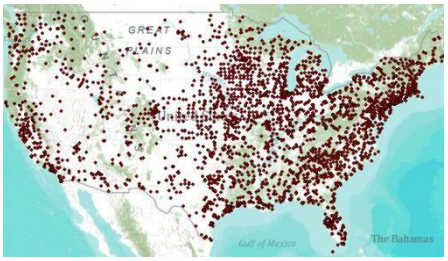


Displaying Latitude & Longitude Data (XY Data) in ArcGIS

Created by Barbara Parmenter and, revised for 10.7.1 by Nick Pittman on 7/31/2019

If you have a table of data that has **longitude and latitude**, or **XY coordinates**, you can view these data as points on a map in ArcMap. Examples might be school locations, data from a GPS receiver, or a table of violent conflicts.

For detailed instructions about adding tabular XY data to ArcMap 10.6.1, see the ArcGIS Desktop Help for Adding XY Coordinate Data as a Layer

There are two basic ways of displaying XY data from a table:

- In ArcMap, click on **File → Add Data → Add XY Data**
- In ArcMap, **add your table** to the table of contents (e.g., an Excel worksheet as shown below), and then *right click* on that data layer and choose **Display XY Data.**

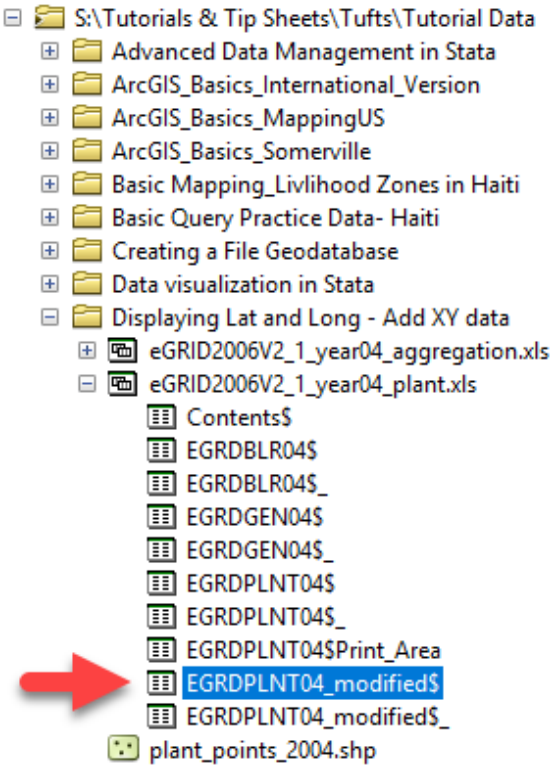
Adding the table first is useful because it allows us to examine the table to make sure it is being read and displayed properly in ArcMap before attempting to map the data.

We are going to use a dataset that is available in the S: drive as well as on our website, where it can be downloaded as a zip file. Follow the steps in the graphics below to add points for all electricity plants in the US based on an Excel file from the EPA called eGRID.

1. To add data, navigate to **S:\Tutorials & Tip Sheets\Tufts\Tutorial Data\ Displaying Lat and Long - Add XY data**.

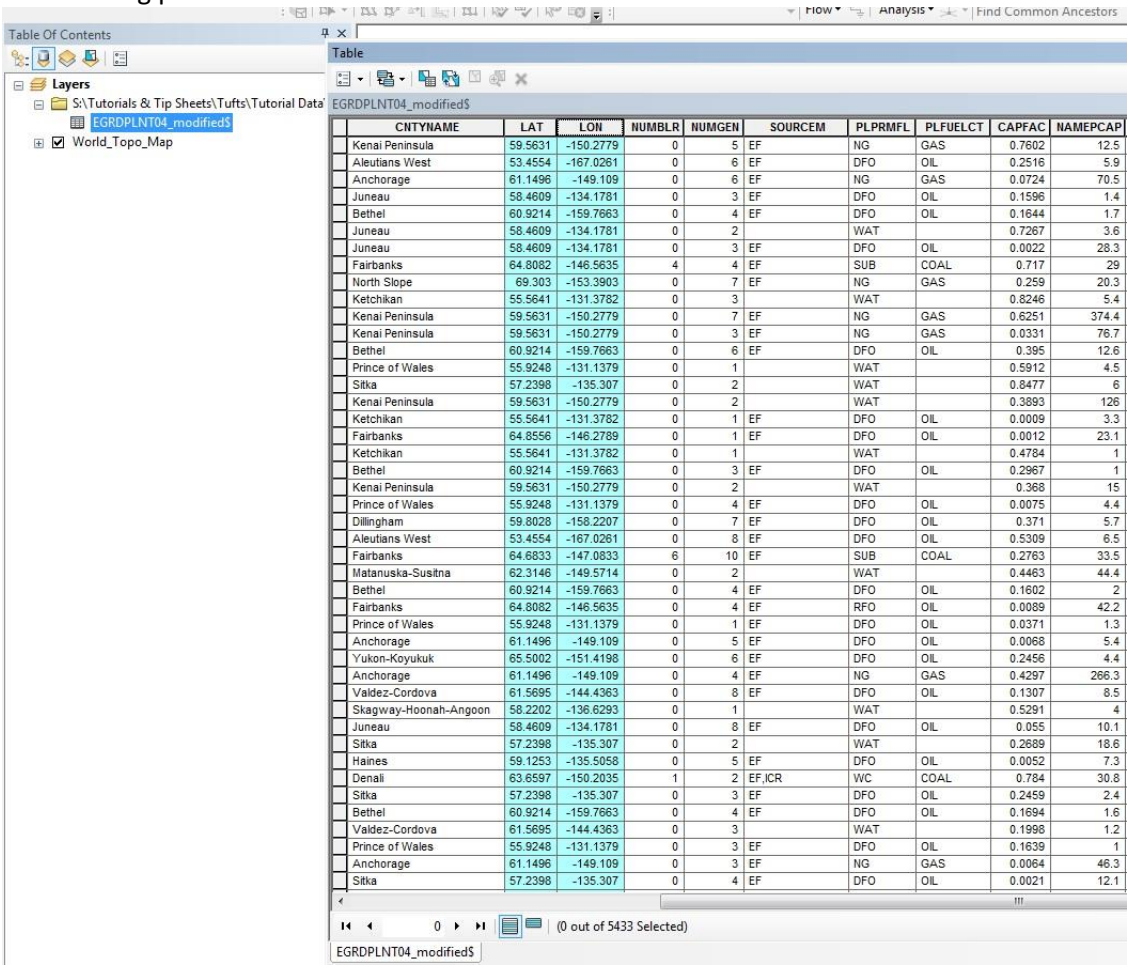
2. Expand eGrid2006V2_1_year04_plant.xls

