



**SPE 114869**

## **Optimal Value Testing – Moving From Vision to Reality**

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This paper was prepared for presentation at the 2008 SPE Annual Technical Conference and Exhibition held in Denver, Colorado, USA, 21–24 September 2008.

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### **Abstract**

Over the past few years, there has been a vision that Optimal Value Testing (OVT) will replace conventional drill stem tests for in-situ measurement of dynamic reservoir properties such as permeability and drainage volume. This vision was that OVT would be safer, less costly, and friendlier to the environment, but the key impediment to OVT was the concern that the quality of the results might be inadequate for the difficult development decisions that we face.

Definitions of OVT vary but, in general, it may be defined as any testing method that yields fit-for-purpose results with the lowest cost and Health, Safety, and Environmental (HSE) impact. In more pragmatic terms, an OVT is any pressure transient test in which live hydrocarbons do not have to be produced directly to surface. Our OVT toolbox currently includes three types of well tests – wireline formation testing (WFT), closed system testing with cleanup and repeat surges, and injection testing. Our recent examples of closed system tests and wireline formation tests have proven to us that we can get comparable data quality to a conventional DST. Injection testing, aimed at determining drainage volume, is still relatively immature, as we have executed only one injection test to date. However, there has been considerable design work that makes us believe that this technology is also promising.

Our experiences with OVT over the past several years suggest that the wireline formation tester solution is the best answer in a large proportion of our cases. We will therefore focus in this paper on describing its strengths, weaknesses, and opportunities. Our applications of this technology are still evolving, and there are clearly more issues to resolve than with a conventional drill stem test. However, by drawing on our increasing breadth of experience, future value of information decisions about doing in-situ dynamic measurements will more often include this cheaper, safer, and more environmentally friendly option.

### **Introduction**

The focus of this paper is the use of dynamic well testing in exploratory and appraisal wells. Historically the industry called this a drill stem test, but most modern exploratory and appraisal tests use a dedicated production tubing string rather than the drill string. Following industry convention, however, we will be using the words drill stem test and conventional test interchangeably throughout this paper. This type of testing in which we flow the hydrocarbons directly to surface while measuring the rate and the pressure is one of the major tools petroleum engineers use to decide how to develop a hydrocarbon resource. In most scenarios, these drill stem tests tie up expensive equipment for many days and additionally are a major source of safety and environmental risks. Flaring of the produced hydrocarbon gas is a common example of the high level of such risks. Cost and HSE concerns have driven us to seek better ways to obtain similar reservoir and fluid data. Within our organization, a major international operating company, we have coined the term Optimal Value Testing (OVT) and defined it as any fit-for-purpose well test with minimal cost and HSE impact. In an ideal world, all tests should be optimal, but in our usage the phrase has come to mean any test in which no significant volume of live hydrocarbons is produced to the surface. We have identified three types of tests that might qualify as an OVT – wireline formation tests, closed system tests, and injection tests.

In later sections of the paper, we will discuss each of these three types of OVT in some detail, but the first step in evaluating the usefulness of any OVT is to understand more fundamentally why we perform well tests in the first place. The concept of the Value of Information (VOI) is well known within modern Decision Analysis and has been thoroughly described by Newendorp (1975) and Dunn (1992). Simply saying that we need to evaluate VOI to decide how to develop a hydrocarbon resource may sound like a tautology, but VOI has a very specific meaning for the decision analyst.