

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Transmission Availability Data System Reporting Training

November 2021

RELIABILITY | RESILIENCE | SECURITY



Learning Objective

Participate in test your knowledge activities to strengthen and solidify newly acquired TADS reporting concepts.

- A 115kV Phase Shifting Transformer tripped and locked out due to an internal fault. At the same instant that the PST failed, a remote 115kV transmission line terminal, not associated with the PST, tripped and reclosed in 5 seconds. This trip is due to a protection relay misoperation, but cannot be attributed to incorrect relay settings
- The 115kV line trip and automatic reclose in <1 minute would not normally require a TADS submittal. However, since the automatic outage of the PST was the initiating event for the misoperation of the remote 115kV line, should these be submitted as Dependent Mode Initiating (for the PST) and the Dependent Mode (for the 115kV line)?

- A: If the PST outage resulted in the 115kV line outage, it should be reported as a Dependent Mode Initiating outage, even though the 115kV line outage is not reportable as it was a momentary outage.

Updating Inventory for previous years

- Entities reviewing their inventories and notice something that hadn't been updated when it should have been
 - An element was added to their system in 2019 but they forgot to add it
 - An element was retired in 2018 but the change was never made
 - An element needs to be added but in-service date is in a previous year
- Elements are changing ownership from one Entity to another
- Entities and Regions aren't allowed to make these changes
- NERC will have to make change - Send email to tads@nerc.net
 - Please include your NCR
 - Complete Workbook Forms with updated data

Editing Outages from previous years.

- Outage started in 2020 and continued to 2021 had the incorrect Element ID associated with it.
- Outage from previous year has incorrect cause code
- Entities and Regions aren't allowed to make these changes
- NERC will have to make change - Send email to tads@nerc.net
 - Please include your NCR
 - Complete Workbook Forms with updated data

- Q: An ice storm caused multiple lines to trip due to conductor galloping. They occurred throughout the day and not at the same time. Would these be considered Common Mode Outages or Single Mode Outages?
- A: Single Mode outages. Even though each individual outage is caused by the same galloping conductor because there are not multiple outages occurring at the same time or very close to each other in time and the lines are back in service after each outage they are not considered common mode. If, for example, the galloping conductor causes an outage on a line and that line stays out, and the conductor causes another outage on another line which also stays out then those outages would be considered Common Mode

- Q: Could you elaborate as to what qualifies as a change/reconfiguration(column D in Table 3.2)?
- A: Column G (Change/Reconfiguration Data) is when the element was placed in-service. If this is unknown, use the January 1 of the current year you are reporting. If the element is altered/reconfigured in a way that would change its rating or voltage characteristics, then that date would be entered here.”

- Q: We could create many abnormal “configurations” on our system (by pass more than one sub), I could create AC circuits that will very likely never be used. I’m trying to figure out when not to include an AC circuit. Is there a general rule of thumb? For Example: only include the AC circuits in the inventory if they are if they have historically been used 95% or more of the time during the year?
- A: Only report the ones that are used during the course of a year.

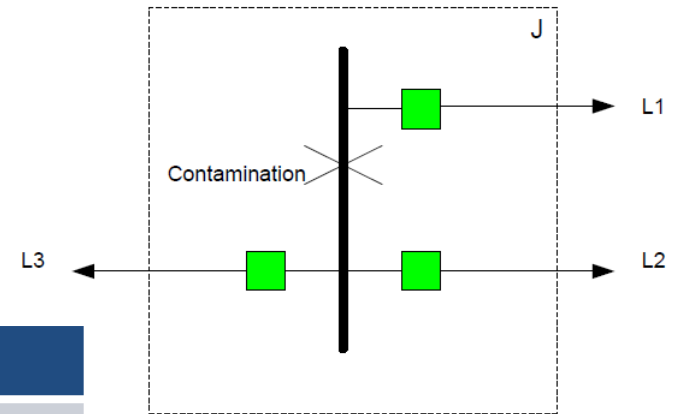
- Q: Why doesn't my 5.0 form show as complete?
- Q: Why does my TO statement show as incomplete?
- Q: I have entered data for Q1, why doesn't it show as complete?
- A: The Status column will show 'Completed' after all data for the reporting year is entered (Q1-Q4) and then reviewed by the Regional Coordinator.

Single P-G fault on the Bus due to contamination, no damage resulted.

At what point are the individual outages over?

Which line(s) should this outage be reported for?

How would this be coded?

