

Data Maintainer Record



WECC SRWG Meeting

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PowerWorld
Corporation

DataMaintainer



- Represents the entity responsible for maintaining the input data for an object
- Purpose in software
 - Provide contact information in the form of an email or phone number of someone to contact regarding an object
 - Provides ability in software to use this to filter output
 - Examples
 - “Write out some input data for Columbia Grid”
 - Write out some input data for Grant County PUD only
 - Makes it easier to piece together portions of a model

DataMaintainer Object



- DataMaintainer object has the following fields
 - **Contact** : Name of Person or Position
 - **Phone, Email, Company, Location**
 - **DataMaintainerAssign** (DataMaintainers can belong to other DataMaintainer – will discuss shortly)
 - Might want a generic email at a company too
 - For example: weccbasecase@bpa.gov

| DataMa | Name | DataMaintainer | Contact | Phone | Email | Company | Location |
|--------|------------------------|----------------|--------------------|--------------|------------------------------|---------|----------------|
| 1 | WECC | | Doug Tucker | | dtucker@wecc.biz | | Salt Lake City |
| 2 | Chelan PUD | Columbia Grid | Zachary Zornes | | Zachary.Zornes@chelanpud.org | | |
| 3 | Snohomish PUD | Columbia Grid | Long Duong | | LTDuong@SNOPUD.com | | |
| 4 | Grant PUD | Columbia Grid | Ken Che | | kche@gcpud.org | | |
| 5 | Puget Sound Energy | Columbia Grid | Eleanor Ewry | | eleanor.ewry@pse.com | | |
| 6 | Seattle City Light | Columbia Grid | Stephanie Lu | | Stephanie.Lu@seattle.gov | | |
| 7 | Bonneville Power Admin | Columbia Grid | Andrew Christensen | | alchristensen@bpa.gov | | |
| 8 | Tacoma Power | Columbia Grid | Khanh Thai | | kthai@ci.tacoma.wa.us | | |
| 9 | Avista Corp. | Columbia Grid | John Gross | 509.495.4591 | John.Gross@avistacorp.com | Avista | Spokane |
| 10 | Columbia Grid | WECC | Jonathan Young | | Young@columbiagrid.org | | |

Assignment of Objects to DataMaintainer



- General concepts for DataMaintainer
 - **Assign** Some object types can be assigned a specific DataMaintainer
 - **Inherit** Some objects type may inherit their DataMaintainer from a related object
 - **Not All** Not all object types can even be considered to belong to a DataMaintainer
 - In end an object has only one DataMaintainer
 - However, a DataMaintainer can belong to another DataMaintainer allow you to create “groups”
- Ultimately, each ObjectType has 2 questions
 - Can it be assigned a DataMaintainer?
 - Can it inherit from a related object?
 - Two YES/NO questions give us 4 choices

Assign?/Inherit? = NO/NO



- Objects for which DataMaintainer is not supported at all
- These objects generally represent one of the following 4 ObjectTypes
 - Solution Options
 - Environment Options
 - Objects dynamically created by software
 - Island, AreaTieLine, ZoneTieLine, SuperBus
 - Results of a software calculation
 - ViolationCTG

