*(i) Provide connectivity from Market Participant firewall or router to ERCOT LAN located at Market Participant site. Market Participants are responsible for their own security through this connection;*

*(j) Provide a channel bank with at least one T1 interface and four Foreign Exchange Station (FXS) ports. Connect FXS (e.g. PBX, key system) to the appropriate equipment. On the digital T1 stream, levels for voice are zero dpm for transmit and receive;*

*(k) Dual cable entrances to Market Participant, connecting to different Telco Central Offices is highly recommended; and*

*(l) Provide ERCOT with internal IP addressing scheme as needed for network design. This will be kept confidential.*

*CSU/DSUCSU/DSU*

*Figure 1 ERCOT Wide Area Network Overview*

*7.1.3 Joint Responsibilities (Maintenance and Restoration)*

*Joint responsibility of ERCOT WAN-connected Market Participants and ERCOT include the following:*

*(1) Coordinate maintenance and restoration activities so its reliability is not compromised;*

*(2) All primary and back-up circuits shall be tested annually or as otherwise requested by ERCOT for end-to-end performance;*

*(3) ERCOT will specify test procedures for hotline and any back-up or alternate path voice circuits;*

*(4) A Market Participant must be able to transmit and receive test voice signals. The test equipment must be capable of transmitting, receiving, and measuring frequency and decibel level. This will allow ERCOT and the Market Participant to isolate circuit and equipment problems for quick resolution and restoration of voice communication; and*

*(5) Scheduled maintenance of any WAN hardware/software shall be coordinated between ERCOT and the affected Market Participant. The Market Participant shall provide reasonable outage windows for ERCOT support personnel to upgrade and repair equipment.*

16.2.1 Criteria for Qualification as a Qualified Scheduling Entity

(1)(j) Comply with the backup plan requirements in the Operating Guides;

*3.2.1 Operating Obligations*

*(1) A QSE shall maintain a 24x7 scheduling center with qualified personnel with the authority to commit and bind the QSE. QSEs shall communicate with ERCOT for the purpose of meeting their obligations specified in the ERCOT Protocols and these Operating Guides. Each QSE shall designate an Authorized Representative as defined in Protocol Section 2, Definitions and Acronyms.*

*(2) Each QSE shall provide ERCOT with a written back-up plan to continue operation in the event the QSE’s scheduling center becomes inoperable.*

*(3) Each back-up plan shall be reviewed and updated annually and shall include as a minimum, the following:*

*(a) Description of actions to be taken by QSE personnel to avoid placing a prolonged burden on ERCOT and other Market Participants(MPs),while operating in back-up control mode;*

*(b) Description of specific functions and responsibilities to be performed to continue operations from an alternate location;*

*(c) Procedures and responsibilities for maintaining basic voice communications capabilities with ERCOT; and*

*(d) Procedures for back-up control function testing and the training of personnel.*

*(4) As an option, the back-up plan may include arrangements made with another Entity to provide the minimum back-up control functions in the event the QSE’s primary functions are interrupted.*

*(5) For connectivity requirements for back-up sites, refer to Section 7, Telemetry and Communication.*

16.4 Registration of ERCOT and Non-ERCOT Transmission and Distribution Service

Providers

(1) Each Entity operating as a Transmission Service Provider (TSP) or Distribution Service Provider (DSP) within the ERCOT Region, including Municipally Owned Utilities (MOUs) and Electric Cooperatives (ECs), shall register as a TSP or DSP, or both, as applicable, with ERCOT. Any DSP operating only outside of the ERCOT Region, but within Texas (“Non-ERCOT DSP”) shall also register as a DSP, but Non-ERCOT DSPs are not required to comply with sections of the Protocols relating only to operations in the ERCOT Region. To register as a TSP or DSP, an Entity must comply with the backup plan requirements in the Operating Guides, execute a Standard Form Market Participant Agreement (using the form provided in Section 22), designate TSP or DSP Authorized Representatives, contacts, and a User Security Administrator (per the Application for Registration as a TSP or DSP), and be capable of performing the functions of a TSP or DSP, as applicable, as described in these Protocols.

