

Using ArcGIS® Data Reviewer to Inspect ArcFM™ Feeder Manager Circuits



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Using ArcGIS Data Reviewer to Inspect ArcFM Feeder Manager Circuits

An Esri White Paper

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Using ArcGIS Data Reviewer to Inspect ArcFM™ Feeder Manager Circuits

Introduction Electric utility data analysts routinely need to inspect electric circuits to identify loops, phase mismatches, and de-energized features. This validation process involves visual inspection of the circuit data, which is labor intensive and time-consuming. The process uses Feeder Manager data to determine the circuit or sources that energize a piece of electrical equipment and which of its electrical phases are energized. This same validation process can be automated with ArcGIS® Data Reviewer using Feeder Manager data. In this paper, we will highlight some of the key functionalities in ArcGIS Data Reviewer, then discuss ArcFM Feeder Manager and outline how you can use both to efficiently inspect electric circuits.

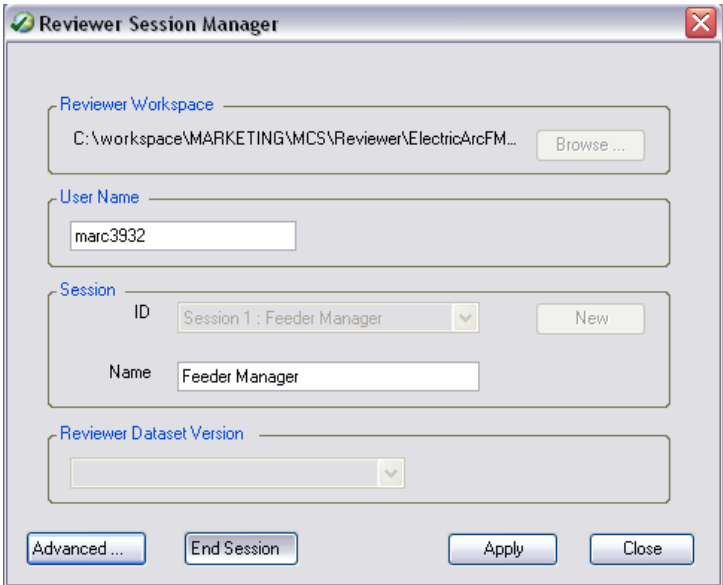
ArcGIS Data Reviewer ArcGIS Data Reviewer, an extension to ArcGIS Desktop, allows you to conduct visual and automated quality review of data in support of database production. Data Reviewer is used to validate data in your geodatabase to find possible anomalies and to identify where corrections, additions, and deletions must be made to spatial data and its attributes. Data validation is performed using automated checks as well as the analysis tools, and the anomalies are stored within Reviewer sessions for further review and correction. ArcGIS Data Reviewer applies a database process to what was formerly a paper trail of quality control error files and corrections.

Reviewer Session Similar to an edit session, the Reviewer session allows you to interact with your data; however, in a Reviewer session, you are performing quality control tasks. Upon starting a Reviewer session, you have the ability to review data, write records to the Reviewer Table, and interact with records in the Reviewer Table.



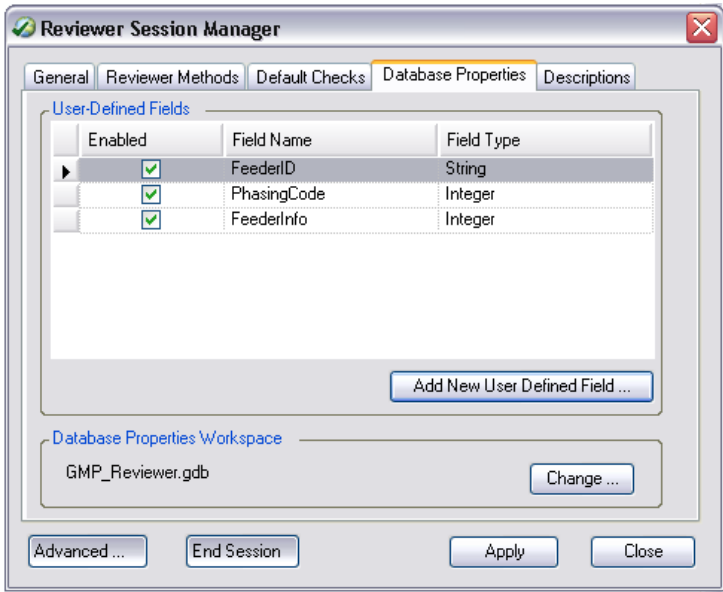
Data Reviewer Toolbar—Reviewer Session Manager

Once the Reviewer session is ended, you can still run checks on the data and do visual quality control but cannot write information to the Reviewer Table. When you are preparing to start a Reviewer session in ArcMap™, you must choose a workspace (personal, file, or ArcSDE® geodatabase) to use and name the current Reviewer session that is going to contain any anomalies found during the validation process.



Reviewer Session Manager

Clicking the Advanced... button provides the ability to configure more advanced options that allow you to control the way batch jobs are run, access table properties, toggle default checks, and determine the location of database properties. The Reviewer workspace can be created on personal, file, and ArcSDE geodatabases.



Reviewer Session Manager—Advanced Options

Reviewer Table

The Reviewer Table is a window that displays the records or results found using automated checks as well as visual review tools. The table contains features and database records that are returned by running data checks individually or in the form of a batch job. Features that fall within thresholds defined in the checks are recorded in the

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Reviewer Table so they can be corrected and evaluated as needed. The Reviewer Table also contains any features or rows that have been committed through manual or visual review processes. Using the Reviewer Table, you can zoom to individual features that have been recorded as well as zoom to their individual parts as applicable.

RECORDID	OBJECTID	SUBTYPE	ORIGINTABLE	ORIGINCHECK	CHECKTITLE	FeederID	REVIEWTECHNICIAN	REVIEWDATE	NOTES
750	46604	Three Phase	PrimaryOHLineSe	Execute SQL	ABC and BC - bad PrimaryOH	26H5	marc3932	Sunday, May 15	ABC and BC -
751	46606	Three Phase	PrimaryOHLineSe	Execute SQL	ABC and BC - bad PrimaryOH	26H5	marc3932	Sunday, May 15	ABC and BC -
752	46608	Three Phase	PrimaryOHLineSe	Execute SQL	ABC and BC - bad PrimaryOH	26H5	marc3932	Sunday, May 15	ABC and BC -
753	21353	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	26H1	marc3932	Sunday, May 15	ABC-ABC Loop
754	21720	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	37J6	marc3932	Sunday, May 15	ABC-ABC Loop
755	21723	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	37J6	marc3932	Sunday, May 15	ABC-ABC Loop
756	22539	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	37J6	marc3932	Sunday, May 15	ABC-ABC Loop
757	22546	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	37J6	marc3932	Sunday, May 15	ABC-ABC Loop
758	34372	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	37G7	marc3932	Sunday, May 15	ABC-ABC Loop
759	34373	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	37G7	marc3932	Sunday, May 15	ABC-ABC Loop
760	34374	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	37G7	marc3932	Sunday, May 15	ABC-ABC Loop
761	34375	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	37G7	marc3932	Sunday, May 15	ABC-ABC Loop
762	34794	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	26H5	marc3932	Sunday, May 15	ABC-ABC Loop
763	38619	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	37H1	marc3932	Sunday, May 15	ABC-ABC Loop
764	38621	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	37H1	marc3932	Sunday, May 15	ABC-ABC Loop
765	64933	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	37J6	marc3932	Sunday, May 15	ABC-ABC Loop
766	64934	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	37J6	marc3932	Sunday, May 15	ABC-ABC Loop
767	70989	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	26H1	marc3932	Sunday, May 15	ABC-ABC Loop
768	70990	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-ABC Loop PrimaryOH	26H1	marc3932	Sunday, May 15	ABC-ABC Loop
769	34135	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	37J6	marc3932	Sunday, May 15	ABC-ABC Loop
770	34136	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	37J6	marc3932	Sunday, May 15	ABC-ABC Loop
771	34468	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	37J6	marc3932	Sunday, May 15	ABC-ABC Loop
772	34469	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	37J6	marc3932	Sunday, May 15	ABC-ABC Loop
773	34472	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	37J6	marc3932	Sunday, May 15	ABC-ABC Loop
774	34473	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	37J6	marc3932	Sunday, May 15	ABC-ABC Loop
775	34479	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	37J6	marc3932	Sunday, May 15	ABC-ABC Loop
776	37630	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	37G7	marc3932	Sunday, May 15	ABC-ABC Loop
777	37830	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	26H5	marc3932	Sunday, May 15	ABC-ABC Loop
778	37831	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	26H5	marc3932	Sunday, May 15	ABC-ABC Loop
779	37832	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	26H5	marc3932	Sunday, May 15	ABC-ABC Loop
780	37833	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	26H5	marc3932	Sunday, May 15	ABC-ABC Loop
781	37834	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	26H5	marc3932	Sunday, May 15	ABC-ABC Loop
782	38925	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	26H1	marc3932	Sunday, May 15	ABC-ABC Loop
783	39227	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	37G7	marc3932	Sunday, May 15	ABC-ABC Loop
784	39228	Three Phase	SecondaryOHLine	Execute SQL	ABC-ABC Loop SecondaryOH	37G7	marc3932	Sunday, May 15	ABC-ABC Loop
785	24582	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-Deenergized PrimaryOH		marc3932	Sunday, May 15	ABC-
786	24583	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-Deenergized PrimaryOH		marc3932	Sunday, May 15	ABC-
787	24585	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-Deenergized PrimaryOH		marc3932	Sunday, May 15	ABC-
788	24586	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-Deenergized PrimaryOH		marc3932	Sunday, May 15	ABC-
789	24587	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-Deenergized PrimaryOH		marc3932	Sunday, May 15	ABC-
790	24588	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-Deenergized PrimaryOH		marc3932	Sunday, May 15	ABC-
791	24589	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-Deenergized PrimaryOH		marc3932	Sunday, May 15	ABC-
792	24593	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-Deenergized PrimaryOH		marc3932	Sunday, May 15	ABC-
793	34766	Three Phase	PrimaryOHLineSe	Execute SQL	ABC-Deenergized PrimaryOH		marc3932	Sunday, May 15	ABC-

