

**2021 AMEREN**  
**LOAD REDUCTION**  
**PROCEDURE**

## INDEX

Cover Page for Tracking

|       |  |        |
|-------|--|--------|
| I.    | Introduction   | Page 3 |
| II.   | Responsibilities – General   | Page 3 |
| III.  | Classification of Disturbance and Response Times   | Page 4 |
| IV.   | Restoration from Load Curtailment Activities to Normal   | Page 8 |
| V.    | Staffing Levels  | Page 8 |
| VI.   | Communication Protocols  | Page 8 |
| VII.  | Controlling Actions during Load Shed   | Page 8 |
| VIII. | Tasks to be Coordinated with and among Adjacent Transmission Operators, Balancing Authorities, Midcontinent Independent System Operator (MISO) and Southeast Electric Reliability Council (SERC) | Page 9 |
|       | Signature and Approval   | Page 9 |

## APPENDICIES

|                   |  |
|-------------------|--|
| <b>Appendix 1</b> | <b>2021 Ameren Corp UFLS Memo and Totals</b>     |
| <b>Appendix 2</b> | <b>2021 Ameren UFLS List</b>                     |
| <b>Appendix 3</b> | <b>2021 Ameren Load Shed List</b>                |
| <b>Appendix 4</b> | <b>2021 Emergency Authority rev January 2021</b> |

## LOAD REDUCTION PROCEDURE

### I. INTRODUCTION:

Load reduction may be required when a system does not have the ability to balance load and generation (including imports) or to prevent instability, cascading outages or voltage collapse. Whether this is caused by loss of generation, abnormal increase in load or a loss of system transmission facilities, certain procedures or automatic equipment may be utilized to alleviate possible equipment thermal overloads or potential low frequency conditions. Load reduction in specific areas may be required to prevent overload of equipment of the Bulk Electric System. When a system disturbance occurs, a prime consideration is to maintain parallel operation throughout the interconnected system if possible. This will permit rendering maximum assistance to the system in trouble, may prevent cascading of trouble to other parts of the interconnection, and will assist in restoration of normal operation.

**When automatic operations or other options are not expected to alleviate system separation or transmission facility overloads, the Transmission Operations Supervisors (TOSs) have been given the authority to direct load reductions as necessary. (See Appendix 4 2021 Emergency Authority rev January 2021)**

### II. RESPONSIBILITIES - GENERAL:

- A. The TOS is the jurisdictional and functional authority over the interconnected electric transmission system.
- B. **The TOS shall initiate load curtailment activities as required, without delay.**
- C. The Distribution Control Offices are the functional authority over the radial electric transmission system and both functional and jurisdictional authority over the electric sub-transmission and distribution system.
- D. **The Distribution Control Supervisors shall notify the Call Center and Regional Managers of planned load shedding activities as quickly as practicable but shall not delay TOS directed shedding of load to make this notification.**
- E. The TOS, and the Transmission Dispatchers shall review available information and determine what type of disturbance the electric system is experiencing. Based upon this evaluation, the TOS shall take the appropriate actions as outlined in this instruction.
- F. **Regional Directors or their designees are to periodically review the loads in their regions and prioritize the circuits for load shedding activities.**
- G. The TOS or the TOS designee will contact generator operators to request reduction of non-essential station loads at each generation station. **Note that a separate call should be made by the TOS directly to the Shift Supervisor at Clinton and Callaway nuclear stations.**

- H. The Supervising Engineers (Missouri and Illinois) of Distribution System Planning shall annually review existing under-frequency load shedding compliance with SERC Supplement, Underfrequency Load Shedding, and NERC Reliability Standards PRC-006 through 009.
- I. The Supervising Engineers (Missouri and Illinois) of Distribution System Planning, the TOS, Supervising Engineer of Transmission Planning, and Dispatch Supervisor shall review anticipated system conditions and develop any necessary Operating Guides to supplement this instruction.
- J. **Directors of Corporate Communications shall coordinate any public communications in anticipation of, or the actual occurrence of, electric system problems, load curtailment activities, or load shedding operations, as appropriate.**

### **III. CLASSIFICATION OF DISTURBANCES AND RESPONSE TIMES:**

The TOS, the Distribution Dispatch Office Personnel, Transmission Dispatchers, Power Dispatchers, and all Operating Personnel, shall keep each other informed during any system disturbance relative to abnormal local frequency, line flows, voltage and the condition of equipment. A comprehensive record and log shall be kept of all emergency operations and switching, in order that restoration to normal can be accomplished in an orderly manner. This is accomplished through SCADA and elogs but other measures may be required.

