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1. Conventions

This document uses the following conventions:

- When a term from the NERC Glossary of Terms is used, the term will be capitalized. Examples include: Facility, Contingency, and Near-Term Transmission Planning Horizon.

- Terms defined by Peak in this document and others such as the Outage Coordination Process document, will be capitalized and italicized. Examples include: Forced Automatic, Urgent, Planned, TOP Confirmed, RC Long-Range Conflicts Identified.

2. Introduction

The submission of outage data to the Peak Reliability Coordinator (RC) per NERC Standard requirements, such as IRO-010 and IRO-017, is necessary in order to facilitate performance of RC functional obligations. The agreed upon method of outage data submittal to the RC is performed using the Peak Coordinated Outage System (COS). The outward facing documents describing what outage information is needed and how to submit that data are:

- The Outage Coordination Process document describes what types of outages are to be submitted and the applicability of those responsibilities. These are the business rules governing timelines and requirements for outage submittal.

- The Peak Reliability Data Request Specification contains a section “Scheduled and Unscheduled Outage Information” that are outside the scope of the Outage Coordination Process, but necessary to support Peak RC’s operational planning processes and real-time operations.

- This COS Manual describes the detailed tasks and data requirements necessary for submitting outages as required by the Outage Coordination Process document and the Peak Reliability Data Request Specification.

The internal RC processes and procedures used by RC staff for conducting the analysis and coordination process are not described within this document.

3. Purpose

The purpose of the COS Manual is:

- Provide detailed instructions on how transmission and generation outages within the Peak RC Area are to be submitted within the COS tool.
Submitting outage data in accordance with the COS Outage Manual will facilitate an increased awareness as to how outages should be accounted for in both the RC’s and TOP’s studies.

4. Applicability

This COS Manual is applicable to the following outage submitting entities within the Peak RC Area:

- Peak Reliability as the RC
- Balancing Authorities (BA)
- Transmission Operators (TOP)

Please note, as stated in the Outage Coordination Process document, BAs are expected to require Generator Owners (GO) and Generator Operators (GOP) to communicate outages to the BA as required to support the Outage Coordination Process. Also, TOPs are expected to require Transmission Owners (TO) and BAs to communicate outages to the TOP as required to support the Outage Coordination Process.

5. COS Outage Submittal Scope

Below is a list of the types of equipment required for submittal to COS as a part of the Outage Coordination Process. See the Outage Coordination Process document for further details regarding equipment outage applicability requirements:

- BES transmission/generation Facilities
  - Includes buses, circuit breakers, generating units, reactive compensation (dynamic, series, shunt), transformers, transmission lines
- BES Remedial Action Scheme (RAS), non-RAS automatic schemes, or protection systems when functionality is affected (i.e., when normal fault clearing zones are impacted) or Contingency definitions are impacted
- Non-BES transmission or generation Facilities or equipment that are identified by the RC, TOP or BA as having an impact on the reliability of the BES

The Peak Reliability Data Specification also contains a list of other data which Peak requires for its real-time operations and operations planning needs. For some of these data items (listed below), COS is also the mechanism for providing that data to Peak and the COS Manual will provide clarity, where applicable, on how to submit that data to COS.
• BES Generating Unit Derate
• Automatic Voltage Regulator (AVR) or Power System Stabilizer (PSS)
• Total Transfer Capability (TTC) of WECC Path
• Telemetering and Control Equipment
  o Includes, but not limited to SCADA, RTU, communication channels and iccp

6. Outage Submission Timelines
For the specific submission timelines and frequency of updates, please refer to the Peak Reliability Outage Coordination Process document. For submission timelines and frequency of update for requested data out-of-scope Outage Coordination, please refer to the Peak RC Data Specification Document.

7. Switching Point Submission Requirement
In order to facilitate a clearer understanding of system topology during outage conditions in the Peak RC Area, certain equipment types listed below in COS will require the submission of the applicable switching point(s) as modeled in the Peak West-wide System Model (WSM) with the outage record. Those equipment types are the following:

• Buses
• Generating Units
• Reactive Compensation Devices (Dynamic, Series, Shunt)
  o Including Static Var Compensator (SVC), Statcoms, DVAR, DVR,
    Synchronous Condensers, series capacitors, series reactors, shunt
    capacitors, shunt reactors
• Transformers
  o Auto-Transformer
  o Load-Tap Changer (LTC)
  o Phase-Shifter
• Transmission Line Segment or Protection Zone
  o Transmission Line Protection Zones (breaker-to-breaker)
  o Transmission Line Segments (breaker-to-switch, switch-to-switch)

A Switching Point is defined as either a circuit breaker, circuit switcher or disconnect switch used to switch elements in- and out-of-service. Each outage submitting entity will need to submit the Switching Point which best represents how an outage should be modeled in a study along with the outage status of the switching point, i.e. open or closed. Several outage submission examples are shown in the “Examples of Entering Outages In COS with Switching Points” section of this document, which indicate Switching Point submission by the various equipment types.

Switching Points can also be located outside of the station where the outage is being taken. If an outage of an element requires other parts of the system to be sectionalized or
other elements switched in- or out-of-service in order to facilitate the outage, e.g. closing a
normally open circuit breaker at a different station, then those switching points should also
be submitted as a part of the outage record. While there may be many switching points
associated with the equipment, not all will have to be submitted. The outage submitting
entity shall use their best judgement and submit the Switching Point which best indicate
how the equipment should be modeled in a study per the topology in the Peak WSM.
Please note that while this is the responsibility of the outage submitting entity, circuit
breakers should be viewed as the preferred Switching Point(s) to be submitted to COS. In
cases where circuit breakers are unavailable or are not actually being switched, then
disconnect switches should be submitted.

Outage submittals with their respective Switching Point(s) should reflect the Outage End
State. The Outage End State is defined as the state immediately following switching when
work is ready to begin on the element being outaged. The Switching Points being
submitted to COS are those that reflect the Outage End State and not the switching
sequence typically used to energize and de-energize equipment.