*3.9 Transmission Operators*

*(3) TOs shall provide ERCOT with written back-up control plans to continue operation in the event the TOs control center becomes inoperable.*

*(4) Each back-up control plan shall be reviewed and updated annually and shall meet the following minimum requirements:*

*(a) Include descriptions of actions to be taken by TO personnel to avoid placing a prolonged burden on ERCOT and other Market Participants;*

*(b) Include descriptions of specific functions and responsibilities to be performed to continue operations from an alternate location;*

*(c) Include procedures and responsibilities for maintaining basic voice communications capabilities with ERCOT; and*

*(d) Include procedures for back-up control function testing and the training of personnel.*

*(5) As an option, the back-up plan may include arrangements made with another Entity to provide the minimum back-up control functions in the event the TO’s primary functions are interrupted.*

16.8.1 Criteria for Qualification as a CRR Account Holder

(e) Demonstrate to ERCOT’s reasonable satisfaction that the Entity is capable of complying with the requirements of all ERCOT Protocols and Operating Guides;

*2.2.2 Security Criteria*

*(1) Technical limits established for the operation of transmission equipment shall be applied consistently in planning and engineering studies, Congestion Revenue Rights (CRRs), Day-Ahead studies, Real-Time security analyses, and operator actions.*

*5.5 System Modeling Information*

*(6) Congestion Revenue Rights (CRR) Network Model Outage determination uses network topology of the CRR Network Model identified by ERCOT Staff. This must include Planned Outages of Transmission Elements approved by ERCOT at the time the CRR Network Model is being built and that demonstrate significant impact to the transfer capability during the effective period. ERCOT Staff will consider including Outages in the CRR Network Model that are scheduled to occur in the relevant time period and meet one or more of the following criteria:*

*ERCOT NODAL OPERATING GUIDES – NOVEMBER 1, 2007 (EFFECTIVE UPON TEXAS NODAL MARKET IMPLEMENTATION) PUBLIC 5-5 SECTION 5: PLANNING*

*(a) Consecutive or continuous approved Outages greater than or equal to five days;*

*(b) Approved Outages which include Transmission Elements included in the definition of a Hub;*

*(c) Approved Outages which include Transmission Elements in a 345 kV Transmission Facility;*

*(d) Approved Outages that require the use of a Block Load Transfer (BLT); and*

*(e) Any other approved Outage that has been determined by ERCOT Staff to carry a substantial risk of causing significant congestion.*

*All Outages included in the CRR Network Model shall be posted on the Market Information System (MIS) Secure Area consistent with the model posting requirements and with accompanying cause and duration information, as indicated in the Outage Scheduler in Protocol Section 7.5.1, Nature and Timing.*

**SECTION 22 (D): STANDARD FORM BLACK START AGREEMENT**

C. Delivery.

(2) If the ERCOT Transmission Grid at the Black Start Resource becomes deenergized and if Participant cannot communicate with either ERCOT or the Transmission Service Provider (TSP) and/or Distribution Service Provider (DSP) serving the Black Start Resource, then Participant shall follow the procedures specified for the Black Start Resource under ERCOT’s Black Start plan in the Operating Guides, but Participant shall not commence delivering electric energy into the ERCOT System without specific instructions to do so from either ERCOT or the TSP and/or DSP serving the Black Start Resource.

*4.6 Black Start Service*

*(1) This section provides general guidelines to be followed in the event of a partial or complete collapse of the ERCOT System. Timely implementation of a restoration plan compiled according to these Operating Guides should facilitate coordination between ERCOT, Qualified Scheduling Entities (QSEs), Resource Entities, and Transmission Operators (TOs) and ensure restoration of service to the ERCOT System at the earliest possible time. Those QSEs representing contracted Black Start Resources will provide ERCOT with the individual plant start-up procedures for coordination of their activities with those of the appropriate TO.*

*(2) Pre-established plans and procedures cannot foresee all the possible combinations of system problems that may occur after a major failure. It is the responsibility of ERCOT to restore the system to normal, applying the principles, strategies, and priorities outlined in the ERCOT Black Start Plan.*

*4.6.1 Principles*

*(1) In order to minimize the time required, ERCOT will develop the Black Start Plan to utilize the principles, strategies, and priorities outlined in this Guide. The ERCOT Black Start Plan shall be coordinated with local TO Black Start plans, to provide a coordinated Black Start reference.*

*(2) ERCOT shall establish and maintain a system Black Start capability plan that shall be coordinated, as appropriate, with the Black Start capability plans of neighboring regions. Documentation of system Black Start capability plans shall be provided to the North American Electric Reliability Corporation (NERC) on request.*