Based upon the severity and type of the system disturbance, slightly different responses are necessary. For purposes of this instruction, the 3 basic time frames for responding to the situation are: **Less than 1 minute, More than 1 minute but Less than 2 Hours, and More than 2 Hours.**

#### **A. Less than 1 minute - Typically Rapidly Declining Frequency**

In a large interconnected system, the possibility of critically low frequency is remote but not impossible. The Mid Continent Independent System Operator (MISO) Energy Management System (EMS) has Automatic Generation Control (AGC). This operating mode automatically changes generation to supply Ameren's frequency bias responsibility to the interconnected system.

Operating Reserves for Ameren load are acquired in the MISO market through the Energy Operating Reserve Tariff.

If abnormal frequency is indicated, the TOS shall immediately analyze telemetering instruments and communicate with power plants and dispatch centers of neighboring systems to ascertain the source of trouble. Once analyzed, correcting measures such as increased generation or load shedding can be taken to restore frequency and, if necessary, permission may be given for resynchronizing at one or more points of separation. This will, time permitting, be coordinated with the Reliability Coordinator and the MISO Regional Generation Dispatcher.

If the Automatic Generation Control trips, it shall not be placed back in service until the operator is assured that the Balancing Authority it controls is intact. However, if the Balancing Authority seems normal, all tie line meters are operating within range, and the frequency meter is indicating frequency within the 60.4 – 59.6 band, then the Automatic Generation Control should remain or be placed back in service unless its operation tends to aggravate an abnormal condition at either the power plants or the tie lines to other critical Balancing Authorities.

If automatic load control is unavailable due to low frequency, then manual control may be used at the power plants to increase generation to the point necessary to restore automatic control, provided mutual agreement is obtained from MISO and adjacent Balancing Authorities to insure that such changes do not have adverse effects on their system or overload interconnecting tie point facilities beyond emergency ratings.

## 1. UNDER-FREQUENCY RELAYS

a) Automatic load shedding under-frequency relays are installed in specified load areas, to assist in establishing conditions of stability in event of extreme low frequency. SERC Supplement, Underfrequency Load Shedding, NERC Reliability Standards PRC-006 through 009 details the required automatic load shedding utilizing under-frequency relays. Basically 10 percent of total system load is to be shed at 59.3 Hz, at 59.0 Hz, and at 58.7 Hz, for a total of 30 percent.

b) **Appendix 1 - 2021 Ameren Corp UFLS Memo and Totals** briefly describes the process for the Ameren Underfrequency load shed program. It also includes a summary of the quantity of load shed in Illinois, Missouri and on the total Ameren system. **Appendix 2 - 2021 Ameren UFLS List** lists the substations, appropriate breakers being tripped, under-frequency trip setting, and approximate peak summer load and state location for each affected load.

c) In the event of an under-frequency relay operation, proceed as follows:

i. Transmission Dispatcher shall contact the TOS whenever an under-frequency relay operates with information on which loads were shed. Transmission Dispatchers should make no attempts to reclose any transmission lines until directed to do so by the TOS. It is possible that an island (group of substations and generation plants) may have formed that is no longer part of the interconnected system and may be operating at a frequency other than 60 Hz. Therefore, attempting to close a tie line with that islanded system may lead to further system collapse.

ii. The TOS shall determine the cause of the under-frequency operation. When system conditions allow after consultation with the Midcontinent ISO and any neighboring Transmission Operators whose systems might be affected, the TOS shall direct the Transmission Dispatcher to reconnect all or part of shed load and the transmission lines can be reclosed to re-establish the interconnected system.

d) Frequency must be at least 59.95 Hz before the under-frequency lockout relay can be reset.

e) Station batteries are designed to provide substation protection power requirements for 8 hours.

