Power System Switching Procedure

Chapter 1
November 2018

POWER SYSTEM OPERATIONS MANUAL
Western Area Power Administration
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## Version History

Table 1 provides the development history of this document.

**Table 1 Version Information**

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|      |         | -added the 6 steps of switching to template in Appendix H  
|      |         | -modified list of editors  
|      |         | -updated 6.6.7 to state removal has NOT begun, removed “note”, and fixed table of contents page numbering  
|      |         | -removed bad link to “HLO” reference document  
|      |         | -created dynamic table of contents, thereby also eliminating page numbering discrepancy for 2.2 “Logbooks” and 2.3 “Tags” |
| 2017 | General | Rebranded with general numbered template from HQ RC to eliminate updating problems. The template applied is used generally by WAPA HQ. |
| 2017 | General | Replaced cover photo  
|      | General | non-substantive edits to correct errata due to new format. |
| 2017 | General | Reinserted Emergencies under 6.3.3  
|      |         | Reinserted “Shall” in 7.3.1 & 7.3.2  
<p>|      |         | Corrected General formatting errors |
| 2018 | Version History | Removed old Appendix K (Version History) and inserted previous revision history into current WAPA Templated Version History format. Previous Appendix L changed to new App K. |
| 2018 | General | General edits for consistent use of: abbreviations, capitalization, punctuation, font and font size, boldness, alignment, Style, etc |</p>
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Preface

On October 1, 1977, Public Law 95091 transferred the power marketing and transmission functions of the Bureau of Reclamation to the Department of Energy. On December 21, 1977, the Western Area Power Administration (WAPA) was established within the Department of Energy to carry out these functions.

The November 2016 revision of Chapter 1 of the Power System Operations Manual was the result of a coordinated effort spanning every Region in WAPA, tapping the expertise and knowledge of many individuals, and incorporating needs across all affected functional groups. Two goals were identified early in the process: 1) To build upon the work of the past, and 2) To ensure OSHA compliance.

Throughout the process, WAPA employees and managers provided feedback and recommendations, while the cross-functional PSOM Chapter 1 Review Team provided guidance and decision-making authority for the final product. The team, comprised of representatives from each Region, solicits formal input and reviews suggested changes annually. WAPA appreciates the efforts of everyone who contributed, especially the following

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1. Introduction

1.1 Purpose

This Power System Operations Manual (PSOM) Chapter 1 establishes consistent and coordinated procedures for the safe and reliable operation and maintenance of Federal power system facilities for which Western Area Power Administration (WAPA) is responsible. This document is to be used in conjunction with work practices and guidelines in WAPA’s PSOM Chapters, Power System Safety Manual (PSSM), Power System Maintenance Manual (PSMM), and WAPA’s Safety and Occupational Health Program (WAPA Order 440.1) with the objective of creating a safe working environment.

This Chapter also contains language to ensure the Bulk Electric System (BES) portions are operated in compliance with applicable North American Electric Reliability Corporation (NERC) standards.

1.2 Scope

This document establishes procedures that shall be complied with throughout WAPA. This applies to employees, contractors, and non-WAPA entities as required in this document.

1.3 References

- Section 302 of Public Law 95-91, the Department of Energy Organization Act
- Power System Maintenance Manual (PSMM)
- Power System Operations Manual (PSOM)
- Power System Safety Manual (PSSM)
- Occupational Safety and Health Program (WAPA Order 440.1)
- OSHA General Industry Standards (CFR 1910)
- WAPA Records Retention Standards
- WAPA Construction Standards, Standard 1, General Requirements
1.4 Review and Revision

WAPA will review this Chapter annually and update it as necessary, to assure that the guidelines and procedures are adequate for the safe and reliable operation and maintenance of the Federal power system. Proposed revisions may be submitted to the Supervisory Power System Dispatchers (AD 6s) using the form in Appendix D. Once reviewed by the respective AD-6, they will be forwarded on to the Senior Power Operations Specialist for consideration in the next review process.

1.5 Interpretations

The stated interpretations for the following words shall apply throughout this Chapter:

1. May: Permissive choice

2. Shall: Mandatory

3. Should: Advisory

4. Will: Mandatory, but allowing the responsible employee or party discretion as to when, where, and how.

NOTE: Terms used in this document shall be interpreted as gender-neutral.

1.6 Emergencies

In an emergency, Authorized Personnel may modify or suspend any of these procedures temporarily, as necessary, to permit proper handling of the specific emergency. For emergency switching when Authorized Personnel are not available, other personnel may be used. These may be either WAPA or non-WAPA employees deemed qualified by the System Operator to perform the switching. In handling such emergencies, safety shall be the primary consideration. Authorized Personnel shall first ensure that the situation is safe, and then contact the System Operator.

1.7 Variance to the PSOM

If a situation arises that cannot be addressed by the PSOM, a variance to the PSOM must be requested and approved utilizing the form found in Appendix F of this Chapter.

The variance to the PSOM shall not conflict with OSHA 1910.269(m).
1.8  Principles of Safe Switching Procedures

The following principles are considered basic to the safe operation of the Federal power system and to those systems operated for other entities by WAPA:

1.8.1  Priorities

The following are priorities in their order of importance:

1. Physical safety of employees and the public

   Employees shall realize, “If I violate a procedure, Safety Tag, Hot Line Tag, or Lockout-Tagout Tag, I may kill somebody!”

2. Integrity and reliability of the Federal power system

3. Protection of equipment

4. Service to the customer.

1.8.2  Activities Under WAPA’s Control

1.8.2. All activities under WAPA’s control, such as placement, issuance, receipt, release, and removal of all switching programs and associated operations, shall be performed by Authorized Personnel.

1.8.3  Switching Operations

All switching operations shall be guided and tested by the fundamental principles, "Start with the correct procedure and follow it exactly."

This shall be accomplished by following:

1. Carry the switching program with you while switching.

2. Touch or point to the device identification name plate to verify its/your location.

3. Recheck the switching program for right location and right sequence.

4. Verify anticipated device position.

5. Perform requested action on the device.
6. Verify desired device position.

Note: These steps are referred to as The Six Basic Steps of Switching.

1.8.4 WAPA and Non-WAPA Personnel

WAPA and non-WAPA personnel shall comply with the requirements of safety and procedural provisions in this manual, PSSM, PSMM, WAPA Order 440.1, OSHA, and in WAPA’s Construction Standards, Standard 1, General Requirements. When there is a conflict between this and other applicable safety, maintenance, or construction documents, observe the most stringent requirement.

1.9 Facility Visits and Attendance

Anyone visiting any substation or communications site shall contact the System Operator upon arrival and departure and provide the following information:

1. Who they are (name)
2. Where they are at (location)
3. What they want (purpose)

This includes specific details of any work that may affect power system operations or reliability. The visit and reasons for the visit shall be recorded in the operations and substation logs.

Auto logging into the dispatcher log is permitted for initial entry into facility. Use of auto logging will only be permitted if the dispatcher is provided a visual representation of entries into facilities.

If the reason for the substation visit does not require the need to enter the substation control room (such as the substation facility is used for equipment storage and the person entering the substation to perform inventory/delivery actions, meter reading, vegetation control, etc.) then the individual(s) must call the System Operator when entering and departing the facility. In these instances, the need to enter the control room only for the purpose of logging in and out of the substation log shall be left to the discretion of the Region.

Maintenance personnel duty-stationed at a particular station shall follow local reporting procedures when arriving or departing during normal work hours. Activities outside normal work hours shall be reported to the System Operator upon arrival and/or departure. The visit and reasons for the visit shall be recorded in the operations and substation logs.
Security personnel entering a substation for routine patrols will follow local reporting procedures when arriving or departing a facility.

In the event that anyone visiting a substation suspects that vandalism and/or sabotage may have occurred, the System Operator shall be immediately notified.

### 1.10 Systems Reliability and Integrity

#### 1.10.1 Outage Duration

The duration equipment is abnormal or removed from service for any reason shall be kept to a minimum by:

1. Making equipment available to the crews at the prearranged time.
2. Ensuring crews are ready to start work at the prearranged time.
3. Releasing the equipment promptly upon completion of the work.
4. Returning equipment to service as soon as possible. Events such as shift changes and lunch periods, and overtime considerations shall not unduly impede or delay returning equipment to normal.

#### 1.10.2 System Operator

The System Operator shall provide outage information daily to its Reliability Coordinator, and to affected neighboring utilities for scheduled BES transmission outages planned for the next day that may collectively cause or contribute to an SOL or IROL violation or a regional operating area limitation.

#### 1.10.3 Scheduled Outages of System

Scheduled outages of system voltage regulating equipment, such as automatic voltage regulators on generators, supplementary excitation control, synchronous condensers, shunt and series capacitors, reactors, etc., shall be planned and coordinated between affected utilities.

#### 1.10.4 Scheduled Outages of Communication

Scheduled outages of telemetering and control equipment and associated communication channels shall be planned and coordinated between affected utilities.
2. Materials and Instructions for Use with Switching Procedures

2.1 Forms

2.1.1 Switching Program Form Request

The request identifies the Requestor, the Clearance Supervisor or Hot Line Order (HLO) Supervisor, the purpose of the request, equipment to be removed from service, limits of protection (for Clearance), requirements (for HLO), date and time (for placement and removal), and emergency response location information. Requests may be written or verbal.

2.1.2 Switching Program Form

2.1.2.1 Switching Program Form Purpose

WAPA Switching Program Forms formalize and document each step in the process of establishing and releasing Clearances, Hot Line Orders, Special Conditions, and performing General Switching.

The respective Regional offices will produce Switching Program Forms. Each form shall contain the following information:

1. Cover Sheet
2. Switching for placement

Space for other information may be provided. The Switching Program Form and entries shall be typewritten/computer-generated or hand-printed using permanent marking material.

2.1.2.2 Switching Program Form Application

1. All Switching Program Forms shall be prepared by a System Operator and checked by a second System Operator when possible. The Form shall identify who prepared it and who checked it.

2. Upon completion of the work, the Switching Program Form shall be kept as a supplement to the operations log and to the substation log according to records retention standards.
Any changes made to the Switching Program Form, including switching steps, shall identify the person making the change and the date of the change.

3. To limit interruption time to customers, the System Operator may direct emergency sectionalizing switching and log operational times without documenting this information on a Switching Program Form.