3. Pull in **EGRDPLNT04_modified$** into your ArcMap session.



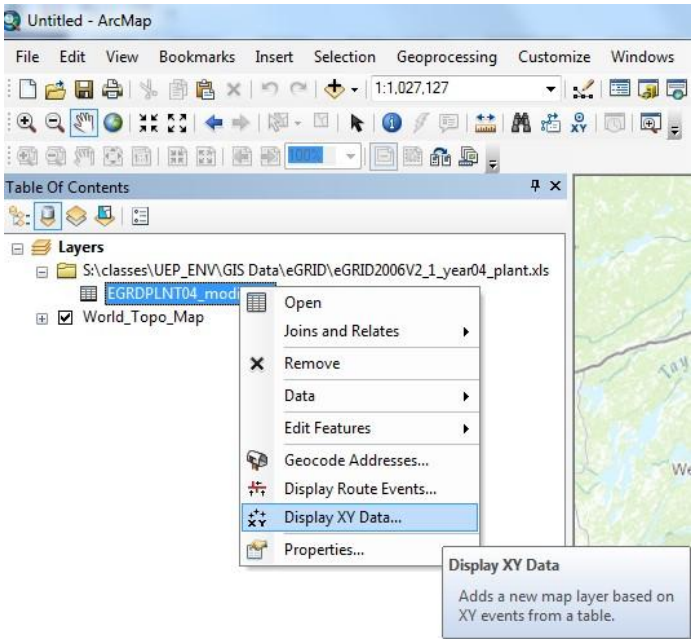
4. Finally, we will add a Basemap by clicking File → Add Data → Add Basemap → Topographic.

5. Check that the table loaded properly by opening it (*Right-click* → Open). Note the field names where the coordinate numbers are stored. (You will need to scroll right on the table.) It is important to remember that **Lat = Y Coordinate** and **Long = X Coordinate.** These are commonly switched, and if, so will make the data show up in the wrong place.



