

## Creating USNG Polygons

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## **PROBLEM:**

The USNG is a UTM-based coordinate system. It is the current FEMA and FGDC standard coordinate system for use in emergency/disaster operations. Standard topographic maps such as those provided by the USGS and printed at the 1:24,000 map scale provide UTM grid overlays. The military bases many of their map products on the MGRS coordinate system and often prints them at the 1:24,000 map scale. Both are done because most every base-plate mounted compass provides a 1:24,000 map protractor. Thus emergency/disaster users may easily read off position in USNG coordinates without having to understand the complexities of degrees, minutes, and seconds. The fundamental problem is that GIT software is fairly clunky when forced to create USNG/UTM/MGRS layers – especially so when dealing with polygon features and not simple overlay graphics.

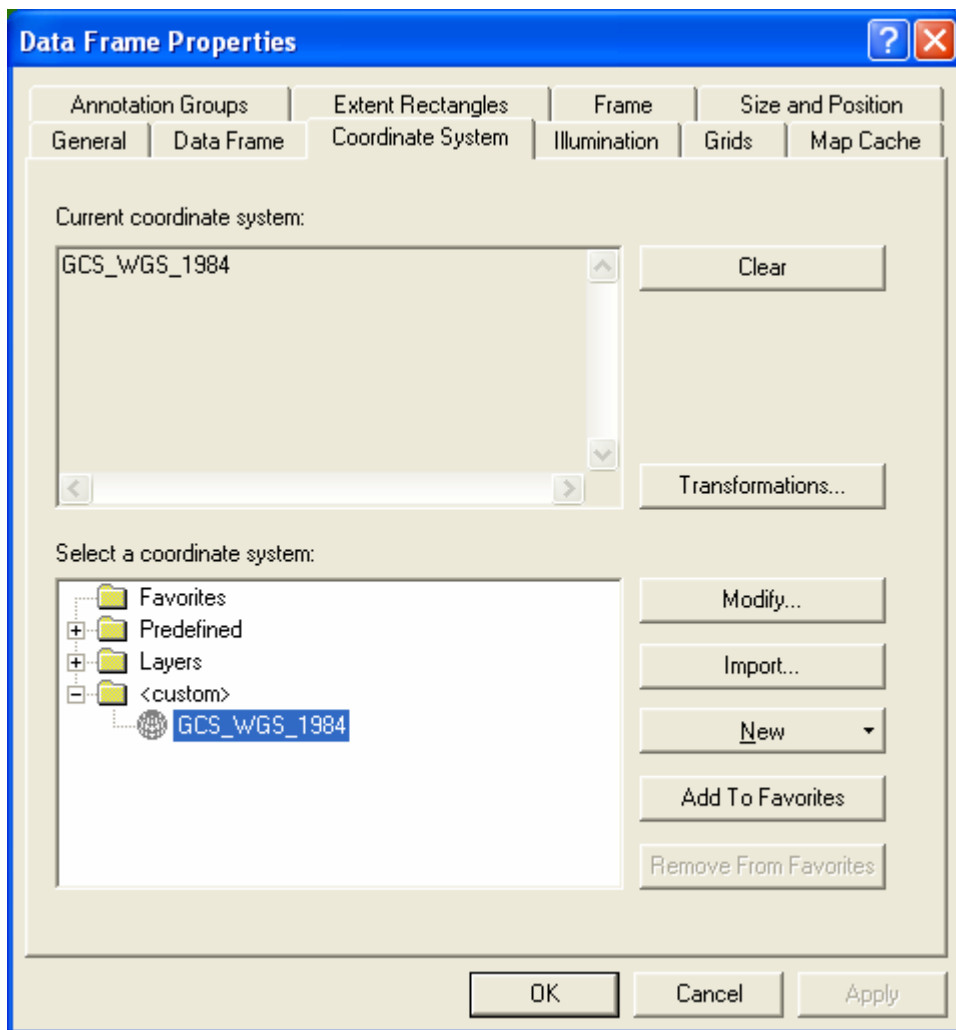
Here's why polygons are important:

