OBJECTIVE
The objectives of this study are to map in detail, the basement depth and structure in the Powder River Basin since paleostructures can control fracturing as well as the trapping of hydrocarbons. To achieve these objectives, magnetic, gravity, and topographic data have been rigorously analyzed. Interpretation techniques include an exhaustive profile based Werner deconvolution analysis coupled with qualitative enhancement analysis and mapping to provide additional spatial control.

DELIVERABLES
All maps will be delivered as digital grids in ASCII format and as shape files in ArcView format.

TOPOGRAPHY
- Topography map
- Residual topography map

GRAVITY
- Bouguer gravity map
- Various gravity residual maps

MAGNETICS
- Total magnetic intensity map
- Reduction to magnetic pole
- Various RTP residuals

INTERPRETATION
- Depth to basement interpretation
- Color depth to basement map
- Residual depth to basement map

Earthfield Technology, located in Houston, Texas has been supplying the oil and gas industry with state of the art integrated gravity and magnetic interpretation since 1985. Our staff of professionals brings over 100 years of interpretation experience to our projects.

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**DATA INTERPRETATION**

The interpretation of basement depth and structure using magnetics is possible due to the consistent and well established relationship between a magnetic anomaly wavelength and the depth to its causative body. For years, these calculations were made by hand. Today we are able to provide a computerized approach called Werner deconvolution. Werner is a two dimensional inversion technique that iteratively evaluates the various waveforms present along a magnetic profile yielding the depth, dip and apparent susceptibility of causative bodies. The example shown opposite demonstrates a series of depth solutions and the interpreters analysis of these solutions. When the entire series of profiles have been interpreted they are then drafted into a three dimensional surface which is digitized and provided as one of the project deliverables.

**PROCESSING & QUALITATIVE MAPPING**

The maps shown to the left and right represent the Bouguer gravity and a 40 kilometer high pass residual of the Bouguer gravity. While magnetic data is the best way to map basement related anomalies due to the magnetic character of the basement rock, gravity is the preferred approach for mapping sedimentary features because of the wide variety of densities, both vertically and horizontally, within the sedimentary rocks. Earthfield’s approach of frequency filtering the gravity data allows for the examination of regional to local sedimentary events that can then be related back to geologic and production trends.

The magnetic maps shown to the left and right represent the total magnetic intensity and a 40 kilometer high pass filter of the magnetic data. The various filtered residual magnetic maps allow for the analysis of regional fabric and possible basement structures and transforms that will be mapped in more detail by the quantitative profile by profile interpretation of the magnetic data.