Switching Point COS data entry section found on the Request Summary tab of the COS
Outage Request.

After clicking “Add…” type in the station name when the Switching Points reside.
Select All Applicable **Switching Point(s)**.

Select an isolating device...

- Pinto C/S 3321
- Pinto C/S 3821
- Pinto CB 103
- Pinto CB 106
- Pinto CB 109
- Pinto CB 302
- Pinto CB 314
- Pinto CB 322
- Pinto CB 342
- Pinto CB 352
- Pinto CB 363
- Pinto CB 383
- Pinto CB C110
- Pinto CB C111
- Pinto CB L104
- Pinto CB L107
- Pinto CS 1051
- Pinto Valley (PV) 115 Bkr 312
- Pinto Valley (PV) 115 Bkr 332
- Pinto Valley (PV) 115 Bkr 352
- Pinto Valley (PV) 115 Bkr 362
- Pinto Valley (PV) 115 Bkr 372

COS allows for multiple points at the same station to be selected at the same time.

The user is able to select which state, open or closed, the **Switching Point** will be in during the Outage End State. The normal state is populated from the COS Data Dictionary.
8. RC Study Window Submission

Per the Outage Coordination Process document, in order for an outage to be included in the various RC study windows (Long-Range, Short-Range, OPA), it will need to be in one of the following outage states:

- **TOP Confirmed**: Transmission outages that are in-scope for the Outage Coordination Process.
- **BA and TOP Confirmed**: Generation outages that are in-scope for the Outage Coordination Process.

There are a few important notes to make when entering in-scope outages in COS. The first note is in regards to generation outages. For generator outages where the BA and TOP are different entities, these outages will typically move from the **BA Confirmed** state to the **BA and TOP Confirmed** state. This will require coordination to occur and a change to be made to COS in order to facilitate this outage state change.

While an entity may enter multiple pieces of equipment on a single outage request, the multiple equipment cannot be a mix of generator outages and transmission outages. For example, an outage record that contains two transmission lines cannot contain a generator outage as well. The outage states are for the entire record and since generator outages and transmission outages are handled differently, i.e. TOP Confirmed and BA and TOP Confirmed, they must be submitted on separate outage records in order for them to be placed in the correct outage state. **Failure to do adhere to this may result in a loss of priority and the outage not being included in the RC Study Windows.**

The other note, which is very important, is regarding the **Submitted** outage state. This is not an outage state defined in the Outage Coordination Process document and should not be used for equipment that is in-scope for Outage Coordination. This outage state resides exclusively in the COS tool and used to be the way to enter outages in COS. The use of the **Submitted** outage state is relegated to out-of-scope Outage Coordination Process equipment and those outages identified in the Peak Reliability Data Request Specification. Should an in-scope outage for the Outage Coordination Process be placed in the **Submitted** outage state, then it **will not be included in any of the RC study windows (Long-Range, Short-Range, OPA).**
Example Line Outage on the Imperial Valley – North Gila 500kV Line

Please note the buttons at the bottom of the page

In order for this outage to be included in any of the RC study windows (Long-Range, Short-Range, OPA), the outage submitting entity will have to ultimately get this into the TOP Confirmed outage state prior to the applicable RC study submission timelines.
Example of the Imperial Valley – North Gila 500kV Line outage in the correct state of TOP Confirmed. Please note the two areas where this is indicated on the record below (circled in red).

Here is an example of the same line outage, but the incorrect outage status selected.

Important Note: If a user selects the Submit Request button for an in-scope Outage Coordination equipment they want included in the RC study windows, the record will not be included in those studies and therefore the RC will be unable to confirm that outage. Selecting the “Submit Request” button will place the outage in the Submitted outage state which is not a state that can be studied by the RC for Outage Coordination purposes.
9. Generator Derate Submissions

Generator derates are described as a reduction of an individual generating unit’s maximum capability. The reduction threshold stated in the Peak Reliability Data Request Specification is any reduction > 50 MW of an individual generating unit’s capacity which is expected to last 30 min or more in duration. Note: Any limitation to the output capability of the generator >50 MW, whether related to the actual generator itself or an external limitation, such as a transmission constraint, is considered a derate. There are two types of generating derates that need to be reported, planned and unplanned, which have different submission timelines.

- **Planned Generator Derates:** The submission timeline for a planned generator derate is the same submission timeline as the Short-Range Study Window. While the submission timeline is the same, the planned generator derate is still out-of-scope and does not follow the same submission requirements as in-scope Facility/equipment per the Outage Coordination Process.

- **Unplanned Generator Derates:** The submission timeline for a unplanned generator derate is as soon as practicable.

When entering either a planned or unplanned generator derate, the outage submitting entity will need to select the appropriate equipment, outage type and select the “Submit Request” button which will place the outage in the Submitted outage state. This way, the outage submittal will not be subjected to the same business rules and study process as those which are in-scope for the Outage Coordination Process.

When entering either a planned or unplanned generator derate MW value, the value should be the resultant individual generating unit’s capacity. This is done by changing the default “Constraint Type” from OOS to Derate and entering the resultant MW derate value. For example, if a generating unit normally has a maximum rated capacity of 500 MW and the unit will experience a 100 MW derate, then a value of 400 MW should be entered in COS as the generating unit’s capacity under the generator derate period.
Example Generator Derate Entry

Entering is generator derate is similar to entering an outage where the user begins by selecting the outage entry option. The user will then proceed in selecting the generator being derated in the “Equipment Requested” section. After that has been created, the user will then need to adjust the “Constraint Type” field and enter the resultant MW derate.

Select the Notepad Option in “Constraint Type”

Select the “Derate” radio button and proceed in entering the resultant derate. From the example above, a 100 MW on a normally available 500 MW capacity unit would leave the unit with a maximum capacity of 400 MW. So the value that should be submitted is the resultant maximum generator capacity which is 400 MW in this example.
Completed Generator Derate Entry Outage Request

Please note that since generator derates are out-of-scope for the Outage Coordination Process, the Outage Coordination outage states do not apply and should not be selected. Instead, the user will need to select the “Submit Request” button.