Assign?/Inherit? = YES/NO



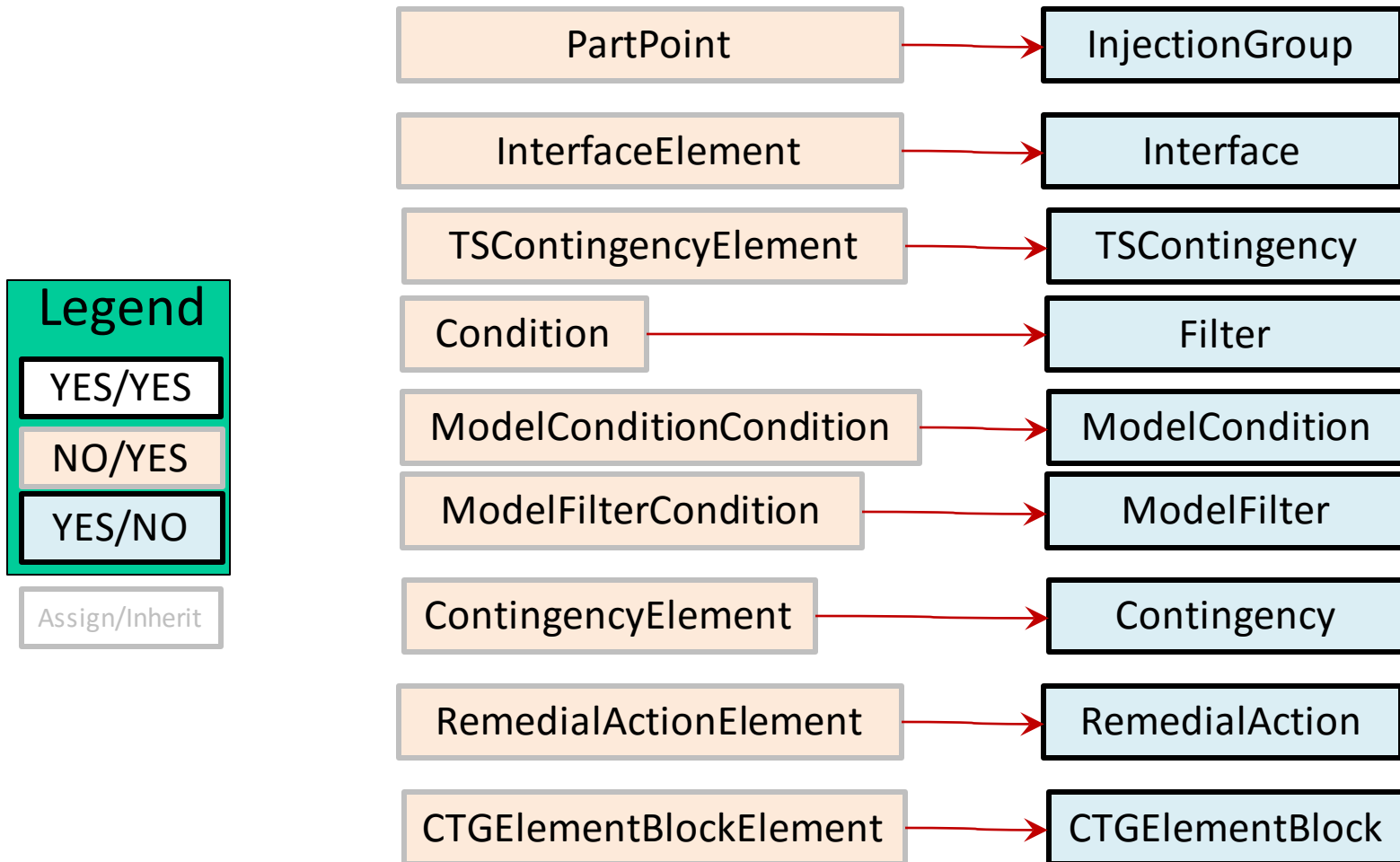
- ObjectTypes which can have a DataMaintainer specified but NEVER inherit
 - Aggregations Objects
 - Area, BalancingAuthority, Direction, InjectionGroup, Interface, Owner, StudyMWTransactions, Substation, SuperArea, VoltageControlGroup, XFCorrection, Zone
 - Transient and Contingency Analysis Objects
 - Contingency, CTGElementBlock, CustomMonitor, GlobalContingencyActionsElement, LimitSet, RemedialAction, ModelCondition, ModelExpression, ModelFilter, ModelStringExpression, TSContingency, TSLimitMonitor, DistributionEquivalent, LoadModelGroup, PlayIn
 - Case Information Objects
 - BGCalculatedField, CustomExpression, CustomExpressionStr, Filter, DataMaintainer

Why allow Inheritance?



- Make it easier for user
 - It is very natural to inherit this from either a Bus or Substation
- For some object types, specifying a DataMaintainer directly won't make any sense
 - InterfaceElement, etc...