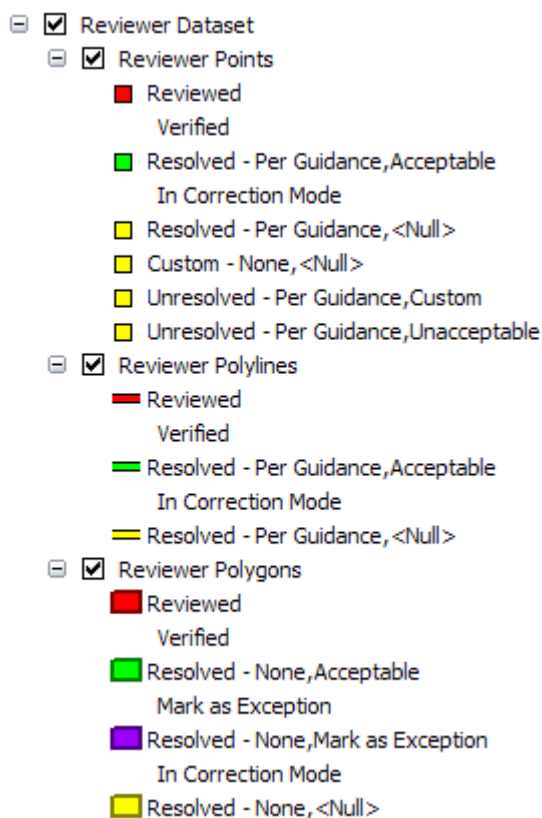
Reviewer Table

Once the record has been corrected, it can be updated with correction information, which includes the evaluation and explanation. The evaluation is the correction status. The explanation is the reason behind the resolution or lack thereof. Both can be chosen using the default options available. Custom evaluation and explanation choices can also be added to your database to use during the correction process. The CORRECTIONTECHNICIAN, CORRECTIONDATE, and CORRECTIONSTATUS fields are populated for the selected record or records.

After a record is corrected, it is customary to have another person verify the correction and ensure that it is acceptable. The verification process is similar to the correction process in that it involves interacting with the Reviewer Table record and updating table information. During the verification process, the record is visited and its correction is reviewed. A verification status is provided to indicate whether the correction is acceptable. The VERIFICATIONTECHNICIAN, VERIFICATIONDATE, and VERIFICATIONSTATUS fields are updated for the selected record or records.

Symbolizing Reviewer Table Records

Feature records in the Reviewer Table can be symbolized and added as layers to ArcMap so they reflect the current state of the record in the Reviewer Table. This allows you to interact with Reviewer record geometries visually in addition to the tabular view. The records can be symbolized repeatedly to reflect the most current status of all the records in the table. The Reviewer Dataset group layer is loaded into the ArcMap table of contents when you use the Symbolize Reviewer Feature Records tool. It contains three layers: Reviewer Polygons, Reviewer Polylines, and Reviewer Points. The Reviewer Polygons layer shows the current geometries of the polygon feature records, the Reviewer Polylines layer shows the current geometries of the polyline records, and the Reviewer Points layer shows the current geometries of the point records. Red is used to represent features that have been committed to the Reviewer Table, yellow is used for the features that have a correction status, and green is used for features that have been verified.

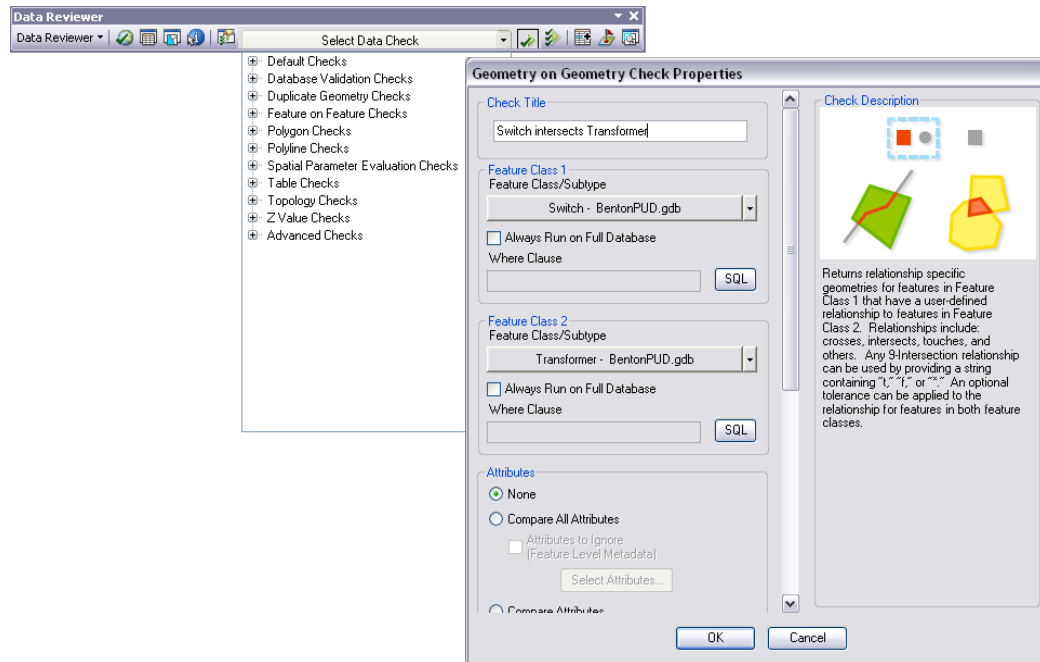


Reviewer Dataset Group Layer

Reviewer Checks

Automated checks are tools that allow you to validate your data based on specific conditions. Some of the checks allow you to search for conditions, such as polygon slivers or cutbacks, while other checks allow you to search for features that have spatial relationships with each other. For example, you may want to find switches that have been mistakenly placed on top of fuse features.

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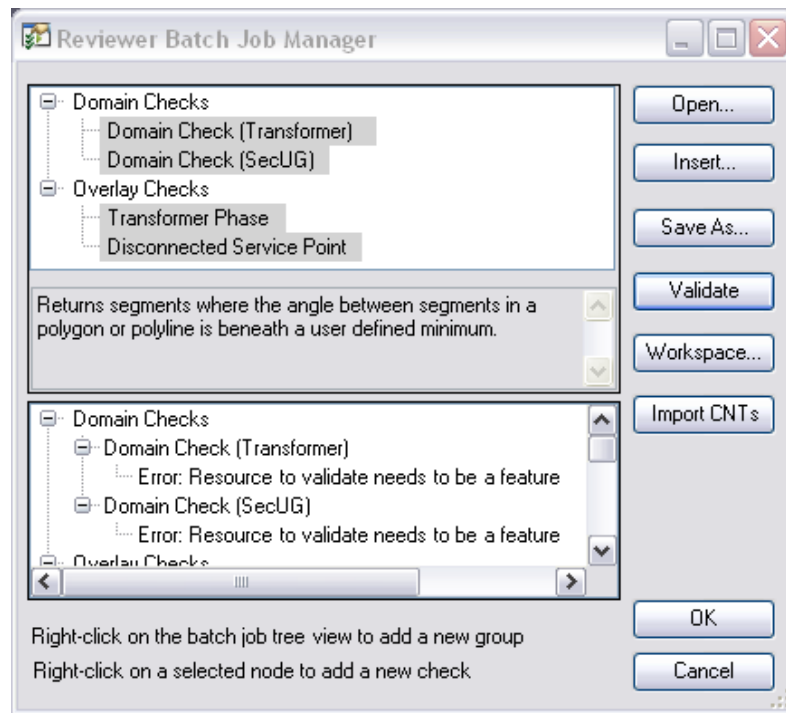
Reviewer Checks—Geometry on Geometry Check

Reviewer Batch Job

Batch jobs are groups of checks that can be saved and run against the data. The checks can be organized and combined into any number of groups within a batch job depending on how you want to classify them. The checks you add to each of these groups can be applied to different feature classes and can therefore appear in the same group a number of times, depending on the relationships you are evaluating in your data.