By selecting the “Submit Request” button, the generator derate will be placed in the Submitted outage state. This way, the outage submittal will not be subjected to the same business rules and study process as those which are in-scope for the Outage Coordination Process.
10. AVR/PSS Outage Submissions

An outage to a generating unit’s automatic voltage regulator (AVR) or power system stabilizer (PSS) will need to be entered in COS as a part of the Peak Reliability Data Request Specification. The criteria for these outages are that they must have a duration of 30 min or more and also be a BES Facility. There are two types of generating derates that need to be reported, planned and unplanned, which have different submission timelines.

- **Planned AVR/PSS Outage:** The submission timeline for a planned AVR/PSS outage is the same submission timeline as the Short-Range Study Window. While the submission timeline is the same, the planned AVR/PSS outage is still out-of-scope and does not follow the same submission requirements as in-scope Facility/equipment per the Outage Coordination Process.

- **Unplanned AVR/PSS Outage:** The submission timeline for a unplanned AVR/PSS outage is as soon as practicable.

When entering either a planned or unplanned AVR/PSS outage, the outage submitting entity will need to select the appropriate equipment, outage type and select the “Submit Request” button which will place the outage in the *Submitted* outage state. This way, the outage submittal will not be subjected to the same business rules and study process as those which are in-scope for the Outage Coordination Process.

11. SOL and Total Transfer Capability (TTC) COS Entries

The reporting of a reduction of a WECC Path Total Transfer Capability (TTC) will also need to occur in COS. The responsible TOP will be expected to submit any known reduction of a WECC Path TTC due to a generation or transmission outage. There are two types of WECC Path TTC reductions that need to be reported, planned and unplanned, which have different submission timelines.

- **Planned WECC Path TTC Reduction:** The submission timeline for a planned WECC Path TTC reduction is the same submission timeline as the Short-Range Study Window. While the submission timeline is the same, the planned WECC Path TTC reduction is still out-of-scope and does not follow the same submission requirements as in-scope Facility/equipment per the Outage Coordination Process.

- **Unplanned WECC Path TTC Reduction:** The submission timeline for a unplanned WECC Path TTC reduction is as soon as practicable.

When entering either a planned or unplanned WECC Path TTC reduction due to a generation or transmission outage, the submitting entity will need to ensure the generation or transmission outage has already been entered. After the outage is entered, the submitting
entity must identify the COS outage number and will need to enter that when creating the WECC Path TTC reduction record in COS. Below are the steps and instructions to enter a WECC Path TTC reduction in COS.

- Select the “Path Derate Outage Request”
  - This may be renamed in a future COS enhancement.

- Select the appropriate Path Number for which the WECC Path TTC reduction is applicable
  - If this is a new path or it is not listed, then please select “Other” and enter a description when prompted
• Fill out all of the required WECC Path TTC reduction attribute information
  o Limitation Reason
    ▪ Select User Defined
    ▪ Enter either “TTC” or “SOL” in the blank field to the right to match what type of entry the TOP is making.

  or

  o Limitation Type
  o Contributing Outage (enter COS outage number)
    ▪ Select None if the reduction is not due to an outage.
  o Start and End (period in which the reduction is applicable)
  o Path Direction SOL or TTC MW
  o Static/Dynamic
    ▪ Indicate whether the value is changing, i.e. dynamic, or constant, i.e. static. If dynamic, enter the maximum value for the period.
  o Limiting Contingency
  o Monitored Element
  o SOL coordinated with impacted TOP
    ▪ For TTC entries, leave as default “N/A”
    ▪ For SOL entries, select applicable entry
The submitting entity will need to complete the SOL or TTC reduction entry by selecting the “Submit Request” button.
If the submitting entity is submitting an SOL, then the entry can be put into COS by selecting the “Submit Request” button.

12. **Opportunity Outage Submission**

*Opportunity* outages are an outage type applicable to in-scope Facilities/equipment per the Outage Coordination Process. The criteria and submission requirements are describe in the Outage Coordination Process document, but the COS Manual will describe outage submission examples are how to get those outage types entered in COS.

The first step in creating an *Opportunity* outage is to select it from the outage type field as in the screenshot below.
Opportunity outages will only be Confirmed in one business day increments. This implies an Opportunity outage must be able to be returned the same-day in which it is taken unless an exception has been coordinated with the RC. In order to adhere to the one business outage duration, Opportunity outages must be submitted utilizing the Non-Continuous option. By default, COS will start every outage record in the Continuous mode, so this will also need to be changed as indicated below.

Each requested Opportunity outage day must be indicated using the Outage Profile feature which can be accessed by selecting the Request Details tab located on the top of the Outage Request page.
The user can add more days to the Opportunity outage request by selecting the Add button and indicating the start and end times needed.

13. Telemetering and Control Equipment

An outage to Telemetering and Control Equipment will need to be entered in COS as a part of the Peak Reliability Data Request Specification. Equipment in this category includes, but is not limited to SCADA, RTU, communication channels and ICCP. The only outage type of Telemetering and Control Equipment outages that need to be reported to COS are Planned. Unplanned outages are to be communicated to the RC via requirements found in the IRO-010 RC Data Specification document.

When entering a Telemetering and Control Equipment outage, the outage submitting entity will need to select the appropriate equipment, outage type and select the “Submit Request” button which will place the outage in the Submitted outage state. This will ensure the outage submittal is not subjected to the same coordination and study requirements as those which are in-scope for the Outage Coordination Process.
It will be the responsibility of those required to submit outage records in the Telemetering and Control Equipment area to ensure all equipment in this category are added to their respective data dictionaries. Please contact COS.Support@peakrc.com to get equipment added to the dictionaries in a bulk manner. If the Telemetering and Control Equipment is not listed in the data dictionary and an outage recorded needs to be submitted, then it can be added utilizing the Not-in-Model (NIM) process which allows for on-demand additions to the data dictionary.

