WEBINAR SERIES

Carbonates: Opening Gateways to New Energy Industries

Presenter: David Hill

The massive development of hydrocarbons from carbonate reservoirs in the 1950s and '60s paved the way for using these reservoirs for 21st Century industries such as lithium, geothermal and sequestering carbon dioxide. It's back to the future for geologists and engineers alike as we go back to the large scale, regional type of work that most of us have not done for decades to reinterpret the wealth of information contained in old logs, cores, DSTs and production histories.

This talk will address three critical questions:

How important are carbonates in the 2020s?

Since the iconic Imperial Oil Leduc No. 1 discovery in February, 1947, Canada's energy fortunes have been linked to its knowledge of its carbonate rock resource—vast carbonate platforms and ramps that defined this area of the world between the Devonian and Mississippian periods. Each major carbonate discovery was followed by infrastructure to bring that oil to market. Success brought more investment, investment brought more exploration, and within a decade or so, the mammoth carbonate fields had been discovered. Yet the game had not ended; with infrastructure built and paid for, the smaller economically unviable pools in the overlying Cretaceous became economic and development continued. Without the massive infrastructure development that was initiated by developing carbonate rocks in the 1950s and '60s (see chart), the following decades of clastic development may have been much slower to bring to market.

In the 2020s, we are looking at our geological resources very differently—as places to recover heat, as sources of lithium and helium, and as places to permanently sequester carbon dioxide. Each of these industries relies on an innate function of the subsurface strata in which they are deployed; the need to access large volumes of fluid-filled porosity, either to pull in mineral or heat resources, or to push out CO_2. The needs of these new industries are no different than that of Ted Link, Imperial's chief geologist, who bloody-mindedly drilled 133 wildcat dry holes before eventually hitting success in Leduc on that cold February 1947 morning—to access as much porosity as possible but with as few wells as possible.

Alberta and Saskatchewan Production by well discovery year

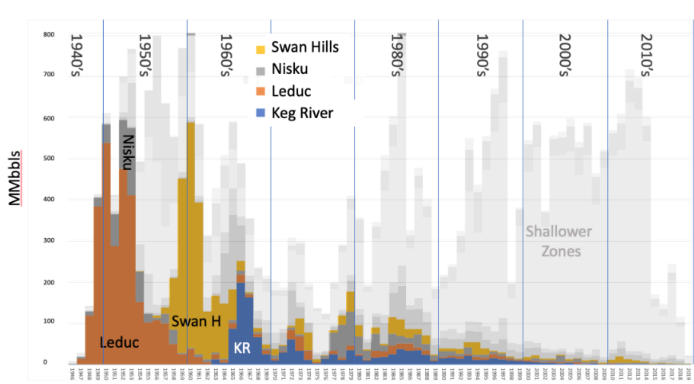

Chart shows the amount of oil produced from wells by their discovery year

What are the opportunities and challenges that we might face using carbonate platforms and ramps vs deep saline clastic aquifers?
Porosity types differ between clastics and carbonates. How does that relate to using carbonate reservoirs for these new industries? For example, a carbonate could give access to a large volume of pore space, but the direction and distance that the plume migrates might be less predictable vs sandstone aquifers, which the Quest and Aquistore projects have shown to be very efficient in storage volume and to have a predictable, slow-moving plume.

How do trapping mechanisms differ between carbonate and sandstones, and how does that affect CO_2 sequestration?

What is the potential for mineralization after injecting CO_2 into carbonate reservoirs?

How must we think differently about the rock for these new industries in the 2020s?
In the conventional oil industry, we work in areas with individual reservoirs that are separated like islands, and the only information we have needed is on those "islands". With the new energy industries, we need to take the sea away; the old outline of the islands becomes less important as we now need to see and understand the whole platform and ramp. Knowing how entire platforms are plumbed outside of the hydrocarbon reservoirs is now important so it's time to dust off old oil migration reports and hydrodynamic studies! The entire platform is now open for development, which means as geoscientists we have to go back to the large scale, regional type of work that none of us have done for decades!

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