Design of the batch job should be the duty of a technical lead in an organization.

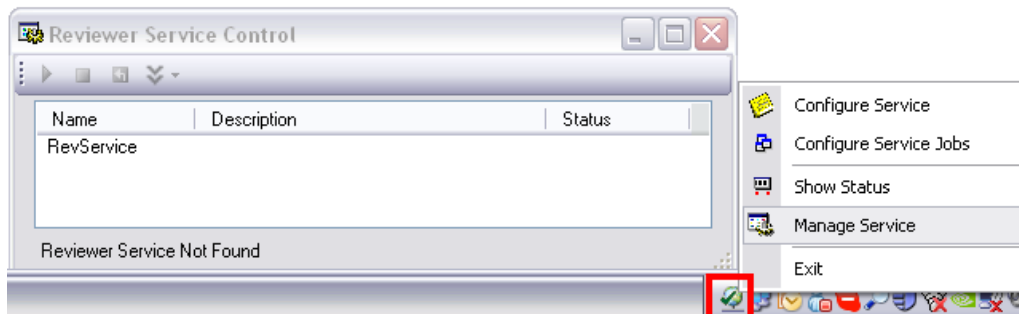
The batch job allows users in different locations to utilize a consistent set of automated checks when validating their data.



Reviewer Batch Job Manager

Reviewer Service

Reviewer service is a Microsoft® Windows® service that can be scheduled to run Reviewer batch jobs outside of the ArcMap environment. Similar to running a batch job using the Reviewer Batch Validate tool, the Reviewer service validates and runs batch jobs and writes the results to the Reviewer Table in a specified Reviewer session. Batch jobs can be scheduled to run once at a specific date and time or to run repeatedly at regular intervals.



Reviewer Service Control

ArcFM Feeder Manager

ArcFM Feeder Manager allows utility managers to determine which circuit a given piece of electrical equipment belongs to (which sources supply it with power) and which of its electrical phases are energized on the primary side. A distribution circuit, or feeder, is a grouping of thousands of electrically connected devices and lengths of conductor. Some features in the circuit represent switching devices that may, depending on their status,

constitute a break in electrical continuity between features that would otherwise be connected.

Feeder Manager writes FeederID and energized phase information to the ArcFM database in attribute fields of individual electrical features. It assigns the same FeederID to all features in an ArcFM database considered to belong to a particular electric distribution circuit. Feeder Manager maintains information that indicates which electrical phases can reach the feature from the source of power. Once the circuit ID and energized phase information are assigned to ArcFM features, Feeder Manager uses autoupdaters to update information about circuit association or energized phases when changes are made to the network.

Users can generate a circuit map, locate all features or tie devices associated with a feeder, select features belonging to a particular feeder or group, and show feeder information graphically in a map display (loops, islands, and double feeds or extra feeds).



Energized Phases: Feeder Manager defines *energized phases* as those phases that are continuous between a given device and its ultimate source. When determining an energized phase, Feeder Manager does not consider the switch status or the phase designation value on the device.

ArcFM Solution Online Help

About Feeder Manager Configuration

ArcFM's Feeder Manager automatically determines which circuit or sources energize a piece of electrical equipment with power and tracks which of its electrical phases are energized on the primary side. Feeder Manager responds to edits to the network (such as closing a switch) by updating the FeederID field and energized phase information for all affected features. MMElectricTraceWeight stores all the attribute information about a device or conductor that feeder management needs to perform traces and assign FeederID values. The attribute information contains data on FeederID, tracing impedance (open or closed status) and possibly operating voltage and phasing information. Feeder Manager relies on the weight autoupdater, which is a collection of autoupdaters. The weight autoupdater automatically maintains the value of the MMElectricTraceWeight field for every feature class in the geometric network.

Feeder Manager requires specific classes, fields, relationships, and domains in the geodatabase design. If your geodatabase cannot be designed this way, you may need to create a custom weight autoupdater.

Trace All Feeders

ArcFM Trace All Feeders is run on a new geodatabase to properly initialize the Feeder Manager fields. When changes are made to the data after the initialization, Feeder Manager autoupdaters are designed to maintain the FeederID, FeederID2, and FeederInfo fields (and ParentCircuitSourceID for EFM users). There are minimal types of edits that can cause Feeder Manager autoupdaters to *not* maintain that information accurately (use of Esri's Connect and Disconnect tools may be the only example of this type of edit). If this type of edit occurs, select the Trace All Feeders or Trace a Feeder option to update affected conductors and devices in all feeder systems or a selected feeder system. Only one instance of Trace a Feeder or Trace All Feeders may be run at one time. The tools to trace feeders are available in the following locations:

- **Trace a Feeder (ArcCatalog™):** This tool traces a single feeder until it comes to the end of the feeder or encounters a de-energized feature.

- **Trace a Feeder (ArcMap):** This tool traces a single feeder until it comes to the end of the feeder or encounters a de-energized feature.

Note: Trace a Feeder stops tracing when it encounters a de-energized feature.

- **Trace All Feeders (ArcCatalog):** This tool traces all feeders in the geometric network, including those that have no source junction (island) and any feeders downstream from a de-energized junction.
- **Trace All Feeders (stand-alone executable):** This tool traces all feeders in the geometric network, including those that have no source junction (island) and any feeders downstream from a de-energized junction. This tool also compresses the database after tracing each feeder, making Trace All Feeders faster than when it is run in ArcCatalog.



De-energized Features: If Trace All Feeders encounters a de-energized feature, it assigns the FeederID field a value of Null.

ArcFM Solution Online Help

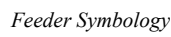
Feeder Symbolology

Feeder Manager populates the FeederID, FeederID2, and FeederInfo fields. The FeederID field identifies separate feeder systems and the devices associated with them. The FeederID2 field will be populated if the feature has more than one circuit source.

You can use the FeederID to display each circuit individually. By using a layer definition query, you can overlap the circuit with other electric lines.

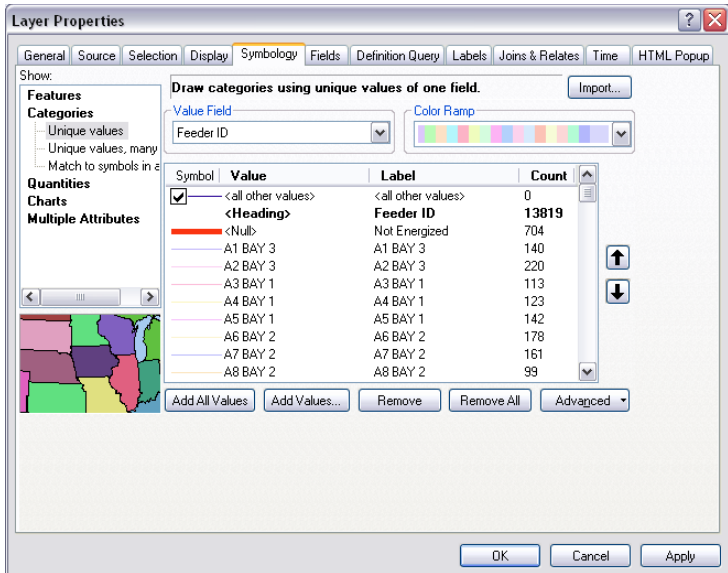
1. Right-click a layer and select Properties. Go to the Definition Query tab.
2. In the Definition Query box, type: FEEDERID = '26H5'.

In this example, the FeederID of the circuit is '26H5'. In ArcMap, the same definition query needs to be applied for each electric line feature class participating in the geometric network to have a complete view of the circuit (Primary Overhead Conductor, Primary Underground Conductor, Secondary Overhead Conductor, and Secondary Underground Conductor).



1. Right-click a layer and select Properties. Go to the Symbolology tab.
2. Select FeederID in the Value Field.
3. Click Add Values or Add All Values.
4. Right-click each value and select Properties for Selected Symbols. Edit the symbol for that particular feature.