As indicated above, the user must select the Add button on the record and when the pop-up appears, select New. The next option is either Transmission Circuit or Station Equipment, please select Station Equipment.
After pushing Select, the user will then proceed to the next screen where user should enter the name for the equipment (should describe what it is, e.g. Station A RTU, Station B SCADA, TOP ICCP). Next select the equipment type that most closely matches the equipment being outaged. If the equipment type is not there, then include it with the name of the element, i.e. External Name, and send a separate email to COS.Support@peakrc.com notifying Peak of that missing equipment type.
14. Reporting of Stability Limitations per the RC Instructions for SOL Methodology

The RC Instructions give specific direction on how to communicate TOP-identified transient stability or voltage stability limitations to Peak. This section of the COS Manual is specific to the reporting of these limitations when they are being identified in an Outage Study, Operational Planning Analyses (OPA), and Same-Day or Real-time timeframe. Please see the RC Instructions for SOL Methodology for the process in which to communicate stability limitations outside of these processes or timeframes.

For stability limitations identified above, the TOP must report the following six items in COS:

1. Instability Risk
2. Contingencies
3. Prior Outages
4. Stability Limitation Values
5. Monitoring Method
6. Other Pertinent Information

COS currently has a place to report all six of those items, plus any additional documentation which can be attached via the Attachments tab located at the top of the outage entry form, through the COS Path Report. Below are the steps that should be followed in order to properly report the stability limitation in COS.

Navigating to the Path Derate Entry Form

Once logged into the COS WebUI, click on the Outage Requests tab and then click on New. From there a pop-up will appear and the user will need to select “Path Derate Outage Request”. Please note, while the description says “Path Derate Outage Request”, this is the location that the TOP will need to enter its identified stability limitation.
Entering Data (6 items) in the COS Path Derate Outage Request Form

On the form, the 6 items above will map in the following manner to the items listed on the “Outage Request” form:

1. Instability Risk - > Path Number
   a. Select Other from list (click on magnifying glass first), then enter description in the free form text box (titled Other Impact)
2. Contingencies -> Limiting Contingencies
   a. Click on “Add” and enter the contingencies in the free form text box.

3. Prior Outages -> Contributing Outages
   a. If there are outages associated with the stability limitation, click on add and enter the COS Outage #.

   b. If there are no associated outages, then check the “None” box.
4. Stability Limitation Values -> Path Direction SOL or TTC
   a. Enter the SOL associated with the stability limitation

   Path Direction SOL or TTC: [0] MW

   b. In the field immediately to the right, select whether or not this is a Static, i.e. constant value, or Dynamic, i.e. changing value.

   Static/Dynamic: [ ]

5. Monitoring Method -> Monitored Elements
   a. Click on “Add” and enter what is being monitored in the free form text box.

   ![Monitored Elements]

   ![Add Monitored Element]

6. Other Pertinent Information - > Comments
   a. A free form text box is provided at the bottom of the form to indicate any additional and/or pertinent information for the stability limitation.

   Comments:
There are other fields that will also need to be entered to complete the entry in COS. Please reference the Section 11 above titled “SOL and Total Transfer Capability (TTC) COS Entries” for more information. In short, those additional fields are:

- Limitation Reason

  ![Limitation Reason Drop-down]

  - Outage
  - Seasonal SOL
  - User Defined
  - WECC Path Rating

- Limitation Type

  - Should indicate what type of stability limitation is being submitted

  ![Limitation Type Drop-down]

  - Thermal
  - Voltage
  - Voltage Stability
  - Transient Stability
  - Other

- Start and End Date/Times

  - Will only need to be entered if this is not an outage driven stability limitation.

- SOL coordinated with impacted TOPs

  ![SOL coordinated with impacted TOPs]

After entering all of the above data, the user will need to push “Submit Request” button to commit the record in COS. Once in COS, the stability limitation will then appear in the COS Path Report for the days associated with the start and end of the stability limitation.

### 15. Utilizing the Constraint Type Field in COS

The Constraint Type flag is set to Out-Of-Service (OOS) by default in COS. There are various outage submittals where the user must indicate the appropriate constraint type for the outage being taken. The outage types that require the adjustment of this flag are:

- Generator Derates (addressed in the Generator Derate Submissions section)
- One At a Time (OAT) Outages
- Bypass Out Of Service (OOS) Outages

OAT outages are an outage submittal option available to both the BA and TOP per the criteria stated in the Outage Coordination Process document. There are essentially two types of OAT
outages where the entity may either indicate equipment is being removed from service or it is being de-rated. The Constraint Types for OAT considerations are:

- OAT-OOS
  - When equipment is being removed from service OAT
- OAT-Derate
  - When equipment remains in-service, but is being derated OAT. An example of this use would be for hydro plant maintenance when the unit may still be running, but at a reduced capacity.

OAT outages are in-scope for Outage Coordination Process and must be submitted in the appropriate state in order to be included in the RC study windows (Long-Range, Short-Range, OPA).

The other Constraint Type submission are for circuit breaker bypass conditions. This Constraint Type should be used in the event where a circuit breaker outage is occurring, but the equipment it is connected, e.g. a transmission line, remains in-service through another circuit breaker. This is also known as a Bypass and Clear (BP&C). Please see the “Examples of Entering Outages in COS with Switching Points” section for examples of circuit breaker bypass conditions. For these outage scenarios, the outage submitting entity is to select the following:

- BP-OOS
  - When a breaker is removed from service, but the equipment it protects remains in service and relay protection is maintained through a different breaker. For example, if a line breaker is removed and the line remains in service through a transfer or spare breaker.

Circuit breaker outages are in-scope for the Outage Coordination Process and must be submitted in the appropriate state in order to be included in the RC study windows (Long-Range, Short-Range, OPA). Indicating circuit breaker bypass conditions by changing the Constraint Type to BP-OOS is required and is necessary to support an accurate study process.

