Using BOUNDARY.EXE:
locating the edges of gravity or magnetic sources

Using **BOUNDARY** to locate maxima in the horizontal gradients of your data is a good first step when trying to model subsurface sources. The maxima will help you decide where to put edges when you start modeling. To use **BOUNDARY** you must have gridded data in the USGS format. One way to acquire such data is to extract them from the **National Geophysical Data Grids CD-ROM** as discussed on another handout. The programs used to extract data are:

PRJPT.EXE calculates the Albers coordinates for the SW and NE corners of your area. You need to know that *base lat = 0.0, central meridian = -96.0* (all west longitudes are negative) and *projection number = 5*.

UTILITY.EXE uses those values to extract the data you are interested in from the CD-ROM.

Once you have a binary grid from **UTILITY** you are ready to use **BOUNDARY**, which asks:

Select which operation you care to use:

Option #1- *transform grid to psuedogravity* is the first step for magnetic data. You will need to know the local declination and inclination and any remanence direction that might be applicable (usually just put it parallel to the field).

Do you want automatic augmentation? Usually yes, but you may not if you run up against the size limitations of Boundary.

File name of output grid - whatever (e.g., psuedo.bin)

If the calculations were successful, **BOUNDARY** returns to the opening menu. Otherwise you may have to tinker with some of your answers or the size of your grid.

Option #2 - *calculate horizontal gradient magnitude*. Use option #2 to continue with magnetic data, or to start with gravity data*:*

Provide the input and output filenames (e.g., psuedo.bin, psuedo.bnd) as requested. Then you are prompted for a new title. The title can include comments up to 56 characters long. Success returns you to the opening menu.

Option #3 - *locate maxima in grid* makes the files you will eventually plot.

Provide the input filename (e.g. psuedo.bnd) as requested.

Geographic or cartesian coordinates? If you leave the coordinates as cartesian (Albers in this case) you can later use **GENPROJ.EXE** to change them to latitude and longitude. If you choose geographic then **BOUNDARY** will do the transform and you will need to provide:

projection type which is 5 for the U.S. Albers projection used on the USGS CD-ROM

CM & BL are entered exactly like this: 96 0, 0 0 (include spaces and comma!)

Significance levels - you can play with this and make several files, choice #3 seems to work just fine and allows plenty of different levels to plot..

Specify range of maxima to be output - make a few files of increasing ranges here and you can plot them, with **SURFER**, with increasing size. It seems to work pretty well to use three ranges starting at the mean value and going up.

Provide the output filename (e.g. level.1) as requested. You are then given with the opportunity to make another file with different ranges.

Option #4 stops **BOUNDARY.EXE**

Using BOUNDARY with SURFER:

To contour a USGS grid with **SURFER** use:

G2XYZ.EXE to change from a USGS binary grid to a USGS binary xyz file.

GENPROJ.EXE to go from Albers projection coordinates to lat, long coordinates. You need to know that *base lat = 0.0, central meridian = -96.0* (all west longitudes are negative) and *projection number = 5*.

XYZ2A.EXE to get an ascii file from the binary file.

SURFER: grid your ascii data and contour it (**SURFER** needs it gridded its own way).

To plot the results from **BOUNDARY** with **SURFER** on a contour map:

Use **XYZ2A.EXE** to get ascii-xyz files for **SURFER** from the binary-xyz files **BOUNDARY** wrote. You will have independent files for each range of the maxima in the horizontal gradients that you chose in **BOUNDARY**. Then separately POST each file of different ranges you wrote from **BOUNDARY**'s option #3 on your contour map. Use a different and appropriate symbol size for each range, you'll have to experiment and iterate to get the most useful results.