Direct Inheritance Only Objects

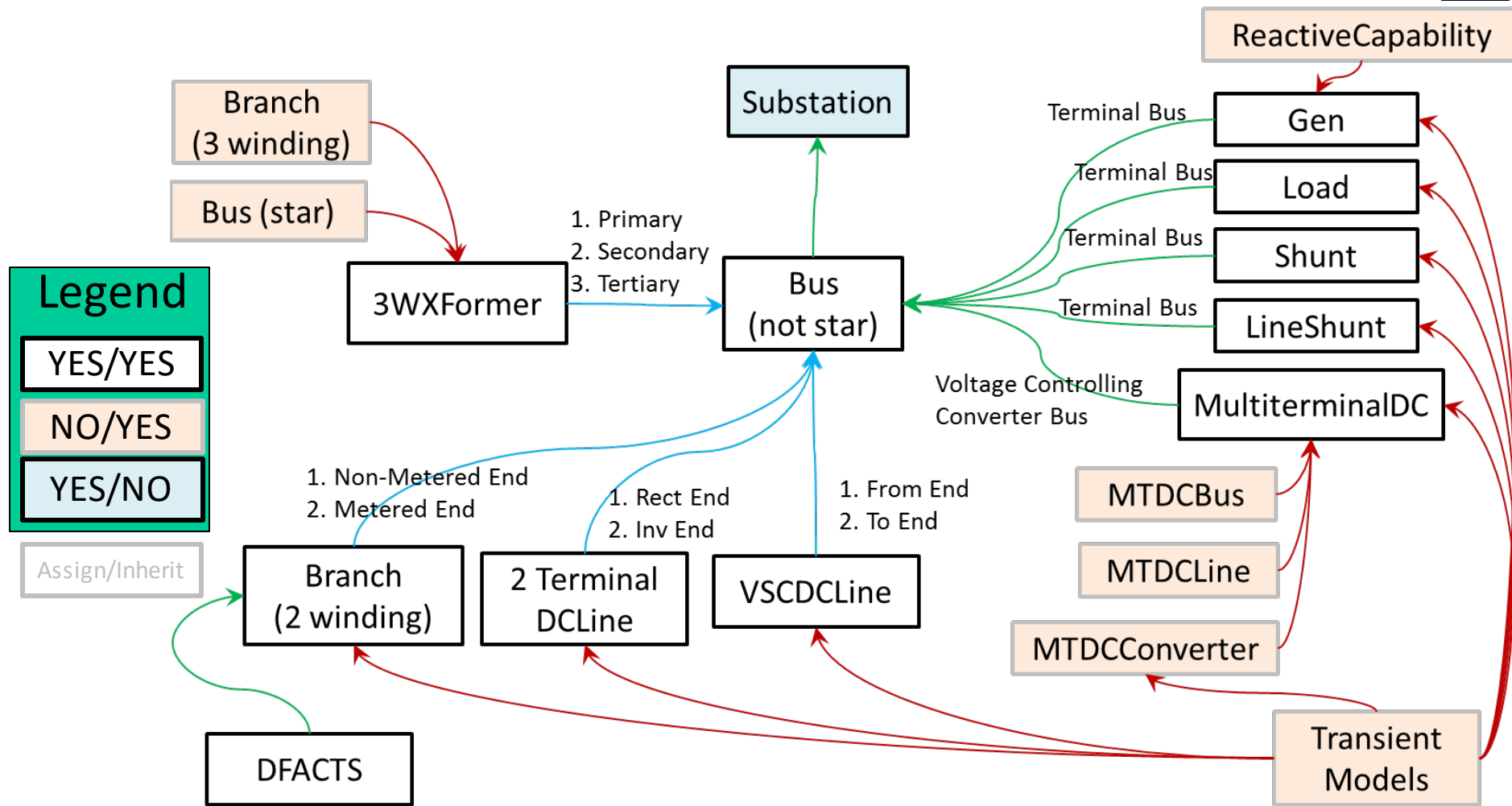


Expected Use of DataMaintainer Inheritance



- Create substations and assign a DataMaintainer to each substation and allow inheritance to work
 - Then just put in exceptions to this rule
 - We expect substations to get populated
 - GIS systems
 - GIC input data requires this
- Alternate: assign a Data Maintainer to each bus and use inheritance