**16. Operating Plan Submission**

Per the Peak Reliability Data Request Specification, TOPs are required to submit their Operating Plans for next-day operations that are expecting to address potential SOL exceedances. There are two different categories which Operating Plans would fall into that determine how those shall be submitted to Peak. Those for Outage Specific conditions and those for more general Next-Day Operations.
• **Outage Specific:** These Operating Plans must be submitted along with the outage record in COS in which they are intended to support. The Operating Plan must address any potential SOL Exceedance(s) that may occur while the outage is in-progress. The plan must identify the mitigating action(s) and when they are expected to occur, i.e. pre- and/or post-contingency. These plans can be submitted either as an attachment with the outage record or entered in the free form comments box provided in COS.

Please Note: If a large procedure is attached which addresses the Outage Specific condition, then the outage submitting entity is required to indicate which page number and section, in the free form comment box of the COS outage record.

• **Next-Day Operations:** These are operating plans which cannot be tied to a specific outage, but to a variety of system conditions, e.g. system loading, high system flows, etc. Since these are not tied to a specific outage, they cannot be entered in COS. These operating plans will need to be submitted along with the TOP’s Operational Planning Analysis (OPA) to PeakRC.org to their respective entity folder.

Attaching an existing document in COS for the Outage Specific Operation Plan
At the main page of the Outage Request default tab, click on the “Attachments” tab.

Attachments Tab of the Outage Request

Click on the “Add…” button to select and upload the document. After the document has been uploaded, the user will need to return to the default Outage Request page by selecting
the “Request Summary” tab. If the document being attached is several pages long, the outage submitting entity must indicate the page number and section, if applicable in the comments box.

Comments Box (Free Form Field)

17. COS Data Dictionary

The COS Data Dictionary is the equipment list maintained within the COS tool in which entities are able to submit outage records against. The COS Data Dictionary is Peak WSM centric, which means that all BES equipment in the WSM will have a matching element in COS. There may be other equipment in COS that is either non-BES or cannot be modeled, e.g. Telemetering and Control Equipment, which is not directly mapped to the WSM, but still allowable in the COS Data Dictionary.

The COS Data Dictionary has been designed to support a one-to-one mapping of equipment in the WSM. That means equipment can only exist once and in cases such as jointly operated equipment where there may be multiple operators, those operators will have to agree upon a single name to be used in the dictionary. In order to be able to submit an outages against equipment, the outage submitting company must be listed as either an operator or submitting entity. COS supports up to 5 operators per equipment and up to 2 entities for general outage submission privileges.

For equipment that is not listed in the COS Data Dictionary, but an outage record is needed for the equipment, a Not-In-Model (NIM) option is available to the user. This can be added during the creation of the outage record where equipment may not be found in the existing list. NIM equipment is designed to be a temporary solution which provides the necessary flexibility for entities to enter outages for equipment not currently in the dictionary. Each NIM record will be evaluated to determine if it is a duplicate record, missing WSM equipment or future equipment that has yet to be place in-service. Steps are listed below on how to create a NIM equipment record.

From the Request Summary tab (default tab for Outage Record) select the “Add…” button.

At the Select Circuits/Equipment… pop up, select the “New” button.
The Select Equipment Type window provides two options, Transmission Circuit or Station Equipment. If the equipment being added is not a Transmission Circuit, then the user should select "Station Equipment".

The user will be able to select the exact equipment on the next screen within the station that currently exists in COS as an equipment type.

NIM Equipment Form
The default station name is listed as NIM. The user will have a place to enter the exact station name at the bottom of the form in the NIM Station field. The user must enter an External Name to describe the equipment, along with selecting the appropriate equipment type from the drop down list. Lastly, the user will need to indicate whether this is existing (BES or non-BES) or future equipment (BES or non-BES) which is not currently in the COS Data Dictionary. When the equipment has been saved, it will be made available for immediate use by the user.

Selecting Circuits/Equipment Form (enter newly created equipment)
COS Data Dictionary Equipment List (new equipment is already there and can be selected)

As shown above, the newly added equipment to the COS Data Dictionary through the NIM option was added and selected as a part of the Outage Request. NIM should only be used when adding small numbers of equipment to the COS Data Dictionary. For bulk changes that need to be made to the COS Data Dictionary, users are requested to email cos.support@peakrc.com and request the dictionary change template. From there, users will have to indicate which changes, per the instruction on the template, need to be made and then submit the completed form back to the cos.support@peakrc.com for processing.

COS also supports the reporting of changes by company for each entity’s data dictionary. Every COS user will have the ability to subscribe to a weekly report, for any company, which equipment has been added, updated or marked as deleted during the reporting period. All
equipment will have a last updated date stamp to indicate when the change was made. The reporting period is on a weekly basis (Mon – Mon) with reports first being sent out at 3:30AMPT on Mondays and distributed by company in one minute offsets to avoid overloading the server. Details on how to subscribe to these reports will be described in the next section.

18. Subscribing to COS Outage Notifications

COS provides automated Email Notifications where a user can be notified by email for entries or changes in COS by the following categories:

- Station / Equipment
- Submission by Company
- Equipment Type
- Outage States
  - For example, if a TOP wanted to know when an interconnected BA submitted a generator outage which they must confirm in the BA Confirmed state, they could select the specific generator(s) and BA Confirmed state. This would then notify the TOP whenever that specific BA submits a generator outage for their review in the BA Confirmed outage state.

Any COS user can request notification by email for updates to outage requests using a notification subscription to set up criteria identifying outages for which they want to be notified of. Below is a screenshot of that subscription form.
A user can subscribe to email notification for these events as listed above, by clicking on the “Email” radio button in the Notification group in the left margin of the COS – Operations Reports form. The user would then enter notification criteria and click the “Subscribe” button.

Report / Notification Subscription(s)
One may view, update, and delete a report and notification subscriptions in the COS. Also, one can retrieve a subscription and use the subscription criteria to generate an ad-hoc report.

Viewing Report / Notification Subscription(s)
For a user to view any report and notification subscriptions set up, the user would click the “Subscriptions” button in the left margin of the COS report form.