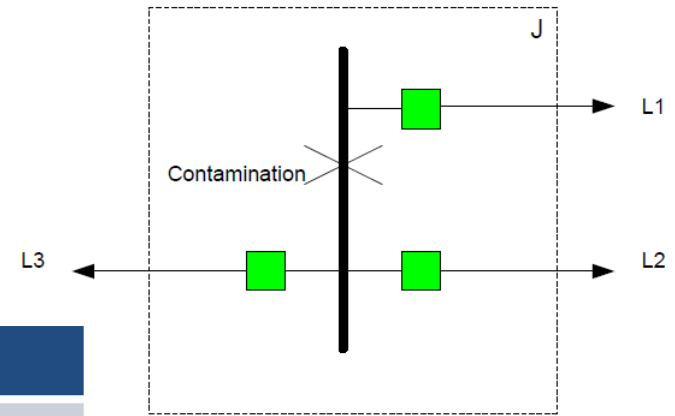


Fields	Form ___ L1, L2, L3	Form 5.0	
Fault Type		Event Type Number	
Outage Initiation Code			
Initiating Cause Code			
Sustained Cause Code			
Outage Mode Code			

Single P-G fault on the Bus due to contamination.

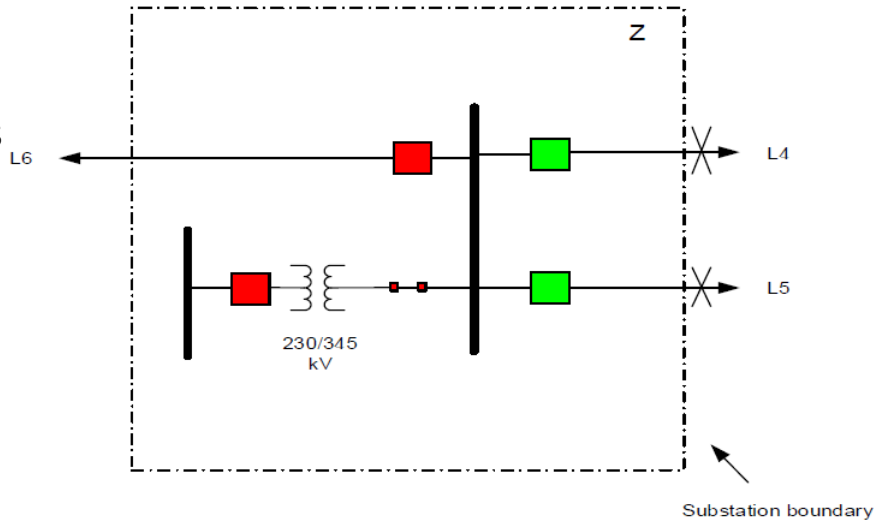
The individual outages are over when corresponding line breakers are placed in-service.

Individual outages should be reported on all three lines under the same event.



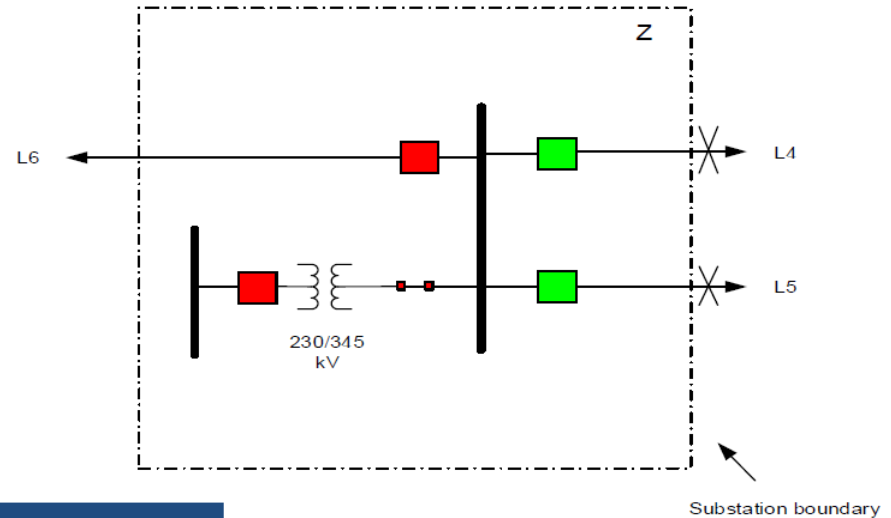
Fields	Form 4.1 L1, L2, L3	Form 5.0	
Fault Type	Single P-G fault	Event Type Number	05
Outage Initiation Code	AC Substation-Initiated		
Initiating Cause Code	Contamination		
Sustained Cause Code	Contamination		
Outage Mode Code	Common Mode		

Lines L4 and L5 are located on a common structure. A single lightning strike hits both circuits causing them to each experience a single phase to ground fault. Both breakers automatically reclose successfully and simultaneously.