## 2. Load Reduction during Abnormal Operations

While load reduction may be directed with a normal system configuration to reduce loading on equipment, maintain reserves or to maintain Automatic Generation Control (AGC), there may be abnormal conditions for which load reduction would be required. Such abnormal conditions might include operating in an island situation due to restoration from a full or partial blackout or multiple emergent equipment outages.

If the abnormal situation includes operating an island and all of the load and generation in the island is in the Ameren control areas (whether AMIL or AMMO) Ameren Transmission will be solely responsible for controlling and directing generation and load in order to maintain voltage, AGC, if appropriate, and voltage. Among other tools for accomplishing these controls, the TOS may direct manual load shedding. In this situation MISO will likely monitor but will not be involved in these controls.

If the abnormal situation includes operating an island which includes Ameren load and/or generation with load and/or generation controlled by one or more other Transmission Operators, control of load and generation will need to be coordinated between Ameren and any other TOPs with either load or generation which would normally be in their control area. MISO will also assist in this coordinated effort. If manual load reduction is necessary it will be coordinated between MISO and all concerned TOPs. However, Ameren load reduction will be directed by the Ameren TOS.

### 3. NOTIFICATION OF LOAD SHEDDING ACTIVITIES

In the event of correct load shedding activities by under-frequency relays the TOS is to notify the Director – Transmission Operations and the Midcontinent ISO. The Director – Transmission Operations will make other subsequent notifications. Department of Energy Form OE-417 will be completed as time permits within requirements for specific lines and schedules.

### 4. POWER PLANT OPERATION AT FREQUENCIES BELOW 60 HZ

a) Extended operation at frequencies below 59.5 Hz may result in structural damage to turbine blades by resonant vibration. Plant operating instructions should specifically address operating procedures during these conditions.

b) AT 58.3 CYCLES GENERATING STATIONS WILL EACH ATTEMPT TO ISOLATE ONE UNIT EITHER WITH ITS OWN AUXILIARIES ONLY OR WITH LOCAL LOAD

### **B. More than 1 Minute and Less Than 2 Hours - Typically Overloaded Facilities or Slowly Declining Frequency**

This situation will normally arise when system overloads occur due to transmission interchange and can be significantly impacted when aggravated due to subsequent facility outages, such as generators, transmission lines, or transmission transformers. For each of these situations the TOS should direct other Distribution Providers in the Ameren Control areas to reduce load consistent with the proportion of load reduced by Ameren.

#### 1. SLOWLY DECLINING FREQUENCY PROBLEMS

If the TOS determines that the system is experiencing a frequency problem due to insufficient generation sources for the system load, then load shedding activities and generation increases to approved emergency loading conditions need to occur.

a) The TOS consults with the Midcontinent Independent System Operator to request Power Plant personnel to operate units to emergency loading levels.

b) **If time permits, the TOS directs Distribution Control Offices to quickly shed load from the system at voltages 69 kV and below via remote operation.** The list of these loads by the Dispatch area is listed in **Appendix 3 - 2021 Ameren Load Shed List.**

c) **If time does not permit the TOS to direct Distribution Control Offices to quickly shed load, the TOS will:**

**i. use the “Set Modes” display to obtain permission to operate on the distribution systems where possible, and**

**ii. drop loads as necessary**

**iii. or TOS deenergizes loads using 138kV breakers.**

d) In the event the TOS directs load shedding notification should be made to the Director – Transmission Operations and the Midcontinent ISO. **The Director – Transmission Operations will make other subsequent notifications.**

## 2. TRANSMISSION LOADING PROBLEMS

a) If Dispatch Supervisor, Transmission Dispatchers, and the TOS determine that a transmission facility is operating above its normal ratings, then proceed as follows:

i. The TOS shall determine what the actual rating of the facilities should be, based upon current environmental conditions. This step is necessary due to the fact that normal ratings are based on one set of environmental conditions which can be increased due to such things as increased wind velocity or decreased temperatures. If time permits, this step may involve discussions with appropriate engineering personnel.

ii. The TOS and MISO Reliability Coordinator shall evaluate the situation and determine if any alternative switching arrangements can be made to alleviate system loading problems. The TOS will review available Operating Guides as necessary. If time permits, this step may involve simulating switching by utilizing an electric load flow model.