CNTYNAME	LAT	LON	NUMBLR	NUMGEN	SOURCEM	PLPRMFL	PLFUELCT	CAPFAC	NAMEPCAP
Kenai Peninsula	59.5631	-150.2779	0	5	EF	NG	GAS	0.7602	12.5
Aleutians West	53.4554	-167.0261	0	6	EF	DFO	OIL	0.2516	5.9
Anchorage	61.1496	-149.109	0	6	EF	NG	GAS	0.0724	70.5
Juneau	58.4609	-134.1781	0	3	EF	DFO	OIL	0.1596	1.4
Bethel	60.9214	-159.7663	0	4	EF	DFO	OIL	0.1644	1.7
Juneau	58.4609	-134.1781	0	2		WAT		0.7267	3.6
Juneau	58.4609	-134.1781	0	3	EF	DFO	OIL	0.0022	28.3
Fairbanks	64.8082	-146.5635	4	4	EF	SUB	COAL	0.717	29
North Slope	69.303	-153.3903	0	7	EF	NG	GAS	0.259	20.3
Ketchikan	55.5641	-131.3782	0	3		WAT		0.8246	5.4
Kenai Peninsula	59.5631	-150.2779	0	7	EF	NG	GAS	0.6251	374.4
Kenai Peninsula	59.5631	-150.2779	0	3	EF	NG	GAS	0.0331	76.7
Bethel	60.9214	-159.7663	0	6	EF	DFO	OIL	0.395	12.6
Prince of Wales	55.9248	-131.1379	0	1		WAT		0.5912	4.5
Sitka	57.2398	-135.307	0	2		WAT		0.8477	6
Kenai Peninsula	59.5631	-150.2779	0	2		WAT		0.3893	126
Ketchikan	55.5641	-131.3782	0	1	EF	DFO	OIL	0.0009	3.3
Fairbanks	64.8556	-146.2789	0	1	EF	DFO	OIL	0.0012	23.1
Ketchikan	55.5641	-131.3782	0	1		WAT		0.4784	1
Bethel	60.9214	-159.7663	0	3	EF	DFO	OIL	0.2967	1
Kenai Peninsula	59.5631	-150.2779	0	2		WAT		0.368	15
Prince of Wales	55.9248	-131.1379	0	4	EF	DFO	OIL	0.0075	4.4
Dillingham	59.8028	-158.2207	0	7	EF	DFO	OIL	0.371	5.7
Aleutians West	53.4554	-167.0261	0	8	EF	DFO	OIL	0.5309	6.5
Fairbanks	64.6833	-147.0833	6	10	EF	SUB	COAL	0.2763	33.5
Matanuska-Susitna	62.3146	-149.5714	0	2		WAT		0.4463	44.4
Bethel	60.9214	-159.7663	0	4	EF	DFO	OIL	0.1602	2
Fairbanks	64.8082	-146.5635	0	4	EF	RFO	OIL	0.0089	42.2
Prince of Wales	55.9248	-131.1379	0	1	EF	DFO	OIL	0.0371	1.3
Anchorage	61.1496	-149.109	0	5	EF	DFO	OIL	0.0068	5.4
Yukon-Koyukuk	65.5002	-151.4198	0	6	EF	DFO	OIL	0.2456	4.4
Anchorage	61.1496	-149.109	0	4	EF	NG	GAS	0.4297	266.3
Valdez-Cordova	61.5695	-144.4363	0	8	EF	DFO	OIL	0.1307	8.5
Skagway-Hoonah-Angoon	58.2202	-136.6293	0	1		WAT		0.5291	4
Juneau	58.4609	-134.1781	0	8	EF	DFO	OIL	0.055	10.1
Sitka	57.2398	-135.307	0	2		WAT		0.2689	18.6
Haines	59.1253	-135.5058	0	5	EF	DFO	OIL	0.0052	7.3
Denali	63.6597	-150.2035	1	2	EF,ICR	WC	COAL	0.784	30.8
Sitka	57.2398	-135.307	0	3	EF	DFO	OIL	0.2459	2.4
Bethel	60.9214	-159.7663	0	4	EF	DFO	OIL	0.1694	1.6
Valdez-Cordova	61.5695	-144.4363	0	3		WAT		0.1998	1.2
Prince of Wales	55.9248	-131.1379	0	3	EF	DFO	OIL	0.1639	1
Anchorage	61.1496	-149.109	0	3	EF	NG	GAS	0.0064	46.3
Sitka	57.2398	-135.307	0	4	EF	DFO	OIL	0.0021	12.1

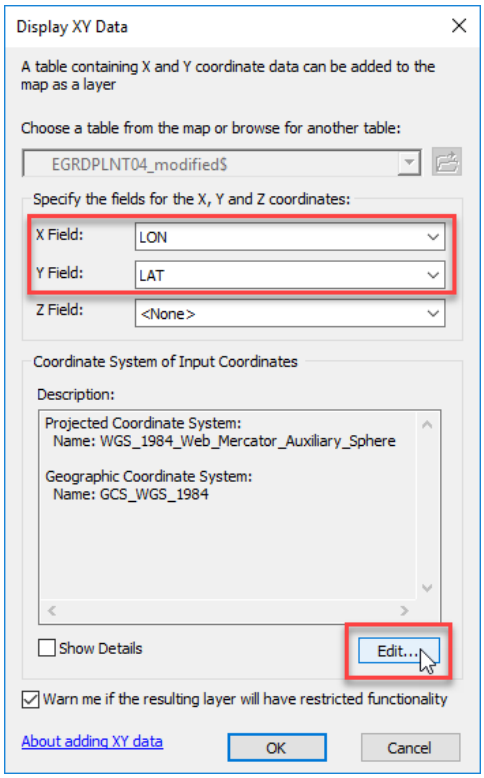
6. *Right-click* on the table in ArcMap again (after closing out current table) and choose **Display XY Data.**



