NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Transmission Availability Data System Reporting 202 Training

November 2020

RELIABILITY | RESILIENCE | SECURITY




Learning Objective

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

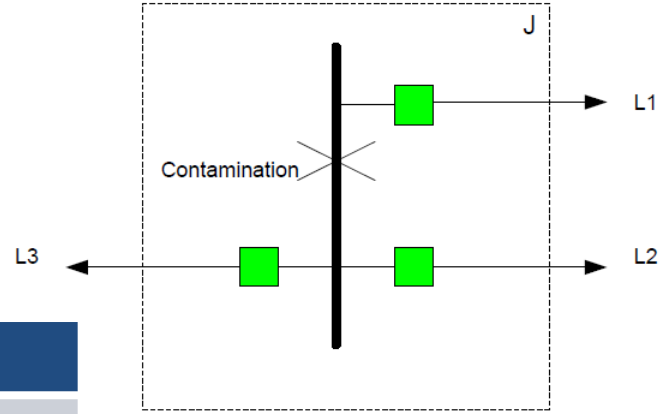
Test Your Knowledge – Example 1

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?



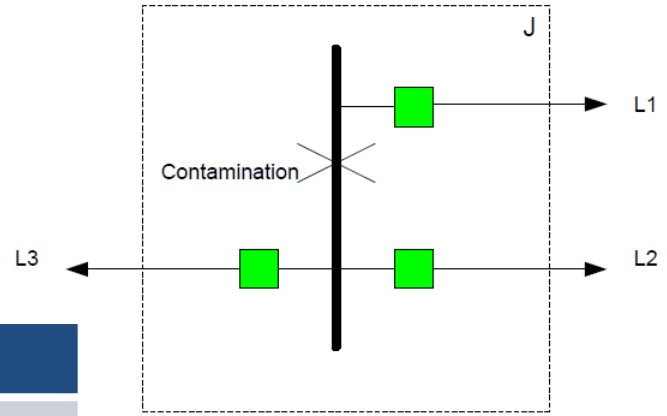
Fields	Form ___ L1, L2, L3	Form 5.0	
Fault Type		Event Type Number	
Outage Initiation Code			
Initiating Cause Code			
Sustained Cause Code			
Outage Mode Code			

Test Your Knowledge – Example 1 Answer

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

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

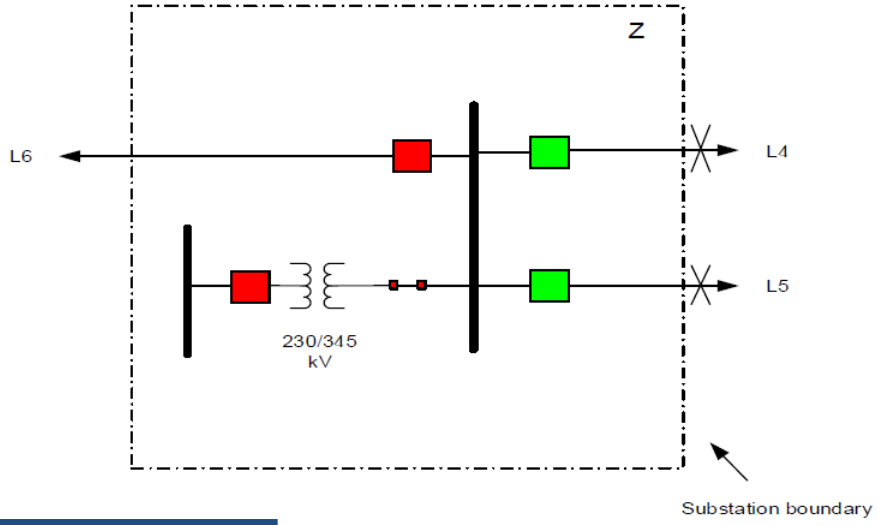
Individual outages should be reported on all three lines under the same event.



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		

Test Your Knowledge – Example 2

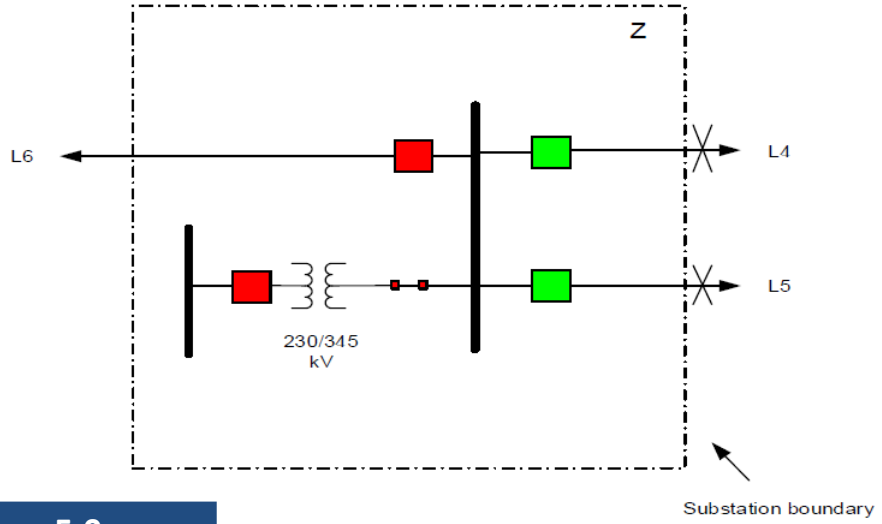
Lines L4 and L5 are located on a common structure. A single lightning strike hits both circuits causing them to each experience a single phase to ground fault. Both breakers automatically reclose successfully and simultaneously.



