SEISMIC DATA ACQUISITION INSTRUMENTATION ADVANCES

IAN T. MCMAHON

Halliburton Geophysical Services, Inc.
Lam Soon Industrial Bldg.
63 Hillview Avenue, No. 08-23
Singapore 2366

Since the start of digital recording of seismic data in the 1960's, instrumentation has had to keep abreast of the innovation in techniques of multi-fold recording, 3D data acquisition, high resolution data acquisition, complex sweeps, multiple sources and other new modes of operation. This paper examines recent advances in seismic data acquisition instrumentation and the corresponding effect on seismic data collection, crew operations and geophysical data quality.

With oil prices stabilizing at lower levels during the late 1980's, there has been increased emphasis placed on cost effective exploration and improved recovery from existing fields. Today's improvements in seismic instrumentation are providing geophysicists with better tools to meet these objectives.

Data acquisition systems have progressed from the 48 channel DFS V's of the mid 70's to the 480+ channel telemetry systems of today. Fortunately system reliability, user-friendly control, flexibility, automation, and built-in diagnostics have also progressed to allow 500 to 1000 channel systems to be practical and productive.

Field quality control has progressed from a simple visual analysis of camera records to sophisticated field processing available on the crew with workstation based seismic processing packages. In addition, online quality assurance systems are beginning to appear which provide survey preplanning, automated logging of the actual operation in the field and machine readable observer's logs. Survey data and field statics can be integrated with the data acquisition information to create a comprehensive data base containing all of the information necessary to QC the data acquisition and automate processing inputs for reduced processing cycle time.

Advances in seismic instrumentation provide better crew productivity in difficult environments, efficient high channel 3D operations, improved broad-band data and significantly improved quality assurance and control in the field. Further advancements in the next few years will provide major improvements in instantaneous dynamic range for better high frequency data and less dependence on spatial arrays for noise reduction. Quality control will continue to advance toward the goal of complete assurance of data quality before the crew leaves the field. This will include all aspects of data quality : signal-to-noise ratio, bandwidth, timing, statics and positioning.

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 17, No. 4, July-August 1991