

3-D seismic acquisition in complex urban area of Yumen City, Western China

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Summary

Some urban 3-D seismic explorations have been conducted in areas where S/N ratio is high. But the similar exploration has not been performed in complex areas of western China where the data quality is not so good, especially along foreland thrust belts and mountain-front. In 2004, BGP conducted one 3-D seismic data acquisition project in the urban area of Yumen city, the place belongs to complex substructure of foreland belt in Yalaobei area of Jiuquan basin. There exist many difficulties in seismic exploration, some shots and receivers are difficult to be deployed because variety of underground pipelines and cables and basic infrastructures; there are many interference sources in urban area and oilfield, especially the non-stop interference from urban refinery and power plant characterized in strong energy, broad band frequency. The underground of the urban area is characterized in complex substructures, shallow targets, steep dip structures and rapidly changed faults and strata, which cause seismic wave very complex. Considering the urban buildings and structures, BGP designed the relevant geometry and implemented the real-time analysis of shot/receiver points around the civil construction, which well solved the layout issues of shot/receiver and guaranteed the completeness of shallow data. Through careful study of the property of interference, a sets of seismic data acquisition and processing methods in complex interference region were formulated which solved the shooting and receiving problems in urban area. The seismic data showing the clear inter-bed was first completely acquired by joint application of above mentioned techniques.