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

Test Your Knowledge – Example 2 Answer

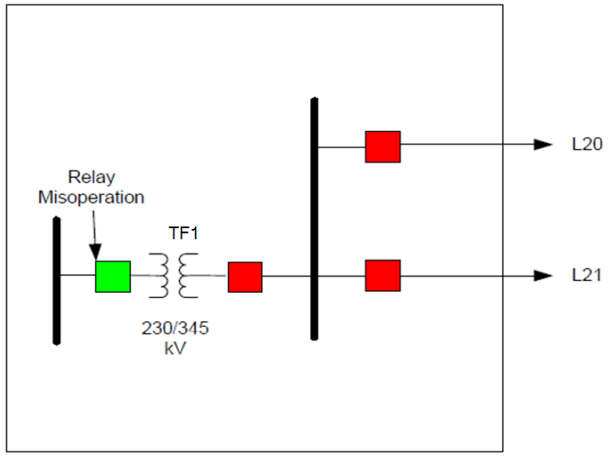
Lines L4 and L5 are located on a common structure. A single lightning strike hits both circuits causing them to each experience a single phase to ground fault. Both breakers automatically reclose successfully and simultaneously.



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		

Test Your Knowledge – Example 3

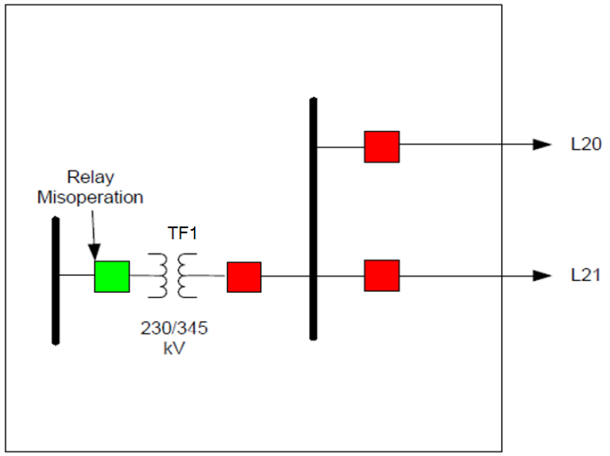
A relay fails causing a 230/345 kV transformer outage.



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

Test Your Knowledge – Example 3 Answer

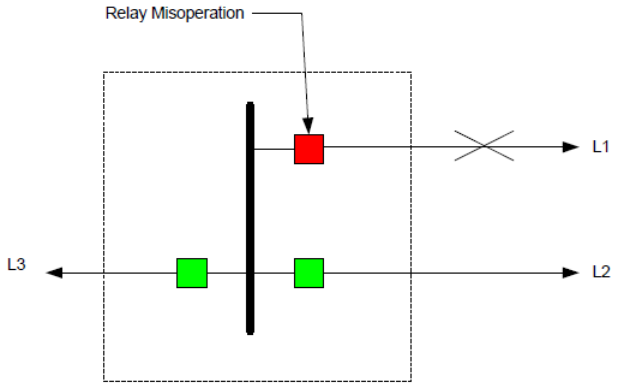
A relay fails causing a 230/345 kV transformer outage.



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 Eq.		
Sustained Cause Code	Failed Protection System Eq.		
Outage Mode Code	Single Mode		

Test Your Knowledge – Example 4

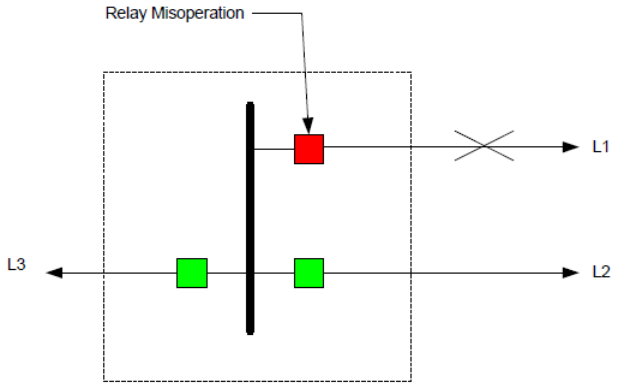
A conductor breaks causing a phase to phase fault. The breaker on one end of the line fails to operate due to a relay Misoperation causing breakers on lines L2 and L3 to open.



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				

Test Your Knowledge – Example 4 Answer

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.