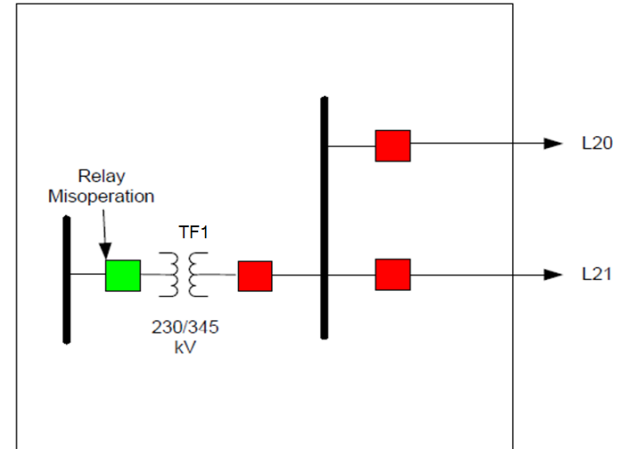
Fields	Form ___ L4, L5	Form 5.0	
Fault Type		Event Type Number	
Outage Initiation Code			
Initiating Cause Code			
Sustained Cause Code			
Outage Mode Code			

Lines L4 and L5 are located on a common structure. A single lightning strike hits both circuits causing them to each experience a single phase to ground fault. Both breakers automatically reclose successfully and simultaneously.



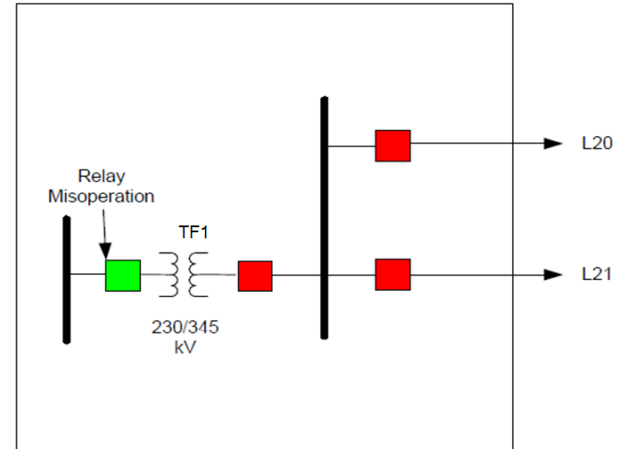
Fields	Form 4.1 L4, L5	Form 5.0	
Fault Type	Single P-G	Event Type Number	31
Outage Initiation Code	Element-Initiated		
Initiating Cause Code	Lightning		
Sustained Cause Code	NA – Momentary		
Outage Mode Code	Common Mode		

A relay fails causing a 230/345 kV transformer outage.



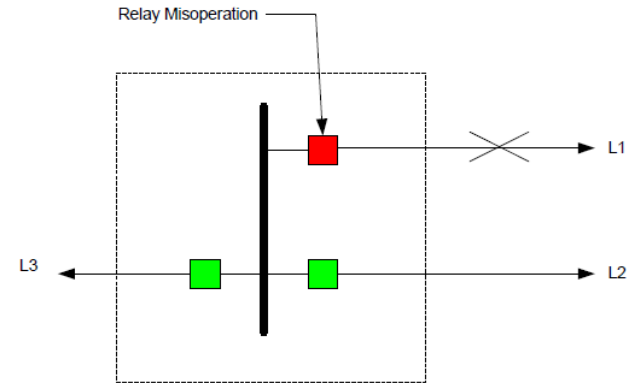
Fields	Form ____ TF1	Form 5.0	
Fault Type		Event Type Number	
Outage Initiation Code			
Initiating Cause Code			
Sustained Cause Code			
Outage Mode Code			

A relay fails causing a 230/345 kV transformer outage.



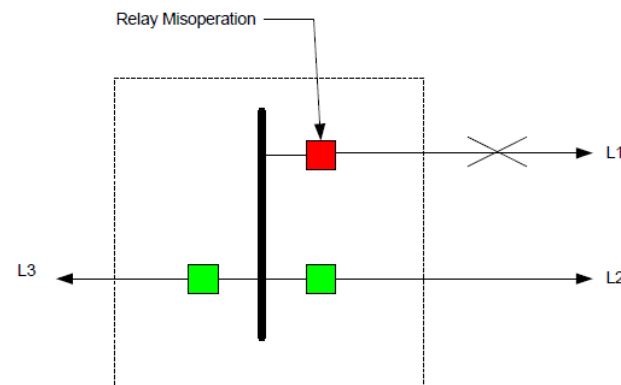
Fields	Form 4.3 TF1	Form 5.0	
Fault Type	No-Fault	Event Type Number	62
Outage Initiation Code	Protection System-Initiated		
Initiating Cause Code	Failed Protection System Equipment		
Sustained Cause Code	Failed Protection System Equipment		
Outage Mode Code	Single Mode		

A conductor breaks causing a phase to phase fault. The breaker on one end of the line fails to operate due to a relay Misoperation causing breakers on lines L2 and L3 to open.