2.1.2.3 Form Numbering

1. The Form shall state whether the procedure is a Clearance, Hot Line Order, Special Condition, or General Switching.

2. Each Switching Program Form for Clearances, Hotline Orders, General Switching, and Special Conditions shall be given a unique sequential number. The sequential numbers shall start with a letter identifier:

   \[C = \text{Clearance}\]
   \[HLO = \text{Hot Line Order}\]
   \[SC = \text{Special Conditions}\]
   \[G = \text{General Switching}\]
   \[IC = \text{Inter-connected System action (the prefix is used with other letters to signify interconnected actions).}\]

3. The year is next, followed by sequential numbers. Only one set of sequential numbers shall be used, except in regions where the volume of switching dictates that each type of action must have separate sets of sequential numbers.

   \[\text{Example:}\]
   \[C-YY-#### (where C = clearance, YY = year indicator, and #### = sequential number)\]

   For identical clearances and hot line orders, the sequential number shall be followed by a suffix (A, B, C, etc.)

   \[\text{Example:}\]
   \[HLO-YY-####A (where HLO = hot line order, YY= year, #### = sequential number, and A = identical hot line order indicator)\]

4. Revision Process Format:
a) A switching program that has been prepared and peer reviewed (checked) by two System Operators, and has been finalized.

b) Something has required a modification to the finalized switching program; once the switching program has been modified the peer review process must be completed before the program can been finalized again.

c) Once this takes place a “Revision Number” is assigned.

Example:

C-YY-##### (where C = clearance, YY = year indicator, and ##### = sequential number, Revision 1).

2.1.2.4 Switching Steps

1. “Switching for Placement” and “Switching for Removal” sections of the Switching Program Form record the Facility Identifier (FID), equipment and switchmen involved, the exact steps required, and the tagging information.

2. Each switching step shall be listed in the sequence to be performed per LOCATION and shall include operations or steps not requiring a tag. The sequence may be changed at the discretion of the System Operator after communicating the change to the switchman.

3. Equipment shall be identified by FID and equipment number and may be further identified by type and usage.

4. There shall be only one operation per step on the Switching Program Form.
   a) Checking one operating device’s position is considered one step.
   b) Operating one device, checking it in the desired position, and tagging it is considered one step.

5. Switching steps shall be written to include:
   a) Time
   b) Step number
   c) Action to be completed
   d) Device number.

6. Only the following abbreviations or acronyms shall be allowed:
a) Substation equipment acronyms

b) Power company abbreviations or acronyms

c) Identifiers labeled with an abbreviation in the stations.

   Example:

   Bus Differential Control Switch (187 BDCS or 187 BCS)

2.1.2.5 43LS (Local/Supervisory) Switches

The 43LS switch for a switchyard device is used to isolate the device from control actions, inadvertent or intentional, from the SCADA system or RTU. The 43LS switch is located in the control building and is not to be confused with the Local/Remote switch located at the actual device cabinet in the switchyard. Turning the 43LS switch to Local can prevent the switchman from experiencing unexpected control actions. It is recommended that a step of switching to place the Local/Supervisory switch to Local be performed prior to any switchman performing steps of switching on or near a device that is SCADA controlled. If the equipment control system is equipped with a 43LS switch and will not interfere with the intended work to be done, then it should be placed to Local.

2.1.3 Special Work Permit Form

The Special Work Permit Form formalizes and documents preparation and coordination between WAPA and non-WAPA personnel to authorize work by contractors and non-WAPA construction or maintenance forces on or near WAPA’s power facilities.

Note: Section 11 explains where to find the Special Work Permit information.

2.2 Operations and Substation Logbooks

All entries shall be-legibly written in permanent marking material or entered into permanent, write-protected, electronic files. Entries shall be made as soon as possible after the action. The name of the person making entries shall appear in the log. Additionally, the following information shall be entered into the operations and substation logs:

1. Date
2. Time
3. Type of action (Clearance, HLO, Special Condition, or General Switching)
4. Assigned program number

5. Person issued to or released by


Substation log entries shall be made in clear, concise language using only accepted substation FID codes and complete words (no ditto marks, etc.).

The System Operator shall record outstanding Clearances, Hot Line Orders, Special Conditions, and/or General Switching at the beginning of each day.

2.2.1 Issue or Release Action

Each Region shall ensure systematic maintenance of logbook records. This requires:

1. Issue and Release action log entries shall be made in a distinctive font or color of ink or rubber stamp for operations logs and substation logs.

2. A readily accessible file shall be maintained at the Dispatch Office of Switching Program Forms for current Clearances, Hot Line Orders, Special Conditions, and General Switching.

2.2.2 Errors or Changes in Log Entries

Errors or changes in log entries shall be voided without destroying the original record. Such changes, handwritten or electronic, shall be made by drawing a single line through the error or with an addendum to the record. The person making the change and the date shall be identified on the record.

2.3 Tags

Locations of the Safety and Hot Line Tags define the perimeter for Clearances and Hot Line Orders. Attachment shall meet the requirements of OSHA 1910.269(d)(3)(ii)(D).

Only the Regional Dispatch Offices have the authority and responsibility to approve and control tags (except LOTO). Only Tags approved for specific procedures (Clearances, Hot Line Orders, Special Conditions, and Lockout-Tagout) shall be used.
2.3.1 Safety Tags

Safety Tags are used in connection with Clearances to convey that employees are working on or near equipment. The tags are to indicate employees working and do not operate. The Safety Tag shall be considered the same as a lock.

**IMPORTANT:** A Safety Tag shall be used only on devices which provide for a means of visible isolation.

The tagged point shall not be operated while the Safety Tag is in place.

Safety Tags shall be Regionally-approved, pre-numbered, and made of red plastic. Regions shall designate and affix appropriate FID with sequential numbers to at least one side of each tag. There shall be no duplication of tag numbers in any one facility.

**NOTE:** Regions may utilize a Safety Tag on other devices when Operations and Maintenance concur that its placement is necessary or beneficial to the safety of personnel.

2.3.2 Hot Line Tags

Hot Line Tags are used in connection with Hot Line Orders to prevent re-energizing equipment.

Hot Line Tags shall be Regionally-approved, pre-numbered, and made of yellow plastic. Regions shall designate and affix appropriate FID with sequential numbers to at least one side of each tag. There shall be no duplication of tag numbers in any one facility.

2.3.3 Special Condition Tags

Special Condition Tags designate Special Conditions (see Section 9) affecting equipment. The tag shall be uniquely numbered and entries made in permanent marking material.

2.3.4 Lockout-Tagout Tags

Lockout-Tagout Tags are used for Lockout-Tagout (LOTO) procedures where voltage is 600 volts or less. Exceptions are for potential transformer secondaries or other secondaries, when used as limits of protection in a clearance (see Section 6). LOTO procedures are for the protection of workers and workers shall use them in accordance with WAPA Order 440.1 and the PSSM.
2.3.5 **SCADA Control**

When a Clearance or Hot Line Order is issued or Special Condition is placed on equipment operated by SCADA, this status **shall** be indicated on SCADA. If Clearance, Hot Line Order, and Special Condition placement or removal data are automatically logged and documented by means of the computer printout, these printouts may be used to supplement the documentation in the operations log.

2.3.5.1 **Clearance**

When a Clearance is involved, the Safety Tag indication on the SCADA display point is only for the information of the System Operator and **shall not be** relied upon to protect workers.

When a Hot Line Order and a Clearance are in place simultaneously and the SCADA display cannot indicate both conditions affecting the same device, the Hot Line Tag indication **shall** take precedence over the Clearance (Safety) Tag indication. If either action is removed, the appropriate remaining tag **shall** be retained.

2.3.6 **Backup SCADA Control**

When other companies have remote control capabilities of equipment under WAPA's operational jurisdiction, the other company's SCADA display **shall** show an appropriate symbol to indicate a Clearance or Hot Line Order. WAPA **shall** require the tagging of any remote control SCADA display for Clearances and Hot Line Orders where possible. A Special Condition notation may be placed on the other company's SCADA display if deemed necessary by the WAPA System Operator.

2.3.7 **Equipment Operated by DCS Technology**

This topic discusses Digital Control System (DCS) technology.

Each Region **shall** develop procedures for training and manual tagging of substation equipment that uses digital control technology. Manual tagging will be used when SCADA control is unavailable and only at the direction of a System Operator. At a minimum, this evolving technology **shall** allow for placement of an electronic or manually activated symbol (either locally, or by supervisory) to indicate a Hot Line Order is in effect, which **shall** also inhibit breaker closure.
3. General Responsibilities and Authority for Switching Procedures

3.1 Switching Responsibilities

Each person involved with switching procedures shall do the following:

1. Understand Chapter 1 rules and switching procedures and be able to apply them to the work performed.

2. Analyze the switching instructions as far in advance as possible. Questions regarding the completeness or correctness of the Switching Program Form shall be resolved before the switching begins.

3. If a question arises at any point during the switching sequence, it shall be resolved to the satisfaction of all involved parties before continuing with the Switching Program Form.

4. Always perform the operations in the sequence listed on the switching program form or as directed by the System Operator.

5. Ensure the requirements of the PSOM are:
   a) Understood by all concerned
   b) Properly applied
   c) Strictly observed.

6. Act strictly within their authority.

7. Always observe and use the Six Basic Steps of Switching.

8. Be able to demonstrate knowledge and proficiency on this document at any time.

9. Correctly identify all equipment. In the case of a transmission line, its proper designation must be given and all terminals must be specifically identified.

10. Log all appropriate information.

IMPORTANT: NO PERSON WILL BE REQUIRED TO PERFORM SWITCHING OR WORK ON A JOB OR EQUIPMENT THAT THEY CONSIDER UNSAFE.
3.2 Switching Procedure Requestor Responsibilities

The switching procedure requestor shall do the following:

1. Determine if the Agency’s Safety and/or Maintenance Procedures require a switching procedure (Clearance, Hot Line Order, General Switching, or Special Condition) and if so, request it from the System Operator.

2. Provide switching requests at least three (3) business days in advance, except in a declared emergency. Requests for work on busses, lines, and transformers over 100 kV may require submittal at least six (6) business days before the scheduled work. When requesting switching on a facility with regional impact, consideration must be given to the approval requirements of the regional Reliability Coordinator.

   **NOTE:** Advance notice considerably greater than 3 business days may be required. WAPA Regional Outage Coordination Procedures will be followed and may identify more stringent timing requirements.

3. Notify the System Operator of any maintenance or construction activities that may affect power system operations, regardless of whether the activity is within the scope of the PSOM.

4. In cases where the requestor will not be the Clearance/HLO Supervisor, the requestor shall ensure that the Clearance/HLO Supervisor is informed of the details of the request.

3.3 System Operator Responsibilities

The system operator shall do the following:

1. Authorize and log work that may affect power system operations.

2. Ensure that appropriate system studies are performed to demonstrate that there will be no negative effects on system reliability, such as SOLs or IROLs.

3. Authorize, direct, and log switching procedures on all equipment affecting the Federal power system.

4. Prepare a correct Switching Program Form that shows the sequence of the required switching, and/or operations.

5. Ensure the Switching Program Form is checked by a second qualified System Operator when possible.
6. Ensure that the System Operator that is directing the switching has checked it for accuracy and initialed the Switching Program Form prior to starting.

7. Notify other operating entities and the Reliability Coordinator of planned work and real-time status changes on BES elements and of work that has potential operational impact, as appropriate.

8. Directly observe and be responsible for dispatch trainees while they perform actions covered in PSOM Chapter 1.

9. Ensure that Switchmen, Requestors, and Clearance/HLO Supervisors involved with switching actions are listed as Authorized Personnel.

