

Generating a Full Field Development Plan in a Highly Restricted Urban Drilling Location

The Challenge

The project conducted by Integrated Petroleum Technologies Inc. for Mineral Resources Inc. is unique because the vast majority of the 10 square mile acreage is literally under the city of Greeley, Colorado. Historically, development in this urban environment was restricted by limited surface drilling locations, effectively leaving a significant development hole in the heart of the DJ Basin's Wattenberg field.

To access the gas condensate reserves on an economic basis, it was necessary to use long horizontal wells (up to 17,000' Measured Depth), some of which required significant offsets (up to 4500') before entering the mile and a half long lateral section. Such extended wells needed detailed engineering design to ensure drillability and avoid potential string failures.

The development targeted two formations: the Niobrara at around 6650' TVD, and the Codell Formation at around 6950' TVD. In the case of the Niobrara, two key formation benches were targeted, requiring planned laterals to be staggered between a total of three separate zones. In combination with the dense pad patterns proposed, these target requirements demanded accurate trajectory planning, survey error modelling, clearance analysis, and visualization to ensure optimal wellbore placement and avoid potential wellbore collisions.

The overall challenge was to generate a reliable development plan for the entire acreage that effectively addressed all trajectory

and engineering concerns, and produce final well proposals that could be drilled safely, efficiently and successfully.

The Solution

Paradigm Sysdrill® is a single application for comprehensive well planning, survey management and drilling engineering analysis. Sysdrill enhances productivity and accuracy through unprecedented levels of data, interface and workflow integration.

By using the Sysdrill system, Integrated Petroleum Technologies was able to rapidly design multiple pad patterns that fulfilled all the requirements of anti-collision and reservoir placement. They could then immediately validate these proposed trajectories from the perspective of critical engineering aspects such as torque & drag, hydraulics, cementing and casing design.

An important part of the engineering workflow was use of the Sysdrill torque & drag functions to run multiple scenarios for different well path and string combinations. On the basis of this work, several key recommendations were made regarding string design, including the use of more robust string connections than were originally proposed.

Because they were dealing with such a large number of wellbores in close proximity to each other, the ability to share high-quality, interactive 3D output files with their client was a distinct advantage for Integrated Petroleum Technologies when reviewing refinements to the development plan.

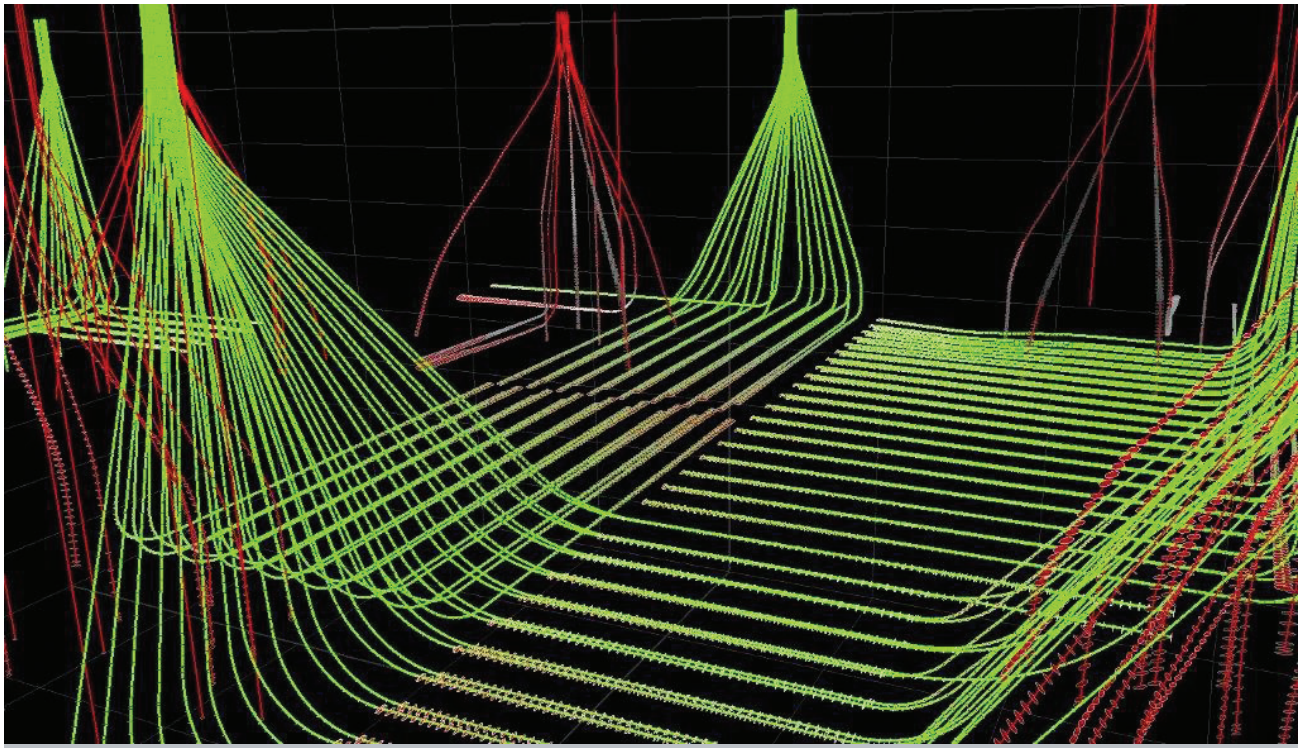
The Sysdrill solution has allowed us to significantly expand our service offering and has rapidly become essential in our day-to-day operations.

» Clayton Doke, Senior Engineer, Integrated Petroleum Technologies, Inc.

Results

Through use of the comprehensive Sysdrill well planning and drilling engineering tool, Integrated Petroleum Technologies was able to demonstrate engineering feasibility for their client's acreage despite the significant challenges present in the area, and generate a full field development plan that effectively removed the previous production limit imposed by restricted surface locations. The client is now successfully executing on this development plan with a high degree of confidence.

Clayton Doke, Senior Engineer at Integrated Petroleum Technologies, said, "The Sysdrill solution has allowed us to significantly expand our service offering and has rapidly become essential in our day to day operations. The integrated nature of the application coupled with its ease of use allows us to efficiently deliver the comprehensive well planning and drilling engineering services that our clients require."



▲ Fully engineered wells for the Greeley field development project displayed in the Sysdrill 3D Viewer (Image courtesy of Integrated Petroleum Technologies Inc. and Mineral Resources Inc.)