Fields	Form ___ L1	Form ___ L2, L3	Form 5.0	
Fault Type			Event Type Number	
Outage Initiation Code				
Initiating Cause Code				
Sustained Cause Code				
Outage Mode Code				

A conductor breaks causing a phase to phase fault. The breaker on one end of the line fails to operate due to a relay Misoperation causing breakers on lines L2 and L3 to open.



Fields	Form 4.1 L1	Form 4.1 L2, L3	Form 5.0	
Fault Type	P-P Fault	No fault	Event Type Number	61
Outage Initiation Code	Element-Initiated	Protection System-Initiated		
Initiating Cause Code	Failed AC Circuit Equipment	Failed Protection System Equipment		
Sustained Cause Code	Failed AC Circuit Equipment	Failed Protection System Equipment		
Outage Mode Code	Dependent Mode Initiating	Dependent Mode		

Galloping conductors on a double circuit structure carrying a 138kV line (Line X-Y) and a 230kV line (Line A-B) resulted in momentary outages to both lines. The faults occur between phases on the same voltage.

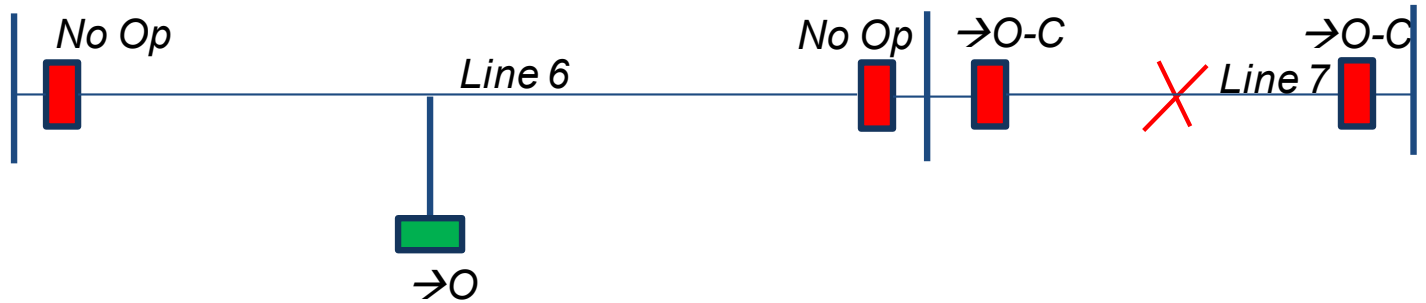
Fields	Form ___ Line A-B	Form ___ Line X-Y	Form 5.0	
Fault Type			Event Type Number	
Outage Initiation Code				
Initiating Cause Code				
Sustained Cause Code				
Outage Mode Code				

Galloping conductors on a double circuit structure carrying a 138kV line (Line X-Y) and a 230kV line (Line A-B) resulted in momentary outages to both lines. The faults occur between phases on the same voltage.

Fields	Form 4.1 Line A-B	Form 4.1 Line X-Y	Form 5.0	
Fault Type	P-P fault	Not reportable	Event Type Number	11
Outage Initiation Code	Element-Initiated	Not reportable		
Initiating Cause Code	Weather	Not reportable		
Sustained Cause Code	NA- Momentary	Not reportable		
Outage Mode Code	Single Mode	Not reportable		