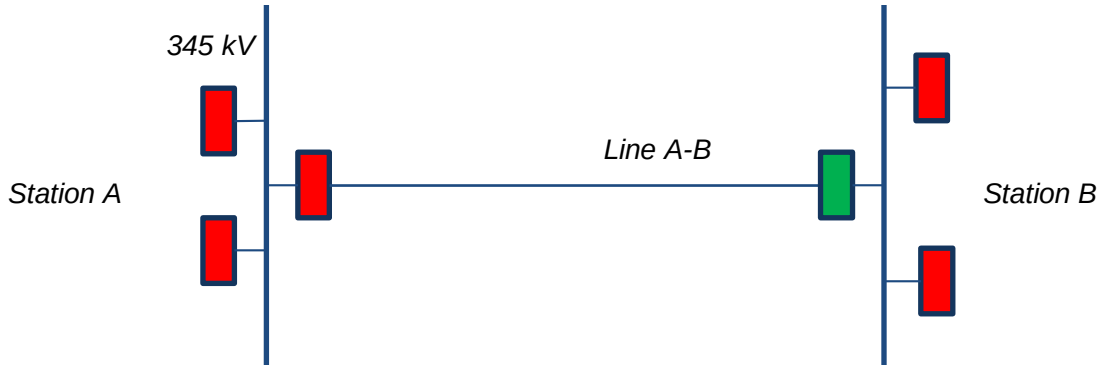


Fields	Form 4.1 L1	Form 4.1 L2, L3	Form 5.0	
Fault Type	P-P Fault	No fault	Event Type Number	61
Outage Initiation Code	Element-Initiated	Protection System-Initiated		
Initiating Cause Code	Failed AC Circuit Eq.	Failed Protection System Eq.		
Sustained Cause Code	Failed AC Circuit Eq.	Failed Protection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

Test Your Knowledge – Example 5

A technician applies settings to a relay and the settings result in an immediate trip. The relay issued the trip at the exact moment when the relay accepted the settings after the technician loaded and implemented the settings.

How should this be coded?

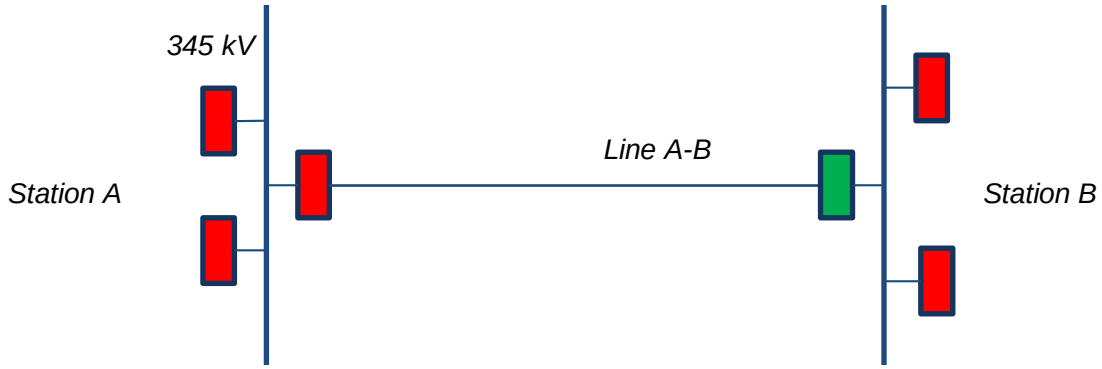


Fields	Form ___ A-B	Form 5.0	
Fault Type		Event Type Number	
Outage Initiation Code			
Initiating Cause Code			
Sustained Cause Code			
Outage Mode Code			

Test Your Knowledge – Example 5 Answer

A technician applies settings to a relay and the settings result in an immediate trip. The relay issued the trip at the exact moment when the relay accepted the settings after the technician loaded and implemented the settings.

How should this be coded?



Fields	Form 6.1 A-B	Form 5.0	
Fault Type	N/A	Event Type Number	N/A
Outage Initiation Code	N/A		
Initiating Cause Code	Human Error		
Sustained Cause Code	N/A		
Outage Mode Code	N/A		