iii. **The TOS and Distribution Control Supervisor shall analyze the loading situation and appropriate equipment rating to determine if load shedding activities are required. If load shedding activities are required, then proceed as follows:**

b) The TOS requests loading relief on the affected transmission facility. MISO initiates curtailment of all non-firm interchange transactions and executes congestion management measures.

c) The TOS initiates process to start customer's emergency generators in appropriate areas.

d) The TOS initiates process for requesting wholesale customers and cogenerating facilities to increase their generation and/or drop their interruptible load in appropriate areas.

e) The TOS requests loading relief on the affected transmission facility. MISO initiates curtailment of all firm interchange transactions and any additional congestion management measures.

f) **If time permits, the TOS directs Distribution Control Offices to quickly shed load from the system at voltages 69 kV and below via remote operation.** The list of these loads by the Dispatch area is listed in **Appendix 3 - 2021 Ameren Load Shed List.**

g) **If time does not permit the TOS to direct Distribution Control Offices to quickly shed load, the TOS will:**

**i. use the “Set Modes” display to obtain permission to operate on the distribution systems where possible, and**

**ii. drop loads as necessary**

**iii. or TOS deenergizes loads using 138kV breakers.**

h) NOTE: If generation balance is not met, Ameren Illinois and Ameren Missouri native load will have to be shed on a percentage basis with wholesale customers, such as PPI, IMEA, etc. In the event of a localized problem, shed the most effective load.

i) In the event the TOS directs load shedding notification should be made to the Director – Transmission Operations and the Midcontinent ISO. The Director – Transmission Operations will make other subsequent notifications. **If time permits, notification should be made prior to shedding loads.**

j) **Corporate Communications shall initiate requests for general public load reductions through public news media.**

### 3. POWER SUPPLY DEFICIENCY PROBLEMS

a) If the TOS determines that the system is experiencing a power supply deficiency problem due to insufficient generation sources for, or in anticipation of, the system load, then load shedding activities and generation increases to approved emergency loading conditions need to occur. Proceed as directed under above Transmission Loading Problems plus:

If time permits the TOS will ask that MISO requests Power Plant personnel to operate units to emergency loading. If time does not permit the TOS will requests Power Plant personnel to operate units to emergency loading.

#### **C. More Than 2 Hours- Typically Overloaded Facilities or Power Supply Deficiency**

This situation is same as Section B above except that there is more time to react. Therefore, **all appropriate personnel shall be informed prior to initiating any load shedding or operating generating facilities at emergency levels.** The only change would be:

a) **The TOS shall direct Transmission Dispatchers to direct operating personnel to reduce distribution feeder voltage by 3% in the appropriate areas and on the circuits equipped for voltage reduction.**

b) **The TOS shall direct Distribution Control Offices to shed load from the system at distribution level with the distribution substation breakers or wholesale customer delivery points. Depending upon length of emergency, these loads shall be rotated, if possible, in an attempt to have a circuit de-energized no longer than 2 hours.**



c) In the event the TOS directs load shedding notification should be made to the Director – Transmission Operations and the Midcontinent ISO. **The Director – Transmission Operations will make other subsequent notifications. If time permits, notification should be made prior to shedding loads.**

d) **The TOS should direct other Distribution Providers in the Ameren Control areas to reduce load consistent with the proportion of load reduced by Ameren. The other Distribution Providers should be informed as to the amount of load to be reduced and that this reduction must be maintained until load is able to be restored to normal. The Distribution Provider's load can be reduced either by rotating the loads to be reduced or leaving the initial reductions offline for the duration of the requirement.**

#### **IV. Restoration from Load Curtailment Activities to Normal**

The TOS shall direct restoration of system to normal.

#### **V. Staffing Levels**

The normal on-duty staff can begin implementation of the load shedding. The TOS is expected to call for assistance from the call-out list used in daily operations to delegate activities as he/she wishes. It is recommended that at least three Transmission Dispatchers, two TOSs and either one Senior TOS or the Director of Transmission Operations is working following initiation of load shed activities until operations are returned to a normal condition.

#### **VI. Communications Protocols**

During load shed activities the regular communication protocols and directive procedures should be used for clear and efficient communication.