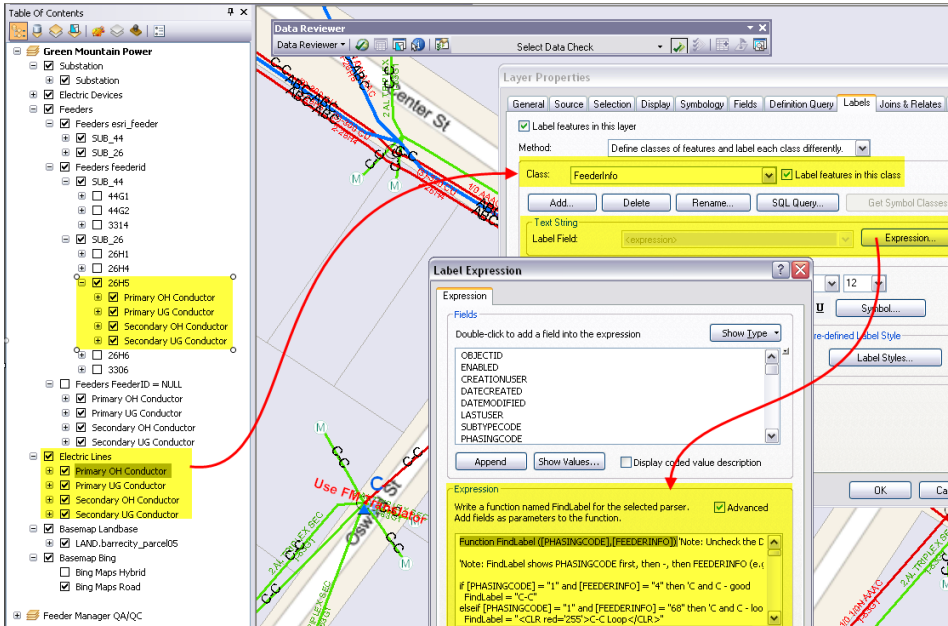
Esri White Paper



Layer Symbology

**Feeder Manager
Phase Mismatch
Label Text
Expression**

A label text expression that shows Phase Designation versus the Feeder Manager-maintained FeederInfo field is useful for finding loops, phase errors, mismatches, and de-energized features during visual inspection of the circuits.



FeederInfo Label Expression

The electric line segments are labeled using Phase Designation and FeederInfo value combinations. Labels in the color **black** indicate “good” conductors, and labels in the color **red** indicate conductors with a Feeder Manager data anomaly. Those anomalies can be recorded in the ArcGIS Data Reviewer Table. Tools in the Reviewer Table can be

used to quantify each type of anomaly and later visit, inspect, and correct the invalid data. The Label Text Expression is presented below.

The following lists the PhaseDesignation domain assigned to the PhasingCode field:

```
4  A
2  B
1  C
6  AB
5  AC
3  BC
7  ABC
0  N
```

```
Function FindLabel ([PHASINGCODE],[FEEDERINFO]) 'Note: Uncheck the Display
Coded Value Description checkbox

'Note: FindLabel shows PHASINGCODE first, then -, then FEEDERINFO (e.g. A-
A)

if [PHASINGCODE] = "1" and [FEEDERINFO] = "4" then 'C and C - good
  FindLabel = "C-C"
elseif [PHASINGCODE] = "1" and [FEEDERINFO] = "68" then 'C and C - loop
  FindLabel = "<CLR red='255'>C-C Loop</CLR>"
elseif [PHASINGCODE] = "1" and [FEEDERINFO] = "132" then 'C and C -
multifeed
  FindLabel = "<CLR red='255'>C-C Multifeed</CLR>"
elseif [PHASINGCODE] = "1" and [FEEDERINFO] = "196" then 'C and C - loop
and multifeed
  FindLabel = "<CLR red='255'>C-C Loop and Multifeed</CLR>"

elseif [PHASINGCODE] = "2" and [FEEDERINFO] = "2" then 'B and B - good
  FindLabel = "B-B"
elseif [PHASINGCODE] = "2" and [FEEDERINFO] = "66" then 'B and B - loop
  FindLabel = "<CLR red='255'>B-B Loop</CLR>"
elseif [PHASINGCODE] = "2" and [FEEDERINFO] = "130" then 'B and B -
multifeed
  FindLabel = "<CLR red='255'>B-B Multifeed</CLR>"
elseif [PHASINGCODE] = "2" and [FEEDERINFO] = "194" then 'B and B - loop
and multifeed
  FindLabel = "<CLR red='255'>B-B Loop and Multifeed</CLR>"

elseif [PHASINGCODE] = "3" and [FEEDERINFO] = "6" then 'BC and BC - good
  FindLabel = "BC-BC"
elseif [PHASINGCODE] = "3" and [FEEDERINFO] = "70" then 'BC and BC - loop
  FindLabel = "<CLR red='255'>BC-BC Loop</CLR>"
elseif [PHASINGCODE] = "3" and [FEEDERINFO] = "134" then 'BC and BC -
multifeed
  FindLabel = "<CLR red='255'>BC-BC Multifeed</CLR>"
elseif [PHASINGCODE] = "3" and [FEEDERINFO] = "198" then 'BC and BC - loop
and multifeed
  FindLabel = "<CLR red='255'>BC-BC Loop and Multifeed</CLR>"
elseif [PHASINGCODE] = "3" and [FEEDERINFO] = "2" then 'BC and B - bad
  FindLabel = "<CLR red='255'>BC-B</CLR>"
elseif [PHASINGCODE] = "3" and [FEEDERINFO] = "4" then 'BC and C - bad
  FindLabel = "<CLR red='255'>BC-C</CLR>"
```

```

elseif [PHASINGCODE] = "4" and [FEEDERINFO] = "1" then 'A and A - good
  FindLabel = "A-A"
elseif [PHASINGCODE] = "4" and [FEEDERINFO] = "65" then 'A and A - loop
  FindLabel = "<CLR red='255'>A-A Loop</CLR>"
elseif [PHASINGCODE] = "4" and [FEEDERINFO] = "129" then 'A and A -
multifeed
  FindLabel = "<CLR red='255'>A-A Multifeed</CLR>"
elseif [PHASINGCODE] = "4" and [FEEDERINFO] = "193" then 'A and A - loop
and multifeed
  FindLabel = "<CLR red='255'>A-A Loop and Multifeed</CLR>"

elseif [PHASINGCODE] = "5" and [FEEDERINFO] = "5" then 'AC and AC - good
  FindLabel = "AC-AC"
elseif [PHASINGCODE] = "5" and [FEEDERINFO] = "69" then 'AC and AC - loop
  FindLabel = "<CLR red='255'>AC-AC Loop</CLR>"
elseif [PHASINGCODE] = "5" and [FEEDERINFO] = "133" then 'AC and AC -
multifeed
  FindLabel = "<CLR red='255'>AC-AC Multifeed</CLR>"
elseif [PHASINGCODE] = "5" and [FEEDERINFO] = "197" then 'AC and AC - loop
and multifeed
  FindLabel = "<CLR red='255'>AC-AC Loop and Multifeed</CLR>"
elseif [PHASINGCODE] = "5" and [FEEDERINFO] = "1" then 'AC and A - bad
  FindLabel = "<CLR red='255'>AC-A</CLR>"
elseif [PHASINGCODE] = "5" and [FEEDERINFO] = "4" then 'AC and C - bad
  FindLabel = "<CLR red='255'>AC-C</CLR>"

elseif [PHASINGCODE] = "6" and [FEEDERINFO] = "3" then 'AB and AB - good
  FindLabel = "AB-AB"
elseif [PHASINGCODE] = "6" and [FEEDERINFO] = "67" then 'AB and AB - loop
  FindLabel = "<CLR red='255'>AB-AB Loop</CLR>"
elseif [PHASINGCODE] = "6" and [FEEDERINFO] = "131" then 'AB and AB -
multifeed
  FindLabel = "<CLR red='255'>AB-AB Multifeed</CLR>"
elseif [PHASINGCODE] = "6" and [FEEDERINFO] = "195" then 'AB and AB - loop
and multifeed
  FindLabel = "<CLR red='255'>AB-AB Loop and Multifeed</CLR>"
elseif [PHASINGCODE] = "6" and [FEEDERINFO] = "1" then 'AB and A - bad
  FindLabel = "<CLR red='255'>AB-A</CLR>"
elseif [PHASINGCODE] = "6" and [FEEDERINFO] = "2" then 'AB and B - bad
  FindLabel = "<CLR red='255'>AB-B</CLR>"

elseif [PHASINGCODE] = "7" and [FEEDERINFO] = "7" then 'ABC and ABC - good
  FindLabel = "ABC-ABC"
elseif [PHASINGCODE] = "7" and [FEEDERINFO] = "71" then 'ABC and ABC -
loop
  FindLabel = "<CLR red='255'>ABC-ABC Loop</CLR>"
elseif [PHASINGCODE] = "7" and [FEEDERINFO] = "135" then 'ABC and ABC -
multifeed
  FindLabel = "<CLR red='255'>ABC-ABC Multifeed</CLR>"
elseif [PHASINGCODE] = "7" and [FEEDERINFO] = "199" then 'ABC and ABC -
loop and multifeed
  FindLabel = "<CLR red='255'>ABC-ABC Loop and Multifeed</CLR>"
elseif [PHASINGCODE] = "7" and [FEEDERINFO] = "1" then 'ABC and A - bad
  FindLabel = "<CLR red='255'>ABC-A</CLR>"
elseif [PHASINGCODE] = "7" and [FEEDERINFO] = "2" then 'ABC and B - bad
  FindLabel = "<CLR red='255'>ABC-B</CLR>"
elseif [PHASINGCODE] = "7" and [FEEDERINFO] = "3" then 'ABC and AB - bad
  FindLabel = "<CLR red='255'>ABC-AB</CLR>"
elseif [PHASINGCODE] = "7" and [FEEDERINFO] = "4" then 'ABC and C - bad
  FindLabel = "<CLR red='255'>ABC-C</CLR>"
elseif [PHASINGCODE] = "7" and [FEEDERINFO] = "5" then 'ABC and AC - bad
  FindLabel = "<CLR red='255'>ABC-AC</CLR>"
elseif [PHASINGCODE] = "7" and [FEEDERINFO] = "6" then 'ABC and BC - bad
  FindLabel = "<CLR red='255'>ABC-BC</CLR>"