Test Your Knowledge – Example 6

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				

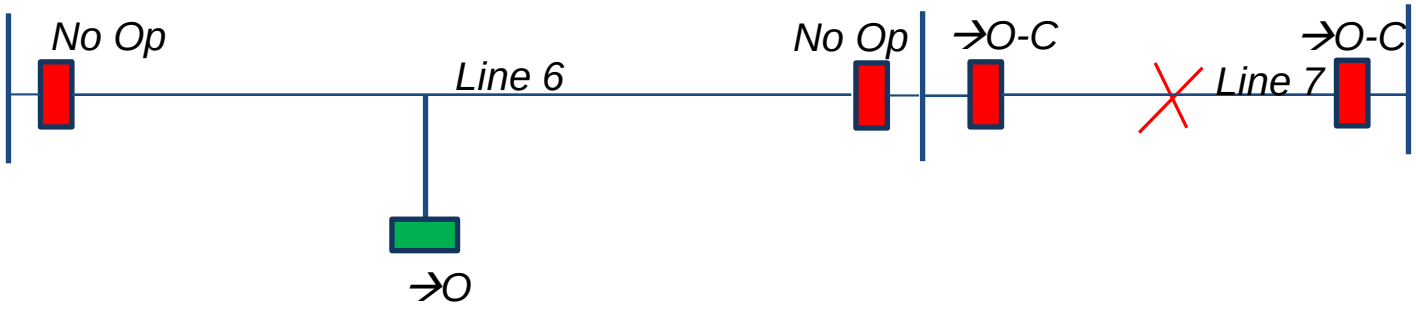
Test Your Knowledge – Example 6 Answer

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 7

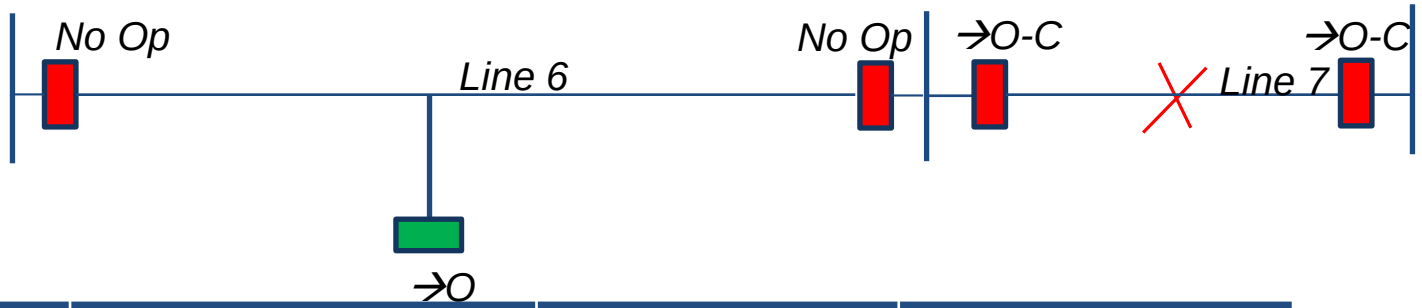
A 138 kV two-terminal transmission line experiences an outage due to bird contamination which resulted in a single phase to ground fault. The faulted line trips and successfully returns to an in-service state in less than one minute. On an adjacent 138 kV three-terminal line one remote breaker opens 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				

Test Your Knowledge – Example 7 Answer

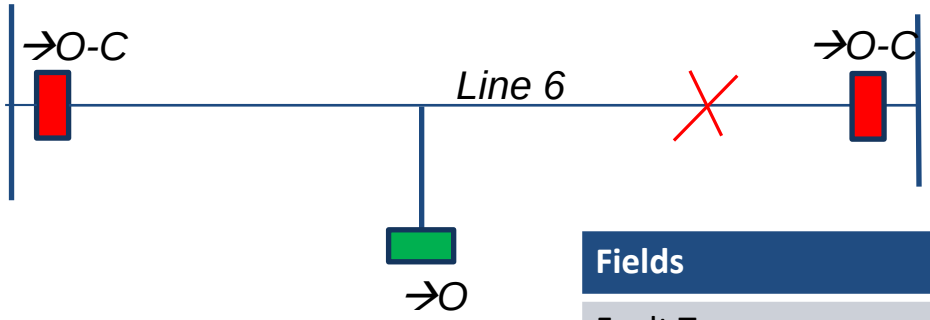
A 138 kV two-terminal transmission line experiences an outage due to bird contamination which resulted in a single phase to ground fault. The faulted line trips and successfully returns to an in-service state in less than one minute. On an adjacent 138 kV three-terminal line one remote breaker opens 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 Eq.	Not reportable		
Sustained Cause Code	Failed AC Substation Eq.	Not reportable		
Outage Mode Code	Dependent Mode	Not reportable		

Test Your Knowledge – Example 8

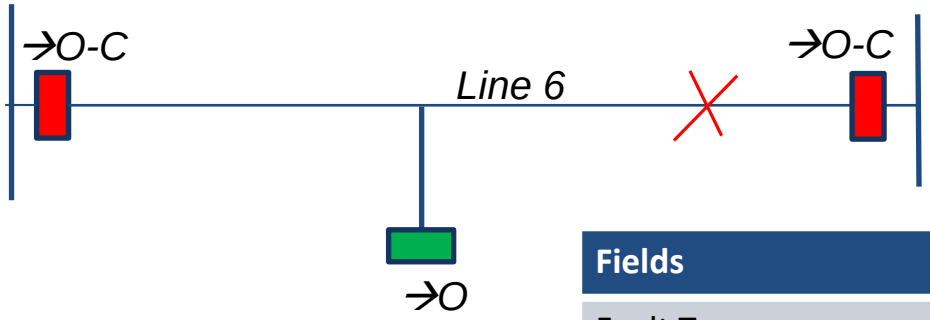
A 138 kV three-terminal line experiences a single phase to ground fault due to lightning. The fault was cleared correctly but one terminal did not close due to a faulty recloser.



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

Test Your Knowledge – Example 8 Answer

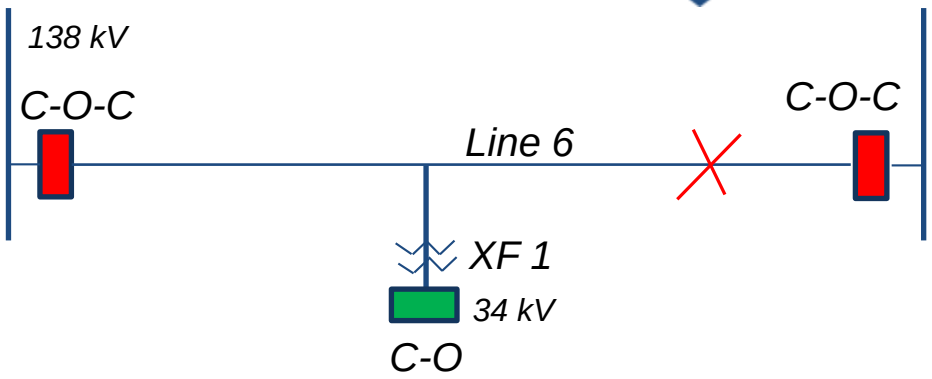
A 138 kV three-terminal line experiences a single phase to ground fault due to lightning. The fault was cleared correctly but one terminal did not close due to a faulty recloser.