*(3) Each contracted Black Start Resource and each QSE with contracted Black Start Resource(s) will have readily accessible and sufficiently detailed current operating procedures to assist in an orderly recovery.*

*(4) Mutual assistance and cooperation will be essential during the restoration. Deliberate, careful action by each QSE, TO, and Resource Entity is necessary to minimize the length of time required for restoration and to avoid the reoccurrence of a partial or complete system collapse.*

*(5) Throughout the restoration, recovery will depend on ERCOT receiving an accurate assessment of system conditions and status from each QSE, TO, and Resource Entity throughout the restoration. Adequate and reliable communications must be available within the ERCOT System. During Black Start recovery, communication restrictions are lifted to enable the sharing of that information that pertains to reliability including status information and recovery activities.*

*4.6.2 Strategies*

*In the event of a partial or complete system blackout, immediate steps must be taken to return the interconnected network to normal as quickly as possible. For detailed Black Start information, refer to Section 8, Attachment A, Detailed Black Start Information.*

*(1) Each TO shall immediately initiate its portion of the ERCOT Black Start Plan and attempt to establish contact with ERCOT. If communications with ERCOT are unavailable the TO shall immediately establish communications with its interconnected Black Start Resource(s) and the Black Start Resource’s QSE.*

*(2) Each QSE with representing Black Start Resources should initiate communications with its Black Start Resources and immediately notify ERCOT and the appropriate TO of their condition and status.*

*(3) Available Black Start Resources should immediately start their isolation and startup procedures and attempt to establish communications with the local TO.*

*(4) As generating and transmission capabilities become available, systematic restoration of ERCOT Load with respect to priorities should begin in accordance with the local TO Black Start plans, taking care to balance Load and generating capability while maintaining an acceptable frequency.*

*(5) Appropriate voltage levels and reactive control must be maintained during the restoration. Consideration should be given to connecting islands at locations having communications, frequency control, voltage control, synchronization facilities, and adequate transmission capacity. ERCOT will coordinate the return to full Automatic Generation Control (AGC) in the interconnection.*

*4.6.3 Priorities*

*Priorities for an ERCOT System Black Start recovery are listed below:*

*(1) Secure and/or stabilize generating units where necessary.*

*(2) Prepare transmission corridors as necessary to support restoration.*

*(3) Assess ERCOT System condition, and available communication facilities.*

*(4) Restore and maintain communication facilities to the extent possible.*

*(5) Bring units with contracted Black Start capability On-Line.*

*(6) Provide service to critical facilities:*

*(a) Provide station service for nuclear generating facilities;*

*(b) Provide critical power to as many power plants as possible to prevent equipment damage;SECTION 4: EMERGENCY OPERATION ERCOT NODAL OPERATING GUIDES – DECEMBER 1, 2009 (EFFECTIVE UPON TEXAS NODAL MARKET IMPLEMENTATION) PUBLIC 4-15*

*(c) Secure or provide startup power for generating plants that do not have Black Start capability; and*

*(d) Supply station service to critical substations where necessary.*

*(7) Connect islands at designated synchronization points taking care to avoid recurrence of a partial or complete system collapse.*

*(8) Restore service to critical Loads such as:*

*(a) Military facilities;*

*(b) Facilities necessary to restore the electric utility system, including fuel sources;*

*(c) Law enforcement organizations and facilities affecting public health; and*

*(d) Public communication facilities.*

*(9) Restore service to the remaining Customers. Attention should be given to restoring feeders with under-frequency relay protection.*

*4.6.4 Responsibilities*

*(1) ERCOT’s responsibilities are as follows:*

*(a) Shall maintain a Black Start plan in accordance with NERC Reliability Standards;*

*(b) Coordinate and approve Planned Outage schedule for contracted Black Start Generation Resources;*

*(c) Train QSE, TO, Resource Entity, and Market Participant personnel in the implementation and use of the Black Start plan;*

*(d) Will review the plans and procedures for consistency and conformance with these Operating Guides and ensure that they are updated at least annually;*

*(e) Will make annual reports during the first quarter to the Reliability and Operations Subcommittee (ROS) of plan review and any testing activities of Black Start Generation Resources;*