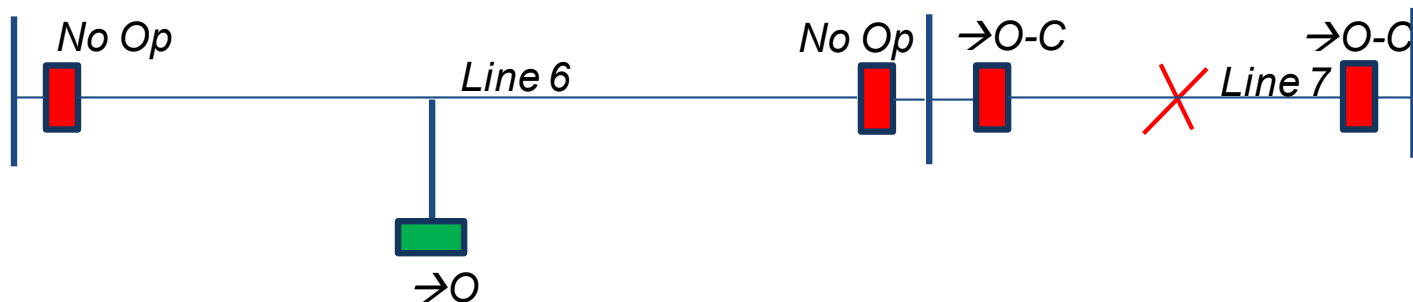
Test Your Knowledge – Example 6

A 138 kV two-terminal transmission line (#7) experiences an outage due to bird contamination which resulted in a single phase to ground fault. The faulted line trips and successfully returns to an in-service state in less than one minute. On an adjacent 138 kV three-terminal line (#6), one remote breaker opens due to failed communication system and failed to return to an in-service state due to a failed reclosing scheme.



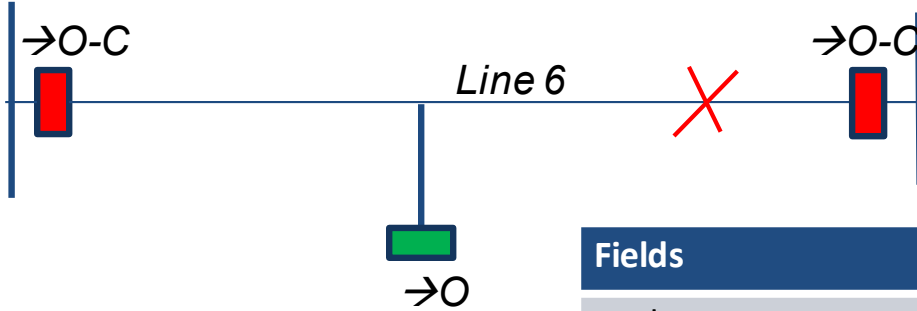
Fields	Form __ Line 6	Form __ Line 7	Form 5.0	
Fault Type			Event Type Number	
Outage Initiation Code				
Initiating Cause Code				
Sustained Cause Code				
Outage Mode Code				

A 138 kV two-terminal transmission line (#7) experiences an outage due to bird contamination which resulted in a single phase to ground fault. The faulted line trips and successfully returns to an in-service state in less than one minute. On an adjacent 138 kV three-terminal line (#6), one remote breaker opens due to failed communication system and failed to return to an in-service state due to a failed reclosing scheme.



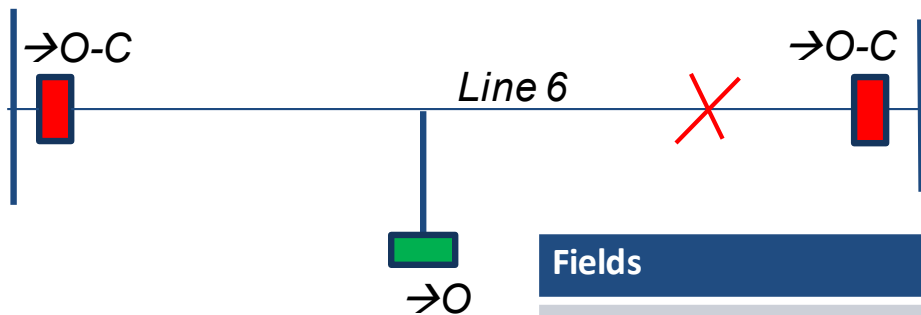
Fields	Form 4.1 Line 6	Form 4.1 Line 7	Form 5.0	
Fault Type	No fault	Not reportable	Event Type Number	62
Outage Initiation Code	Protection System-Initiated	Not reportable		
Initiating Cause Code	Failed Protection System Equipment	Not reportable		
Sustained Cause Code	Failed AC Substation Equipment	Not reportable		
Outage Mode Code	Dependent Mode	Not reportable		

A 138 kV three-terminal line experiences a single phase to ground fault due to lightning. The fault was cleared correctly but one terminal did not close due to a faulty recloser.



Fields	Form __ Line 6	Form 5.0	
Fault Type		Event Type Number	
Outage Initiation Code			
Initiating Cause Code			
Sustained Cause Code			
Outage Mode Code			