Data Maintain Inheritance from Network Structure



See last slide of presentation for specific details

DataMaintainer of a DataMaintainer



- Allow a “Groups of DataMaintainers” which have hierarchy, with WECC at the top of hierarchy

| Hypothetical Structure | Representation in an Auxiliary File (Omitting Contact Info) |
|---|---|
| <ul style="list-style-type: none"> • WECC <ul style="list-style-type: none"> ○ ColumbiaGrid <ul style="list-style-type: none"> ▪ Avista ▪ BPA ▪ Chelan ▪ Grant ▪ PSE ▪ Seattle ▪ SnoPUD ▪ Tacoma ○ California <ul style="list-style-type: none"> ▪ SMUD ▪ TID ▪ LADWP ▪ ImperialCA ▪ SCE ▪ SANDIEGO ▪ MEXICO-CFE ○ PG&E ○ Arizona ○ El Paso ○ New Mexico ○ Nevada | <pre>DataMaintainer (Name, DataMaintainerAssign) { "WECC" " " "Columbia Grid" "WECC" "Avista" "Columbia Grid" "BPA" "Columbia Grid" "Chelan" "Columbia Grid" "Grant" "Columbia Grid" "PSE" "Columbia Grid" "Seattle" "Columbia Grid" "SnoPUD" "Columbia Grid" "Tacoma" "Columbia Grid" "California" "WECC" "SMUD" "California" "TID" "California" "LADWP" "California" "ImperialCA" "California" "SCE" "California" "SANDIEGO" "California" "MEXICO-CFE" "California" "PG&E" "California" "Arizona" "WECC" "El Paso" "WECC" "New Mexico" "WECC" "Nevada" "WECC" }</pre> |

What does GUI look like?

Aggregations/DataMaintainer



The screenshot displays the PowerWorld Model Explorer interface. The main window title is "Model Explorer: Generators - Case: DataMaintainerExample.PWB Status: Initialized | Simulator 19". The menu bar includes File, Case Information, Draw, Onelines, Tools, Options, Add Ons, and Window. The toolbar contains various icons for editing, running, and viewing. The left pane shows a tree view of the network model, with "Data Maintainers (508)" selected. The main pane shows a table of Data Maintainers with columns for Name, Data Maintainer Assign, Contact, Phone, Email, Company, and Location. A red box highlights the contact information for several entries, including Doug Tucker, Stephanie Lu, Khanh Thai, Ken Che, Andrew Christensen, Long Duong, Zachary Zornes, Eleanor Ewry, and John Gross. The status bar at the bottom indicates "Run Mode", "Solution Animation Stopped", "AC", and "Viewing Current Case".

| | Name | Data Maintainer Assign | Contact | Phone | Email | Company | Location |
|----|-----------------------------|------------------------|--------------------|--------------|------------------------------|---------|----------------|
| 1 | WECC | | Doug Tucker | | dtucker@wecc.biz | | Salt Lake City |
| 2 | Seattle City Light | Columbia Grid | Stephanie Lu | | Stephanie.Lu@seattle.gov | | |
| 3 | Tacoma Power | Columbia Grid | Khanh Thai | | kthai@ci.tacoma.wa.us | | |
| 4 | Grant PUD | Columbia Grid | Ken Che | | kche@gcpud.org | | |
| 5 | Bonneville Power Admin | Columbia Grid | Andrew Christensen | | alchristensen@bpa.gov | | |
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| 7 | Chelan PUD | Columbia Grid | Zachary Zornes | | Zachary.Zornes@chelanpud.org | | |
| 8 | Puget Sound Energy | Columbia Grid | Eleanor Ewry | | eleanor.ewry@pse.com | | |
| 9 | Avista Corp. | Columbia Grid | John Gross | 509.495.4591 | John.Gross@avistacorp.com | Avista | Spokane |
| 10 | AES Alamos LLC | WECC | | | | | |
| 11 | Applied Energy LLC (NTC/) | WECC | | | | | |
| 12 | Applied Energy LLC (Naval) | WECC | | | | | |
| 13 | Aragonne Wind LLC | WECC | | | | | |
| 14 | Arizona Public Service | WECC | | | | | |
| 15 | ACE Cogeneration Co. | WECC | | | | | |
| 16 | 3minutenergy Renewable | WECC | | | | | |
| 17 | Applied Energy LLC (N.Isla) | WECC | | | | | |
| 18 | AVSOLAR NON SRP | WECC | | | | | |
| 19 | Boise-Kuna Irrigation Dist | WECC | | | | | |
| 20 | Algonquin-Cambian Pacif | WECC | | | | | |
| 21 | Basin | WECC | | | | | |
| 22 | Basin Creek (MSE) (Monta) | WECC | | | | | |
| 23 | Beartooth Elec (Montana) | WECC | | | | | |