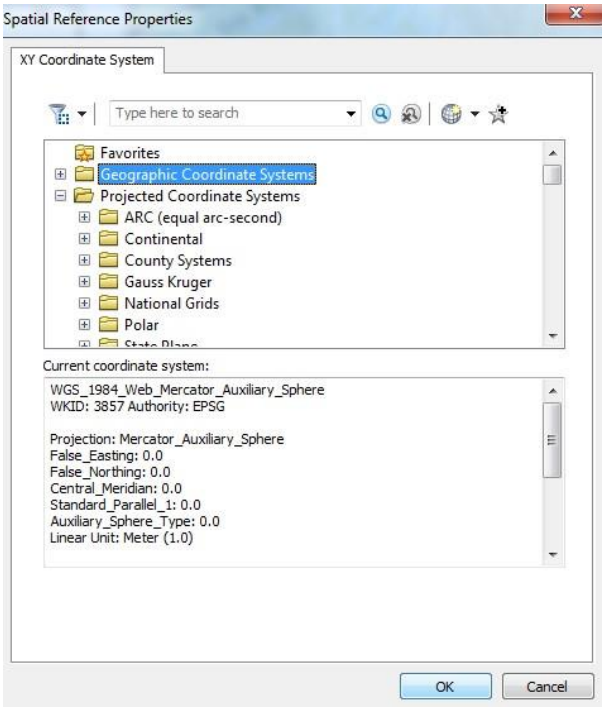
7. Follow the steps in the graphic– **do NOT leave out the part about editing the coordinate system and changing it to GCS WGS1984!** This is another common mistake.

    a. Make sure the X field is set to **LON** and the Y field is set to **LAT**.

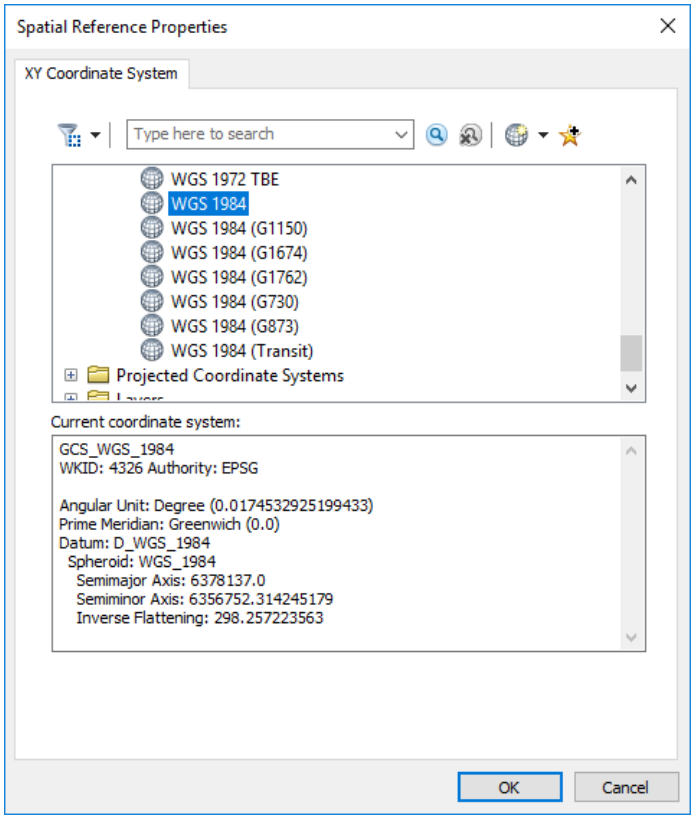
    b. Press **Edit** to change the coordinate system. Currently, it is in a projected coordinate system that reads meters. We need to take it out of that projection and put it into a **Geographic Coordinate System** that works in **Decimal Degrees**!



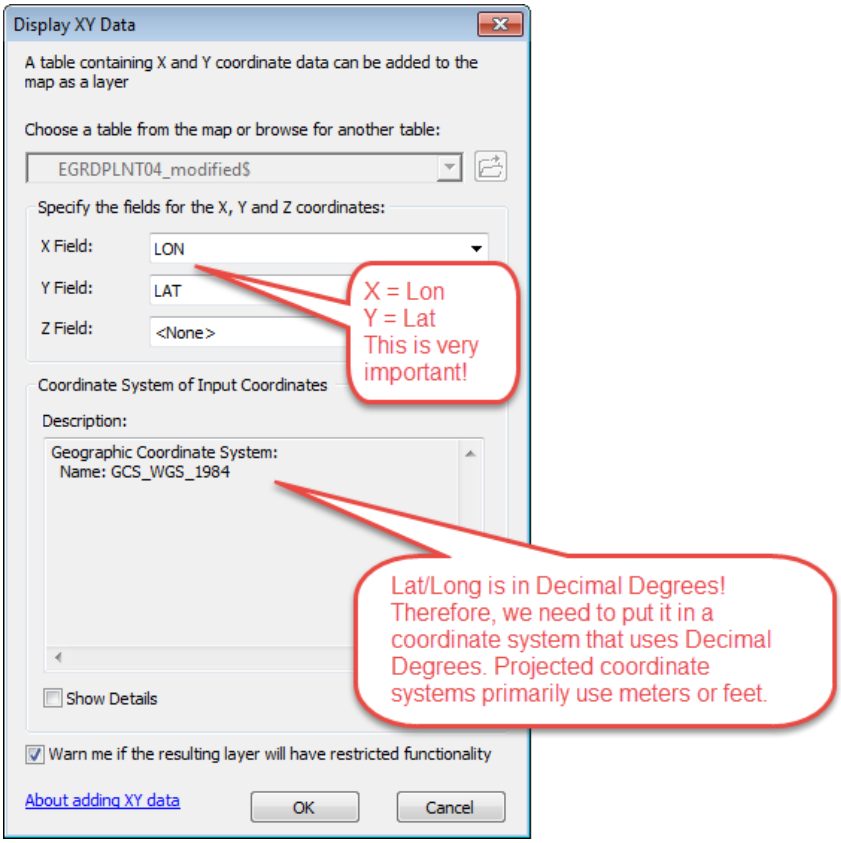
    c. Scroll all the way up to **Geographic Coordinate System.**



d. Expand **Geographic Coordinate System** and go to **World** and then select **WGS 1984**. Click **OK**.