10. Receive a statement from the Clearance Supervisor verifying the limits provided are adequate for the work to be done prior to the issuance of a Clearance.

### 3.4 Clearance/HLO Supervisor Responsibilities

The Clearance/HLO Supervisor shall do the following:

1. Notify the System Operator of any maintenance or construction activities that may affect power system operations.

2. Check the protection and/or perimeter provided to ensure it is adequate to carry out the work safely.

3. Personally check the Clearance limits visually before accepting the Clearance, when possible.

4. Walk around and visually inspect the site.

5. Notify all workers under his jurisdiction of pertinent conditions and the limits of the Clearance or requirements of the HLO.

6. Ensure that upon completion of the job, all workers and equipment are in the clear and that any unusual conditions are reported to the System Operator before returning equipment to service.

7. Ensure that all personal protective grounds have been removed before releasing a Clearance.

8. Maintain responsibility for releasing a Clearance or HLO.
9. Directly observe and be responsible for switchman trainees while they perform actions covered in PSOM Chapter 1.

### 3.5 Switchman Responsibilities

The switchman **shall** do the following:

1. Determine whether another Switchman is available to serve as a Switchman Checker and, if so, follow guidelines set forth in Appendix G of this Chapter.

2. Perform pre-switching inspection and review of program against station one-line for correctness and familiarization.

3. Review the switching with the System Operator immediately before switching.

4. Repeat back to the System Operator all instructions exactly as given by the System Operator, i.e. “I understand I can perform steps 7 through 10 on C-YY-XXXX and call you back with times and tags.”

5. Notify the System Operator if any of the following conditions exist:
   
   a) Instructions are not clearly understood.
   
   b) Instructions are incorrect.
   
   c) An unexpected relay, breaker, or other action occurs.
   
   d) A device is found in a position other than anticipated.

6. Properly execute the switching indicated on the Switching Program Form as directed by the System Operator, using the Six Basic Steps of Switching.

7. Ensure all disconnect switches are either completely open or closed as directed.

8. Ensure the status indicators on circuit breakers correspond with the desired position. The switchman **shall not** rely on the position indicating lights on the control board.

9. Ensure that all motor-operated disconnect switches are properly made inoperative or operative as instructed.

10. Use the tap position indicator on the voltage regulator rather than the remote indicator for neutral position when bypassing this equipment.

11. Check the operation indicators on all interrupter units when practical, as well as air-break blades to ensure that they correspond with the desired position.
12. Ensure operating controls exposed to the public are mechanically deactivated or attended.

13. Directly observe and be responsible for individuals who are not authorized to switch.

14. Record all necessary switching steps & times on the Switching Program Form.

15. Record the switching action in the substation log.

### 3.6 Worker Responsibility

Each worker **shall** do the following:

1. Report power or auxiliary equipment that is damaged or in a condition which may limit its operation or compromise the integrity of the power system. Stop work and report such condition to the System Operator as soon as possible. Such circumstances could require a Special Condition procedure (Section 9).

2. Fully understand and comply with PSSM safe working procedures.

### 3.7 Regional Responsibilities

Each region **shall** do the following:

1. Ensure that employees are trained in switching procedures per PSOM Chapter 2, “Authorization for Power System Switching Procedures."

2. Maintain and periodically (annually, at minimum) update formal lists of Authorized Personnel. These lists will be available at the Operations offices.

3. Ensure that a current copy of PSOM Chapter 1 is readily available at each switchyard, substation, Operations Office, and to each Switchman.

4. Advise its Workers, Switchmen, Requestors, Clearance/HLO Supervisors, and System Operator as to the extent of their respective authorities.
4. Authorization to Work

4.1 Purpose

The Authorization to Work shall provide information to the System Operator regarding all work performed on equipment affecting the power system that does not require a Clearance, Hot Line Order, or General Switching.

4.2 Overview

Work affecting or removing power system equipment (e.g. protective relays, communication equipment/channels, transducers, DC circuits, remote terminal units, SCADA, ICCP, etc.) requires an Authorization to Work. Employees should refer to Regional commissioning guides for planning and operational requirements when work involves installation of new equipment or replacement of old equipment. While switching steps may not be necessary, a Switching Request Form should be used as information and documentation for the System Operator.

NOTE: If operation of substation yard equipment is needed or re-configuration is necessary, a General Switching program shall be utilized, as these steps shall not be included in an Authorization to Work program.

NOTE: Scheduled outages of telemetering and control equipment and associated communication channels shall be planned and coordinated between affected utilities.

4.3 Responsibilities

4.3.1 Worker/Requestor Responsibilities

The worker/requestor shall request an Authorization to work on specified equipment.

4.3.2 System Operator Responsibilities

The system operator shall review and grant/deny the Authorization to Work on specified equipment.

4.4 Granting an Authorization to Work

Follow this procedure for requesting and granting authorization to work:
Authorization to Work

1. The Worker/Requestor shall request an Authorization to Work by submitting the following information:
   a) Equipment/circuits involved in the work
   b) Time period of the work (specify daily or continuous program)
   c) Effect on power system equipment
   d) Redundant or backup systems to mitigate risk to system reliability
   e) Estimated down-time of equipment/circuits
   f) Estimated time to restore equipment in the event of an emergency.

2. The System Operator shall document and review the Authorization request.

3. The System Operator shall notify the worker, as soon as possible, if the Authorization to Work cannot be granted. The notification shall include the reason(s) for the decision.

4. The Worker shall contact the System Operator immediately before beginning work covered by the Authorization to Work, for each day the work is being performed.

5. The System Operator shall review current system conditions and give final approval to proceed with work, for each day the work is being performed.

6. The System Operator shall log the Authorization to Work or the denial of the Authorization to Work (including all pertinent information) in the operations log.

7. The Worker shall notify the System Operator when work is complete each day. Any abnormal equipment conditions or equipment modifications shall be reported at the end of each day.

8. The System Operator shall log all reported completion information.

9. The system operator shall review and grant or deny the Authorization to Work on specified equipment.
5. **Power Switching System**

5.1 **Communicating Switching Steps**

5.1.1 **Switching Communication Process**

The switching communication process will follow what is commonly referred to as the three-part-communication process which includes the following:

1. The sender/initiator (System Operator) prepares and transmits (written or verbal) the message (Switching Steps).
2. The receiver (Switchman) will repeat the message (Switching Steps) back to the sender (System Operator).
3. The sender (System Operator) confirms the repeat back as ‘correct’ or will have the receiver (Switchman) restate the area(s) wherein errors were made.

5.1.2 **Correct Identification of the Device**

Special emphasis **shall** be placed on understanding the operation to be performed and on the correct identification of the device as follows:

1. A System Operator **shall** prepare the switching program.
2. A second System Operator **shall** check the switching program when possible.
3. A System Operator will transmit the Switching Program Form to the Switchman.
   a) Copies of the Switching Program Form should be sent at least one day in advance to each location involved in the program for review and reference. The Switchman **shall** use the Switching Program Form during the switching and tagging operation.
   b) If an advanced copy is not possible, the System Operator will provide the information verbally to the Switchman, who will write all pertinent information on a Switching Program Form. All switching instructions **shall** be written exactly as stated by the System Operator.
4. The Switchman **shall** read the switching steps back to the System Operator to verify that the correct instructions were received and correctly recorded. The System Operator **shall** verify all items of the written instructions.
Any errors or changes to switching steps once the switching program has been checked shall be lined out and dated. The person making the change shall be identified.

5. As directed by the System Operator, the Switchman shall proceed using the Six Basic Steps of Switching:

**Step 1: Carry the Switching Program Form with you while switching.** By carrying the Switching program, the Switchman shall readily refer to it.

**Step 2: Touch or point to the device identification name plate to verify its/your location.** The Switchman shall carefully and deliberately touch or point to the device nameplate to ensure it matches the device listed on the Switching Program Form.

**Step 3: Recheck the Switching Program Form for right location and right sequence.** Before each step, the Switchman shall recheck the instructions to make certain he is at the correct device and that he understands what action to perform.

**Step 4: Verify anticipated device position.** The Switchman shall visually verify both the initial and anticipated device positions. He shall be alert for any discrepancies and notify the System Operator before proceeding if any are found.

**Step 5: Perform requested action on the device.** The Switchman shall perform the action in a safe manner.

**Step 6: Verify desired device position.** The Switchman shall then check the device to see that it is in the desired position and then complete the Switching Program Form.

### 5.2 Delayed Removal of Tags

At the discretion of the System Operator, removal of Safety Tags at remote locations may be delayed until it is practical to remove them. This permission to delay removal and the subsequent removal shall be recorded separately in the operations and substation logs. The Switching Program Form is not considered complete until all appropriate Safety Tags have been removed.
6. Clearances

6.1 Purpose

A Clearance provides protection against energization from sources of Primary System Energy. The Clearance procedure is intended to achieve this protection with as little delay and inconvenience as possible. However, safe work practices shall always take precedence over job productivity. A Clearance primarily protects personnel and may incidentally provide protection for equipment.

A Clearance does not provide protection against occurrences such as a lightning strike, induced energy, or falling conductors from nearby circuits. Proper personal grounding procedures protect against such hazards and are the responsibility of the Clearance Supervisor.

6.2 Overview

Clearances are achieved by systematically isolating the equipment to be worked on from all sources of Primary System Energy. This is accomplished by providing for visually verified open points or limits of protection by such means as opening switches, opening or removing jumpers, removing fuses, racking out breakers, opening potential transformer secondaries, and opening other transformer secondaries that could inadvertently be energized from the low-voltage side. These devices shall be tagged and shall also be locked where a means for locking is provided.

A Safety Tag shall be used only on devices which provide for a means of visible isolation.

Equipment to be worked on should be free of unnecessary Safety Tags, which could impede work and/or prohibit movement of component parts. Clearances shall establish a continuous zone of protection.

IMPORTANT: NO PERSON WILL BE REQUIRED TO PERFORM SWITCHING OR WORK ON A JOB OR EQUIPMENT THAT THEY CONSIDER UNSAFE.

6.2.1 Safety Tags on Other Devices

Regions may utilize Safety Tags on other devices when Operations and Maintenance concur that its placement is necessary or beneficial to the safety of personnel.
Clearances

Caution: Changes in CCVT technology make it possible that hazardous voltages can be generated on the primary from back feeding the secondary of the CCVT. As a minimum, each Region shall follow the WAPA Maintenance Policy concerning CCVTs to ensure safe working conditions on circuits where these devices are connected. For additional information see the WAPA Maintenance Policy “CCVT Hazard”.

IMPORTANT: A SAFETY TAG SHALL BE CONSIDERED THE SAME AS A LOCK. THE TAGGED POINT SHALL NOT BE OPERATED WHILE THE SAFETY TAG IS IN PLACE.

6.3 Responsibilities

6.3.1 System Operator Responsibilities

The system operator shall issue Clearances on specifically identified equipment.

6.3.2 Requestor Responsibilities

The requestor shall request the Clearance by submitting a Switching Request.

