ADVANCED SEISMIC INTERPRETATION OF ROSE RUN REMNANTS IN OHIO

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ABSTRACT

The variety of Rose Run trap styles has outgrown simple interpretation on a black-and-white paper seismic section. A Rose Run remnant (or what looks like a remnant?) is easily identified with moderately good quality seismic data, but the critical details of the prospect remain concealed within the seismic data. The key to greater drilling success in the Rose Run play is to first understand the geology, relate the geology to the seismic data, and then interpret that data to exploit the concealed details within by using advanced seismic interpretation techniques.

The advanced seismic interpretation process begins with quality seismic acquisition and processing. Acquisition and processing should be designed on the signal and for high frequency content. The second step is to phase-correct the seismic data and, if applicable, enhance frequencies (whiten data) using interpretive wavelet processing that requires a sonic log. A sonic log provides reflection coefficients which are used to correct for phase (and reflection identification in wildcat areas). Once the correct phase is established, the amplitude spectra are analyzed for frequency range and balance. The amplitude spectra are easily whitened if the seismic data contain high frequencies and is not high-frequency cut. After identification and interpretation of key reflectors is complete, isochron graphing is compared to known geology and can indicate thickening or thinning of rock section at the Knox Unconformity. Next, analysis of individual reflectors is performed to enhance details in seismic waveform and amplitude. Waveforms exhibit different character with different frequencies and with different geology and can provide clues to formation thickness and geologic sequence. Detailed wavelet character is interpreted by understanding the relationship of the local geology to the seismic information, regional geology and the frequency content of the seismic data. Amplitude graphs support lithology interpretations and can indicate changes in reservoir porosity and fluid/gas content. Time picks from reflection interpretations are then used to construct time-structure maps of two or more seismic lines and show local and/or regional geological relationship between remnants. Time picks are also used to show 2-D seismic anomaly shapes and are interpreted for clues to paleotopography and remnant trends (important for guiding lease and seismic programs). Rose Run seismic anomalies typically exhibit a low-angle dip slope (backside) and an escarpment face (frontside). Finally, detailed seismic modeling is the answer for questions concerning seismic anomalies, detailed seismic character, and amplitude tuning.

ADVANCED SEISMIC INTERPRETATION PROCEDURE (ASIP) FOR ROSE RUN REMNANTS

1) Do seismic acquisition and processing designed for a broad range frequency content.
2) Phase-correct seismic data.
3) Analyze amplitude spectra and whiten seismic data.
4) Identify key reflectors.
5) Integrate geology from local and/or regional wells.
    - Isochrons
6 Analyze individual reflections.
    - Waveform
    - Amplitude
7) Reconstruct paleotopography and geologic history.
    - Isochrons
    - Time-structure mapping
8) Do seismic modeling of preferred stratigraphy.
9) Identify realizable stratigraphic traps.