```



```

elseif [PHASINGCODE] = "1" and [FEEDERINFO] = "8" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>C-Deenergized</BOL></CLR>"
elseif [PHASINGCODE] = "2" and [FEEDERINFO] = "8" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>B-Deenergized</BOL></CLR>"
elseif [PHASINGCODE] = "3" and [FEEDERINFO] = "8" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>BC-Deenergized</BOL></CLR>"
elseif [PHASINGCODE] = "4" and [FEEDERINFO] = "8" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>A-Deenergized</BOL></CLR>"
elseif [PHASINGCODE] = "5" and [FEEDERINFO] = "8" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>AC-Deenergized</BOL></CLR>"
elseif [PHASINGCODE] = "6" and [FEEDERINFO] = "8" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>AB-Deenergized</BOL></CLR>"
elseif [PHASINGCODE] = "7" and [FEEDERINFO] = "8" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>ABC-Deenergized</BOL></CLR>"

elseif [PHASINGCODE] = "1" and [FEEDERINFO] = "0" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>C-Deenergized</BOL></CLR>"
elseif [PHASINGCODE] = "2" and [FEEDERINFO] = "0" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>B-Deenergized</BOL></CLR>"
elseif [PHASINGCODE] = "3" and [FEEDERINFO] = "0" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>BC-Deenergized</BOL></CLR>"
elseif [PHASINGCODE] = "4" and [FEEDERINFO] = "0" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>A-Deenergized</BOL></CLR>"
elseif [PHASINGCODE] = "5" and [FEEDERINFO] = "0" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>AC-Deenergized</BOL></CLR>"
elseif [PHASINGCODE] = "6" and [FEEDERINFO] = "0" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>AB-Deenergized</BOL></CLR>"
elseif [PHASINGCODE] = "7" and [FEEDERINFO] = "0" then 'Deenergized and
FeederID is null
    FindLabel = "<CLR red='255'><BOL>ABC-Deenergized</BOL></CLR>"

else 'all other cases
    FindLabel = "<CLR red='255'><BOL>Use FM Translator</BOL></CLR>"
end if
End Function

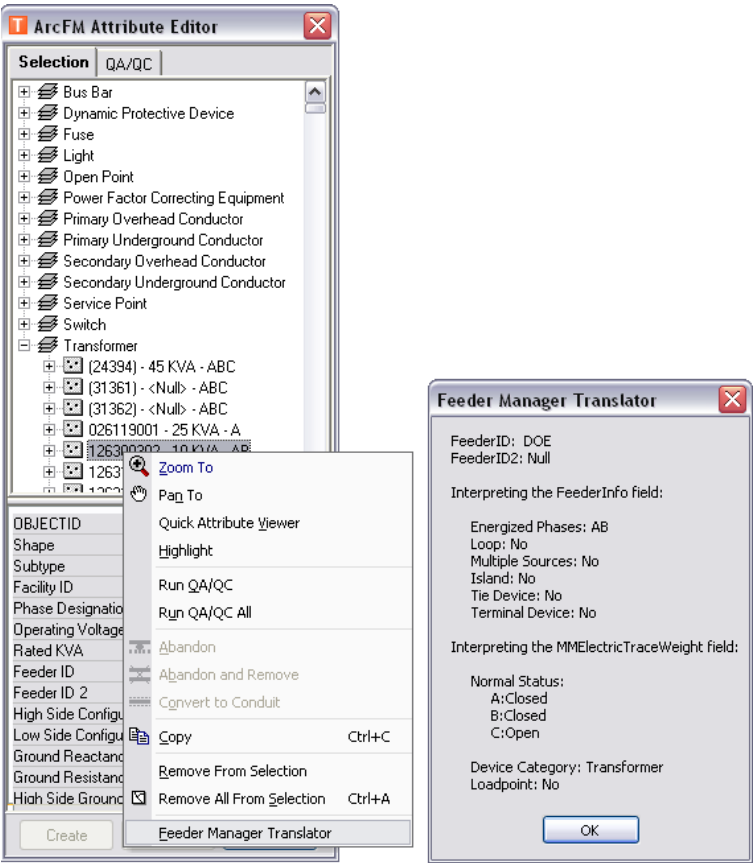
```

Note: Contact [Telvent Technical Support](#) to learn more about the FeederInfo bit gate values for your ArcFM release.

The latest Feeder Manager Phase Mismatch Label Text Expression can be found at <http://resources.arcfmsolution.com/>.

Feeder Manager Translator

The Feeder Manager Translator displays feeder information about the selected feature.



Feeder Manager Translator

Reviewer Execute SQL Check

Conductors identified by Feeder Manager as loops, phase errors, mismatches, and de-energized features based on the FeederInfo field can be recorded in the Reviewer Table for later inspection and correction by running the Execute SQL check. The check utilizes an SQL query to select features based on a combination of attribute values.

Example of Phase Mismatch

[PHASINGCODE] = "7" and [FEEDERINFO] = "3" then 'ABC and AB – bad

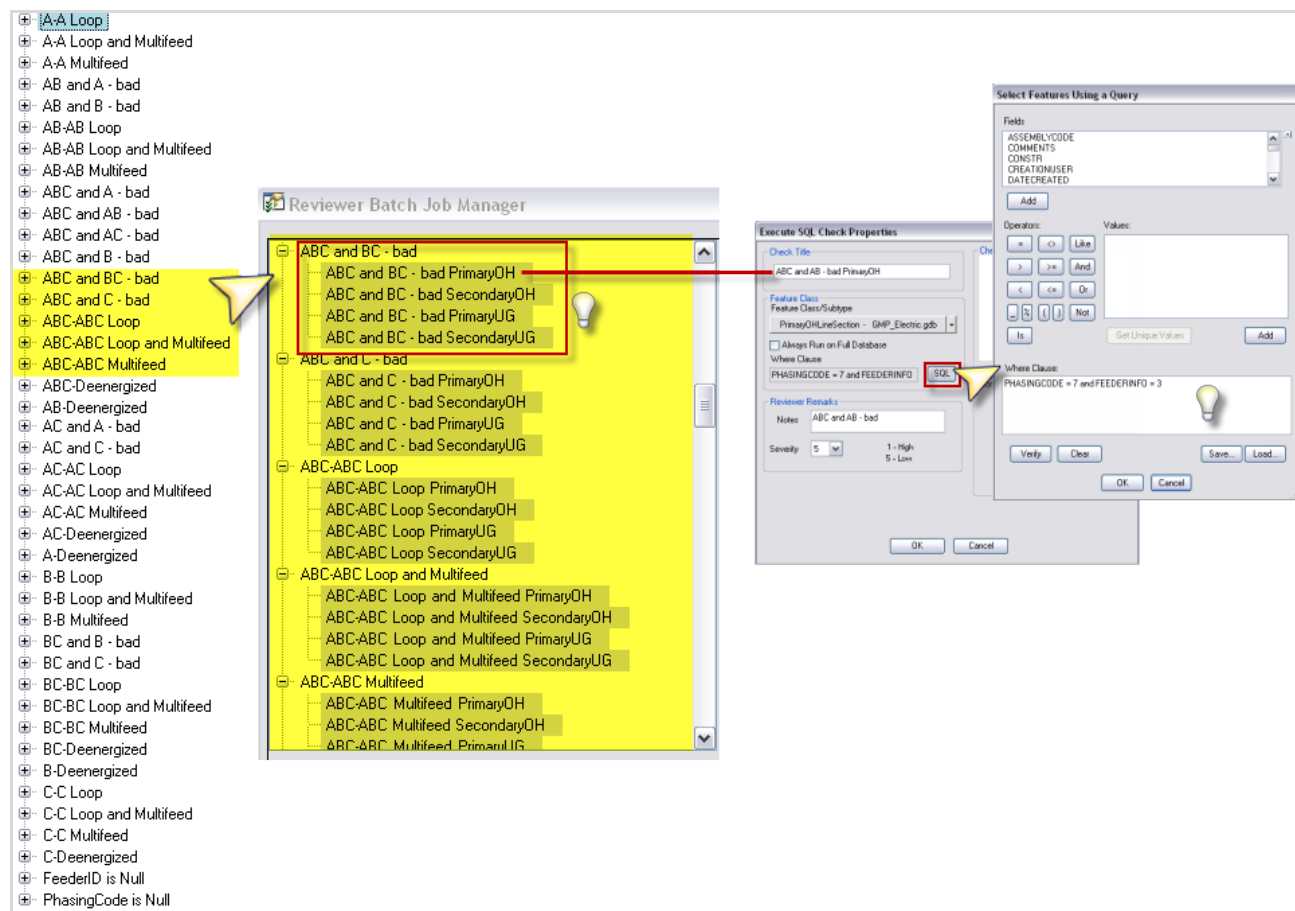
The expression is derived from the Feeder Manager Phase Mismatch Label Text Expression.