Contact Information

Hover Hints on DataMaintainer field



Model Explorer: Generators - Case: DataMaintainerExample.PWB Status: Initialized | Simulator 19

File Case Information Draw Onelines Tools Options Add Ons Window

Edit Mode Run Mode Mode

Case Information

Network Aggregation Solution Details

Case Description... Power Flow List... Case Summary... Quick Power Flow List... Custom Case Info... AUX Export Format Desc...

Bus View... Substation View... Oneline Viewer... Open Windows

Case Data

Generators Data Maintainers Buses Owners Zones

Records Geo Set Columns

Filter Advanced Generator Find... Remove Quick Filter...

| Gen | BusNum (1) | BusName (<) | DataMaintainer | DataMaintainerAssign | UnitType | FuelType | ID (2B) | AllLabels | Status (<) | Vc |
|------|------------|-------------|------------------------------|-----------------------------------|--------------------|----------|---------|-----------|------------|----|
| 2552 | 47983 | BIGLW W2 | Portland General Elec [Bus] | | WT (Wind Turbine) | Unknown | Z1 | | Open | |
| 2553 | 47985 | BIGLW W3 | Portland General Elec [Bus] | | WT (Wind Turbine) | Unknown | Z1 | | Open | |
| 2554 | 47989 | CONDN W1 | Bonneville Power Admin [Bus] | | WT (Wind Turbine) | Unknown | Z1 | | Open | |
| 2555 | 47995 | HORN8 W1 | Invenery LLC [Bus] | | OT (Other) | Unknown | Z1 | | Open | |
| 2556 | 48061 | CABGOR12 | Avista Corp. [Bus] | | HY (Hydro) | Unknown | 1 | | Closed | |
| 2557 | 48061 | CABGOR12 | Avista Corp. [Bus] | | HY (Hydro) | Unknown | 2 | | Closed | |
| 2558 | 48063 | CABGOR34 | Avista Corp. | | HY (Hydro) | Unknown | 3 | | Closed | |
| 2559 | 48063 | CABGOR34 | Avista Corp. | Contact = John Gross | HY (Hydro) | Unknown | 4 | | Closed | |
| 2560 | 48166 | IEP-A | Avista Corp. | Phone = 509.495.4591 | UN (Unknown) | Unknown | 1 | | Closed | |
| 2561 | 48168 | IEP-B | Avista Corp. | Email = John.Gross@avistacorp.com | UN (Unknown) | Unknown | 1 | | Closed | |
| 2562 | 48173 | KETTLEAV | Avista Corp. | Company = Avista | ST (Steam Turbine) | Unknown | 1 | | Open | |
| 2563 | 48173 | KETTLEAV | Avista Corp. | Email = John.Gross@avistacorp.com | JE (Jet Engine) | Unknown | 2 | | Open | |
| 2564 | 48189 | LITFALL2 | Avista Corp. | Location = Spokane | HY (Hydro) | Unknown | 1 | | Closed | |
| 2565 | 48189 | LITFALL2 | Avista Corp. | | HY (Hydro) | Unknown | 2 | | Closed | |
| 2566 | 48191 | LITFALL3 | Avista Corp. | Columbia Grid | HY (Hydro) | Unknown | 3 | | Closed | |
| 2567 | 48191 | LITFALL3 | Avista Corp. | Contact = Jonathan Young | HY (Hydro) | Unknown | 4 | | Closed | |
| 2568 | 48205 | LONGLKG1 | Avista Corp. | Email = Young@columbiagrid.org | HY (Hydro) | Unknown | 1 | | Closed | |
| 2569 | 48207 | LONGLKG2 | Avista Corp. | | HY (Hydro) | Unknown | 2 | | Closed | |
| 2570 | 48209 | LONGLKG3 | Avista Corp. | | HY (Hydro) | Unknown | 3 | | Closed | |
| 2571 | 48211 | LONGLKG4 | Avista Corp. | WECC | HY (Hydro) | Unknown | 4 | | Closed | |
| 2572 | 48227 | MEYERSFL | Hydro | Contact = Doug Tucker | HY (Hydro) | Unknown | 1 | | Closed | |
| 2573 | 48227 | MEYERSFL | Hydro | Email = dtucker@wecc.biz | HY (Hydro) | Unknown | 2 | | Closed | |
| 2574 | 48241 | MONROE | Avista Corp. | Location = Salt Lake City | HY (Hydro) | Unknown | 1 | | Closed | |