1. They form the basis of search grids. If local search and rescue teams are able to implement USNG-based polygons in the form of grid maps, then the coordinate system they are using plugs directly into a common operational framework. The coordinates they use will be the same as the military etc...
2. They are required for building map books. Map books are important – if you've ever done search and rescue, you know the hassles associated with carting around a large format print and trying to keep it dry and from being tattered. If we, as GIT professionals, are able to furnish maps at a 1:24,000 scale in a portable format (like 8 ½ x 11 or smaller), then we're doing something useful. Unfortunately, most software packages require some sort of a polygon layer to define the extent of each map page in a map book.
3. USNG-based polygons create the basis for management/accountability areas for disaster/emergency managers. Emergency managers must maintain spatial accountability for teams in the field at all times. As search teams and such are mobile, if managers are able to constrain and manage team movement within a polygon, accountability increases and their risk decreases. As an added benefit, one can also change the symbology in polygons to indicate which have been searched, where teams are active and so on.

Not as clearly stated as I'd like – please help me edit this for the version that goes to press....

**HOW TO (in just 8 easy steps!!! lol, chuckle, guffaw... take a deep breath – you should only have to do this process once and I know this bit needs a lot of work...):**

1. Load your map data into a data frame set to use WGS 84 as the coordinate system (this is important!!!!). Note – we're using WGS 84 as the baseline coordinate system in ArcGIS because that's what most national or GPS-based data sets will use. **Note to Tom Terry** – this solves the USCG 5x5 minute air hassle as a user can now easily reference back and forth – their cursor will read in dms while the USNG toolbar scrolls in USNG with a visible grid overlay.