6.3.3 Clearance Supervisor Responsibilities

The clearance supervisor shall do the following:

1. Maintain responsibility for a Clearance at all times. Only the Clearance Supervisor who receives a Clearance shall release that Clearance.

2. Isolate hazardous energy sources in accordance with LOTO procedures, if required, after the Clearance is issued.

3. Personally check the clearance limits visually before accepting the Clearance, when possible.

4. Provide a statement to the System Operator verifying the limits of protection provided are adequate for the work to be done prior to the issuance of a Clearance.

5. Emergencies: If the Clearance Supervisor is unavailable for an unacceptable period of time, his supervisor shall assume full responsibility for the Clearance, including its release. This situation shall be fully documented on the Switching Program Form and in the operations log.
6.3.4 Switchman Responsibilities

The switchman shall perform all switching steps on the Switching Program Form as directed by the System Operator and make all appropriate log entries in the substation logbooks.

6.4 Requesting and Placing a Clearance

This section covers procedures for requesting and placing a clearance.

6.4.1 Requesting a Clearance

Follow this procedure to request a clearance:

1. The Requestor shall be on the official Authorized Personnel list.

2. The Requestor shall submit a request for a Clearance to the System Operator by identifying:
   a) Clearance Supervisor
   b) Work to be performed
   c) All equipment to be removed from service
   d) Limits of protection
   e) Date
   f) Time
   g) Emergency response location information.

3. The System Operator(s) shall prepare the Switching Program Form.

4. Another System Operator shall check the Switching Program Form, if possible. Exceptions may occur in an emergency.

6.4.2 Placing a Clearance

Follow this procedure to place a clearance:
1. The Switchman **shall** perform switching steps as directed by the System Operator, place Safety Tags, record times and tag numbers on the Switching Program Form, and report to the System Operator.

2. The System Operator **shall** state to the designated Clearance Supervisor:
   a) Exactly what protection has been provided.
   b) Status of pertinent equipment (e.g. breakers, disconnect switches, ground switches, open jumpers, potential transformer secondaries, CCVT secondaries, etc.)
   c) Location of Safety Tags
   d) That the equipment is isolated from Primary System Energy.

3. The Clearance Supervisor **shall** repeat back to the System Operator exactly what protection has been provided.

4. The System Operator **shall** issue the Clearance to the Clearance Supervisor.

The System Operator and the Clearance Supervisor **shall** record the required details of the Clearance on their respective Switching Program Forms and logs.

**NOTE:** If an immediate need arises for a new clearance, the applicable Safety Tags may be transferred from the original Clearance that has been released to the new Clearance when there is concurrence between the Clearance Supervisor and the System Operator. This **shall** be documented on the Switching Program Form(s). The documentation on the Switching Program Form for the new Clearance **shall** clearly state the transferred Safety Tag number(s) and the original Clearance number.

### 6.5 Operating Equipment within a Clearance Parameter

1. The Clearance Supervisor **shall** ensure the equipment is safe to operate.

2. The Clearance Supervisor may allow workers to operate untagged equipment within the Clearance perimeter for tests and adjustments.

3. The Clearance Supervisor **shall** ensure that all equipment is returned to its original position before releasing his clearance (unless agreed otherwise with the System Operator).

4. The Clearance Supervisor **shall** report any unusual or unexpected operating conditions or requirements to the System Operator as soon as practical.
6.5.1 Testing from a Primary System Energy Source

If it is necessary to energize the equipment under Clearance from a source of Primary System Energy (for testing purposes) before the work is completed:

1. The Clearance shall be released with the applicable Safety Tags removed. Once a Clearance is released it shall not be reissued.
2. Tests shall be made.
3. Upon completion of tests, equipment shall be returned to pre-test condition.
4. A new Clearance shall be requested, placed, and issued before the work is allowed to continue.
5. The new Clearance may reference or use tags from the prior Clearance.

6.5.2 Placing Identical Clearances

When issuing two or more concurrent Clearances on the same equipment (both requiring the same limits of protection, and exactly the same Safety Tag application) the following procedure applies:

1. The System Operator shall record the issuance of all Identical Clearances on the same Switching Program Form.
2. The System Operator shall mark the Switching Program Form distinctively to indicate an identical Clearance by:
   a) Filling in the Clearance Supervisor’s name for each Clearance in the “Issued to:” column.
   b) Using the same Clearance number, plus a sequential suffix letter (A, B, C, etc.) in the “No._ ” column for each additional Clearance.
3. The Clearance Supervisor shall verify that limits of protection are adequate to perform his work. He should use a copy of the Switching Program Form to verify this information.
4. The System Operator shall notify all appropriate Clearance Supervisors that an identical clearance has been issued.
5. The System Operator and Clearance Supervisor shall record the required details of the Identical Clearance on their respective Switching Program Forms and logs.
Note: Switching to restore equipment to service shall not begin until ALL Clearances have been released.

6.5.3 Transfer of Responsibility for a Clearance

Transfer of responsibility for a Clearance is not permitted. In lieu of transferring responsibility, use the procedures under Section 6.5.2 to obtain an Identical Clearance. See Section 6.3.3 for the emergency situations when the original Clearance Supervisor is unavailable.

6.5.4 Establishing a New Clearance Perimeter

When the work under a Clearance requires a change in limits of protection, the following steps shall be followed in this order:

1. The Clearance Supervisor shall notify all involved workers of the change.

2. The Clearance Supervisor shall request a new Clearance from the System Operator by stating all of the points needed for the new perimeter.

3. The System Operator shall prepare a new Switching Program Form for the new Clearance with the required information. The Switching Program Form shall include the switching steps for placing or transferring each Safety Tag at all limits of protection for the new Clearance perimeter.

4. The System Operator shall direct a Switchman to perform the required switching and tagging.

5. The Switchman shall perform all operations as directed.

6. The System Operator shall issue the new Clearance to the Clearance Supervisor.

7. The Clearance Supervisor shall release his original Clearance.

8. The System Operator shall direct the removal of the Safety Tags associated with the original Clearance and ensure that the “Removal” (return to service) section of the new Switching Program Form reflects the necessary steps in proper sequence to return the equipment to normal.

NOTE: Applicable Safety Tags may be transferred from the original Clearance to the new Clearance when there is concurrence between the Clearance Supervisor and the System Operator. This shall be documented on the Switching Program Form(s). The
Clearances

6.6 Releasing a Clearance

1. The Clearance Supervisor who received the Clearance shall personally release the Clearance except in emergencies, per Section 6.3.3.

2. The Clearance Supervisor shall notify all involved Workers of the intent to release.

3. The Clearance Supervisor shall ensure removal of all personal grounds, Lockout-Tagout Tags, and other devices attached to the equipment by Workers.

4. The Clearance Supervisor shall release his Clearance by stating to the System Operator:
   a) All personnel and equipment are clear.
   b) All personal grounds have been removed.
   c) The equipment is ready to be returned to service.
   d) What work was completed.

5. The System Operator shall notify other Clearance Supervisors, Switchmen, and affected operational entities involved.

6. The System Operator, the Clearance Supervisor, and the Switchman shall record details of the release and equipment restoration on their respective Switching Program Forms and logs.

7. Once a Clearance has been released, it may be reissued, provided the following:
   a) Concurrence between the System Operator and Clearance Supervisor.
   b) The removal switching has NOT begun.

6.7 Releasing Identical Clearances

The Clearance Supervisor who received the Identical Clearance shall personally release the Clearance except in emergencies, per Section 6.3.3.

1. The Clearance Supervisor shall notify all involved Workers of the intent to release.
2. The Clearance Supervisor will notify all other Identical Clearance Supervisors of intent to release the Clearance.

3. The Clearance Supervisor shall release the Clearance by communicating the following to the System Operator:
   a) Status of personnel and equipment
   b) Status of personal grounds
   c) Status of equipment
   d) Work that was completed.

4. The System Operator shall notify the other Clearance Supervisors.

5. The System Operator and the Clearance Supervisor shall record details of the release on their respective Switching Program Forms and logs.

6.8 Restoring Equipment to Services

1. The System Operator shall notify the Switchman that the Clearance has been released and direct switching to return the equipment to service.

2. The Switchman shall perform switching steps as directed by the System Operator, remove Safety Tags, report to the System Operator, and log actions on the Switching Program Forms and logs.

3. Any abnormal conditions shall be reported to the System Operator as soon as possible.

6.9 Special Circumstances and Equipment

6.9.1 Limited Communications

If it is necessary to perform prescheduled work requiring a Clearance at an isolated location where communications with the Operations Office are difficult or impossible, the following procedure shall be used:

1. The System Operator will provide the Clearance Supervisor with the Switching Program Form, a pre-assigned Clearance number, and complete instructions for all switching.

2. The Clearance Supervisor should contact the System Operator on the way to the job site to verify approval to proceed.
3. The Clearance Supervisor will perform or direct the required switching and record all switching information on the Switching Program Form.

4. The Clearance Supervisor shall record that he is taking his own Clearance on the Switching Program Form and in the substation log.

5. The Clearance Supervisor shall release his Clearance when the work is finished and record the release on the Switching Program Form and substation log.

6. The Clearance Supervisor shall make every reasonable effort to advise the System Operator of any changes in work schedule.

7. The Clearance Supervisor shall report all operations as soon as he is able to communicate with the System Operator.

6.9.2 Jumpers Used as a Limit of Protection

Open jumpers shall be tagged at the attachment location or nearest access point to the air gap, such as tower step bolts, access ladders, etc., and should be enhanced with yellow caution tape.

Example: Attaching a 5 foot streamer of yellow caution tape off the tag hanging on the structure.

Completely removed jumpers themselves shall not be tagged.

6.9.3 Switching Capacitor Banks

At least 5 minutes shall elapse between the opening of the circuit breaker, circuit switcher, or disconnect switch before closing the ground switch (if available), on a capacitor bank. A capacitor bank shall remain de-energized for at least 5 minutes before it is re-energized.

An additional 5 minutes shall be allowed after the ground switch (if available) is closed before issuing the Clearance. The time required above shall be explicitly expressed in switching orders involving capacitor banks.

For work requests where work is to take place on an associated line, but the capacitor bank is not within the limits of the Clearance, there is no need to ground the capacitor bank as long as the capacitor bank is visually isolated from the line by open and tagged disconnects.
6.9.4 **Hazards Associated with Switching Voltage Regulators**

When switching voltage regulators, the following must be included in the switching program for maintenance and testing.

1. The regulator must be placed in the neutral position. (Verification must be made by the manufacturer’s recommendation.)
2. Tap-Changer operation must be disabled during the bypass switching.
3. Tap-Changer must not be moved off the neutral position if bypass switch and source/load switches are closed. (Tests/checks **shall not** be performed in this configuration.)

If the regulator is in any other position, part of the series winding will be shorted when the bypass switch is closed, resulting in high circulating current.