Hover Hints Over DataMaintainer Field

Search avista Search Now Options

Avista Corp.Contact = John GrossPhone = 509.495.4591Email = John.Gross@avistacorp.comCompany = Avista.Location = Spokane Columbia Grid Contact = Jonathan Young Email = Young@columbiagrid.org WECC Contact = Doug Tucker Email = dtuck

Saving the WECC RAS and Contingency Format



- “Save Selected Data Maintainers Only”
- This works because all ObjectTypes have a DataMaintainer

Contingency Settings

There are numerous settings which affect the Contingency Analysis calculations. Choose which settings you would like to store and also some formatting options on how to represent them in the AUX file

What to Store

- Save Contingency Definitions
- Save Remedial Actions and Global Actions (none)
 - Save unlinked contingency actions (none)
- Save ModelFilter, ModelCondition, and ModelExpression (none)
- Save Contingency Options (also Area Makeup, Gen Line Drop, Gen AGC, Gen Max MW, Bus Load Throw)
 - Suppress Gen and Bus Contingency Options
- Save General Power Flow Solution Options
- Save Custom Monitors (none)
- Save Limit Monitoring Settings (Area, Zone, LimitSet, Bus, Branch, and Interface)
 - Save Limit Cost Functions if they exist (none)
- Save List Display Settings
- Save Contingency Results (none)

Formatting Options

Save Data Using

- Number
- Name and Nominal kV
- Label (Use Number if no label)

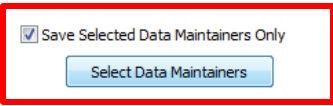
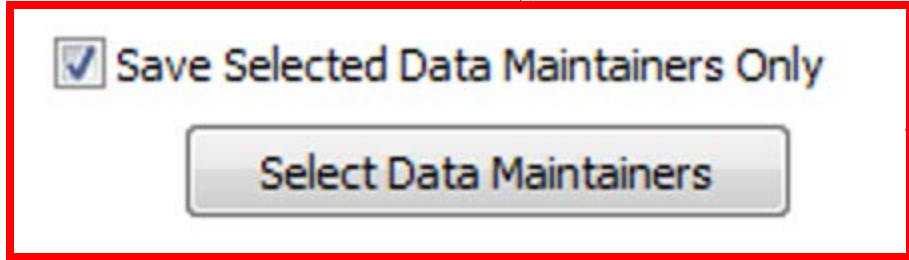
- Use Concise Variable Names and AUX Headers
- Replace SUBDATA with DATA
- Use Object ID fields with Area, Zone, Bus, Branch, Gen, and Interface objects to simplify AUX file output
- Use Special Objects IDs for MS Line Sections
- Use Special Objects IDs for 3 Winding Transformer windings