Summary of Subscriptions, Notifications and Reports
Report subscriptions and email notifications appear in separate groups with the newest subscriptions appearing at the top of the group. Exiting this field is done by clicking on the “Back” button in the upper right hand corner.

Deleting or Modifying Report / Notification Subscription(s)

To delete a report or notification subscription, the user would click on the “Delete Subscription” link. The application prompts the user to confirm the deletion. The user would then click “OK”.

For a user to modify a report or notification subscription, click “View/Modify Subscription” link. The application loads the subscription. The user would make the appropriate changes and then click “Save as New or Update Subscription”.

Subscribing to the Automated Path Report

The system automatically creates Path Reports and distributes them via email subscriptions if you enable those subscriptions. These are system subscriptions which you cannot create, modify or delete yourself. You can only enable or disable these subscriptions.

Clicking on the “Reports” tab and then the “Subscriptions” button will bring you to this display where these system subscriptions are shown at the bottom. You can enable or disable these subscriptions for yourself under the View/Modify Subscription column.

Path Report Subscription

The 1st subscription above will email you the HTML version of the Path Report that is created at 10:00 a.m. PPT each business day. The 2nd subscription will email you “revisioned” versions of the report whenever there are modifications to the outages or derates contained in the previous version of the report. There is also a 3rd report in Excel which will be generated every 15 min when the change check process runs. The path report subscription options are listed below and any the three reports can be subscribed to by clicking the “Enable Subscription” button. Likewise, a subscription can be discontinued by clicking the “Disable Subscription” button.
COS Data Dictionary Change Report

As described in the COS Data Dictionary section, there is also an option to subscribe to any number of dictionary change reports by all the companies who have equipment in COS. Those reports run every Monday beginning at 3:30A MPT and report out changes occurring the previous week (Mon – Mon) with timestamps indicating when the changes occurred. Subscribing and unsubscribing to these reports are done in the same manner as the Path Reports.

COS Data Dictionary Change Subscription (not all companies listed in screenshot)

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<th>Subscription Date</th>
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<th>View Category</th>
<th>View Name</th>
<th>Report Format</th>
<th>View Transform</th>
<th>View/Modify Subscription</th>
</tr>
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19. COS Validation Rules

While there are many COS validation rules in use by the system, the COS Manual will need to describe a validation rule called Significant Changes which determines what the allowable changes are to an outage record along with the impact to its Priority Date.

The Priority Date for an outage record is considered the point in time in which an outage establishes its queue position or priority. The Priority Date is referenced in the Conflict Resolution section of the Outage Coordination Process and the final tie-breaker in determined what outage is allowed to proceed in the case of an unresolved conflict between multiple outages. The Priority Date is initialized when an outage submitting entity places an outage in one of the following outage states:

- BA Proposed
- BA Confirmed
• BA and TOP Confirmed
• TOP Proposed
• TOP Confirmed

The Priority Date is cleared when an outage is changes to one of the following outage states:

• BA Preliminary
• TOP Preliminary
• Cancelled
• Expired

The Priority Date will be reset to the current date/time if it is currently set and a Significant Change is made to the outage request.

A Significant Change is a method to define when a change to an outage record may warrant either a resubmission and/or loss of priority. There are three changes which would trigger a Significant Change:

• Moving the Start Date Up
• Moving the End Date Out (prior to the outage beginning)
• Adding more equipment to the outage record
• Changing outage type to Planned from anything else
  ○ For example, if an outage were submitted as an Informational and changed to Planned, then a Significant Change would be triggered.

These changes are allowed to occur, however the Priority Date would be reset to the date/time in which the changes were saved. There is an important note, if a Significant Change were to occur while in the RC Short-Range Confirmed, OPA D+2 Confirmed or OPA D+1 Confirmed outage states, then the changes are not allowed to be saved with the outage dates being revised and the outage being placed back into a BA or TOP outage states, e.g. need to be saved by placing it in the TOP Confirmed state if adding another line to the record. The purpose in that example is so that both lines can be studied together in the applicable RC study window.

It is important to note that not all changes being made to an outage record are deemed significant. Examples of changes that do not trigger a Significant Change validation are:

• Adding/editing Switching Points
• Adding/editing the comments
• Changing the Constraint Type from OOS to anything else
• Removing equipment from the record
• Shortening the duration of the outage, i.e. moving the start date out or moving the end date up, provided it was within the original outage window.
For example, if an outage were originally scheduled from Mon – Fri, an entity could move the start date out from Mon to Tues or move the end date in from Fri to Thurs without triggering a Significant Change.

An outage in an RC Confirmed state (RCSO, D+1, etc.) that passes the planned start time will automatically be transitioned to the Implemented Unverified state by COS. Likewise, once the outage planned end time passes the current time, the outage will be automatically transitioned to a Completed Unverified state. In the future, Peak will investigate an automated validation tool to transition these outages into either the Implemented Verified or Completed Verified state automatically. In the interim, RCSO’s and ROE’s may manually utilize the Verified states. Outage requests that pass the planned start or end time but have not yet been RC confirmed (RCSO, D+1, etc.) will not be automatically transitioned to an Implemented or Completed state. They are considered to be not confirmed. TOP’s and BA’s should inquire with the RCSO before commencing with an outage that does not yet have a valid RC confirmation.

20. Examples of Entering Outages in COS with Switching Points

The COS Manual has included several examples of the most common outage scenarios experienced on this system for each equipment type listed above. The intent of the manual is not to list all outage scenarios for this equipment, but to provide a subset that will give the end user a better idea as to what is required when creating an outage in COS. There may be outage scenarios where a phone call or some other communication is needed in order to determine the exact configuration. For scenarios where it is not clear on how to submit an outage to COS, an email should be sent to the rc.outages@peakrc.com for
further clarification. Below is the legend which contains all of the symbols to be used in the outage submission examples.
Transmission Line Segments or Protection Zones

A transmission circuit starts at a substation and ends at a different substation. Transmission circuits can be terminated at either end by a circuit breaker or disconnect. Because of potential termination differences, it is necessary to separate transmission circuits into two distinct categories (Fig. 2), Transmission Line Segments and Transmission Line Protection Zones. A Transmission Line Protection Zone is an element whose termination points at the line ends are circuit breakers. Transmission Line Segments are elements in which the termination points at each end can either be one or more disconnect switches or a combination of a disconnect switch and circuit breaker.