#### **VII. Controlling Actions During Load Shed**

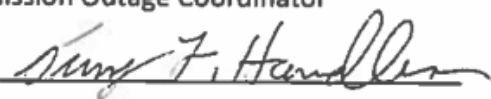
- A.** Requesting assistance from neighboring Transmission Operators or Balancing Authorities.
- B.** Requesting maximum generation from the Midcontinent ISO, generating plants or, through appropriate contacts, customers with onsite generation.
- C.** Through appropriate contacts, request voluntary load reductions of company load, power plant load and customer load.
- D.** Direct field personnel as required.
- E.** Notification of management and other entities.
- F.** Change Modes for operation from EMS consoles.
- G. Deenergize facilities, including load, as necessary.**
- H. Direct deenergization of facilities, including load, as necessary.**

**VIII. Tasks to be Coordinated with and among Adjacent Transmission Operators, Balancing Authorities, Midcontinent Independent System Operator (MISO) and Southeast Electric Reliability Council (SERC)**

- A. Review of system status and condition
- B. Generation control
- C. Load reduction
- D. When appropriate, load restoration
- E. Frequency control
- F. Voltage control
- G. Maintain and/or establish the interchange schedules
- H. Review Load Reduction Procedure

2021 Load Reduction Procedure prepared by: Terry L. Handlen

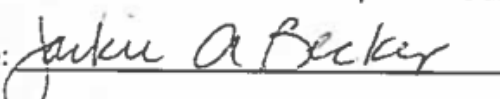
Title: Transmission Outage Coordinator

Signature: 

Date: 07/06/2021

2021 Load Reduction Procedure approved by: Jackie A. Becker

Title: Senior Director – Transmission Operations and Maintenance

Signature: 

Date: 07/06/2021

**Appendix 1**

**2021 Ameren Corp UFLS Memo and Totals**

## **Appendix 4**

**2021 Emergency Authority rev January 2021**



## Authority to Order Emergency Actions, including Load Shed

When emergency conditions are present, or expected, on the Bulk Electric System, the **Senior Director-Transmission Operations and Maintenance, the Manager – Transmission Operations**, or the on-duty **Transmission Operations Supervisor** shall have the responsibility and clear decision-making authority to take whatever actions are needed to ensure the reliability of the Transmission and Balancing Authority areas and shall exercise that specific authority to alleviate operating emergencies; and if necessary, extend their control to the entire electrical systems of **Ameren Illinois, Ameren Missouri, and Ameren Transmission Company of Illinois** to maintain the integrity of the Interconnection or the Ameren System. All control will be accomplished via Operating Instructions which may include actions to: reconfigure the system, operate devices, increase/decrease generation levels, or reduce, divert or re-allocate the amount of load to be carried on various parts of the electrical system. Recipients of Operating Instructions must comply without intentional delay; however if the origin of an Operating Instruction is suspicious, a return call to the Transmission Operations Supervisor (314-554-2988 or 314-621-7060) should be made to verify the Operating Instruction.

With regard to firm load shedding, it is the policy of Ameren to: interrupt non-firm (interruptible) customers, work with the Reliability Coordinator to load all generation to emergency limits, load tie-lines to safe loading limits, reduce local distribution voltage, and take other action as deemed practical and necessary, when time permits, before customer's load is interrupted. **However**, when system operating limits are reached, there shall be no hesitation in reducing firm load if that load reduction will be instrumental in preventing general system service failures or a general area service failure. **In such a situation, the Transmission Operations Supervisor has the authority to direct Ameren Distribution Control Offices to Shed Load.** The direction to shed load may be transmitted by the Transmission Dispatchers, but will be approved by the Transmission Operations Supervisor, who is designated as Ameren's System Operator. Unless requested to immediately shed load because time is of the essence, the appropriate Distribution System Operator shall attempt to place a return call to the Transmission Operations Supervisor (314-554-2988 or 314-621-7060) to verify the request. The Distribution System Operator shall commence shedding load without delay, either through SCADA or the use of field personnel.

Shawn E. Schukar  
President Ameren Transmission  
Company of Illinois  
  
Sr. Vice President, Transmission  
Ameren Services Company

Date: February 4, 2021

Richard J. Mark  
President  
Ameren Illinois

Date: 2-5-2021

Martin J. Lyons, Jr.  
President Ameren  
Missouri

Date: February 8, 2021