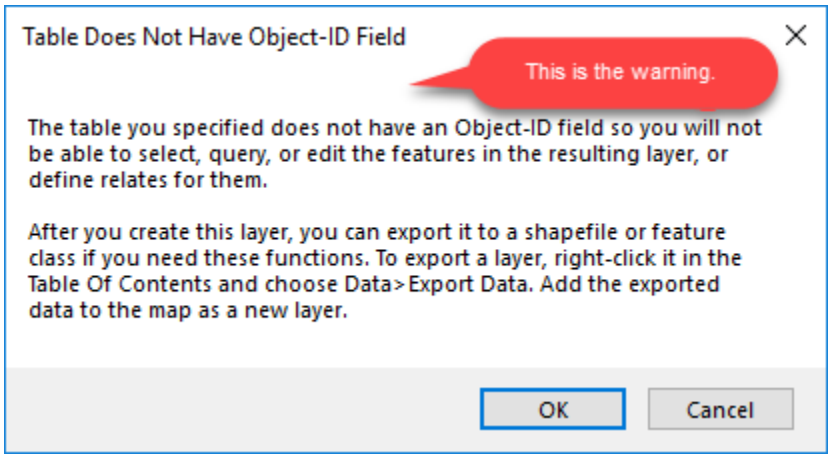


e. Now your coordinate system should be correct, as shown in the figure below.