**WARNING:** FAILURE TO COMPLY MAY RESULT IN DEATH OR SEVERE INJURY AND EQUIPMENT DAMAGE.

6.9.5 **Contractors/Non-WAPA Personnel**

Clearances **shall not** be issued to Contractors/non-WAPA Personnel. Instead, Contractors/non-WAPA Personnel **shall** refer to PSMM Chapter 12, Special Work Permits, or PSOM Section 13, Operational Procedures Associated with Interconnected Systems, for instructions.
7. Hot Line Orders

7.1 Purpose

A Hot Line Order (HLO) allows qualified workers to work on or near energized lines or equipment. Equipment under an HLO shall always be considered energized or “hot” in accordance with the Power System Safety Manual. An HLO does not provide protection to personnel working on or near an energized circuit.

Technical Support Position Paper, TSP-01 reads, in part; “An HLO addresses the following three issues, which are the primary reasons they are required:

1. Elimination of over voltages (surges) due to reclosing after fault conditions. An engineering study must be performed to use reduced clearances (clearances based on a transient overvoltage of less than 3.0 per unit). If there is no guarantee that voltage levels can be reduced, minimum approach distances used, must be based upon worst case Transient Overvoltage (TOV).

2. Coordination with dispatch when there is a maintenance crew or crew(s) on an energized line. Issuing a HLO ensures coordination between maintenance and operations for energized work.

3. Elimination of reclosing a line into a permanent fault which may result due to maintenance activities on or near the line. It may prevent additional damage done to worksite or transmission system equipment in the event accidental contact is made causing a permanent fault.”

7.2 Overview

A HLO is established by disabling all closing and reclosing features capable of re-energizing the equipment after a relay operation. Hot Line Tags shall be placed on these features, and a Hot Line Tag shall be placed on the appropriate control switches (local and/or supervisory) of all breakers connected to the equipment.

Under certain conditions, other devices such as a disconnect switch may be used as a HLO perimeter. These devices shall also be HLO tagged.
7.3 Responsibilities

7.3.1 The System Operator Shall:

1. Issue HLOs on specifically identified equipment.
2. Notify the HLO Supervisor before making or breaking parallel on any equipment or line close enough to have an effect on the equipment covered by the HLO.
3. Document non-WAPA Verbal HLOs as a switching step.

7.3.2 Requestor Responsibilities

The requestor shall request the HLO by submitting a switching request.

7.3.3 The Hot Line Order Supervisor Shall:

1. Remain at the work site while the work is performed under a HLO.
2. Remain in a non-working, observation status during procedural live-line work.
3. Maintain communication with the System Operator while work is performed under a HLO. The HLO Supervisor shall inform the System Operator ahead of time if communications cannot be maintained.
4. Maintain responsibility for a HLO at all times. Only the HLO Supervisor who receives a HLO shall release that HLO.
5. Make immediate contact with the System Operator upon becoming aware of the line being de-energized.

Emergencies: If the HLO Supervisor is incapacitated, his supervisor shall assume full responsibility for the HLO. He may delegate authority and responsibility to a crewmember for releasing or obtaining an identical HLO. This situation in coordination with System Operator shall be fully documented on the Switching Program Form and in the operations log.
7.4 Requesting and Placing a Hot Line Order

Use the procedures in this section to request and place a hot-line order:

7.4.1 Requesting a Hot Line Order

1. The Requestor shall be on the official Authorized Personnel list (see PSOM Chap 2).

2. The Requestor shall submit a request for a HLO to the System Operator by specifying:
   a) Equipment to be placed under HLO
   b) The requirements (all reclosing disabled, tagging, etc.) needed for the HLO perimeter
   c) Work to be performed
   d) Date
   e) Time
   f) Emergency response information.

3. The System Operator(s) shall prepare the Switching Program Form.

4. Another System Operator shall check the Switching Program Form, if possible.

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**Note:** HLOs shall not be issued to Contractors/non-WAPA Personnel. Instead, Contractors/non-WAPA Personnel shall refer to PSMM Chapter 12, Special Work Permits, or PSOM Section 13, Operational Procedures Associated with Interconnected Systems, for instructions.

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7.4.2 Placing a Non-SCADA (Manual) Hot Line Order

1. The Switchman shall perform switching steps as directed by the System Operator.

2. The Switchman and System Operator shall log actions on the Switching Program Forms and logs.

3. The System Operator shall state to the designated HLO Supervisor:
   a) Equipment that has been tagged for the HLO.
b) Devices that have been deactivated and tagged.

c) Non-WAPA Verbal HLOs on normally open disconnects which have been obtained.

4. The HLO Supervisor shall repeat the information in #3 above to the System Operator.

5. The System Operator shall issue the HLO to the HLO Supervisor.

6. The System Operator and the HLO Supervisor shall record the required details of the HLO on their respective Switching Program Forms and logs.

7.4.3 Placing a Hot Line Order by SCADA

When stations are equipped with means of supervisory control from a control center or operations office, it is permissible to issue HLOs without the physical placement of Hot Line Tags at the stations, if the SCADA provides:

1. An indication at each station that a HLO is in effect.

2. An indication back to the Control Center or Operations Office from the remote site that the automatic re-closer is inoperable or breaker close circuit is inoperable.

3. SCADA breaker closure is inhibited.

4. That the circuitry involved in 1, 2, and 3 above will maintain status at the substation in the event of an electrical, communications, or SCADA system failure.

7.4.4 Manually Placing a Hot Line Order when SCADA is Unavailable

The HLO may be placed manually under direction of the System Operator.

7.4.4.1 Criteria for Placing a Hot Line Order

If backup control or dual control from another operations office is in place, it may be possible to place the HLO electronically. The following criteria must be met:

1. A jurisdictional agreement between the involved entities must be in effect.

2. The HLO Supervisor shall be notified of existing SCADA problems and will accept an HLO using this method.
3. The System Operator will request an interconnected HLO from System Operator who now has operational jurisdiction over equipment requested.

4. When SCADA is returned to service, the HLO should be placed by SCADA and the HLO Supervisor shall be notified of the change.

5. SCADA HLOs shall be verified immediately upon installing revised software or rebooting the computer.

6. The System Operator shall record all of the above steps on the Switching Program Form and log.

7.4.5 SCADA Failure while a Hot Line Order is in Effect

This section will explain the procedures should SCADA fail and what the expectations upon SCADA return.

7.4.5.1 Contacting the Hot Line Order Supervisor

When a SCADA failure occurs that may impact a HLO that is in effect, and should the conditions required in section 7.4.3. (4) no longer be satisfied, the System Operator will contact the HLO Supervisor. They will jointly determine which of the following actions will be taken:

1. Continue work
2. Stop work
3. Tag manually
4. Obtain interconnected HLO if backup control is in place.

7.4.5.2 Verification of Electronic Tags

Upon return of SCADA, the System Operator shall verify that electronic tags are still in place.

7.5 Working Under a Hot Line Order

7.5.1 Re-Energizing a Line That Has Tripped Out

When a transmission line or other equipment under an HLO becomes de-energized:
1. The System Operator shall contact the HLO Supervisor to ensure that it is permissible to re-energize the line.

2. The HLO Supervisor shall immediately order all personnel clear of the circuit, determine if the circuit within his work area can be safely re-energized, and then contact the System Operator to inform him of the details.

3. The System Operator shall analyze the relay action that caused the trip.

4. If it has been determined that it is safe to re-energize, the System Operator shall perform steps by SCADA or direct a Switchman to close a circuit breaker which has tripped as follows:
   a) Remove the Hot Line Tag from the control device.
   b) Operate the control device to close the circuit breaker.
   c) Replace the Hot Line Tag on the control device.
   d) Record pertinent information for the trip-out and closure in the substation and operations logs.

5. The System Operator will inform the HLO Supervisor that the circuit breakers have been closed, and that the line is re-energized, and that work under the HLO may resume.

### 7.5.2 De- or Re-Energization for Operational Requirements

1. The System Operator shall notify the HLO Supervisor before attempting either of these operations.

2. The HLO Supervisor may request a delay in the operation until Workmen can be informed and get clear of the circuit.

### 7.5.3 Identical Hot Line Orders

When issuing two or more concurrent HLOs on the same equipment requiring the same perimeter, and exactly the same HLO Tag application, the following procedure applies:

1. The System Operator shall record all HLOs issued on the same Switching Program Form.

2. The System Operator shall mark the Switching Program Form distinctively to indicate an identical HLO by:
   a) Filling in the HLO Supervisor’s name for each HLO in the “Issued to:” column.
b) Using the same HLO number, plus a different suffix letter (A, B, C, etc.) in the “No.” column for each additional HLO.

3. The HLO Supervisor shall verify that the perimeter of the HLO is adequate to perform his work. He should use a copy of the Switching Program Form, if available, to verify this information.

4. The System Operator shall notify all appropriate HLO Supervisors that an identical HLO has been issued.

Note: No tags shall be removed from equipment until ALL HLOs have been released and recorded in the “Released by” column of the System Operator’s Switching Program Form.

The System Operator and the HLO Supervisor shall record the required details of the Identical HLO on their respective Switching Program Forms and logs

7.5.4 Transfer of Hot Line Order Responsibility

Transfer of responsibility for a HLO is not permitted.

In lieu of transferring responsibility use the procedures under Section 7.5.3 to obtain an Identical HLO. See Section 7.3.3 for the emergency situations when the original HLO Supervisor is unavailable.

7.5.5 Establishing a Perimeter for a New Hot Line Order

When the work under an HLO requires a change in perimeter:

1. The HLO Supervisor shall request a new HLO from the System Operator by stating the limits needed for the new perimeter.

2. The HLO Supervisor shall notify all involved Workers of the change.

3. The System Operator shall prepare a new Switching Program Form for the new HLO with the required information. The Switching Program Form will include the switching steps for placing tags for the new HLO perimeter.

4. The System Operator shall perform by SCADA or direct a Switchman to perform the required switching and tagging.

5. The System Operator shall issue the new HLO to the HLO Supervisor.

6. The HLO Supervisor shall release his original HLO.
7. The System Operator shall enter the switching steps for and direct the removal of tags associated with the original HLO and ensure that the “Removal” (return to service) part of the new Switching Program Form reflects the necessary steps in proper sequence to return the equipment to normal.

7.6 Releasing a Hot Line Order

The HLO Supervisor who received the HLO shall personally release the HLO except in emergencies, per section 7.3.3.

1. The HLO Supervisor shall notify all involved workers of the intent to release.

2. The HLO Supervisor shall release his HLO by reporting to the System Operator and state to the System Operator that:
   a) All personnel and equipment are clear.
   b) The equipment is ready for normal service.

3. The System Operator, HLO Supervisor, and Switchman shall record details of the release and equipment restoration on their respective Switching Program Forms and logs.

4. The HLO Supervisor shall report status of work for the day.

5. Once a HLO has been released, it may be reissued, provided the following:
   a) Concurrence between the System Operator and HLO Supervisor.
   b) The removal switching has NOT begun.

7.7 Restoring Equipment to Normal

This section will cover the steps to restore automatic reclosing.