*(f) Shall verify that the number, size, and location of system Black Start Generation Resources are sufficient to meet system restoration plan expectations; and*

*(g) In the event of an ERCOT System collapse, ERCOT will:*

*(i) Maintain continuous surveillance of the status of the ERCOT System;*

*(ii) Act as a central information collection and dissemination point for the ERCOT Region; SECTION 4: EMERGENCY OPERATION ERCOT NODAL OPERATING GUIDES – DECEMBER 1, 2009 (EFFECTIVE UPON TEXAS NODAL MARKET IMPLEMENTATION) PUBLIC 4-16*

*(iii) Coordinate reconnection of transmission;*

*(iv) Direct assistance for QSEs, TOs, Resource Entities, and Market Participants;*

*(v) Direct the distribution of reserve;*

*(vi) Coordinate the return of the ERCOT System to AGC.*

*(2) TOs’ responsibilities are as follows:*

*(a) Shall maintain a local Black Start plan which coordinates with the ERCOT Black Start Plan; and*

*(b) In event of an ERCOT or wide area blackout:*

*(i) Shall communicate with local Black Start units and the Black Start unit’s QSE;*

*(ii) Coordinate switching to next start units and local Load;*

*(iii) Shall implement its local Black Start plan;*

*(iv) Shall follow the direction of ERCOT on behalf of represented TSPs and DSPs;*

*(v) Shall act as the regional ERCOT representative in coordinating interconnection of units; and*

*(vi) Shall follow the direction of ERCOT for reconnection of islands.*

*(3) QSEs’, Resource Entities’, and Market Participants’ responsibilities are as follows:*

*(a) Shall use the ERCOT and local TO Black Start plan;*

*(b) Verify that associated personnel are proficient in its implementation and use; and*

*(c) In the event of an ERCOT System collapse, the QSEs, Resource Entities, and Market Participants will:*

*(i) Take immediate steps to initiate the local Black Start plan;*

*(ii) Supply ERCOT and/or the local TO with information on the status of generation, fuel, transmission, and communication facilities;*

*(iii) Follow the direction of the local TO or ERCOT in picking up local Load and starting next units; and*

*(iv) Provide available assistance as directed by ERCOT or the local TO.*

*(4) Section 8, Attachment A, Detailed Black Start Information, provides a detailed and specific Black Start information guide. Interested parties should use this information for technical SECTION 4: EMERGENCY OPERATION ERCOT NODAL OPERATING GUIDES – DECEMBER 1, 2009 (EFFECTIVE UPON TEXAS NODAL MARKET IMPLEMENTATION) PUBLIC 4-17*

*reference material, Black Start testing, development of Black Start plans, and training of personnel.*

*4.6.5 Black Start Emergency Back Up Communication Facilities Criteria*

*(1) All back-up communications systems shall meet the following minimum requirements:*

*(a) Be operational for 72 hours immediately following the start of a blackout without external power from the ERCOT System;*

*(b) Provide direct voice communications between Black Start Resource and TO, TO and other appropriate TOs, and TO and ERCOT; and*

*(c) Maintain written procedures that address operator training and the testing of the communication system;*

*(2) TOs shall have a satellite phone that meets the minimum back up communication requirements as a back up communication system and that is compatible with ERCOT’s satellite phone.*

B. Hourly Standby Fee Payments.

(1)(b) (iii) the Black Start Resource has failed a black start test, as described in the ERCOT Protocols or Operating Guides and has not passed a subsequent black start test; or

*Section 8, Attachment H*

*CONSIDERATIONS FOR BLACK START TESTING*

*(1) ERCOT shall maintain a record of contracted Black Start Generation Resources within ERCOT and update such records on an annual basis. The record shall include the name, location, MW capability, type of unit, date of test, and starting method of each Black*

*Start Resource per the NERC Reliability Standards. A current Black Start Generation Resource Test Results Form will be provided with the RFP for Black Start Service distributed by ERCOT.*

*(2) The owner or operator of each Black Start Generation Resource shall demonstrate through the testing procedures outlined in Protocol Section 8.1.2.2.6, System Black Start Capability, that the Generation Resource can perform its intended functions as required in the system restoration plan. ERCOT may also order random simulation or testing of Black Start capabilities. Documentation of the analysis shall be provided to NERC on request per the NERC Reliability Standards.*

Total References – 73