Set to Match the WECC RAS and Contingency Format

Save Selected Data Maintainers Only

Select Data Maintainers

OK Cancel



Use the DataMaintainer



- If you populate it → features will come
 - Built-In filtering based on DataMaintainers

Inheritance Precedence for Each Object



| ObjectType | Assign | Inheritance Precedence |
|--------------------------------|--------|--|
| 3WXFormer | YES | <ol style="list-style-type: none"> 1. Primary Bus 2. Primary Bus' Substation 3. Secondary Bus 4. Secondary Bus' Substation 5. Tertiary Bus 6. Tertiary Bus' Substation |
| Branch | YES | <ol style="list-style-type: none"> 1. Non-Metered Bus 2. Non-Metered Bus' Substation |
| | | <i>Except for windings of a 3WXFormer which inherit from the 3WXFormer</i> |
| Bus | YES | <ol style="list-style-type: none"> 1. Substation |
| | | <i>Except for internal buses of 3WXFormer which inherits from the 3WXFormer</i> |
| Condition | NO | Filter |
| ContingencyElement | NO | Contingency |
| ContingencyMonitoringException | NO | Contingency |
| CTGElementBlockElement | NO | CTGElementBlock |
| DCTransmissionLine | YES | <ol style="list-style-type: none"> 1. Rectifier Bus 2. Rectifier Bus' Substation 3. Inverter Bus 4. Inverter Bus' Substation |
| DFACTS | YES | <ol style="list-style-type: none"> 1. Branches' Non-Metered Bus 2. Branches' Non-Metered Bus' Substation |
| Gen | YES | <ol style="list-style-type: none"> 1. Bus 2. Bus' Substation |
| InterfaceElement | NO | Interface |
| LineShunt | YES | <ol style="list-style-type: none"> 1. Bus 2. Bus' Substation |
| Load | YES | <ol style="list-style-type: none"> 1. Bus 2. Bus' Substation |
| ModelConditionCondition | NO | ModelCondition |
| ModelFilterCondition | NO | ModelFilter |

| ObjectType | Assign | Inheritance Precedence |
|---------------------------------|--------|--|
| MTDCBus | NO | <ol style="list-style-type: none"> 1. MTDCRecord 2. MTDCRecord's VConv_Bus 3. MTDCRecord's VConv_Bus's Substation |
| MTDCConverter | NO | <ol style="list-style-type: none"> 1. MTDCRecord 2. MTDCRecord's VConv_Bus 3. MTDCRecord's VConv_Bus's Substation |
| MTDCRecord | YES | <ol style="list-style-type: none"> 1. Voltage Controlling Converter Bus 2. Voltage Controlling Converter Bus' Substation |
| MTDCTransmissionLine | NO | <ol style="list-style-type: none"> 1. MTDCRecord 2. MTDCRecord's VConv_Bus 3. MTDCRecord's VConv_Bus's Substation |
| PartPoint | NO | InjectionGroup |
| PlayInInfo | NO | PlayIn |
| PlayInSignal | NO | PlayIn |
| ReactiveCapability | NO | <ol style="list-style-type: none"> 1. Gen 2. Gen's Bus 3. Gen's Bus' Substation |
| RemedialActionElement | NO | RemedialAction |
| Shunt | YES | <ol style="list-style-type: none"> 1. Bus 2. Bus' Substation |
| StudyMWTransactionsBid | NO | StudyMWTransactions |
| Transient Stability Model (all) | NO | Object to which the stability model is assigned |
| TSContingencyElement | NO | TSContingency |
| TSPlotSeries | NO | TSPlot |
| TSPlotVertAxisGroup | NO | TSPlot |
| TSSubPlot | NO | TSPlot |
| VSCDCLine | YES | <ol style="list-style-type: none"> 1. From Bus 2. From Bus' Substation 3. To Bus 4. To Bus' Substation |