Fields	Form 4.1 Line 6	Form 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 Eq.		
Outage Mode Code	Single Mode		

Test Your Knowledge – Example 9: Modified with Non-BES Transformer

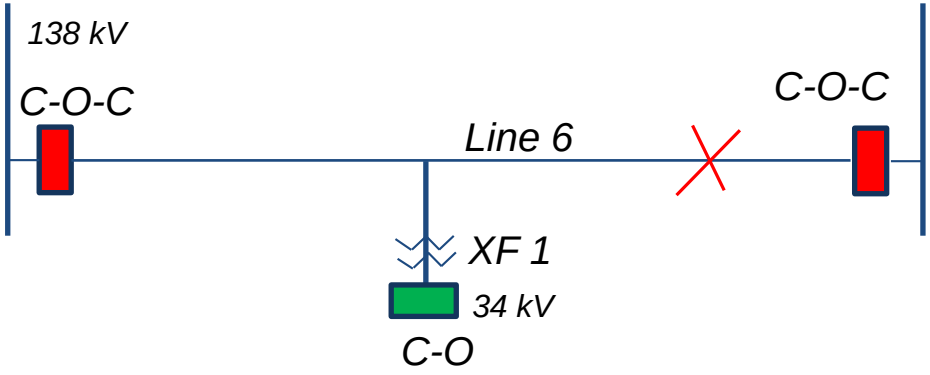
A 138 kV three-terminal line experiences a single phase to ground fault due to lightning. The fault was cleared correctly but one terminal did not close due to a faulty recloser.



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 9: Modified with 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.



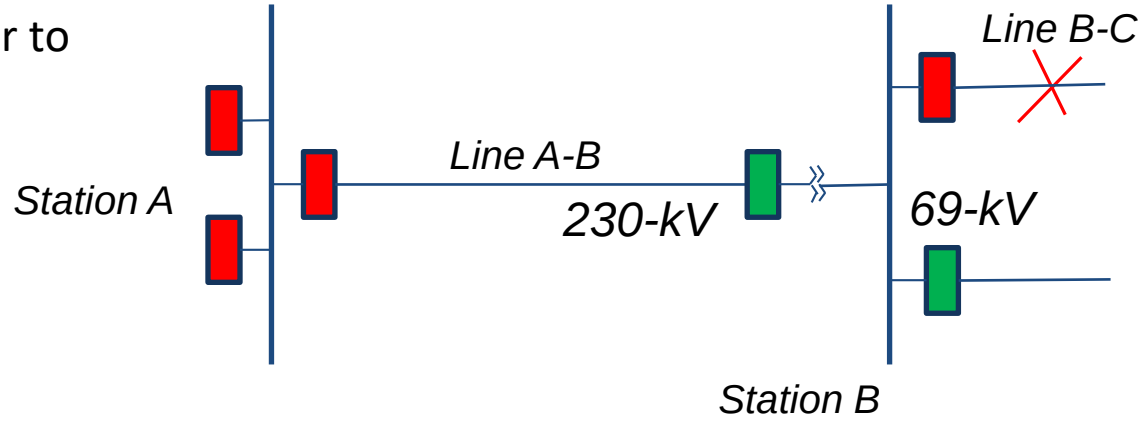
Fields	Form 4.1 Line 6	Form 4.3 XF 1	Form 5.0	
Fault Type	Not reportable	Not reportable	Event Type Number	Not reportable
Outage Initiation Code	Not reportable	Not reportable		
Initiating Cause Code	Not reportable	Not reportable		
Sustained Cause Code	Not reportable	Not reportable		
Outage Mode Code	Not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

Test Your Knowledge – Example 10

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?



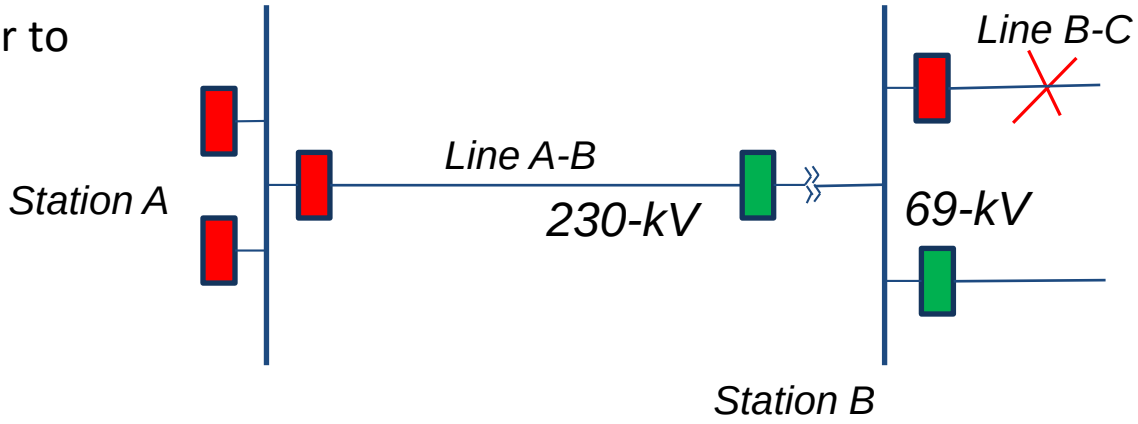
Fields	Form ___ A-B	Form ___ B-C	Form 5.0	
Fault Type			Event Type Number	
Outage Initiation Code				
Initiating Cause Code				
Sustained Cause Code				
Outage Mode Code				

Test Your Knowledge – Example 10 Answer

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?

