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The contents are provisional and will be  
superseded by a paper in the  
DMT'10 Proceedings.

See also earlier Proceedings (1997-2009)  
<http://ngmdb.usgs.gov/info/dmt/>



# Integrating Style Files and Carto Representation into the Geological Map Flow Process (The GSC's implementation of the FGDC geologic symbology)

This poster presents the process of creating FGDC and GSC symbols for a style file and carto representation. Additionally, a master Excel spreadsheet is used to generate domains for feature coding and symbolizing geologic features, and to maintain harmony between the FGDC style item codes and carto representation rule IDs. The procedures below are in sequence and show as an example how fold feature symbols are managed. These procedures are integrated in the Geological Map Flow project to assist cartographers in map production.

## 1. SYMBOL REFERENCE AND REQUISITION

The Symbol Creation Form is a multi-page document where users define a new symbol. It includes sections for 'SYMBOL CREATION FORM' and 'FEATURE ATTRIBUTES'. The Feature Attributes table lists various geologic features with their descriptions, style numbers, and requirements.

REF ID	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
S1.1	Anticline (1st option)/Identify and existence certain, location accurate	[Symbol]	1.4 mm	Place fold base where anticline intersects the ground surface. Place arrows at places along fold base to indicate direction of dip. At all points, fold base must be perpendicular to strike of fold.
S1.2	Anticline (1st option)/Identify and existence certain, location approximate	[Symbol]	1.4 mm	Arrows may be added to show direction of dip. (Option) Symbols may be used to indicate location of fold base or other features.

The FGDC Digital Cartographic Standard for Geologic Map Symbolization is used as the base point for the standard style file and carto representations that will be used in the Geological Map Flow process. The entire library of symbology has been created except for those that limitations in the ArcGIS software would not allow. Some of the map elements such as state location maps, bar scales, declination arrows, etc. were not around. The Geological Map Flow project has other means to create these map surmounted elements.

## 2. FONT CREATION

The font creation process involves drawing a symbol in CorelDraw. A 420 mm bounding box is used to define the symbol's dimensions. The 'True Type Export' dialog is shown, indicating the font name and character set.

Each point symbol or line decoration is drawn to scale in CorelDraw. A template has been set up with a 420 mm bounding box which has been determined to be the optimal dimension, comparable to specifying the size of the symbol in an ArcGIS style file. After the symbol is drawn to scale, it must be a single object and all lines must be converted to outlines. Once this is achieved, the symbol is centered on the template and scaled to 420 mm in its largest dimension with "keep aspect ratio" turned on. It is then exported to a True-type font under the next available character number (available numbers are 33 to 126 and 161 to 255, others are system reserved).

## 3. CREATE STYLE ITEM AND CHECK SYMBOL

The process involves creating a style item in ArcMap. The 'Style Manager' is used to create a new style item, and the 'Check Symbol' tool is used to verify the symbol's appearance and alignment.

Once the True-type font has been updated, the complete symbol is created using the Style Manager. Each layer of the symbol is built to specifications given (mark/gap line pattern, size of marker, colour, etc.). The new symbol is categorized according to which FGDC category it best fits and given a style item number that matches the FGDC standard. The newly created symbol is then brought into an ArcGIS .mxd and checked for sizing, orientation and point of origin. Sizes may have to be adjusted to achieve specified dimensions and offset values may have to be applied to point symbols so the point of origin lands in the correct location.

## 4. GENERATE CARTO REPRESENTATION

The 'Carto Rep Tables.xls' spreadsheet maps FGDC style numbers to Carto Representation (CARTO) rule IDs. The 'Layer Properties' dialog shows the 'Symbology' tab where the 'Match to Style' option is selected for a specific feature class.

All symbols in the style file are imported/converted into carto representation rules and stored in a master geodatabase template under the appropriate representation which corresponds to the feature class in the geodatabase. Each representation rule is checked to ensure that sizing and spacing accuracy was maintained after the conversion. A master Excel spreadsheet exists to aid in maintaining the sequence of carto representation RuleIDs. It contains a worksheet for each feature class that has the FGDC reference number and description, the style file number for "match to style" and the assigned RuleID. These fields are critical in the following steps where domains are created and a consistent relationship exist between style number and the RuleID.

## 5. CONVERT TABLE TO DOMAIN

The 'Table to Domain' tool is used to convert the data from the 'Carto Rep Tables.xls' into a domain for use in the geodatabase. The tool settings show the input table and the output domain name.

The fields STYLE\_NO and STYLE\_DESC\_EN in each Excel worksheet are used to create a coded value domain for each feature class in the project geodatabase. This procedure is required to be applied to each feature class in the geodatabase. In the future, a geoprocessing tool could be created to automate this process.

## 7. COPY CARTO REPS

The 'Copy Carto Reps' tool is used to copy the carto representation rules from the master geodatabase to the project geodatabase. The tool settings show the source and target geodatabases.

Using the Capture Representation Tool (by Ryan Clark, Arizona Geological Survey), copy the carto representation rules from the master geodatabase template for each feature class in the project geodatabase. Browse to the desired feature class in the master geodatabase and supply a name for the new representation class. This tool ensures that the RuleID number sequence is maintained as listed in each Excel worksheet.

## 6. ASSIGN DOMAIN

The 'Assign Domain' process involves assigning the domain to the SYMBOL field in the feature class. The 'Database Properties' dialog is used to define the domain values and their corresponding descriptions.

Each of the domains are then assigned to the SYMBOL field in each of the corresponding feature classes. The SYMBOL field is then used to "Match to Style".

## 8. JOIN TABLE

The 'Join Data' tool is used to join the domain table to the feature class. The tool settings show the source and target tables and the join field.

In ArcMap, join each individual Excel worksheet to the layer's attribute table in order to calculate the RuleID field. The join is based on the SYMBOL value in the layer and the STYLE\_NO in each Excel worksheet (many to one).

## 9. FEATURE CODING

The feature coding process involves using the 'Field Calculator' to calculate the RuleID field based on the domain values. The 'Attributes' table shows the resulting RuleID values for each feature.

An FGDC symbol from the domain description (eg. 5.1.2) Anticline (1st option) - Identify or existence questionable, location accurate) is assigned to the SYMBOL field. The coded value domain (eg. 05.01.02) is actually used in the "Match to Style". This provides a simple method for geologists to symbolize features during map compilation as well as providing some standardization.

With the Excel worksheet joined to the layer attributes, the RuleID can be calculated to equal the value of the RULE\_ID field in the joined Excel worksheet. This will ensure that the carto representation rule ID matches the FGDC symbol stored in the SYMBOL field.