Integrated Reservoir Description with a Multidisciplinary Interactive Workstation

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Abstract

The use of a multidisciplinary interactive workstation greatly enhances the effectiveness of both the data reduction process and the integration of multiple sources of raw information such as log, core and seismic data. This paper presents different stages of an interpretation process that requires complex manipulation intermediate interpretation results to produce a detailed reservoir description.

Subsurface conditions are diagnosed by direct and indirect methods, as well as by discrete and continuous sampling, both in a vertical and in a lateral sense. However, since no single source of information fully describes the reservoir conditions, the most complete and accurate model generally resides in the judicious combination of a variety of independent measurements. Such a combination process varies in nature depending on data type and project objectives. Three general categories can, however, be established. First, a data correlation and simulation process; second, a data correction process; and finally, a data calibration process.

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Efficient handling of each process can benefit from an interactive color-graphics environment wherein optimum decision making in multidisciplinary interpretation can be implemented. Rapid display of the different facets of a comprehensive prospect data base coupled with a wide range of utility programs that enable data reduction, modeling and interpretation are essential ingredients of this comprehensive system.

Design criteria are presented based on the experience gained during a pilot project, along with the study results displayed on this state-of-the-art workstation.

Workstation Based Multidiciplinary Reservoir Description, A Case History

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Data from __ different disciplines were brought to an interactive workstation in order to more accurately define an oil-bearing channel-sand reservoir in the Taber-Turin area, Alberta, Canada. Data was downloaded from each different discipline in the same reference grid.

SLIDES

1L. Title
1R. Authors
2L. Township and Range map
2R. Landsat display with block outlined
3L. Table of available data
3R. Picture of desktop workstation
4L. Bullets summarizing database issues
4R. Composite picture of different data sources (PC, Host IBM, etc.)
5L. Picture of log being digitized
5R. Picture of log displayed on PC
6L. Picture of core data measurements being taken
6R. Picture of table of porosity and permeability measurments on PC
7L. Picture of long 2D seismic section with tie marks
7R. Picture of 2D line location map
8L. Picture of seismic section chair display with picks
8R. Picture of map of Mississippian Unconformity
9L. Picture of several logs and window dragging log for tops correlatio

9R. Picture of same logs with interpretation between tops overlaid
10L. Picture of VSP data
10R. Picture of VSP well location, 2D line connection, and 3D grid locat

11L. Picture of arbitrary seismic sections connecting wells in 3D
11R. Picture of map view of arbitrary lines
12L. Picture of 3D lithologic model data along arbitrary lines
12R. Repeat map in 11R
13L. Table of petrophysical information
13R. Picture of petrophysical data on PC
14L. "The Interpretation Process"
14R. Picture of departmental workstation
15L. Cross-plot of statistics: SLIM vs sonic log thickness
15R. Schematic representation of sonic log and SLIM results
16L. Map of lithologic grid
16R. Table of seismic extracted petrophysical values at well locations
17L. Table of petrophysical values from wells
17R. Hand contoured map of petrophysical values converted to grid
18L. Cross-plot of statistics: sonic log vs seismic derived porosity
18R. Cross-plot of statistics: well log derived vs seismic gross thickne

19L. Well log derived net porosity thickness
19R. Seismically controlled net porosity thickness
20L. Conclusions
20R. Acknowledgements