Feeder Manager Phase Mismatch Label Text Expression

The screenshot displays the Data Reviewer application interface. At the top, the 'Data Reviewer' window shows a 'Data Reviewer' dropdown and a 'Select Data Check' button. Below this, the 'Reviewer Batch Job Manager' window is open, showing a tree view of data checks. The 'Execute SQL Check Properties' dialog box is also open, showing the 'Check Title' as 'ABC and AB - bad PrimaryOH', the 'Feature Class/Subtype' as 'PrimaryOHLineSection - GMP_Electric.gdb', and the 'Where Clause' as 'PHASINGCODE = 7 and FEEDERINFO'. The 'Reviewer Remarks' section shows a note 'ABC and AB - bad' with a severity of 5. The 'Select Features Using a Query' dialog box is open, showing a list of fields including 'ASSEMBLYCODE', 'COMMENTS', 'CONSTN', 'CREATIONUSER', and 'DATECREATED'. The 'Where Clause' is set to 'PHASINGCODE = 7 and FEEDERINFO = 3'.

Reviewer Batch Job Manager—Execute SQL Check

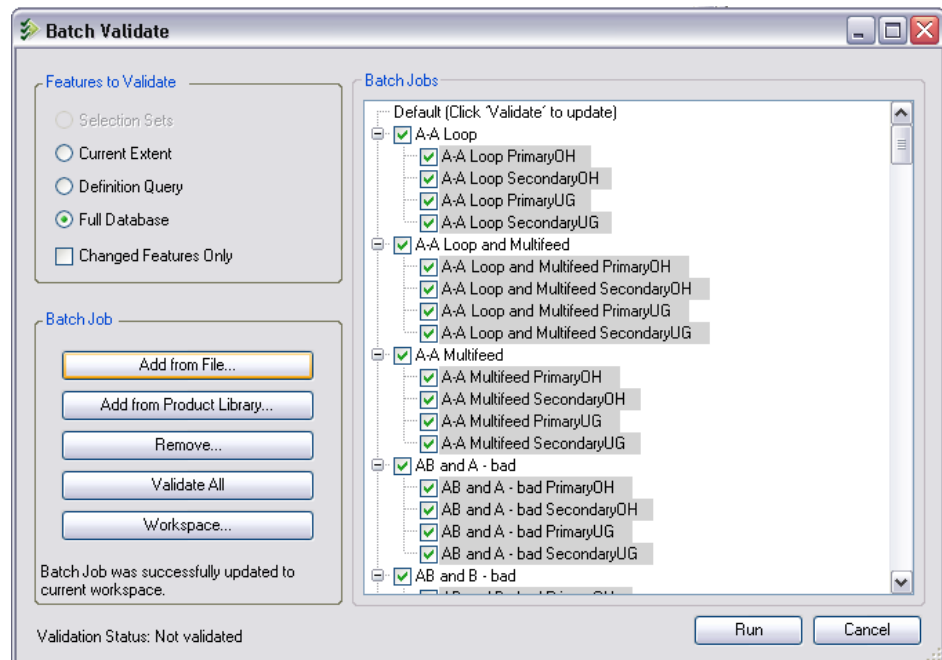
In the Reviewer Batch Job Manager dialog box, you can add checks to groups, edit checks, and remove them from groups. You can also duplicate checks without having to individually configure them each time and apply them to several different feature classes at once. The expressions from the Feeder Manager Phase Mismatch Label Text Expression can be added to a batch job and saved as a Reviewer Batch Job file (.rbj). The checks can be grouped by feature class or type of validation.



Reviewer Batch Job Manager

Reviewer Batch Validate

Once you have created batch jobs using Reviewer Batch Job Manager, you can use them to validate data in your database with the Reviewer Batch Validate tool. When you run a batch job, all the checks included in the batch job are run using the feature classes, subtypes, and selection sets you have specified. The records that correspond with the criteria for each check are then written to the Reviewer Table for correction or further inspection. All the validation checks can be applied to the current extent, definition query, or full database. If you are using an ArcSDE geodatabase, you can run the checks on features that have changed between current and previous versions.



Reviewer Batch Validate

Reviewer Toolbar

ArcGIS Data Reviewer offers many checks that can be selected from the drop-down list on the Reviewer toolbar. These checks allow you to perform geometric and attribute validation to ensure data integrity. All the validation checks can be applied to an entire feature class or database, features within the current extent, or a selected set of features. If you are using an ArcSDE geodatabase, you can run checks on features that have changed between current and previous versions. You can also use an SQL query WHERE clause to limit which features to evaluate for a particular check.

In deciding which checks to run on their data, it is customary for ArcGIS Data Reviewer users to have a data quality business rule; for instance, one of the rules may require service points to be created within the parcel polygon. The Geometry on Geometry check can be used to find any service point that falls outside the parcel feature class. There are also checks you can use to ensure that your data does not contain any invalid features. This includes features that do not have the correct number of vertices for their geometry type or have a null extent.



Reviewer Toolbar—Data Checks

Check Name	Check Description	Use Case Example
Domain	Validates coded value and range domains to ensure that all values meet domain constraints	These checks are useful when migrating GPS-collected data and data from another format, such as CAD, shapefile, or coverage, into the geodatabase.
Subtype	Searches for feature classes with improper or null (optional) subtypes	

Check Name	Check Description	Use Case Example
Connectivity Rules	Finds features that are part of a geometric network and that violate connectivity rules	Connectivity rules are an important aspect of a network. Identifying features that violate geometric network rules and resolving these violations will enhance data integrity. This helps functions such as trace that use the geometric network.
Relationships	Searches for records that are orphans or have improper cardinality in a relationship class	Knowing the exact number of switches and switch units is important. This check can find orphan switch units that do not have a relationship to a switch.
Duplicate Geometry	Finds features of the same geometry type that are colocated and optionally share attributes (Features can be either from two different feature classes or within the same feature class.)	This check can find locations where two or more junctions in a geometric network are on top of each other. Only one of those junctions can actually be connected to the network. These duplicate features can be identified and addressed to ensure proper connectivity of network features.
Geometry on Geometry	Finds features that have a specific spatial relationship, either from two different feature classes or within the same feature class; for example, finding transformers on top of switches	This check can find transformers that are connected to primary lines and compare the phase designation. If the phases do not match, it is reported as an error.
Valency	Validates relationships between point and line features or line features within the same feature class, from ensuring that a point has a specified number of lines connected to it to ensuring that specific patterns of features are met with valency	This check can validate relationships; for example, open point should be connected to two primary lines or a fuse must be connected to one primary line and one secondary line of matching phases.