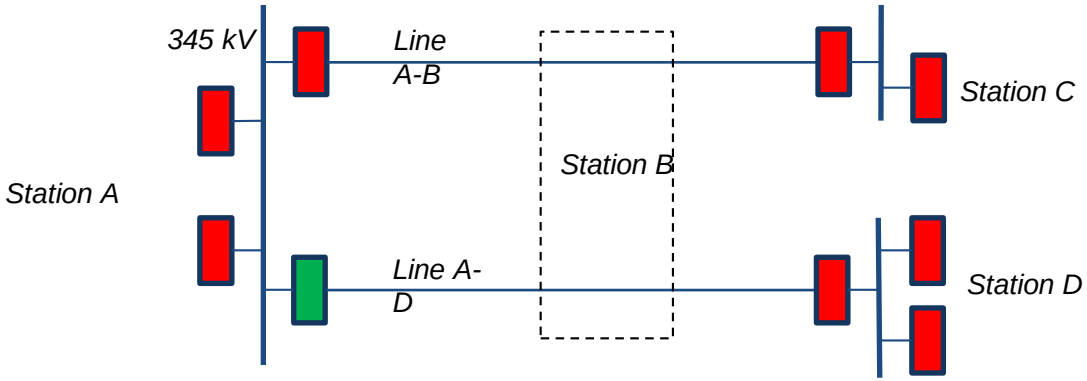


Fields	Form 4.1 A-B	Form 4.1 B-C	Form 5.0	
Fault Type	No fault	Not reportable	Event Type Number	60
Outage Initiation Code	AC Substation-Initiated	Not reportable		
Initiating Cause Code	Failed AC Substation Eq.	Not reportable		
Sustained Cause Code	Failed AC Substation Eq.	Not reportable		
Outage Mode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

Test Your Knowledge – Example 11

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?

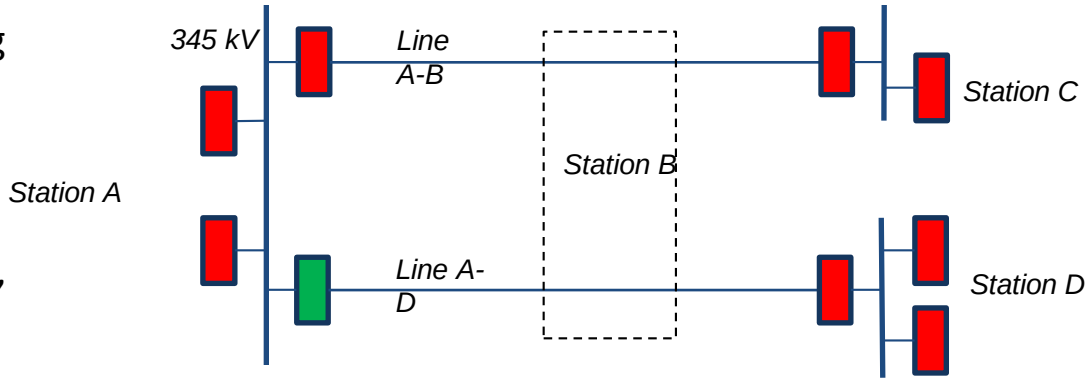


Fields	Form ___ A-D	Form 5.0	
Fault Type		Event Type Number	
Outage Initiation Code			
Initiating Cause Code			
Sustained Cause Code			
Outage Mode Code			

Test Your Knowledge – Example 11 Answer

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.

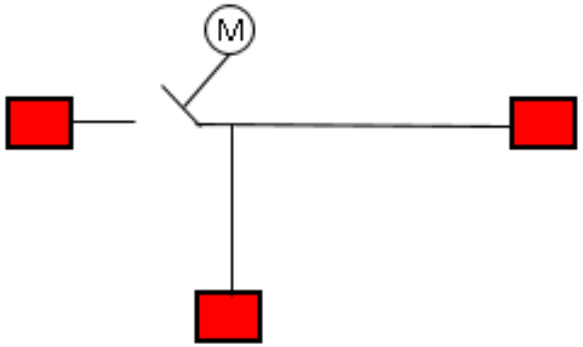
How should this be coded?



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		

Test Your Knowledge – Example 12

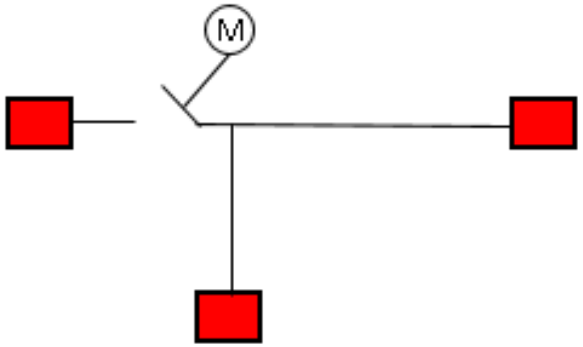
Motor operated disconnect control circuit misoperates and opens the disconnect. For this example, motor operated disconnect is located on the circuit. Breakers do not operate and there is not a BES fault.



