

Mixed Source Recording in Kurdistan

Doug Iverson, Paul Thacker, and Dale Harger
Talisman Energy Inc

Summary

In 2013, Talisman Energy recorded a 355 sq km dynamite/vibroseis 3D seismic project with a cableless recording system in a fairly rugged area of Kurdistan. A combination of technologies were implemented to optimize data quality, reduce environmental impact, lighten equipment loads, and to balance costs.

Introduction

This presentation will discuss some of the technical and logistical aspects of conducting geophysical operations in Kurdistan with some direct correlations to North American operations.

Technical equipment included:

PhotoSat digital elevation model,
OmniSTAR real time satellite corrections for ground gps surveying and vibrator positioning,
Sercel 428 front end with 15,000+ channels of AutoSeis® HDR's and,
ten AHV IV vibrators.

Technical constraints included:

Maximum slope of 15 degrees for vibroseis source points (8 degrees on side hills),
Restricted vibrator movement on active recording spread,
Area dependant Largest Maximum-Minimum Offset (LMOS) constraints of 900m, 1100m and 1200m,
Select mis-patching or dropping lines was permitted,
Line construction (bulldozing) disturbance criteria,
Noise mitigation from ongoing well site construction
Line QC challenges (blind recording, wind noise, line monitoring).

Logistical and timing constraints included:

Worst weather October – April,
Dynamite requires ordering months in advance,
Pre-loading of source points is not a certainty,
Importing equipment,
Local holidays and celebrations.

Stations Classified By Slope of Terrain

	Total # of Stations	# of Stations >15°	% of Stations >15°	# of Stations >10°	% of Stations >10°
Source	12544	5005	39.9	6991	55.7
Receiver	36240	14213	39.2	20031	55.3

Approximately 40 percent of the source lines had stations on slopes greater than 15 degrees requiring dynamite infill unless suitable alternate vibrator source points could be located.

The vibrator / dynamite source point balance was especially important for two reasons: Firstly, dynamite source points are substantially more expensive than vibroseis source points. A 1 percent increase in dynamite source points translated to a cost increase of approximately \$100k. This program had estimates ranging from 10 percent dynamite to 60 percent dynamite which is a 5 MM USD differential. Secondly, with four pairs of vibrators the crew was able to record faster, even with four locations per source point, than with traditional in-country dynamite recording.

Conclusions

By having 5 fleets of 2 vibrators and using the digital elevation models for preplanning vibrator source locations the crew was able to minimize the dynamite source points to less than 17 percent while maintaining effective production rates. By implementing appropriate quality control processes the crew recorded approximately 1.4 million pre stack traces per sq. km. and 3200 stacked traces per sq. km with less than 4.5 percent of the desired traces lost.

Acknowledgements

The author would like to thank Talisman Energy Inc, Western Zagros, and the Kurdistan MNR for permission to publish these results.