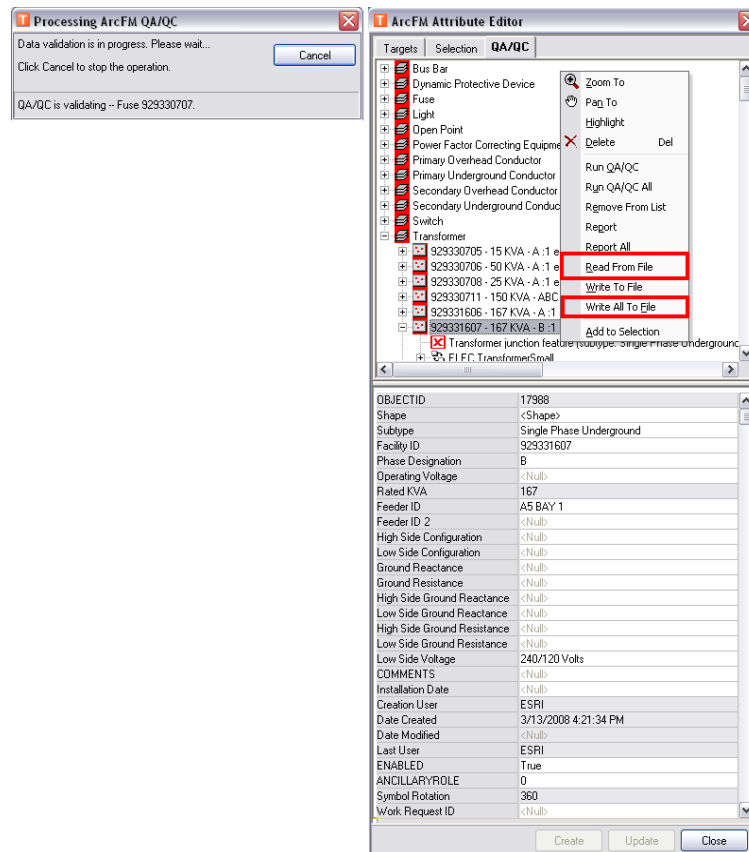
Table Showing Examples of Data Reviewer Checks Utilized by Electric and Gas Utilities

Reviewer Resource Center Helpful resources for this extension, such as tutorials, sample scripts, blogs, and forums, are available on the ArcGIS Resource Center at resources.arcgis.com/content/data-reviewer/10.0/about.

Reviewer Checks Poster To download a copy of the poster, go to esri.com/library/fliers/pdfs/arcgis-data-reviewer-checks.pdf.

ArcFM QA/QC Tool and the Commit to Reviewer Table Tool

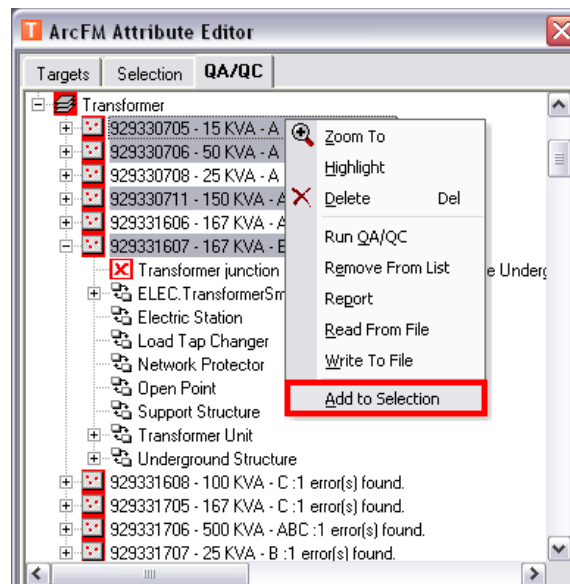
Use the ArcFM QA/QC tool to validate your data. Depending on the option settings, the results may display only the invalid items from the selection or the entire selection with the invalid items identified. You can import/export the results to a printable HTML or XML file.



ArcFM QA/QC Tool

You can also record the ArcFM QA/QC invalid features in the Reviewer Table for later inspection and correction. Follow these steps:

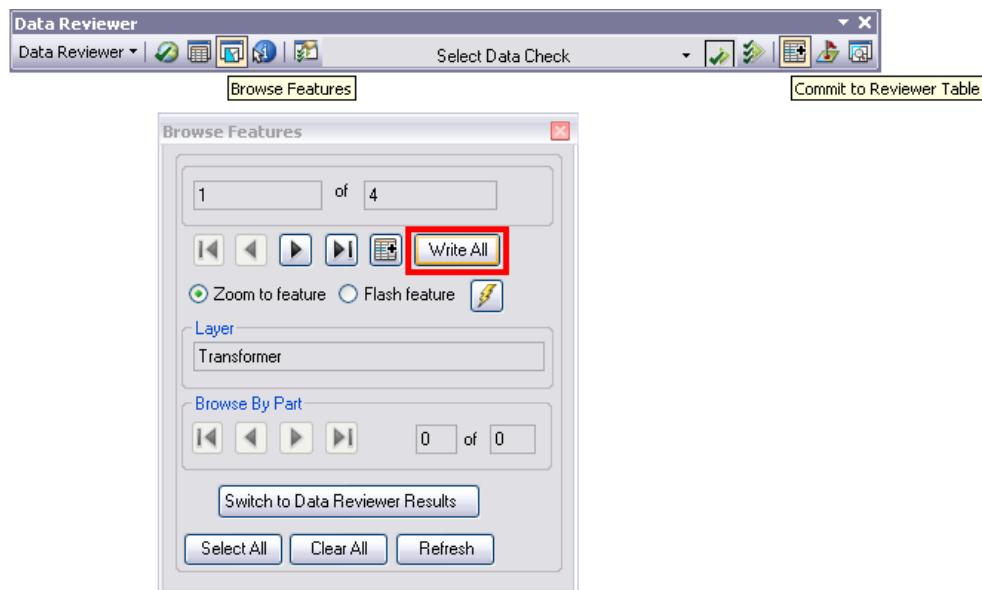
1. Click Clear Selected Features in ArcMap.
2. Select the items to be added to the selection set in ArcFM QA/QC.
You can select multiple items by pressing Ctrl and right-clicking.
3. Right-click and choose Add to Selection.



ArcFM QA/QC Tool—Add to Selection

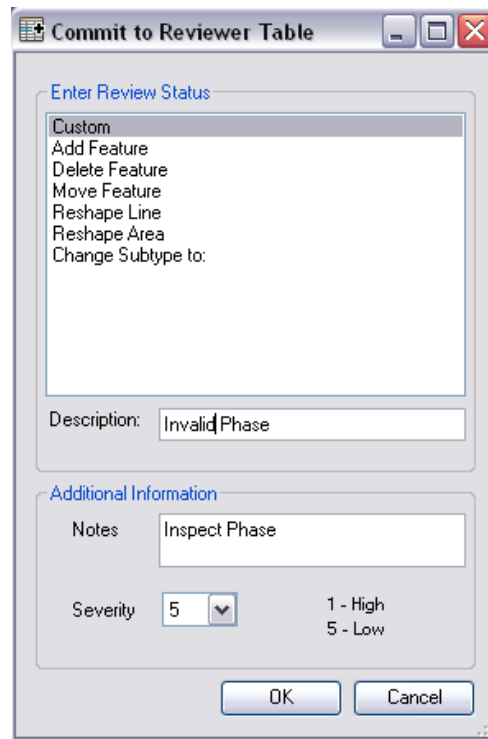
4. If you have only one feature or row selected, click the Commit to Reviewer Table tool in the Data Reviewer toolbar.

You can also write multiple selected features by clicking the Browse Features tool and clicking the Write All option.



Browse Features Tool and Dialog Box

The Commit to Reviewer Table dialog box appears.

The image shows a Windows-style dialog box titled "Commit to Reviewer Table". It has a standard title bar with minimize, maximize, and close buttons. The dialog is divided into two main sections. The top section, titled "Enter Review Status", contains a list box with the following items: "Custom", "Add Feature", "Delete Feature", "Move Feature", "Reshape Line", "Reshape Area", and "Change Subtype to:". Below the list box is a text field labeled "Description:" containing the text "Invalid Phase". The bottom section, titled "Additional Information", contains a text field labeled "Notes" with the text "Inspect Phase". Below the notes field is a "Severity" label followed by a drop-down menu showing the value "5". To the right of the drop-down menu is a legend: "1 - High" and "5 - Low". At the bottom of the dialog are two buttons: "OK" and "Cancel".

Commit to Reviewer Table Dialog Box

5. Choose a Reviewer status option in the Enter Review Status list.

Note: If you choose Add Feature, Delete Feature, Move Feature, Reshape Line, or Reshape Area, the value appears in the Description text box but remains uneditable. If you choose Custom or Change Subtype to, the Description text becomes editable.

Tip: The Review status information appears in the REVIEWSTATUS cell in the Reviewer Table.