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			

Test Your Knowledge – Example 12 Answer

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 Eq.		
Sustained Cause Code	Failed AC Circuit Eq.		
Outage Mode Code	Single Mode		

Questions and Answers

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Data Entry Demonstration

2020 TADS Data Reporting Training
November 2020

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Manual and Bulk Upload Examples

- Add Line to Inventory
  - Form 3.1
- Create Event ID
  - Form 5.0
- Create Line Outage
  - Form 4.1

Questions and Answers

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Validating Your Data

2020 TADS Data Reporting Training
November 2020

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Form 3.1: AC and DC Circuit Detailed Inventory Data

- Invalid Retirement Date. 'Retirement Date' must be within the reporting period range.
- Change/Reconfiguration Date is missing
- Mismatched Precursor Elements. Precursor Elements does not belong to provided Voltage Class (KV) or Circuit Type.
- Duplicate Element Identifier in the file
- Circuit Type is missing
- Invalid KV
- In Service date cannot be set after the Outage(s) creation date on this inventory. Either adjust the Inventory In Service date or Outage start date
- Circuit Mileage is missing
- Invalid To Bus

Form 3.3: AC/DC BtB Converter Detailed Inventory Data

- High Side kV is missing
- Low Side kV is missing
- Duplicate Element Identifier in the file
- Invalid Retirement Date. 'Retirement Date' must be within the reporting period range.
- Invalid Change/Reconfiguration Date. 'Change/Reconfiguration Date' must not be in the future or must be prior to the 'Retirement Date'.
- Invalid High or Low Side Voltage
- Invalid Three Phase Rating

Form 4.1: AC Circuit Detailed Automatic Outage Data

- Warning - For Outage ID [] associated with Event ID [], 'Failed Protection System Equipment' was entered as the 'Initiating Cause Code.' Therefore the cause of this outage is likely to be abnormal clearing (per NERC definition of Normal Clearing). However, the associated Event Type number entered on Form 5 is less than 50, which are 'Normal Clearing' event types. Warning: Please consider entering an abnormal clearing Event Type Number on Form 5, or do not enter 'Failed Protection System Equipment' as the 'Initiating Cause Code' for this Outage.

Form 4.1: AC Circuit Detailed Automatic Outage Data

- Event ID Code not in Form 5 of current period
- Outage ID Code [] has the Outage Continuation field entered as Continues into next period with a Start Date/Time = MM/DD/YYYY HH:MM [] timezone. However, the entered DURATION does not equal the HH:MM [] timezone [the EOYCD] remaining in the given reporting year. Enter a DURATION equal to HH:MM [the EOYCD], or change your data entry in the Outage Continuation Field.

Form 4.1: AC Circuit Detailed Automatic Outage Data

- For a '0' duration outage, the Sustained Outage Cause Code must be 'N/A - Momentary'. Please enter this Sustained cause code OR change the Duration to a number greater than zero.
- For a duration outage greater than '0', the Sustained Outage Cause Code CAN NOT be 'N/A - Momentary'.
- Outage duration overlap other outage(s) in the XML with the same element.
- Duplicate Event ID Code and Element Identifier
- In XML file, Same Event ID Code is used with another outage having one of them as a Single mode outage
- Invalid Sustained Cause Code

Form 4.1: AC Circuit Detailed Automatic Outage Data

- Outage Duration is invalid. (hhhh:mm) Max Duration: XXX:XX
- Invalid Fault Type
- Outage Duration is invalid. Format is hhhh:mm
- Sustained Cause Code is missing
- Outage continuation flag is missing (0,1,2)
- Outage Mode is missing
- Outage Duration is out of range in [] timezone. (Max duration: XXX:XX)
- Initiating Cause Code is missing
- Invalid Initiating Cause Code

Form 4.3: Transformer Detailed Automatic Outage Data

- Event ID Code not in Form 5 of current period
- A transformer outage has been entered with zero outage duration, indicating the outage was momentary. Momentary transformer outages are rare. Please verify that the outage duration should be zero. If OK, please proceed. If not, enter a duration greater than or equal to 1 minute.

Form 4.3: Transformer Detailed Automatic Outage Data

- Warning - For Outage ID [] associated with Event ID [], 'Failed Protection System Equipment' was entered as the 'Initiating Cause Code.' Therefore the cause of this outage is likely to be abnormal clearing (per NERC definition of Normal Clearing). However, the associated Event Type number entered on Form 5 is less than 50, which are 'Normal Clearing' event types. Warning: Please consider entering an abnormal clearing Event Type Number on Form 5, or do not enter 'Failed Protection System Equipment' as the 'Initiating Cause Code' for this Outage.