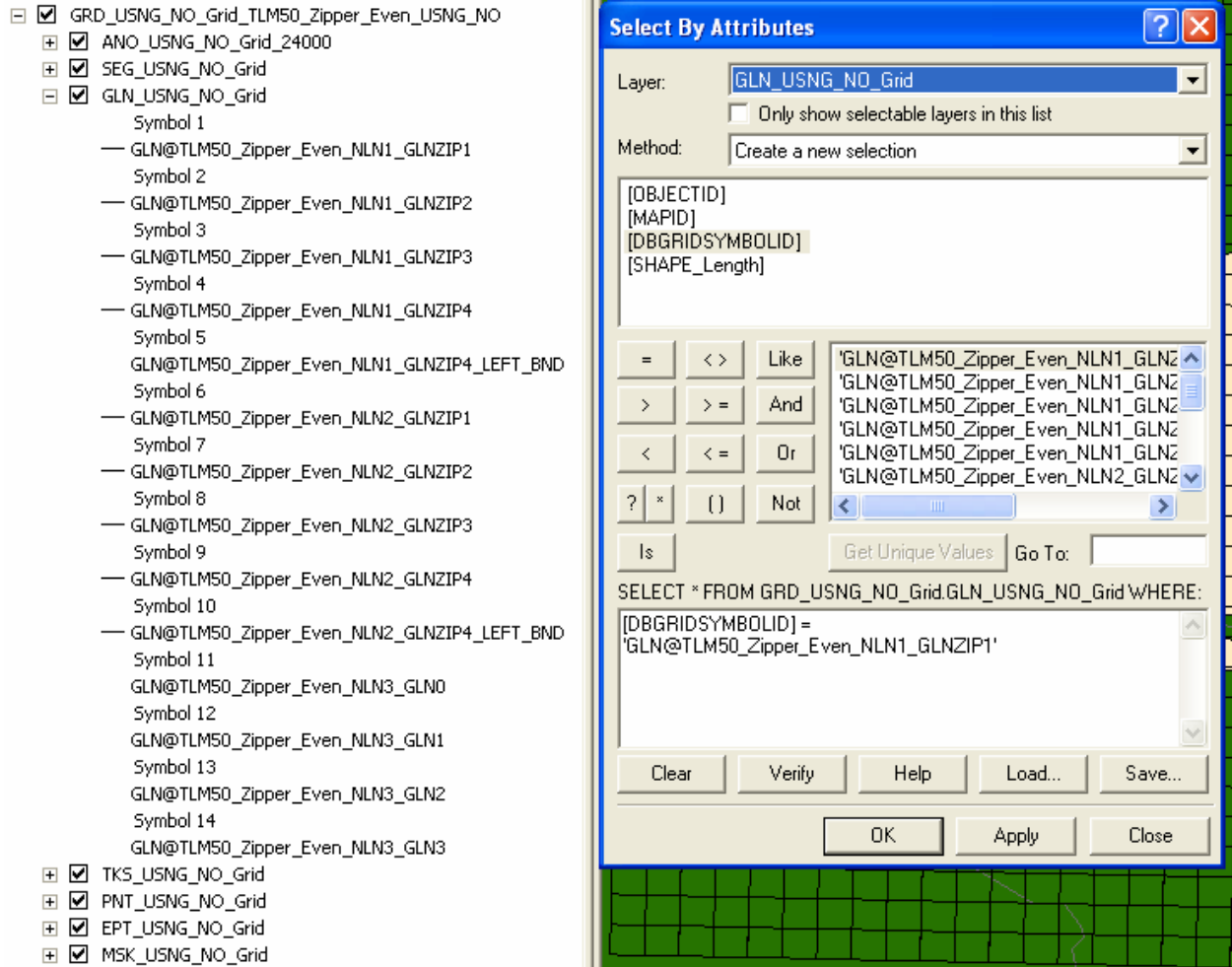


2. Create a gridded overlay with 1,000 x 1,000 meter boxes using the “Grid Creation Wizard” in the Grid Manager toolbar from ESRI’s MPS-Atlas, USNG toolset, Military Analyst, or anything else they’ve bundled it into by using the grid zone junction xml script (ask me an I’ll send it if you don’t have it).



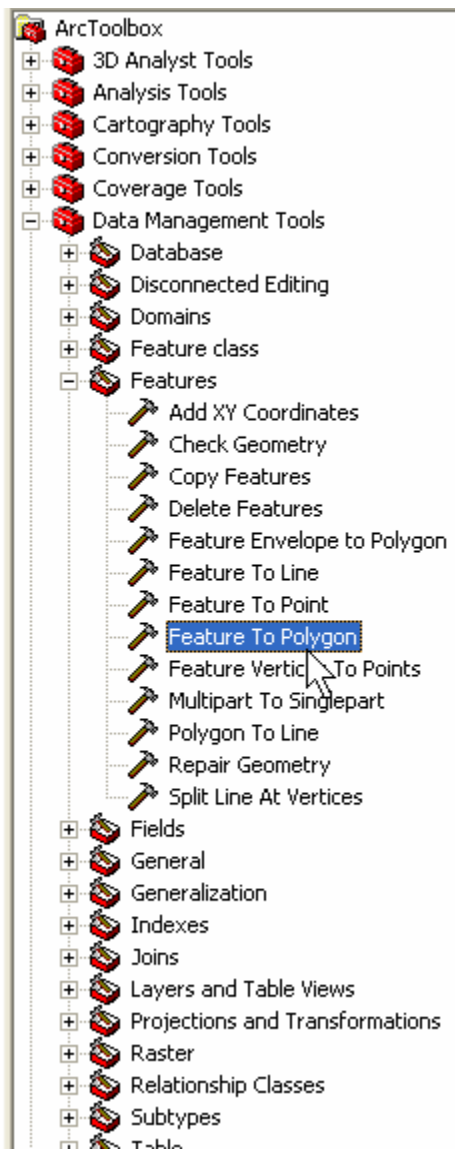
3. The output from above will create a line feature class. Expand the map grid layer grouping so that the features in *GLN\_yourgridname* are visible. You’ll note that the lines have been symbolized based on a classification. Some of the lines will contain symbology, others will not (you’ll notice that there is no symbol next to some of the

classes in the table of contents – these lines are masked – turn them on if you want to see what’s happening here under the hood). We want to select those lines which have symbology. When you have the correct lines selected (use select by attributes on the DBGRIDSYMBOLID field), you should see nice, neat 1,000 x 1,000-m boxes.