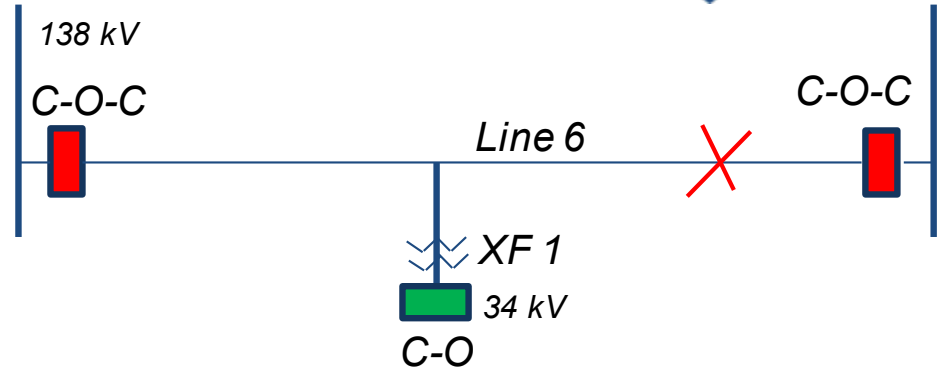
A 138 kV three-terminal line experiences a single phase to ground fault due to lightning. The fault was cleared correctly but one terminal did not close due to a faulty recloser.



Fields	Form 4.1 Line 6	Form 5.0	
Fault Type	Single P-G fault	Event Type Number	11
Outage Initiation Code	Element-Initiated		
Initiating Cause Code	Lightning		
Sustained Cause Code	Failed AC Substation Equipment		
Outage Mode Code	Single Mode		

Test Your Knowledge – Example 8: Non-BES Transformer

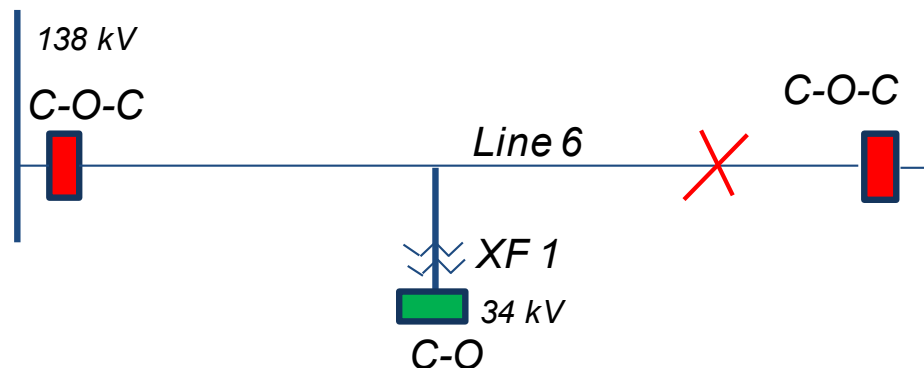
A 138 kV three-terminal line experiences a single phase to ground fault due to lightning. The fault was cleared correctly but one terminal did not close due to a faulty recloser.



Fields	Form __ Line 6	Form __ XF 1	Form 5.0	
Fault Type			Event Type Number	
Outage Initiation Code				
Initiating Cause Code				
Sustained Cause Code				
Outage Mode Code				

Test Your Knowledge – Example 8: Non-BES Transformer Answer

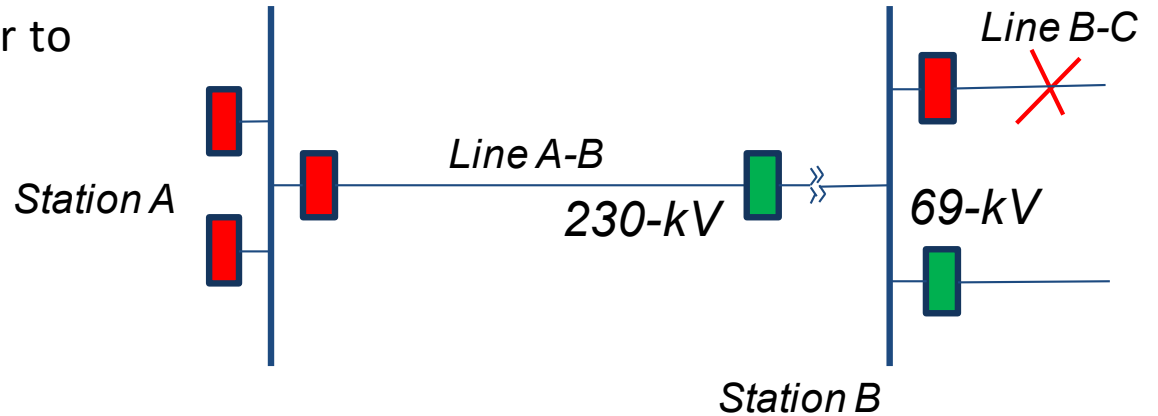
A 138 kV three-terminal line experiences a single phase to ground fault due to lightning. The fault was cleared correctly but one terminal did not close due to a faulty recloser.