6. If necessary, type a description for the Review status in the Description text box.
7. If necessary, type additional details about the feature in the Notes text box.
8. If necessary, click the Severity drop-down arrow and choose a value that indicates the priority of the feature that is being committed to the Reviewer Table.
9. Click OK.

The ArcFM QA/QC tool compares feature attribute values to existing validation and connectivity rules in the geodatabase to ensure that attribute values do not conflict with these rules. The results are displayed on the ArcFM Attribute Editor QA/QC tab.

Types of rules that the ArcFM QA/QC tool validates include the following:

- Coded domain values are the set of valid values that an attribute can have.
- Range domains are the range of numeric values that a value must fall between.

- Contingent attribute validity is a set of valid values that depends on the value of another attribute.
- Connectivity rules govern which network features can be connected.

Conclusion

ArcGIS Data Reviewer can be used to analyze data both visually and via automated checks. These checks can be used to validate many different aspects of a database including feature geometry, topology, relationship classes, and spatial relationships between geometries.

The checks can be grouped into Reviewer Batch Job (.rbj) files, which allow you to run several checks on your geodatabase at the same time.

Other analysis tasks include the following:

- Sampling—Generate a specified number or percentage of features in the geodatabase from selected feature classes for visual assessment. Use sampling when you have limited resources to do visual quality control.
- Obtaining a total feature count—View the total number of features in the geodatabase according to both feature class and subtype.

Visual analysis with ArcGIS Data Reviewer can be managed using the Reviewer Overview Window, which allows you to record and view which areas have been reviewed. Polygon grids can be created over the study area, with grid cell size determined either by a specified number of rows and columns or map units. Missing features can be drawn in the map using the Notepad tools or simply recorded using the Flag Missing Feature tool.

The Reviewer Table is a tool that stores all the validation problems that have been found using the checks and allows you to analyze the records further. The initial review status as well as correction and verification status are stored in the Reviewer Table.

Reviewer Table

General

FeederID: [20 items]

FeederID: 26H1 (4 items)

FeederID: 26H5 (3 items)

CHECKTITLE: ABC and BC - bad PrimaryOH (3 items)

RECORDID	OBJECTID	SUBTYPE	ORIGINTABLE	ORIGINCHECK	REVIEWTECHNICIAN	REVIEWDATE	NOTES	PARAMETERS	SEVERITY	REVIEWSTATUS
750	46604	Three Phase	PrimaryOHLineSe	Execute SQL	marc3932	Sunday, May 15,	ABC and BC -	[Connection1:	5	[PHASINGCODE
751	46606	Three Phase	PrimaryOHLineSe	Execute SQL	marc3932	Sunday, May 15,	ABC and BC -	[Connection1:	5	[PHASINGCODE
752	46608	Three Phase	PrimaryOHLineSe	Execute SQL	marc3932	Sunday, May 15,	ABC and BC -	[Connection1:	5	[PHASINGCODE

CHECKTITLE: ABC-ABC Loop PrimaryOH (1 item)

RECORDID	OBJECTID	SUBTYPE	ORIGINTABLE	ORIGINCHECK	REVIEWTECHNICIAN	REVIEWDATE	NOTES	PARAMETERS	SEVERITY	REVIEWSTATUS
762	34794	Three Phase	PrimaryOHLineSe	Execute SQL	marc3932	Sunday, May 15,	ABC-ABC Loop	[Connection1:	5	[PHASINGCODE

CHECKTITLE: ABC-ABC Loop SecondaryOH (5 items)

RECORDID	OBJECTID	SUBTYPE	ORIGINTABLE	ORIGINCHECK	REVIEWTECHNICIAN	REVIEWDATE	NOTES	PARAMETERS	SEVERITY	REVIEWSTATUS
777	37830	Three Phase	SecondaryOHLin	Execute SQL	marc3932	Sunday, May 15,	ABC-ABC Loop	[Connection1:	5	[PHASINGCODE
778	37831	Three Phase	SecondaryOHLin	Execute SQL	marc3932	Sunday, May 15,	ABC-ABC Loop	[Connection1:	5	[PHASINGCODE
779	37832	Three Phase	SecondaryOHLin	Execute SQL	marc3932	Sunday, May 15,	ABC-ABC Loop	[Connection1:	5	[PHASINGCODE
780	37833	Three Phase	SecondaryOHLin	Execute SQL	marc3932	Sunday, May 15,	ABC-ABC Loop	[Connection1:	5	[PHASINGCODE
781	37834	Three Phase	SecondaryOHLin	Execute SQL	marc3932	Sunday, May 15,	ABC-ABC Loop	[Connection1:	5	[PHASINGCODE

FeederID: 37G7 (3 items)

FeederID: 37H1 (2 items)

FeederID: 37J6 (6 items)

FeederID: 63G1 (5 items)

CHECKTITLE: B-B Loop PrimaryOH (2 items)

RECORDID	OBJECTID	SUBTYPE	ORIGINTABLE	ORIGINCHECK	REVIEWTECHNICIAN	REVIEWDATE	NOTES	PARAMETERS	SEVERITY	REVIEWSTATUS
924	34616	Single Phase	PrimaryOHLineSe	Execute SQL	marc3932	Sunday, May 15,	B-B Loop	[Connection1:	5	[PHASINGCODE
925	34617	Single Phase	PrimaryOHLineSe	Execute SQL	marc3932	Sunday, May 15,	B-B Loop	[Connection1:	5	[PHASINGCODE

CHECKTITLE: B-B Loop SecondaryOH (2 items)

RECORDID	OBJECTID	SUBTYPE	ORIGINTABLE	ORIGINCHECK	REVIEWTECHNICIAN	REVIEWDATE	NOTES	PARAMETERS	SEVERITY	REVIEWSTATUS
929	37426	Single Phase	SecondaryOHLin	Execute SQL	marc3932	Sunday, May 15,	B-B Loop	[Connection1:	5	[PHASINGCODE
932	37874	Single Phase	SecondaryOHLin	Execute SQL	marc3932	Sunday, May 15,	B-B Loop	[Connection1:	5	[PHASINGCODE

CHECKTITLE: BC and C - bad SecondaryOH (4 items)

RECORDID	OBJECTID	SUBTYPE	ORIGINTABLE	ORIGINCHECK	REVIEWTECHNICIAN	REVIEWDATE	NOTES	PARAMETERS	SEVERITY	REVIEWSTATUS
933	28143	SecondaryOHLin	SecondaryOHLin	Execute SQL	marc3932	Sunday, May 15,	BC and C - bad	[Connection1:	5	[PHASINGCODE
934	33350	SecondaryOHLin	SecondaryOHLin	Execute SQL	marc3932	Sunday, May 15,	BC and C - bad	[Connection1:	5	[PHASINGCODE
935	37017	SecondaryOHLin	SecondaryOHLin	Execute SQL	marc3932	Sunday, May 15,	BC and C - bad	[Connection1:	5	[PHASINGCODE
936	37019	SecondaryOHLin	SecondaryOHLin	Execute SQL	marc3932	Sunday, May 15,	BC and C - bad	[Connection1:	5	[PHASINGCODE

CHECKTITLE: C-C Loop PrimaryOH (1 item)

RECORDID	OBJECTID	SUBTYPE	ORIGINTABLE	ORIGINCHECK	REVIEWTECHNICIAN	REVIEWDATE	NOTES	PARAMETERS	SEVERITY	REVIEWSTATUS
984	34958	Single Phase	PrimaryOHLineSe	Execute SQL	marc3932	Sunday, May 15,	C-C Loop	[Connection1:	5	[PHASINGCODE

CHECKTITLE: C-C Loop SecondaryOH (1 item)

RECORDID	OBJECTID	SUBTYPE	ORIGINTABLE	ORIGINCHECK	REVIEWTECHNICIAN	REVIEWDATE	NOTES	PARAMETERS	SEVERITY	REVIEWSTATUS
988	37020	Single Phase	SecondaryOHLin	Execute SQL	marc3932	Sunday, May 15,	C-C Loop	[Connection1:	5	[PHASINGCODE

Notepad

3 Show: ☒ All ☐ Selected Options

Reviewer Table (sort and group records)

Using tools in the Reviewer Table, you can

- Select and/or zoom to Reviewer Table records and associated feature geometries.
- Enter correction and verification information for one or many Reviewer Table records.
- Symbolize the records according to their review, correction, and verification status.
- Sort and group records using any of the fields.
- Set table properties.
- Associate a polygon grid with the Reviewer Table.
- Generate statistics on records in the Reviewer Table.

- Repeat existing table records.
- View the locations of missing features.

For more information on ArcGIS Data Reviewer, visit esri.com/datareviewer or e-mail datareviewer@esri.com.

Acknowledgments

The author would like to thank Telvent Miner & Miner for its collaboration in this paper.



About Esri

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