geologic intervals that may have looked a bit ho-hum when pierced by the drill bit on its way to the Real Target can, on second look, yield some pleasant surprises.

The Uteland Butte Member of the Eocene Green River Formation in the Uinta Basin in Utah is one of these. It’s the basal member of the Green River, above the Upper Paleocene to Lower Eocene Wasatch Formation, which is predominantly a sandstone with red, green and gray shales deposited in a fluvial setting.

In contrast, the Uteland Butte is indicative of a lacustrine environment and is mainly limestone, dolomite, organic rich calcareous mudstone and siltstone, with some thin sandstones, according to AAPG member Michael Vanden Berg.

Vanden Berg is a research geologist in the Energy and Minerals Program at the Utah Geological Survey. He currently serves as president of the AAPG Rocky Mountain Section.

The unconventional Uteland Butte zone ranges in thickness from less than 60 feet to more than 200 feet.

“The Green River Formation in the Uinta Basin has been studied for over 50 years since the first hydrocarbon discoveries,” Vanden Berg said. “But early studies focused on the many conventional sandstone reservoirs currently producing large quantities of oil and gas.”

“Little information exists on the more unconventional crude oil production potential of thinner, organic-rich shale units,” he said, “such as the Uteland Butte Member, Black Shale facies, and deep Mahogany zone.”

The Uteland Butte historically has been a secondary objective as the companies drilled vertical wells through the Green River and into the Wasatch, which was the main target. “They would often perforate the Lower Green River along with the Wasatch,” Vanden Berg said.

“However, there is a Uteland Butte field in the central portion of the basin that is productive from localized sand beds,” he noted, “but this is unusual.”

Pressure Points

Vanden Berg described an active scene today, noting that over the past few years, companies have been targeting the thinner carbonate beds in the Uteland Butte with horizontal drilling.

“In particular they’re going after a single dolomite bed in the upper part of the unit, which has 20 to 30 percent porosity but very low permeability,” Vanden Berg said. “That’s where the horizontal drilling comes in – and the hydraulic fracturing.”

He noted that production from these wells averages 500 to 1,500 Boe/d from horizontal legs up to 4,000 feet long. “Overpressure seems to be key to the success of the Uteland Butte,” Vanden Berg said. “Most of the production is within the overpressure zone. “That’s why Newfield (Exploration Co.) has taken the lead, because they have acreage in the overpressure area, whereas other companies are either further south, west, or east,” he commented.

“Most companies are operating outside the reservoirs overpressured zone, which is hurting the economics of the Uteland Butte play,” Vanden Berg said.”

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Right now, the Utah Geological Survey is evaluating how to make these fringe areas of the Uteland Butte more productive.

“We see significant potential in the fringe area,” Vanden Berg noted. “The question we want to answer is what is the best way to complete these horizontal wells to unlock that potential.”

There’s a whole lotta research going on.

Vanden Berg is principle investigator for a newly launched three-year-long program funded by the National Energy Technology Laboratory – Liquid-Rich Shale Potential of Utah’s Uinta and Paradox Basins: Reservoir Characterization and Development Optimization.

The overall goal of the study is to provide reservoir-specific geological and engineering analyses of:

- Emerging Green River Formation tight oil plays, such as the Uteland Butte Member, Black Shale facies and others in the Uinta Basin.
- Established yet understudied Cane Creek shale (and possibly other shale units) of the Pennsylvanian-age Paradox Formation in the Paradox Basin.

Hands-On Experience

If you were on the scene during the recent AAPG Annual Convention and Exhibition in Pittsburgh, you may have examined a Uteland Butte core that Vanden Berg transported in for a core poster session.

The core, which is from the productive carbonate zone in the Uteland Butte, was acquired from the Bill Barrett 14-3-45 BTR well in southwestern Altamont Field.

“The horizontal drilling objective, as analyzed in the core, is a five-foot interval of fractured dolomite, with porosities between 14 and 26 percent, interbedded with organic-rich limestone,” Vanden Berg noted.

“The TOC values for the 60 feet of recovered core range between 2 and 5 percent, while Ro (vitrinite reflectance) values range between 0.7 and 1.1, indicating these rocks are self-sourcing.”

Not to worry if you missed the Uteland Butte core-viewing opportunity in Pittsburgh. Word has it that you’ll have another chance during a session at the upcoming AAPG Rocky Mountain Section meeting in Salt Lake City in September.
West Side Story
A sweet ‘Beast’ in the Niobrara
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