Fields	Form 4.1 Line 6	Form 4.3 XF 1	Form 5.0	
Fault Type	Not reportable	Not reportable	Event Type Number	Not reportable
Outage Initiation Code	Not reportable	Not reportable		
Initiating Cause Code	Not reportable	Not reportable		
Sustained Cause Code	Not reportable	Not reportable		
Outage Mode Code	Not reportable	Not reportable		

A lightning strike occurs on the 69-kV line B-C. The breaker on line B-C fails to open causing the 230kV breaker to open on line A-B.

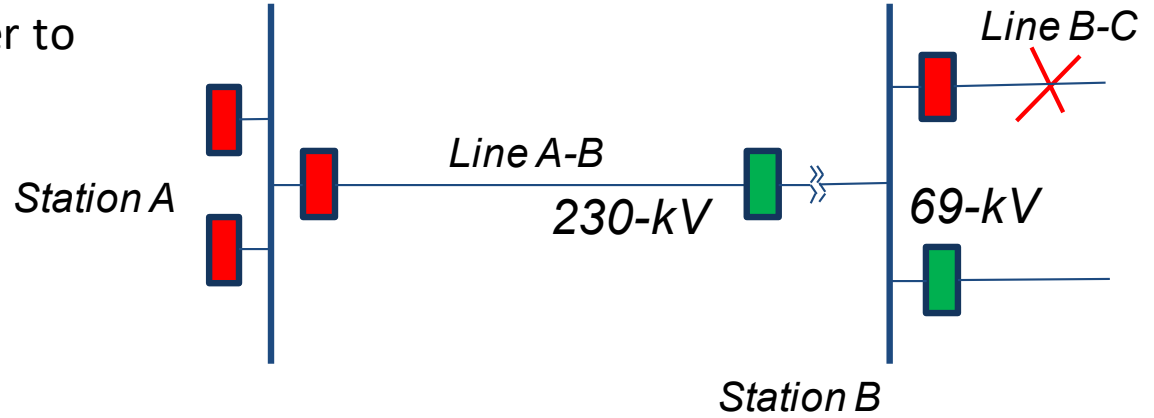
230 kV Line A-B is a BES Element.
How should this be coded?



Fields	Form ___ A-B	Form ___ B-C	Form 5.0	
Fault Type			Event Type Number	
Outage Initiation Code				
Initiating Cause Code				
Sustained Cause Code				
Outage Mode Code				

A lightning strike occurs on the 69-kV line B-C. The breaker on line B-C fails to open causing the 230kV breaker to open on line A-B.

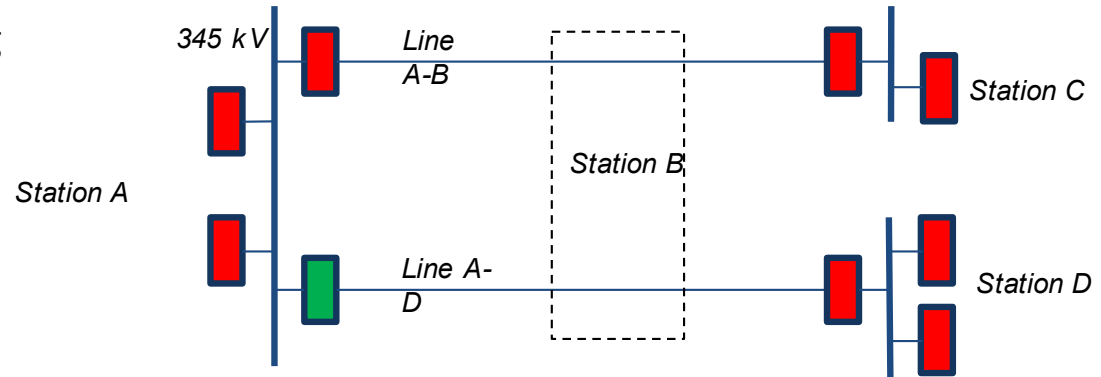
230 kV Line A-B is a BES Element.
How should this be coded?



Fields	Form 4.1 A-B	Form 4.1 B-C	Form 5.0	
Fault Type	No fault	Not reportable	Event Type Number	60
Outage Initiation Code	AC Substation-Initiated	Not reportable		
Initiating Cause Code	Failed AC Substation Equipment	Not reportable		
Sustained Cause Code	Failed AC Substation Equipment	Not reportable		
Outage Mode Code	Dependent Mode	Not reportable		