Two variations of transmission circuits in the COS data dictionary¹

1. Transmission Line Segment “A – B”
2. Transmission Line Segment “B – C”
3. Transmission Line Segment “C – D”
4. Transmission Line Protection Zone “A – D”

¹The above example should have four entries in the COS data dictionary, 3 transmission line segments and 1 transmission line protection zone.
Transmission Line Protection Zone Outage

Example of a transmission line protection zone outage using switching points

1. First select Transmission Line Protection Zone “A-D” in COS as the Circuit/Equipment outage identifier.
2. Add Switching Points
   a. Circuit Breaker at Station A – outage state as “open”
   b. Circuit Breaker at Station B – outage state as “open”

Transmission Line Segment (breaker-to-disconnect) Outage

Example of a transmission line segment outage using switching points
1. First select Transmission Line Segment “A-B” in COS as the Circuit/Equipment outage identifier.

2. Add Switching Points
   a. Circuit Breaker at Station A – outage state as “open”
   b. Disconnect Switch at the tap to Station B – outage state as “open”

**Transmission Line Segment (disconnect-to-disconnect) Outage**

Example of a transmission segment outage using switching points

![Diagram of transmission line segment outage](image)

1. First select Transmission Line Segment “B-C” in COS as the Circuit/Equipment outage identifier.

2. Add Switching Points
   a. Disconnect Switch at the tap to Station B – outage state as “open”
   b. Disconnect Switch at the tap to Station C – outage state as “open”

Note: What is desired for submission into COS is the *Outage End State*. While in the example above, the circuit breakers might have been opened and closed during switching of the line, the *Outage End State* where work is ready to begin are the disconnect switches between Stations B and C. Therefore, since the circuit breakers are not open during the *Outage End State*, these should not be submitted to COS.
Multiple Transmission Line Segment (disconnect-to-disconnect) Outages

Example of two transmission line segments and a transformer outage using switching points

If all of the above work is related, then the following entries should be entered as a part of the same outage record:

1. Select Transmission Line Segment “B-C” in COS as the Circuit/Equipment outage identifier.
   Add Switching Points
   a. Disconnect Switch at the tap right of Station B – outage state as “open”
   b. Disconnect Switch at the tap left of Station C – outage state as “open”

2. Select Transformer at Station C
   a. Disconnect Switch connecting the load at Station C – outage state as “open”
   b. In the comments section, the entity submitting the outage should also state whether or not the load being served by that transformer is being transferred (e.g. Station C load will be transferred to Station B).

3. Select Transmission Line Segment “C-D” in COS as the Circuit/Equipment outage identifier.
   Add Switching Points
   a. Circuit Breaker at Station D – outage state as “open”
   b. Disconnect Switch at the tap to Station C – outage state as “open”

Note: Because the switching points are being submitted, there is no need to create another outage request indicate the transformer outage on the tap to Station C.
Multiple Transmission Line Segments with Series Transformer (breaker-to-disconnect, transformer, disconnect-to-breaker) Outages

Example of a transmission line segments outage using switching points

Transmission Segment “A – HV”  Transmission Segment “LV – B”

Two Transmission Segment plus Transformer Example

1. First select Transmission Line Segment “A – HV” in COS as the Circuit/Equipment outage identifier.
   Add Switching Points
   a. Circuit Breaker at Station A – outage state as “open”
   b. Disconnect Switch on HV side of Transformer A – outage state as “open”

   Add Switching Points
   a. Circuit Breaker at Station B – outage state as “open”
   b. Disconnect Switch on LV side of Transformer A – outage state as “open”

3. Lastly Select Transformer A in COS as the Circuit/Equipment outage identifier.

Note: There is no need to repeat the switching points for Transformer A as they have already been entered in the previous entries. If just the transformer we’re coming out and the end of the line segments via the circuit breakers were to remain closed, then the switching points for the transformer would have to be entered.
Circuit Breaker or Disconnect Switch Outage Resulting in Transmission Line Outage

Prior to entering a circuit breaker or disconnect switch outage, the user will have to determine if the outage end-state will result in an interruption of power flow (even if still energized). If it does, then the element whose power flow is being interrupted is what should be entered into COS. For example, if a transmission circuit if being opened ended due to a circuit breaker outage then the outage should be submitted as a transmission circuit and not a circuit breaker. Below are some examples of correct and incorrect outage submissions for the circuit breaker and disconnect switch category. The outage end-state for a circuit breaker outage with no additional switching. The power flow to the transmission line is being interrupted.

Example of a circuit breaker outage open ending a transmission line protection zone

![Diagram showing a transmission line protection zone with a circuit breaker at Station A and a transmission line between Station A and Station B. The circuit breaker is shown in the "open" position with a P = 0 symbol.]  

Transmission Line Protection Zone “A – B”

**Incorrect Outage Submittal Example**

1. First select Station A “Circuit Breaker” in COS as the Circuit/Equipment outage identifier.
2. Add Switching Points
   a. Circuit Breaker at Station A – outage state as “open”

This is not the desired entry because it creates no awareness that a transmission line is being outaged. An entry such as this creates uncertainty in the outage leaving the study person to question if the circuit breaker is being bypassed or if the line is actually being open ended. A resulting study may assume power flow between A and B if the outage was entered in this way.

**Correct Outage Submittal Example**

1. First select Transmission Line Protection Zone “A – B” in COS as the Circuit/Equipment outage identifier.
2. Add Switching Points
a. Circuit Breaker at Station A – outage state as “open”

Although the switching points are the same in the two above examples, the transmission line example creates greater certainty around what is actually being outaged. A resulting study would correctly interpret that no power would flow between A and B if the outage was entered in this way.

