EXTECH IV Sub-project 1: Preliminary Results from the McArthur River 2D High-Resolution Seismic Reflection Survey

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Abstract

Eight kilometres of 2D high-resolution Vibroseis seismic reflection data were acquired along two profiles crossing the McArthur River uranium camp in northern Saskatchewan. Results from preliminary processing of the data show a strong laterally continuous reflection at 200 to 250 ms two-way travel time that likely represents the basement unconformity beneath the basin-fill sedimentary rocks. Further processing is required to reduce the effects of coherent noise within the data.

1. Introduction

As part of the EXTECH IV Athabasca Multidisciplinary Uranium Studies Project, seismic reflection and auxiliary downhole seismic surveys were conducted within the McArthur River uranium mining camp. Here, we report on the preliminary processing of the 2D data from lines 12 and 14. Survey line locations and acquisition parameters for the 2D surveys can be found in Hajnal *et al.* (this volume). The data were acquired by Kinetex Inc. of Calgary, Alberta and preliminary processing was done at the Geological Survey of Canada.

2. Preliminary Results

In general, the quality of the raw seismic data from lines 12 and 14 is variable. The best data, in terms of signal-to-noise ratio and clear visibility of reflections in the raw data, is found at the southeast end of line 12, outside of the noisy environment of the mine operations. A shot gather from line 12 is shown in Figure 1 with a shallow reflection (labelled R) clearly identified across the entire gather. Elsewhere, mine-generated noise and reverberations due to the overburden (see Hajnal *et al.*, 2000) contaminate the data to a greater extent. Significant processing effort will be required to reduce the effects of the coherent noise trains.

The processing sequence applied to obtain the preliminary stack results is provided in Table 1. A segment of the preliminary stack from the southeast end of line 12 is shown in Figure 2. A prominent laterally continuous reflection is observed at ~200 ms two-way travel time (labelled R) that corresponds to the reflection observed in the raw shot gather (Figure 1). This reflection is likely associated with the basement unconformity (cf. White *et al.*, this volume).

3. Acknowledgments

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4. References

Hajnal, Z., Reilkoff, B., Pandit, B., White, D., Adam, E., Powell, B., and Koch, R. (2000): Seismic modeling prior to the EXTECH IV Athabasca Basin seismic reflection survey; *in* Summary of Investigations 2000, Volume 2, Saskatchewan Geological Survey, Sask. Energy Mines, Misc. Rep. 2000-4.2, p104-109.

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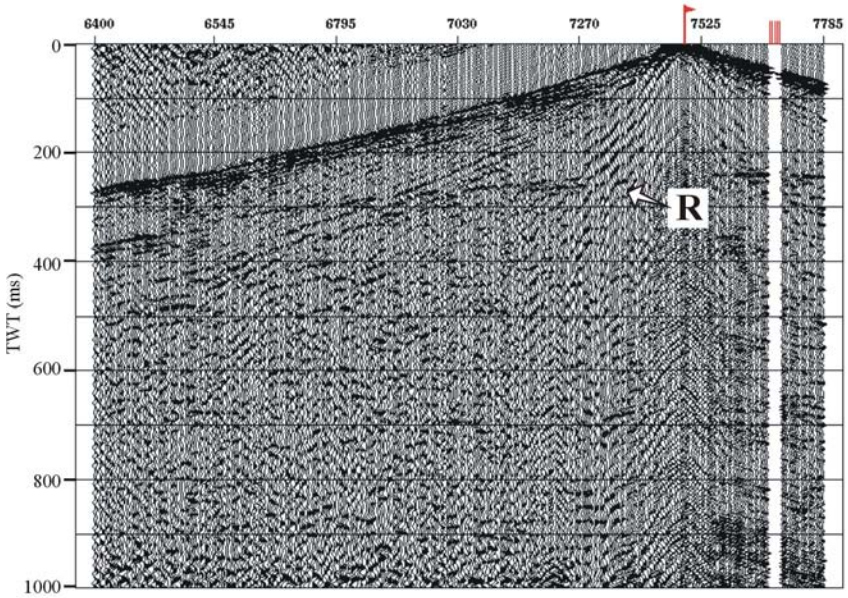

Figure 1 - Raw shot gather from the southeast end of line 12. Note the prominent reflection (hyperbolic shape) labelled R. This reflection is clearly seen in the preliminary stack of Figure 2.

Table 1 - Preliminary processing sequence.

Assign survey geometry
First break picks, noisy trace editing
Common depth point (CDP) sort
Refraction statics
200 ms Automatic gain control (AGC)
Top mute 40 ms following first break
Normal moveout correction (4800 m/s)

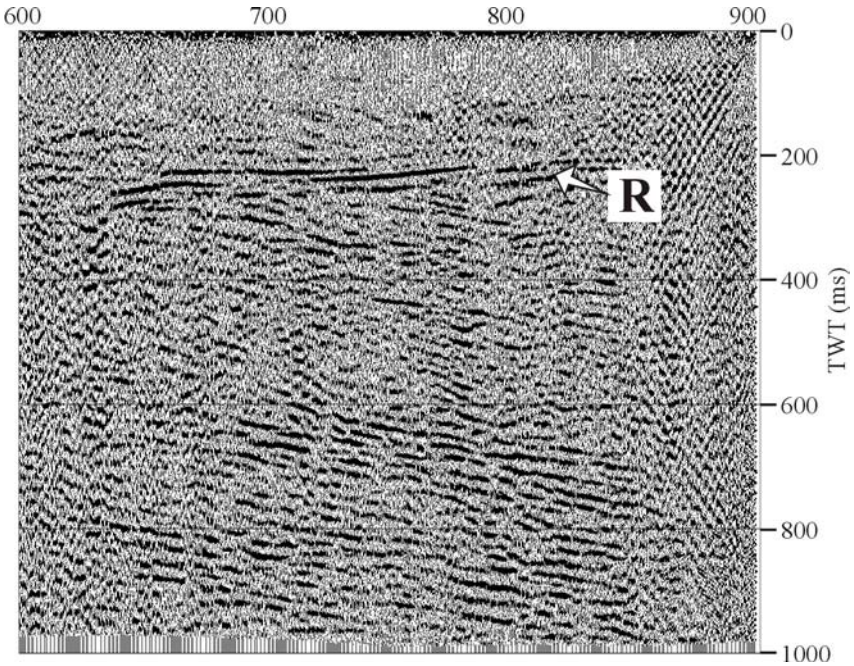

Figure 2 - Segment of preliminary stack for line 12. Note the prominent reflection at ~200 ms two-way travel time (labelled R) that likely corresponds to the basement unconformity.