Test Your Knowledge – Example 10

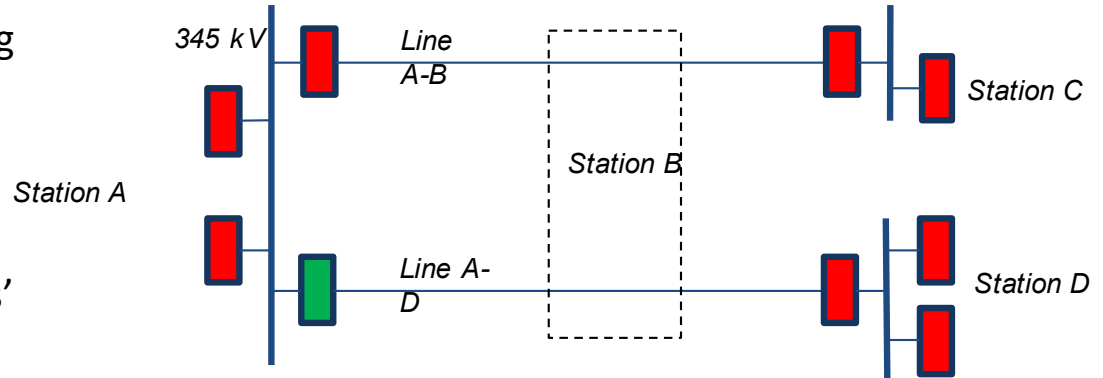
Two circuits exist in parallel both originating from Substation A and running through switching station B, which contains no terminal circuit breakers, before traveling on to two separate remote substations. Whenever a communication link outage of the circuits' protection system occurs one of the parallel lines has to be opened.



How should this be coded?

Fields	Form ___ A-D	Form 5.0	
Fault Type		Event Type Number	
Outage Initiation Code			
Initiating Cause Code			
Sustained Cause Code			
Outage Mode Code			

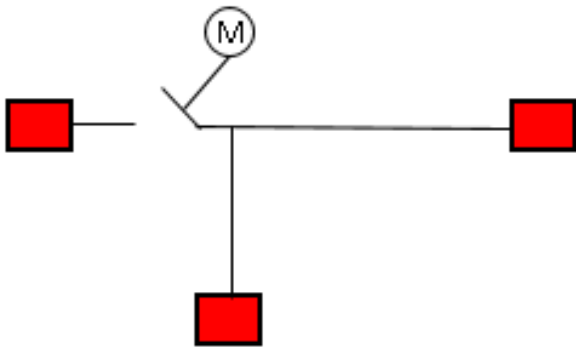
Two circuits exist in parallel both originating from Substation A and running through switching station B, which contains no terminal circuit breakers, before traveling on to two separate remote substations. Whenever a communication link outage of the circuits' protection system occurs one of the parallel lines has to be opened.



How should this be coded?

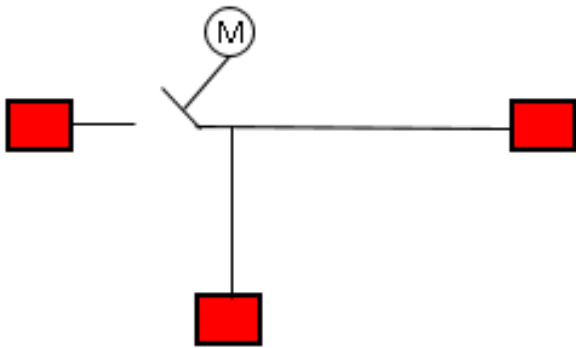
Fields	Form 6.1 A-D	Form 5.0	
Fault Type	N/A	Event Type Number	N/A
Outage Initiation Code	N/A		
Initiating Cause Code	Emergency		
Sustained Cause Code	N/A		
Outage Mode Code	N/A		

Motor operated disconnect control circuit misoperates and opens the disconnect. For this example, motor operated disconnect is located on the circuit. Breakers do not operate and there is not a BES fault.



Fields	Form ___ Line A-B	Form 5.0	
Fault Type		Event Type Number	
Outage Initiation Code			
Initiating Cause Code			
Sustained Cause Code			
Outage Mode Code			

Motor operated disconnect control circuit misoperates and opens the disconnect. For this example, motor operated disconnect is located on the circuit. Breakers do not operate and there is not a BES fault.



Fields	Form 4.1 Line A-B	Form 5.0	
Fault Type	No Fault	Event Type Number	90
Outage Initiation Code	Element-Initiated		
Initiating Cause Code	Failed AC Circuit Equipment		
Sustained Cause Code	Failed AC Circuit Equipment		
Outage Mode Code	Single Mode		

A stylized map of North America is centered on the page. The map is divided into three horizontal color bands: a light purple band at the top covering Canada, a dark blue band in the middle covering the United States, and a light grey band at the bottom covering Mexico. The text "Questions and Answers" is overlaid on the dark blue band.

Questions and Answers

TADS@NERC.NET