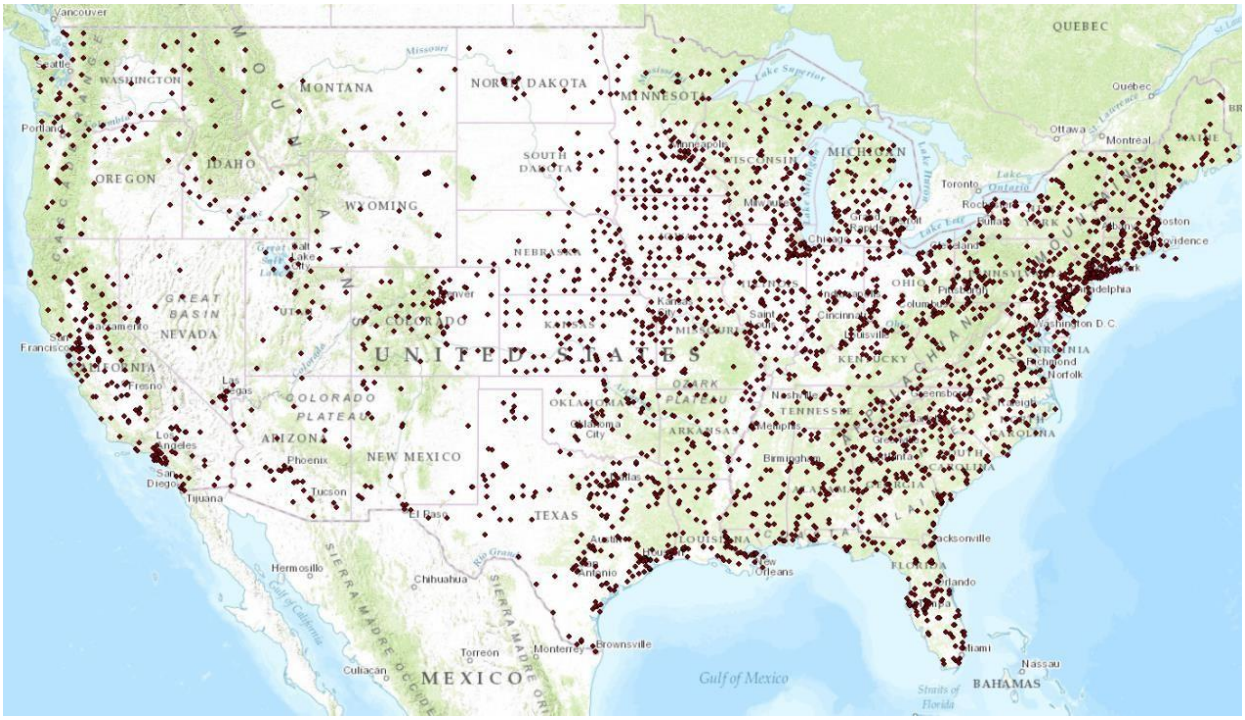


8. Click **OK** and **OK** again to finish.

9. You'll get a warning – read it and we'll explain below. Respond **OK** for now.



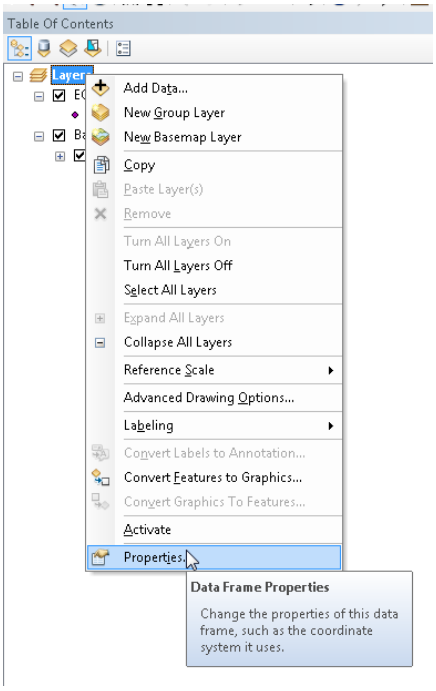
10. Congratulations, you have turned an excel table into a *temporary* point layer. In this example, you have displayed points for the electricity generating plants in the United States database. But you are not done yet.



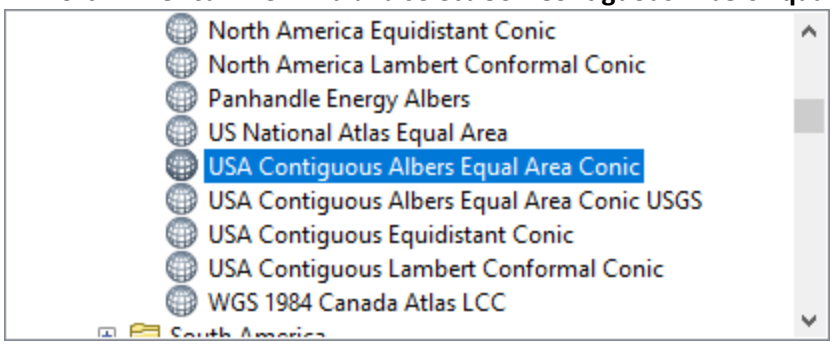
11. This is a **Temporary** visualization of the **excel table** in ArcMap. It is not YET a **shapefile** that you can pull into another map (This is what the warning was talking about). To save the data as a shapefile, we need to do a few more things.

12. First, it's necessary to start thinking about what projection you want the data to be in. In this case, we are looking at data for the contiguous USA. Therefore, we should put this into a USA Projection.

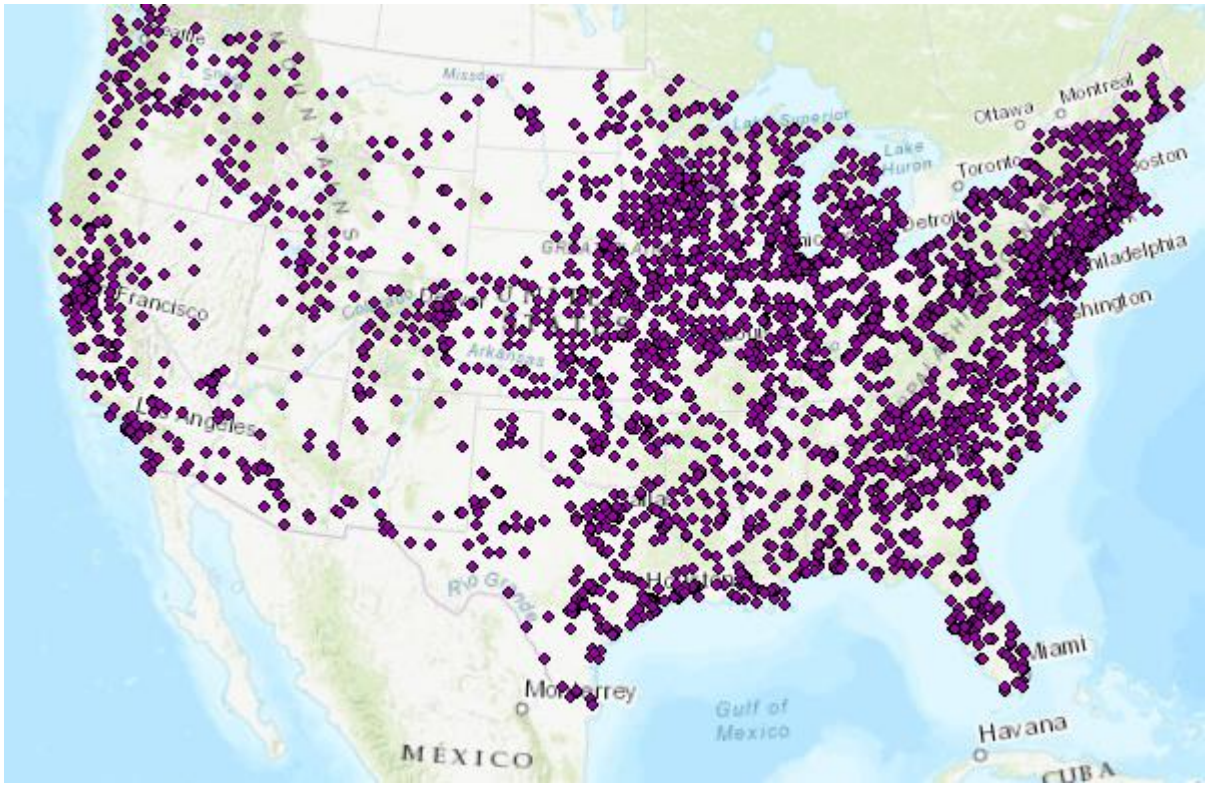
13. Right click on the Data Frame (aka "Layers") and open the properties.