7.7.1 Restoration Procedure

1. Equipment may be restored manually or by SCADA:
   a) Manual: The System Operator shall notify the Switchman that the HLO has been released and shall order the tags removed and the equipment returned to normal.
b) **SCADA**: The System Operator **shall** perform all necessary switching to restore the equipment to normal.

2. The Switchman **shall** perform switching steps as directed by the System Operator, remove tags, report to the System Operator, and log actions on the Switching Program Forms and logs.

### 7.7.2 Delayed Removal of Tags

At the discretion of the System Operator, the removal of tags at remote locations may be delayed until it is practical to remove them. This permission to delay removal and the subsequent removal **shall** be recorded separately in the operations and substation logs. The Switching Program Form **shall not** be considered complete until all appropriate tags are removed.

### 7.8 Special Circumstances

#### 7.8.1 Placing a Hot Line Order on a Bus Section

The Switchman may place a Hot Line Tag on the differential auxiliary (manual reset) relay when placing an HLO on a bus section protected by a bus differential scheme that will trip and block automatic, manual, and SCADA closing of all power circuit breakers associated with that particular bus.

#### 7.8.2 Verbal Hot Line Orders

The following steps are for coordination of multi-utilities HLO work.

**7.8.2.1 Non-WAPA Hot Line Order**

There are numerous tapped transmission lines that can be back-fed through various low-voltage switches that are not controlled by the WAPA System Operator. Therefore, a “Non-WAPA Verbal HLO” will be obtained from the responsible non-WAPA System Operator on normally open but untagged disconnect switches under his jurisdiction.

**7.8.2.2 Personnel to be Informed**

The non-WAPA System Operator providing the Verbal HLO must notify applicable personnel of the following:
1. The HLO work; and

2. The requirement to receive concurrence from the WAPA System Operator on duty prior to operation of normally open switches that could re-energize the circuit under HLO.

7.8.2.3 Documentation of the Non-WAPA Order

The non-WAPA Verbal HLO will be a documented switching step.

7.8.3 Interruption or Compromise of Circuits

1. HLOs shall not be issued on a power circuit while any work or tests are in progress on protective relays or control circuits which would compromise the tripping of any circuit breakers involved in the HLO. HLOs shall not be issued if any special conditions exist that could compromise the high-speed tripping.

2. No work shall be permitted on communication channels or equipment that could interrupt protective relaying and/or voice communications, which would compromise the tripping of any circuit breaker involved in an HLO or interfere with positive communications with the System Operator.
8. General Switching

8.1 Purpose

General Switching is used to sectionalize lines or rearrange system equipment for testing and/or changes in operating conditions. Such operations are not normally associated with Clearances, Hot Line Orders, or Special Conditions. General Switching is required any time a disconnect switch, motor operated disconnect switch, interrupter, fuse disconnect, etc. is to be operated at the System Operator’s direction and is not associated with a Clearance, Hot Line Order, or Special Conditions. General Switching does not provide protection.

8.2 Overview

There are no safety tags associated with General Switching. Remote operation of circuit breakers and/or other devices by the System Operator for the purpose of voltage control does not require General Switching. When communications or relay work is to be performed that is directed by the System Operator and involves switching steps to disable/enable these circuits, General Switching may be used.

The System Operator may direct switchmen to perform a single action without written documentation. This action must be logged in the substation log if possible and in the operations log.

8.3 Procedures

The following procedure shall be used to obtain General Switching:

1. The Requestor shall be a person authorized to perform the tasks associated with the need for general switching.

2. The Requestor will provide the System Operator with time, date, equipment, reason for the work, who will do the switching, what notifications are required, and return time.

3. The System Operator shall approve or disapprove the work. Upon approval, the System Operator shall prepare a General Switching Program Form. An appropriate sequential number shall be prepared for each application of General Switching. When possible, a second System Operator shall check the General Switching Program Form.

4. The Switchman shall perform switching steps as directed by the System Operator for placement and removal of the General Switching program.
9. Special Conditions

9.1 Purpose

The Special Condition procedure provides TEMPORARY instructions for special operating conditions or equipment limitations on the power system or auxiliary power system equipment.

9.2 Overview

Special operating conditions are identified and tagged with Special Condition Tags, which are placed on the appropriate equipment or control points (local and/or supervisory controls). Although a Special Condition Tag may serve as temporary protection for equipment, it shall never be used for personnel protection and shall not be placed without direction from the System Operator.

A Special Condition Tag shall not be used for permanent conditions. If used for an extended period, the Special Condition Tag shall be replaced annually to reflect current equipment and/or operating changes.

9.3 Responsibilities

System Operator Responsibilities

The System Operator shall determine if the Special Condition procedure is necessary when workers report power system or auxiliary power system equipment that is damaged or in a condition which may limit its operation or compromise its integrity or the integrity of the transmission system.

9.4 Placing a Special Condition

1. Workers shall report special conditions or limitations of equipment to the System Operator.

2. The System Operator shall prepare the Switching Program Form.

3. The Switchman shall complete and place the tag on the control device of the affected equipment. If the control device is not accessible, the tag shall be placed in a conspicuous location on the equipment.

4. The System Operator shall place Special Condition tags on appropriate SCADA points.
5. The System Operator and Switchman shall record details of the Special Condition on the Switching Program Form and logs.

### 9.5 Removing Special Conditions

When conditions requiring the Special Condition Tag no longer exist, these actions apply:

1. The System Operator shall direct the removal of the Special Condition Tags.

2. The Switchman shall perform the switching steps as directed by the System Operator, remove Special Condition Tags, and report to the System Operator.

3. The System Operator shall remove Special Condition Tags on appropriate SCADA points.

4. The System Operator and Switchman shall record details of the removal on the Switching Program Forms and logs.
10. Lockout—Tagout

10.1 Purpose

Lockout-Tagout (LOTO) procedures are used for the protection of workers from all secondary sources of hazardous energy.

10.2 Overview

LOTO shall be used for all stored energy for equipment under a clearance and for power system equipment rated at 600v and below. Potential transformer secondaries, when used as limits of protection in a clearance, do not require LOTO. Complete procedures for LOTO are required by OSHA [CFR 1910.269] and can be found in WAPA Order 440.1, PSMM Chapter 18, and the Power System Safety Manual.

10.3 Responsibility and Authority

Workers shall notify and obtain approval from the System Operator when implementing LOTO procedures on equipment that might affect power system operations.
11. Special Work Permits

11.1 Purpose

Special Work Permits provide a means of communicating and tracking conditions affecting contractors and/or non-WAPA forces working on or near WAPA's facilities and equipment. The Permit identifies the limits and conditions of the safe working area by documenting and using sketches and/or single-line diagrams as necessary. The permit identifies and documents potential hazards that could affect the working area and are covered in the PSSM Section 17 Non-WAPA Maintenance Operations and the PSMM Chapter 12.
12. Operational Procedures Associated with Non-WAPA Authorized Representatives

12.1 Purpose

There are several situations where non-WAPA utilities own transformers and/or circuit breakers and associated equipment is installed in or connected to WAPA facilities.

Subject to the approval of the Regional Manager or his designated representative, authorized maintenance personnel of the non-WAPA organization may be granted permission to perform switching and receive Clearances and/or HLOs to perform work on specified non-WAPA equipment.

12.2 Non-WAPA Organization Representative Responsibilities

The non-WAPA organizational representative shall accept full responsibility for the safety of its employees, and for all actions of its employees which might compromise the reliability of the Federal Power System and/or the safety of WAPA employees.

12.3 Authorized Non-WAPA Organization Representation

The authorized representative of the non-WAPA organization shall meet the following expectations:

1. Be certified by the non-WAPA organization as being capable to perform switching and to receive and execute Clearances and Hot Line Orders in specified WAPA stations. WAPA shall review the certification process of the non-WAPA organization to ensure it adequately meets WAPA’s requirements.

2. Provide a current list of certified switchmen to WAPA, upon request.

3. Coordinate work with WAPA’s System Operator.
13. Operational Procedures Associated with Interconnected Systems

13.1 Purpose

To provide for the protection of personnel at points of interconnection between WAPA and non-WAPA facilities or between two WAPA systems.

13.2 Overview

An Interconnected System Clearance or HLO requires documentation from one System Operator to another (this may include a System Operator or other authorized individual from an non-WAPA entity or neighboring utility) that switching has been performed on one system as a partial or complete requirement for a Clearance or HLO on another system.

The System Operator receiving the Interconnected System Clearance or Hot Line Order is responsible for all other switching and for issuing the Clearance or HLO.

13.3 Responsibilities

13.3.1 System Operator Responsibilities

The System Operator shall perform the following actions:

1. Direct all Switching Procedures under his operational jurisdiction, in accordance with the appropriate operating agreements.

2. Receive Interconnected Clearances and HLOs from other interconnected entities.

3. Issue Interconnected Clearances and HLOs to other interconnected entities.

13.3.2 Non-WAPA Entity Responsibilities

The non-WAPA entity shall be responsible for all switching on the non-WAPA system.

13.4 Non-WAPA Requesting a Switching Procedure

This section applies to a non-WAPA entity requesting a switching procedure from WAPA.
1. The non-WAPA Entity requiring a Clearance or Hot Line Order shall request an Interconnected System Clearance or Hot Line Order from the WAPA System Operator.

2. The WAPA System Operator shall prepare a Switching Program Form by clearly documenting the procedure as “Interconnected System” and order switching in accordance with Clearance or Hot Line Order sections of this manual.

3. The WAPA System Operator shall state clearly to the non-WAPA Entity exactly what equipment is affected by the Interconnected Hot Line Order or what limits of protection have been provided under the Interconnected Clearance and the status of pertinent equipment:
   a) Breakers
   b) Disconnect switches
   c) Ground switches
   d) Re-closers
   e) Other pertinent equipment
   f) Location of each Safety Tag and/or Hot Line Tag.

4. The WAPA System Operator shall assign a number to the Interconnected System Clearance or Hot Line Order with the prefix “ICC” or “ICH” respectively. If it is an identical Clearance or Hot Line Order, the documentation will identify the action as “Interconnected System.”

5. The non-WAPA Entity shall read back the exact information provided and verify that their requirements are met.

6. The WAPA System Operator shall issue the Interconnected System Clearance or Hot Line Order to the non-WAPA Entity.

13.5  WAPA Requesting Switching Procedures from a Non-WAPA Entity

13.5.1  WAPA Requestor Requires Clearance

When a WAPA Requestor requires a Clearance or Hot Line Order requiring switching on a non-WAPA entity:
1. The WAPA System Operator **shall** coordinate the appropriate switching with the non-WAPA entity.

2. The non-WAPA Entity **shall** issue the Interconnected System Clearance or Hot Line Order to the WAPA System Operator.

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**Note**: Other entities may use terms such as “Inter-company,” “Source of Power,” etc.

3. The WAPA System Operators and the non-WAPA Entity **shall** document their respective actions on their Switching Program Forms and in their logs.