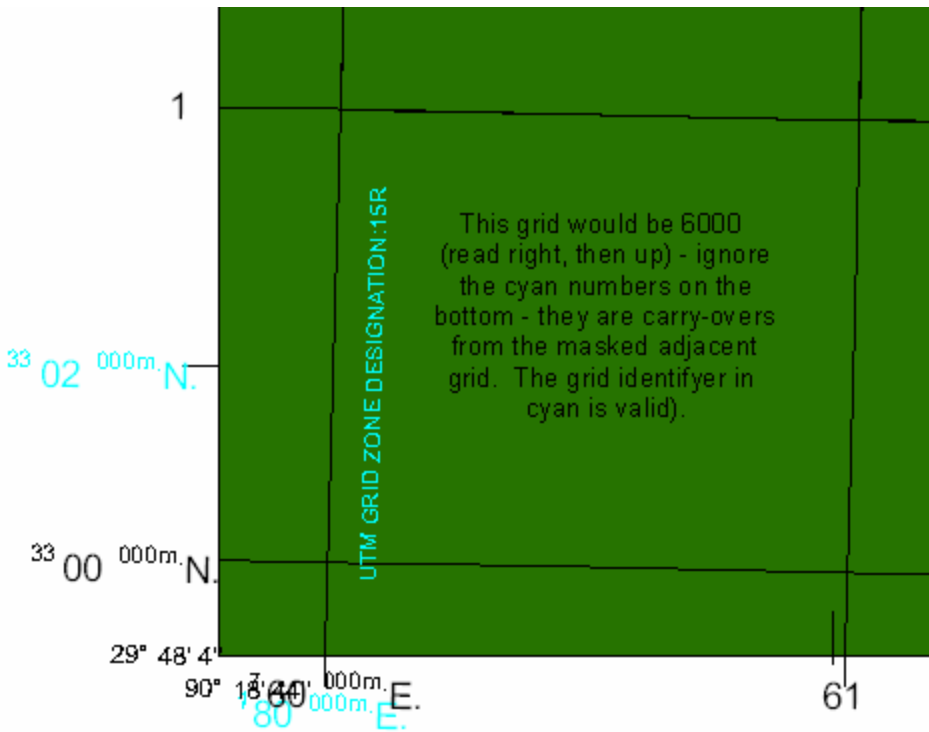


*Table of contents with the “Select by Attributes” dialogue open next to it. Not that some classes are not symbolized – these are masked and we don’t want them in the selection process!*

4. Create a new layer based upon the selected features.
5. Export this layer as a shapefile or feature class.
6. Open ArcToolbox and run the Features to Polygon tool found in the Data Management\Features toolbox. This will convert your line feature class/shapefile to a polygon feature class/shapefile.



7. You now need to attribute each grid with the correct 4-digit identifier (you may want to do the USNG prefixes as well – you can use the strategy described here to do this later and then use an expression to label your features). USNG grids are labeled based on the grid lines at the lower left corner of the grid square. Load your polygon layer AND your grid line feature group back into an ArcMap session. Switch to layout view and zoom to the lower left corner. Making sure that all components of your grid line feature group are turned on (there's an annotation layer buried in there), identify the easting and northing of the lower left hand grid square.



8. Create 2 new STRING attributes – one for northings and one for eastings – for your polygon USNG grid feature class/shapefile. **REMEMBER to preface all single digit numbers with a “0” – you will need to input your values inside quotation marks – eg, “08” AND NOT 8.** Set your selectable layers such that you can only select from your polygon layer. Select one complete horizontal row of grid polygons. Open the attribute table, right click on the “northing” column and use the “Calculate values” function to populate the selection. Repeat this process for all rows and then start the process over again for columns. You’re done and can now use the label expression function to print neat little labels on your grid squares (and convert them to annotation if you so desire) OR, I would recommend creating a new attribute called USNG4ID and using the calculate values function in the attribute table to merge the easting and northing columns so that you can use this field as a map page ID later....