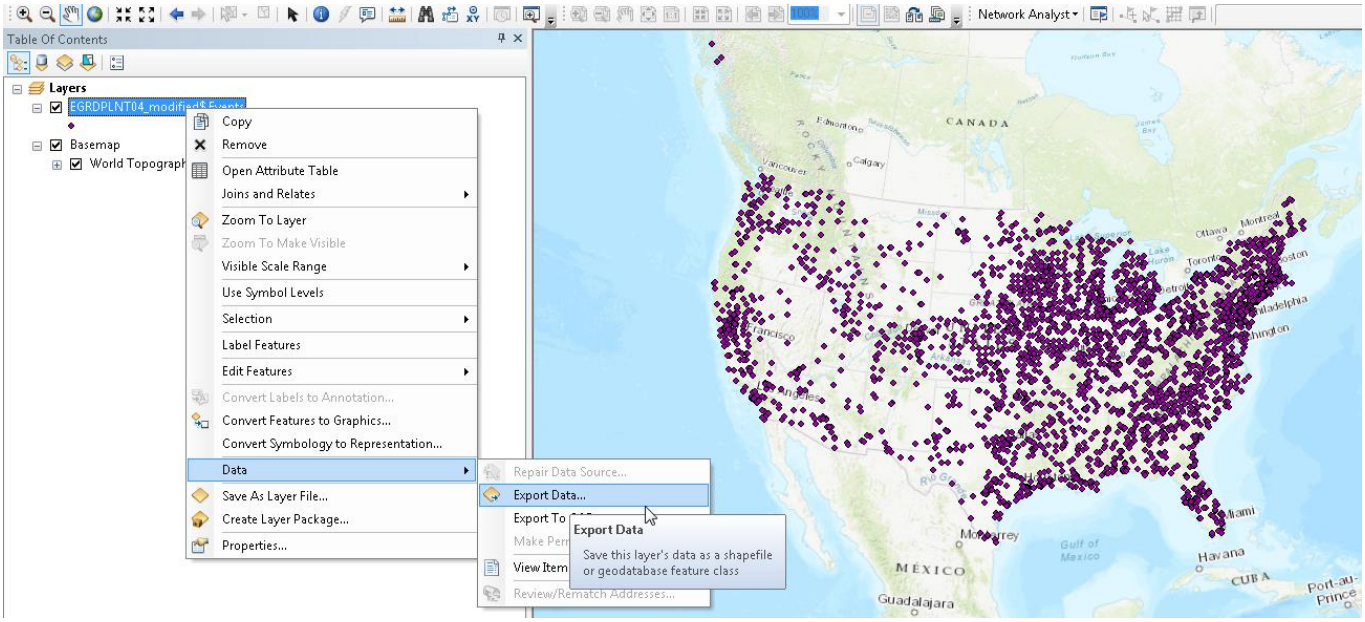
14. Go to the **Coordinate System** tab. Scroll up to the top and expand **Projected Coordinate System → Continental → North America.** Then find and select **USA Contiguous Albers Equal Area Conic.**



15. Press Ok. Press **Yes** if you get a warning. Then press **OK**. Notice how the projection changes to be specific to the US.