Form 4.3: Transformer Detailed Automatic Outage Data

- Outage continuation flag is missing (0,1,2)
- Outage Initiation Code Name is missing
- Outage Mode is missing
- Fault Type is missing
- Invalid Outage Initiation Code Name
- Outage Duration is invalid. Format is hhhh:mm

Form 4.3: Transformer Detailed Automatic Outage Data

- Outage ID Code [] has the Outage Continuation field entered as Continues into next period with a Start Date/Time = MM/DD/YYYY HH:MM [] timezone. However, the entered DURATION does not equal the HH:MM [] timezone [the EOYCD] remaining in the given reporting year. Enter a DURATION equal to HH:MM [the EOYCD], or change your data entry in the Outage Continuation Field.
- Sustained Cause Code is missing

Form 5.0
ID Code and Event Type Number Data

- Duplicate Event ID Code
- Disturbance Report Filed flag is missing
- Event Type ID is missing
- Event ID Code is missing
- Warning - Event ID Code Found. Will not be updated on Append Action.
- Event ID Code exists in another Reporting Period: 2016

Form 6.1: AC Circuit Detailed Non-Automatic Outage Data

- Warning - An old version of xml schema is uploaded. We will not be processing extra field (Planned Cause Code) in the file.
- Outage Duration is invalid. (hhhh:mm) Max Duration: XXX.XX
- Outage duration overlap existing outage(s) with the same element.
- Planned Outage Cause Code CANNOT be 'NA'
- Planned outages are not allowed from year 2016 and forward.
- Outage Duration is missing or zero
- Outage Duration is invalid. Format is hhhh:mm
- For the selected 'Outage Continuation Code', the Outage Duration is out of range (Minimum Duration: XXX:XX)

Form 6.1: AC Circuit Detailed Non-Automatic Outage Data

- Outage continuation flag is missing (0,1,2)
- Outage Duration is out of range in [] timezone. (Max duration: XXX.XX)
- Outage duration overlap other outage(s) in the XML with the same element
- Outage ID Code [] has the Outage Continuation field entered as Continues into next period with a Start Date/Time = MM/DD/YYYY HH:MM [] timezone. However, the entered DURATION does not equal the HH:MM [] timezone [the EOYCD] remaining in the given reporting year. Enter a DURATION equal to HH:MM [the EOYCD], or change your data entry in the Outage Continuation Field.
- Operational Cause Code is missing

Form 6.3: Transformer Detailed Non-Automatic Outage Data

- Warning - An old version of xml schema is uploaded. We will not be processing extra field (Planned Cause Code) in the file.
- Outage Duration is invalid. Format is hhhh:mm
- Outage Duration is missing or zero
- Planned Cause Code is missing
- Planned Outage Cause Code CANNOT be 'NA'
- Planned outages are not allowed from year 2016 and forward.

Common Data Validation Errors

All fatal errors for completed forms must be fixed before checklist can be saved

Quarter	Form(s)	Validation Error Description
Quarter 1	3.2 & 6.3	No inventory exists on Form 3.2 for Form 6.3 Outage ID Code [ ].
Quarter 2	3.2 & 4.3	No inventory exists on Form 3.2 for Form 4.3 Outage ID Code [ ].
Quarter 2	3.2 & 4.3	No inventory exists on Form 3.2 for Form 4.3 Outage ID Code [ ].
Quarter 2	3.2 & 6.3	No inventory exists on Form 3.2 for Form 6.3 Outage ID Code [ ].
Quarter 3	3.2 & 6.3	No inventory exists on Form 3.2 for Form 6.3 Outage ID Code [ ].
Quarter 3	3.2 & 6.3	No inventory exists on Form 3.2 for Form 6.3 Outage ID Code [ ].
Quarter 3	3.2 & 6.3	No inventory exists on Form 3.2 for Form 6.3 Outage ID Code [ ].
Quarter 4	3.1 & 6.1	No inventory exists on Form 3.1 for Form 6.1 Outage ID Code [ ].
Quarter 4	3.1 & 6.1	No inventory exists on Form 3.1 for Form 6.1 Outage ID Code [ ].

RED = Fatal Errors
YELLOW = Warnings

All fatal errors for completed forms must be fixed before checklist can be saved

er	Form(s)	Validation Error Description
	5.0	No Form 4 outages assigned to Event ID [ ]. This Form 5 Event ID should be deleted or at least one outage on Form 4 should use this E

Fatal Errors
W = Warnings

Common Data Validation Errors

n(s)	Validation Error Description
	Event ID "[redacted]" is associated with just one Common Mode or Common Mode Initiating outage. At least one additional Common Mode or Common Mode Initiating outage must be associat event ID.
	Event ID "[redacted]" is associated with just one Common Mode or Common Mode Initiating outage. At least one additional Common Mode or Common Mode Initiating outage must be associat event ID.
	Event ID "[redacted]" is associated with just one Common Mode or Common Mode Initiating outage. At least one additional Common Mode or Common Mode Initiating outage must be associat event ID.
	Event ID "[redacted]" is associated with just one Common Mode or Common Mode Initiating outage. At least one additional Common Mode or Common Mode Initiating outage must be associate event ID.

The excel sheet will allow an AC outage to have the initiating cause code of Failed AC/DC Terminal Equipment to be selected but this is an invalid cause code for AC circuits. It is only valid for DC circuits (not sure if this is something we should just have NERC fix but it has caused issues.

Questions and Answers

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NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Checklist Completion

2020 TADS Data Reporting Training
November 2020

RELIABILITY | RESILIENCE | SECURITY




Checklist

- Last step in Quarterly reporting
- Verifies all data has been submitted or none to report
- Indicator for Regional Coordinators that reporting is complete
- Runs data validations for possible errors
  - Errors must be corrected
  - Warnings should be reviewed

Questions and Answers

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