Transformer Outage Examples

Switching Points

P = 0

Station A

Single Transformer Example

1. First select Transformer in Station A in COS as the Transformer outage identifier.
   Add Switching Points
   a. High-Side Circuit Breaker at Station A – outage state as “open”
   b. Low-Side Circuit Breaker at Station A – outage state as “open”

Note: If there are disconnect switches on either side of the circuit breakers, then those may be submitted in place of the circuit breakers. Not all of the disconnect switches and circuit breakers need to be submitted, but just enough to accurately account for the element in a study. In most cases, circuit breakers are the preferred switching point submission.

Series Compensation Outage Example

In order to properly submit series compensation outages in COS utilizing switching points, all bypass circuit breakers or disconnect switches will need to be included in every entity’s respective COS data dictionary. Series compensation primarily refers to either series capacitors or reactors. Many of these elements can be bypassed when an outage occurs or to manipulate operational conditions. Therefore the user will need to evaluate if the outage of the series compensation element will result in an interruption of power flow (e.g. open ending a
transmission circuit). If it does, then the element whose power flow is being interrupted is what should be entered into COS (e.g. transmission circuit and not just the series compensation element). Otherwise only the series compensation element should be entered.

Example of a series capacitor outage in the before state

Example of a series capacitor outage without bypass in the after state

Incorrect Outage Submittal Example

1. First select Station A “Series Capacitor” in COS as the Circuit/Equipment outage identifier.
2. Add Switching Points
   a. Disconnect Switch at Station A – outage state as “open”

This is not the desired entry because it creates no awareness that a transmission line is being outaged. An entry such as this creates uncertainty and leaves the study person questioning if the circuit breaker is being bypassed or if the line is actually being open ended.
Correct Outage Submittal Example

1. First select Transmission Line Protection Zone “A – B” in COS as the Circuit/Equipment outage identifier.
2. Add Switching Points
   a. Circuit Breaker at Station A – outage state as “open”
      Note that the series capacitor is also being outaged

Although the switching points are the same in the two above examples, the transmission line outage entry creates awareness as to what is actually being outaged.

Example of a series capacitor outage and with bypass in the after state

1. First select Station A “Series Capacitor” in COS as the Circuit/Equipment outage identifier.
2. Add Switching Points
   a. Disconnect Switch at Station A – outage state as “open”
   b. Bypass Circuit Breaker at Station A – outage state as “closed”
Example of a two series capacitors in the before state

Station A

The above two series capacitor example requires all of the disconnect switches, circuit breakers and both series capacitors to be included in the COS data dictionary to support proper switching point outage entry.

Example of a two series capacitors in the before state

1. First select Station A Series Capacitor CAP 1 in COS as the Circuit/Equipment outage identifier.
2. Add Switching Points
   a. Disconnect Switch DSW 2 at Station A – outage state as “open”
   b. Circuit Breaker CB 2 at Station A – outage state as “closed”
Example of a two series capacitors in the before state

1. First select Station A Series Capacitor CAP 1 or CAP 2 in COS as the Circuit/Equipment outage identifier.
2. Add Switching Points
   a. Disconnect Switch DSW 1 at Station A – outage state as “open”
   b. Disconnect Switch DSW 4 at Station A – outage state as “open”
   c. Disconnect Switch DSW 5 at Station A – outage state as “closed”

**Generating Unit Examples**

The first step in determining if and how a generator outage is to be entered is to first evaluate whether the outage qualifies per the BES definition, i.e. individual unit 20 MVA or greater or aggregate facility of 75 MVA or greater. The switching points that are desired for a generator are typically on the high side on the step up transformer.

**Single Generator Outage Example – In Service**
1. Select “BES Generator” as the Generating Unit outage identifier. Add Switching Point

   a. Circuit Breaker CB 1 at Station A – outage state as “closed”

Note: Although CB 2 is also coming out of service, it is not needed since CB 1 is being submitted. CB 2 is connected to a lower kV level and essentially accomplishes the same end result in outaging the generator. If there was no high-side breaker and the only way to outage the generator was by submitting CB 2, then the switching point would need to be submitted.
Circuit Breaker Bypass Examples

Example of a circuit breaker being bypassed (bypass and clear) with an outage end-state of the transmission line still being in-service and carrying power (MW).

1. First select Station A “Circuit Breaker” in COS as the Circuit Breaker outage identifier.
2. Add Switching Points
   a. Circuit Breaker at Station A – outage state as “open”
   b. Disconnect Switch at Station A – outage state as “closed”
   c. Circuit Breaker at Station A (not pictured) – outage state as “closed”

Note: The outage end-state for a circuit breaker outage which includes a circuit breaker and disconnect switch being closed. The power flow to the transmission line is not being interrupted. The constraint type BYPASS-OOS should be selected when submitted this as a circuit breaker outage.
The “before” pre-outage state of a substation prior to any switching occurring.

![Diagram](image1)

The “after” outage end-state by a circuit breaker outage after all switching is complete. The circuit breaker is bypassed (bypass and clear) and an additional circuit breaker is being closed to provide fault protection.

![Diagram](image2)

1. First select Station A “Circuit Breaker” in COS as the Circuit Breaker outage identifier.
2. Add Switching Points
   a. Circuit Breaker at Station A “CB C” – outage state as “open”
   b. Circuit Breaker at Station A “CB TIE” – outage state as “closed”
   c. Disconnect Switch at Station A “DSW C” – outage state as “closed”
## Version History

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<td>1/16/2017</td>
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<td>Jason Ausmus</td>
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<td>1.1</td>
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<td>Revised and reissued</td>
<td>Jason Ausmus</td>
<td>Minor language clarification and refined the example on how to submit Telemetering and Control Equipment. Added new section on how to submit Opportunity outages.</td>
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<tr>
<td>1.2</td>
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<td>Revised and reissued</td>
<td>Jason Ausmus</td>
<td>Removed all non-planned outage references and aligned language with unplanned as stated in the Data Request. Add new section on how to report Stability Limitations per RC Instructions for SOL Methodology.</td>
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