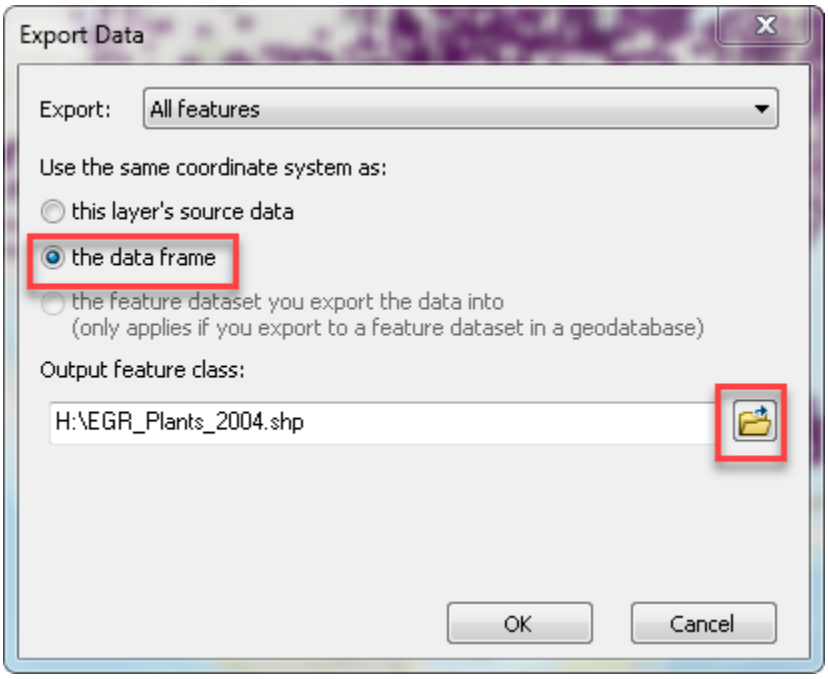


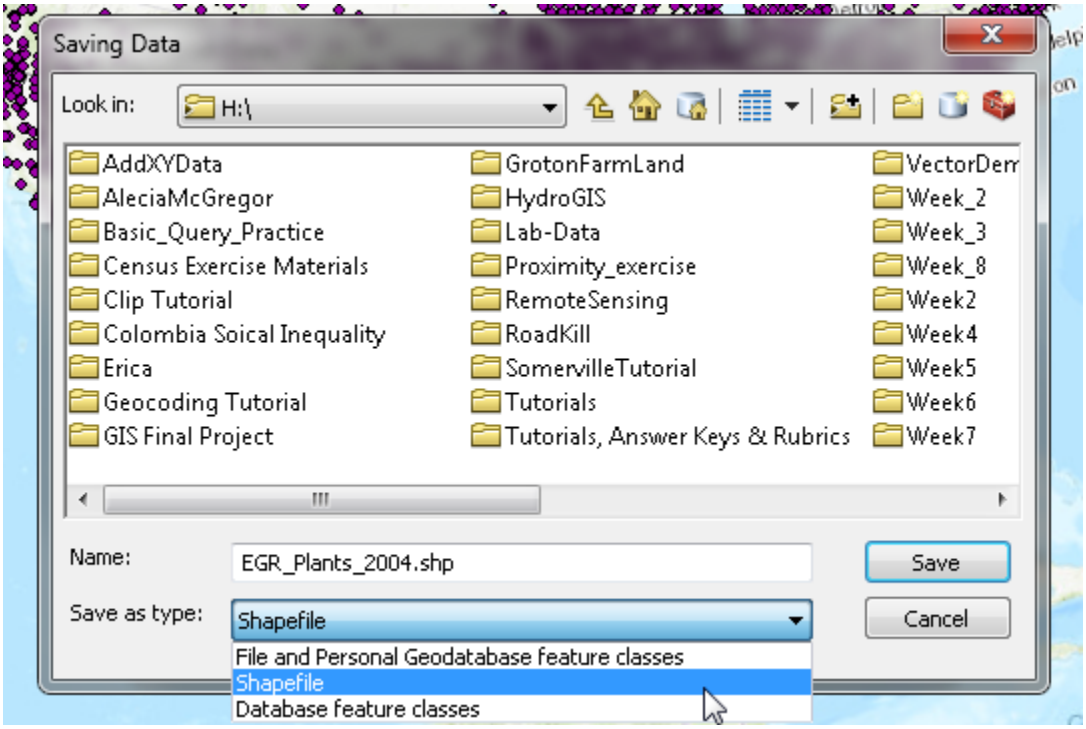
16. Now that the projection is set, we can move on to saving the **Events** layer as a Point Shapefile. R*ight click* on the **EGRDPLNT04_modified$Events** and select **Data → Export Data.**



17. Make sure to export **all features.** Since your Data Frame is already in a projection that we want it to be in, the best method is to select ***Use the same coordinate system as the Data Frame*** as this projects your data at the same time.

18. Press on the folder icon to choose where you want to save your data. Save it in your H drive and give it a good name. Make sure the **save as** type is set to **shapefile.** Click **Save** and **OK. Select Yes when asked if you would like to export it to your map.**





19. Now, you have a permanent shapefile of this data that you can use at any point AND it is in the right projection.

Tips to keep in mind when adding XY data:

- If your data is in longitude and latitude:
    - The columns for the X and Y coordinates must be in decimal degrees (not degrees, minutes and seconds) – to get decimal degrees, you keep the degrees as they are, divide the minutes by 60 and the seconds by 3600 and add all these together.
    - The longitude coordinates for places in the Western Hemisphere should be negative – often in tabular data you acquire, you will find that the longitude coordinates in the Western Hemisphere are given as positive. Before you attempt to use this in GIS, open it in Excel and add a field for negative longitude (e.g., long_neg) and fill it with the negative version of the positive longitude
- When you use the **Display XY Data** function in ArcMap, you will see that the coordinate system is either listed as "undefined" or is listed as the coordinate system of the data frame, which may not be the case – you should press the **Edit** button to define the coordinate system, and then **Select**. For data that is in longitude and latitude, you would typically choose **Geographic Coordinate System**. If your tabular xy data is in another coordinate system (like State Plane or UTM) choose that coordinate system.
- When the data initially displays as points on a map, ArcGIS refers to it as an "events" layer – this is **a temporary, virtual view** of your tabular data. To save this as a permanent shape file that you can edit and analyze, export the "events" layer to a shape file **by right-clicking** on the points events layer, and choosing **Data → Export Data**. In the Export Data dialog box, you can choose to export the data into the data frame's coordinate system so it matches your other data.