### 13.5.2 Delegation of Authority to WAPA Requestor

When required switching on non-WAPA equipment is performed by non-WAPA, distribution-voltage switching centers or switching personnel, the WAPA System Operator may delegate authority to the WAPA Requestor and Clearance/Hot Line Order Supervisor to deal directly with the non-WAPA Entity for Clearances, Hot Line Orders, or General Switching. Notification and Delegation **shall** be documented on the Switching Program Form.

### 13.6 Concurrent Clearance or Hot Line Orders on Interconnected Equipment

When WAPA maintenance personnel require a Clearance or Hot Line Order concurrent with one being held by an interconnected entity, one of the following procedures **shall** be used:

#### 13.6.1 Procedure 1

1. A separate switching program will be used to issue a Clearance or HLO to the WAPA Clearance Supervisor or HLO Supervisor.

2. An Interconnected System Clearance or HLO will be obtained from the interconnected entity on their terminal equipment.

3. The Clearance or HLO on the WAPA terminal equipment will be established by one of the following:
   a) System Operator will self-issue an identical, interconnected Clearance or HLO as was issued to the interconnected entity.
   b) The terminal equipment will be double tagged.
4. A complete Clearance or HLO will be issued to the WAPA Clearance Supervisor or HLO Supervisor.

13.6.2 Procedure 2

1. The WAPA System Operator shall receive a complete Clearance or Hot Line Order covering the equipment from the other entity.

2. WAPA System Operator shall issue the Clearance or Hot Line Order to WAPA Personnel.

13.7 Release

The Interconnected System Clearance or Hot Line Order shall not be released until the Clearance Supervisor or HLO Supervisor has released his Clearance or Hot Line Order. The System Operator on shift shall release the interconnected system Clearance or Hot Line Order. The System Operator shall document details on the Switching Program Form and log.

13.8 WAPA Dispatching for Non-WAPA Utilities

There are specific situations where WAPA transmission lines terminate in power plants, switchyards, or substations owned and operated by non-WAPA Utilities and/or where Non-WAPA transmission lines terminate in WAPA switchyards or substations.

Under specific operating agreements with the non-WAPA Utilities, WAPA Operations Offices have been granted dispatch jurisdiction over certain lines, substations, or equipment located in these stations.

In these situations the WAPA System Operator shall, in accordance with this Chapter and specific operating agreements or Memorandums of Understanding:

1. Prepare the Switching Program Form.

2. Direct the switching performed by the WAPA or non-WAPA Switchman.

3. Issue the Clearance or Hot Line Order to the WAPA or non-WAPA personnel.

Note: The non-WAPA Switchman may use the non-WAPA utility’s tags on equipment owned and operated by that non-WAPA utility.
13.9  Non-WAPA Utilities Dispatching for WAPA

There are situations where non-WAPA transmission lines terminate in WAPA substations. Under operating agreements, non-WAPA dispatch offices have been granted dispatching jurisdiction over listed equipment to facilitate routine maintenance or equipment requiring immediate attention on non-WAPA facilities connected to WAPA substations.

**Note**: The non-WAPA Switchman may use the non-WAPA utility’s tags on equipment owned and operated by that non-WAPA utility.

13.9.1  WAPA System Operator Responsibilities

In these situations the WAPA System Operator shall, in accordance with this Chapter and operating agreements or Memorandums of Understanding:

1. Prepare a switching program form to document the work being done.
2. Operate and tag specific SCADA-controlled equipment covered by the operating agreement at the direction of the non-WAPA Entity.
3. Log actions on the Switching Program Form and operations log.

13.9.2  Non-WAPA Entity Responsibilities

Non-WAPA entities have these responsibilities:

1. Coordinate work on specified equipment with WAPA.
2. Prepare a Switching Program Form.
3. Direct non-WAPA switchmen in switching steps on specified equipment.
4. Issue to and take release from non-WAPA personnel.
5. Report pertinent times to WAPA’s System Operator.
Appendix A Definitions

**Authorized Personnel (Authorized Individual):** Selected persons who have been properly trained, tested, and authorized to perform specific actions, per PSOM Chapter 2, Authorization for Power System Switching Personnel.

**Bulk Electric System (BES):** As defined by the Regional Reliability Organization, the electrical generation resources, transmission lines, interconnections with neighboring systems, and associated equipment, generally operated at voltages of 100 kV or higher. Radial transmission facilities serving only load with one transmission source are generally not included in this definition.

**Clearance:** A statement with documentation from the System Operator to the Clearance Supervisor declaring that the equipment to be worked on has been isolated from all sources of Primary System Energy.

**Clearance Supervisor:** An authorized individual who receives and releases a Clearance and who is responsible for meeting the requirements of this Chapter. The Clearance Supervisor is responsible to ensure that the Clearance protection provided is adequate.

**Contractor:** A non-WAPA construction or maintenance organization responsible to WAPA for the work.

**Contractor’s Authorized Representative:** An employee of the contractor who is designated and authorized responsibility by the contractor to coordinate, receive, and release Special Work Permits. The Contractor’s Authorized Representative is responsible for the work covered by the Special Work Permit.

**Control Center:** A non-WAPA station from which one or more power plants or pumping plants are remotely controlled, and from which power plant switching is directed.

**Digital Control System (DCS):** System used in substation design logic and control interface using digital control technology, including equipment such as microprocessor based relay control systems and programmable logic controller control systems.

**Emergency:** A situation that develops suddenly and unexpectedly, requiring immediate action such as:

i. Facilities in such a condition deemed hazardous to the public, WAPA personnel, or the Federal power or water system.

ii. Power outage to customers, which could be hazardous to life or property.

**Equipment:** Any machine, device, or apparatus, either electrical or mechanical, associated with the generation or transmission of electrical energy.
**Facility Identifier (FID):** A unique abbreviation used to identify facilities, at which power system equipment is located, such as a substation or transmission line tap.

**General Switching:** Switching performed for line sectionalizing or system (electrical, mechanical, hydraulic, etc.) rearrangement for testing and/or changes in operating conditions. Such operations are not normally associated with Clearances, Hot Line Orders, or Special Conditions.

**Hot Line Order (HLO):** A statement with documentation from a System Operator to a HLO Supervisor that the reclosing is turned off and that the equipment covered by the Hot Line Order will not be intentionally re-energized until contact has been made with the HLO Supervisor.

**Hot Line Order Supervisor (HLO Supervisor):** An authorized individual who receives and releases a Hot Line Order and who is responsible for meeting the requirements of this Chapter. The HLO Supervisor is responsible to ensure that the Hot Line Order perimeter is adequate.

**ICCP:** Abbreviation for *Inter-Control Center Communications Protocol*. ICCP is the standard protocol used to exchange data between entities in the utility industry.

**Identical Clearances:** Two or more concurrent Clearances issued on the same equipment, both requiring same limits of protection and exactly the same Safety Tag application.

**Identical Hot Line Order:** Two or more concurrent Hot Line Orders issued on the same equipment, both requiring same perimeter and exactly the same tag application.

**Limits of protection:** A “visible-open” perimeter that isolates equipment to be worked on, from all sources of Primary System Energy. This perimeter is used in conjunction with a Clearance.

**Non-WAPA Authorized Representative:** A properly qualified non-WAPA individual, who is knowledgeable of this Chapter’s procedures and authorized by WAPA to switch, request, and receive Clearances and Hot Line Orders.

**Non-WAPA Verbal Hot Line Order:** (also known as “Verbal Hold” or “Assurance of No Back-feed” by non-WAPA companies). A statement from the responsible non-WAPA Entity that a specific circuit will not be re-energized from an identified non-WAPA power source without permission from the WAPA System Operator. This includes identification of specific normally open disconnect switches under non-WAPA operational jurisdiction.
Primary System Energy: Electrical energy above 600 volts.

Note: Sources of Primary System Energy doesn’t include occurrences such as a lightning strike, induced energy, or falling conductors from nearby circuits. Proper personal grounding procedures protect against such hazards and are the responsibility of WAPA Clearance Supervisors or Non- WAPA appropriate personnel.

Protection: All switching, tagging, logging, etc. performed to make a given piece of equipment available to work on by workers under a procedure.

Requestor (Switching Procedure Requestor): An authorized individual who requests switching procedures, who has been trained in the duties and responsibilities of this Chapter.

SCADA: Abbreviation for “Supervisory Control and Data Acquisition” computer equipment which is used to remotely monitor and operate the power system.

Special Condition: An unusual, temporary condition pertaining to equipment which is not associated with other protective procedures. This term indicates the requirement for documenting special operating instructions and information on the current condition of the equipment.

Special Work Permit: A statement which formalizes and documents the preparation and coordination between WAPA and non-WAPA personnel to authorize work by non-WAPA forces on or near WAPA power facilities.

Switchman: Any person authorized to perform switching and tagging operations. Those authorized may include, but are not limited to, System Operators, foremen, operators, linemen, electricians, technicians, plant mechanics, inspectors, supervisors, and engineers.

Switchman Checker: Authorized Personnel, who are available, to work with the switchman to closely monitor the switchman’s actions while executing switching procedures. The switchman checker shares equal responsibility for properly executing the switching program form, maintaining situational awareness, and following the Six Basic Steps of switching.

System Operator: A Power System Dispatcher qualified and authorized to issue and receive Clearances, Hot Line Orders, Special Conditions, General Switching, Interconnected System Clearances, Hot Line Orders and Authorizations to Work, and who is authorized to direct switching and other operations required in placing and removing the protection required for Clearances, Hot Line Orders, and Special Conditions.

Variance: A document signed by the appropriate officials authorizing a work procedure to provide a safe working environment for situations not addressed by PSOM Chapter 1.
**WAPA’s Authorized Representative:** A properly qualified Operations, Maintenance or Construction person, employed or contracted by WAPA, who is knowledgeable of this document’s procedures and certified by WAPA to switch, request, receive Clearances and Hot Line Orders, and issue a special work permit.

**Worker:** Any person qualified to inspect, service, repair, or otherwise be in contact with equipment. Those qualified may include but are not limited to electricians, testers, technicians, linemen, mechanics, inspectors, operators, dispatchers, foremen, supervisors, and engineers.
Appendix B Clearance Statement

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Example of Clearance Statement
(Refer to Section 6)

ISSUE:

System Operator’s statement:
This is for the Issue of Clearance C-YY-XXXX on the (equipment name)
The limits of the clearance are at (station) (limits) .
This equipment is isolated from all sources of PRIMARY SYSTEM ENERGY. You will be
responsible for your men, equipment and personal grounds within the limits of this clearance. If
you repeat the limits back to me and state that you are satisfied with the limits then I will give you
an issue time.

Clearance Supervisor’s statement:
I understand for the Issue of Clearance C-YY-XXXX on the (equipment name)
The limits of the clearance are (station) (limits)
This equipment is isolated from all sources of PRIMARY SYSTEM ENERGY. I will be
responsible for my own men, equipment and personal grounds within the limits of this clearance
and the limits are adequate.

System Operator’s issuance statement:
We agree on the limits. I will issue Clearance C-YY-XXXX to (name) on the
(equipment name) at (time) .

