

Data Sufficiency for Managing Unconventional Plays in a Conventionally Mature Basin: A Regulatory View of the Cardium Halo

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Summary

Unconventional plays need a different approach to managing development risks than do conventional plays. From a regulatory point of view, however, the same public outcomes must be assured by good regulation and operator performance. In Alberta, these outcomes include resource conservation, orderly development, and collection of subsurface information needed for Alberta's resources to be economically competitive for international investment. The Alberta Energy Regulator (AER) recently embarked on a program of regulatory modifications to data requirements in unconventional plays. The goal was to leverage existing data from Alberta's long history of conventional exploration and development and reduce data requirements for unconventional plays, all while ensuring that the data submitted to the regulatory process remains sufficient to assure Alberta's energy outcomes.

Introduction

Conventional exploration and development can be viewed as a process by which data is systematically gathered and analysed. Since our subsurface knowledge is imperfect and incomplete, the chance of failure can rarely be driven to zero, but it can be reduced by data gathering and analysis, where the cost of failure and data acquisition is offset by the risk-weighted value of a successful well (Rose, 2001).

Unconventional developments in areally extensive and well-drilled formations focus less on chance of success and more on chance of productivity when risking a prospect (Haskett and Brown, 2005). So-called statistical strategies can be deployed where a minimum number of wells are drilled to achieve an expected value of productivity across a portfolio. The incremental or marginal value of new data tends to diminish with additional samples, so an optimal amount of sampling will be needed to ascertain play characteristics for program design (Bratvold and Begg, 2010).

How can the value of existing data from conventional plays be leveraged for unconventional resource plays? The AER faces this challenge in defining data requirements for regulatory purposes. A common goal

of any regulator is to not burden regulated industries with unneeded data requirements while still collecting enough information to ensure stakeholders and governments that their outcomes are being assured by the regulator.

The Alberta Basin is regarded as being very mature with respect to conventional oil and gas development. The conventional industry has been regulated by a provincial agency since 1937, and that regulation has included mandatory submission of geological and engineering data to the regulator for public dissemination and use by industry. This raises the question of how best to leverage this legacy of data in Alberta to minimize new data requirements for emergent shale gas, tight oil, and CBM plays, while still upholding our mandated outcomes for resource conservation and orderly subsurface development. To help answer this question, one of the regulatory instruments the AER has introduced is subsurface orders (SOs). SOs allow the modification of existing subsurface regulations over specific subsurface zones to more effectively manage resources as development strategies and technologies change. Five subsurface orders have been released to date: SO1 and SO1A expansion Montney-Lower Doig, SO2 seismicity in the Duvernay, SO3 Duvernay, SO4 coalbed methane in the Edmonton and Belly River Groups, and SO5 Cardium.

Theory and/or Method

Subsurface orders are applied to amend subsurface requirements that are often varied on an application or waiver basis, or that are otherwise considered to be low risk. This includes varying requirements pertaining to well spacing, target areas, multizone wells (commingled production), allowables, production rates, data collection, and well testing. To initiate the SO process, the AER identifies zones or formations that are candidates for a subsurface order based on industry activity and regulatory statistics. If the initial assessment shows that risks to outcomes are low and tolerable under possible relaxation of regulatory rules, the formation or zone is passed through a rigorous risk analysis process. This includes reservoir characterization, data gap analysis, industry engagement, and economic analysis of alternative regulatory solutions. In the case of setting or relaxing data requirements, the AER looks at the amount of data already available for the play or formation, the stage of the play in its development life cycle, and how data is currently being used at the regulator to protect its mandated outcomes. If current data requirements are no longer relevant, or if the associated risks are being well managed without reference to new data, then an argument can be made to reduce data requirements.

Examples

In mature and well-understood plays such as the Cardium, the knowledge and data collected from conventional development can be used to reduce the risk in developing the unconventional portion of the reservoir, referred to as the Cardium halo. The Cardium Formation has a long history of development and is generally well understood; in certain areas, collecting additional data provides little value to our resource characterization. The shift in development from historical production from the clean sands and conglomerates to horizontal multistage fracturing in the Cardium halo has led to a large number of regulatory variance requests, applications, and waivers to modify the standard requirements. A risk assessment was conducted with the intent to identify areas in which regulatory control may be reduced or eliminated without compromising the currently acceptable level of risk, as well as to increase the efficiency and effectiveness of the regulatory framework. In October 2016, the AER released Subsurface Order No. 5, which simplified regulatory complexities and data requirements in the Cardium, allowing operators more flexibility to conduct optimal development planning.

Conclusions

By assessing current regulations in place and weighing the risks for all stakeholders involved, regulations can be tailored to individual plays, reducing regulatory burden and increasing development potential in a safe and responsible manner.

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