Clearance Supervisor’s response: I understand that at (time) , you have
issued me Clearance: C-YY-XX on the (equipment name) .

RELEASE:

Clearance Supervisor’s release statement:
This is (Clearance Supervisor’s name) and I am ready to release Clearance C-
YY-XXXX on the (equipment name) . All men and equipment are in the clear, all
personal grounds have been removed, and this equipment is ready for normal service.
System Operator’s acceptance of release:
I understand that ______(Clearance Supervisor’s name)____ is releasing Clearance C-YY-XXXX on the ______(equipment name)_____. All of your men and equipment are in the clear, all personal grounds have been removed and the equipment is ready for normal service.

Clearance Supervisor’s response:  Yes

System Operator’s response:  The release time is ______(time)___
Appendix C Hot Line Order

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Example of Hot Line Order (HLO) Statement
(Refer to Section 7)

ISSUE:

**System Operator’s statement:**
This is for the Issue of Hot Line Order H-YY-XXXX on the ____ (line name) _____.
The perimeter points of the HLO are at __________ (station)(equipment turned off and tagged) and
____________ (station)(equipment turned off and tagged).
You will be responsible for your men and equipment within the perimeter of this Hot Line Order.

**HLO Supervisor’s statement:**
I understand for the Issue of Hot Line Order H-YY-XXXX on the ____ (line name)_____
the perimeter points of this HLO are __________ (station)(equipment turned off and tagged) and
____________ (station)(equipment turned off and tagged).
I will be responsible for my own men and equipment within the perimeter of this Hot Line Order and
the perimeter is adequate.

**System Operator’s issuance statement:**
We agree on the perimeter. I will issue Hot Line Order H-YY-XXXX to __________ (name) ___ on the
_______ (line name) ______ at ______ (time) ________.

**HLO Supervisor’s statement:** I understand that at ______ (time) ________, you have issued me
HLO: H-YY-XX on the ______ (equipment name) ______.

RELEASE:

**HLO Supervisor’s release statement:**
This is __________ (HLO Supervisor’s name) ______ and I am ready to release Hot Line Order H-
YY-XXXX on the ______ (equipment name) ______. All men and equipment are in the clear, and
this equipment is ready for normal service.

**System Operator’s acceptance of release:**
I understand that __________ (HLO Supervisor’s name) ______ is releasing Hot Line Order H-YY-
XXXXX on the ______ (equipment name) ______. All of your men and equipment are in the
clear, and the equipment is ready for normal service.

**HLO Supervisor’s response:** Yes

**System Operator’s statement:** The release time is ______ (time) ______
Appendix D Revision Form

Department of Energy
WAPA - Western Area Power Administration

Revision Request Form

Date: _____________________________________________

Submitted by (Requestor): __________________________

Office: __________________________________________

Current Statement: ______________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Suggested Revision and Recommended Wording: ______________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Basis for Revision: ______________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Signature: _________________________________  Requester

Signature:________________________________  Requester’s Supervisor

This form must be signed by the requester and the requester’s supervisor before being submitted to the respective Regional Power System Operations Chapter Team Member. This form must be submitted by September 1st to be considered in the following year’s publication of the Power System Operations Manual.
Appendix E Switching Read & Review

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Example of Switching Read & Review Process

Page 1

1. **Switchman:** This is Nate Adams your Switchman. I’m in TCY substation. I’m ready to get started on switching program C-16-1102 on the TCY CB 882.

2. **System Operator:** Ok, Nate have you had a chance to review C-16-1102 on the TCY CB 882?

3. **Switchman:** Yes, I’ve reviewed switching program C-16-1102 on TCY CB 882.

4. **System Operator:** Ok, Nate you can start your Read back (Read & Review) on C-16-1102 on TCY CB 882, starting at step 4.

5. **Switchman:** Ok, This is for the placement of Clearance (removing from service) on C-16-1102, Original, on TCY CB 882. For example: Steps One, Two and Three were performed by the System Operator.

   - **Step 4** TCY, place 43-882CS to the local position.
   - **Step 5** TCY, Check Open CB 882.
   - **Step 6** TCY, Open DISC 881, Lock & Tag.
   - **Step 7** TCY, Check Open 883, Make Inoperable, Lock & Tag.

6. **System Operator:** That is a good read back (Read & Review) on program C-16-1102, Original, on TCY CB 882, at this time you have permission to perform steps 4 thru 7 only and call me back with times & tags.

7. **Switchman:** I understand that on program C-16-1102, Original , on TCY CB 882, I can perform steps 4-7 only and call you back with times & tags.

8. **System Operator:** That is correct.
Example of Switching Read & Review Process

1. **Switchman:** Hello, System Operator this is Nate Adams, your switchman, I’m ready to report back times and tags for the placement of C-16-1102, Original on TCY CB 882.

2. **System Operator:** Ok Nate, I have the program in front of me, go ahead.

3. **Switchman:** OK, for the placement of C-16-1102 Original, on TCY CB 882, I performed steps 4 thru 7:

   - **Step 4** TCY, place 43-882CS to the local position. 1137
   - **Step 5** TCY, Check Open CB 882. 1142
   - **Step 6** TCY, Open DISC 881, Lock & Tag. TCY, 10 1144
   - **Step 7** TCY, Check Open 883, Make Inoperable, Lock & Tag. TCY, 14 1146

4. **System Operator:** Ok Nate, I have copied those times and tags for the placement of C-16-1102 on TCY CB 882, Thank you. I will call the Clearance Supervisor.
# Appendix F PSOM Chapter Variance Request

## PSOM Chapter 1 Variance Request Form

<table>
<thead>
<tr>
<th>Submitted by: _________________________________</th>
<th>Date: <strong>/</strong>/____</th>
</tr>
</thead>
</table>

A variance to PSOM Ch. 1 requirement __________________________
is requested and **shall** not conflict with OSHA 1910.269(m).

1. The stated requirement needs to be varied because:

   _______________________________________________________

2. How will proper protection and safety of personnel be provided, if applicable:

   _______________________________________________________

3. This variance will remain effective from: _________________ to: _________________

---

**Concurred by:**

Regional Safety Manager: _________________________________ Date: __/__/____

**Approved by:**

Regional Operations Manager: _______________________________ Date: __/__/____

Copy to: Supervisory Power System Dispatcher (AD 6)
Appendix G Two Person Switching

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Two Person Switching
A Guideline for the Switchman & Switchmen Checker

Switching can be done alone, however; it is advantageous to have another set of eyes when performing this critical function. When another Switchman is available, that person may be used as a Switchman Checker to closely monitor what the switchman is doing. This additional effort will help ensure the Principles of Safe Switching Procedures are met (see Section 1.8).

The Switchman Checker should follow the switching program to ensure the Switchman is following the program as written. The Switchman and the Switchman Checker must focus on the task at hand. Conversations unrelated to the switching program, during any portion of the switching process, should be avoided since they can be a distraction leading to an error or injury.

10 Key Elements of Switchman Checking

The Switchman Checker can best assist the Switchman by adhering to the following guidelines:

1. MAINTAIN: Maintain Authorized Switchman status.
2. TAILGATE: Before beginning to switch, ensure that the Switchman explains what they intend to accomplish and how they plan to go about it. Using a station one-line for explanation will help both Switchman avoid overlooking important details.
3. EVALUATE: Evaluate the proposed switching to determine if it will accomplish the desired result.
4. WORK TOGETHER: Share the responsibility to successfully complete the switching program; using the Six Basic Steps of Switching.
5. EXPLAIN: Ensure that the Switchman explains what position they are in, what item they are about to operate, and what the effect of this will be.
6. INQUIRE: Ask about the actual status of the equipment to be operated.
7. AGREE: Give the Switchman verbal agreement to perform the proposed operation.
8. STOP: Stop each other when something is not right, or doesn’t seem right.
9. REFUSE TO BE PASSIVE: There is a significant difference between observing and checking.
10. REFUSE TO BE IGNORED: You are your brother’s keeper—it is in the Switchman’s best interest to have an attentive checker.

NOTE: The use of a Switchman Checker is not required; however, it is to everyone’s advantage to have another qualified Switchman serve as the Switchman Checker, whenever available. The Switchman and the Switchman Checker have a mutual responsibility to complete the switching correctly and safely.
Appendix H Switching Program Form

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Switching Program Form

<table>
<thead>
<tr>
<th>Switching for:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placement:</td>
</tr>
<tr>
<td>Removal:</td>
</tr>
<tr>
<td>Other:</td>
</tr>
</tbody>
</table>

| Date:          |
| Program#:      |

Additional Info:

1) Carry the switching program with you
2) Touch or point to the device
3) Recheck the switching program
4) Verify anticipated device position
5) Perform requested action
6) Verify desired device position

<table>
<thead>
<tr>
<th>Op #</th>
<th>Time</th>
<th>Switching Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Switching At:__________ By:________________________</td>
</tr>
</tbody>
</table>

Checked By: __________
Checked By: __________
Originated By: __________
Page: ____ of ____
# Appendix I – Facility Restoration

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## Facility Restoration Assessment Template

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Safe to Enter</th>
<th>CBs Open</th>
<th>CBs Closed</th>
<th>Any Recordable Voltages?</th>
<th>Potential Lights</th>
<th>Station Service Condition</th>
<th>Station Damage</th>
<th>Station Battery Status</th>
<th>Station Security Concerns</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Explain</td>
<td>Yes</td>
<td>No</td>
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<td>On</td>
<td>Off</td>
<td>Explain</td>
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# Appendix J Station Monitoring for Loss of SCADA

<table>
<thead>
<tr>
<th>Date</th>
<th>Substation</th>
<th>Equipment: Bus / Line / Transformer</th>
<th>MVAr Rating</th>
<th>MVAAs</th>
<th>Voltage</th>
<th>Voltage Reference Chart</th>
<th>Voltage after Insertion</th>
<th>Voltage after Removal</th>
<th>Notes</th>
<th>Notes</th>
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</table>

- **115kV**  
  - 1.0/1.2MVA  
  - 1.0/1.2MVA  
  - 1.2/1.7MVA  
  - 1.5/2.0MVA  
  - 1.5/2.5MVA  
  - 1.5/3.0MVA  
  - 1.5/4.0MVA  
  - 1.5/4.5MVA  
  - 1.5/5.0MVA  
  - 1.5/5.5MVA  

- **400kV**  
  - 1.0/1.2MVA  
  - 1.0/1.2MVA  
  - 1.2/1.7MVA  
  - 1.5/2.0MVA  
  - 1.5/2.5MVA  
  - 1.5/3.0MVA  
  - 1.5/4.0MVA  
  - 1.5/4.5MVA  
  - 1.5/5.0MVA  
  - 1.5/5.5MVA  

**Alerts/Triage**
Appendix K Previous / Superseded Editions

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Previous / Superseded Editions

November 2017
November 2016
November 2015
November 2014
October 2013
April 2012
February 2011
April 2009
November 2007
July 2006
March 2005
March 2002
April 2000
July 1993
January 1986