In Focus

New Technologies in Uranium Production Pivotal to Future PCI Value

TradeTech's monthly Production Cost Indicator (PCI) increased 0.5 percent (US$0.30) to $59.20 per pound U_3O_8 during July 2025. The July PCI value is 2.4 percent ($1.40) higher than last year's equivalent of $57.80 and marks the highest value since the Indicator's inception in April 2020.

Recent Developments

On July 17, 2025, Orano Canada Inc. and Denison Mines Corp. announced the successful commencement of Surface Access Borehole Resource Extraction (SABRE) mining operations at the McClean Lake Joint Venture (MLJV) in Saskatchewan's Athabasca Basin. Orano Canada, the operator of the MLJV, holds a 77.5 percent interest, while Denison owns 22.5 percent.

The milestone marks the first commercial production of uranium from the McClean North deposit, with approximately 250 tonnes of high-grade ore (>10% U_3O_8) estimated to have been recovered in June from the first mining cavity. Orano Canada successfully backfilled the first cavity and is preparing to mine a second cavity, with the commencement of processed ore at the McClean Lake Mill already underway.

The announcement was met with enthusiasm from both companies, with Orano Mining President Xavier Tillet emphasizing the role of SABRE in delivering a reliable and responsible supply of natural uranium. Jim Gorman, Orano Canada's President and CEO, noted the long-term investment in research and development, and the collective effort that brought the project to fruition, describing it as an innovative and exciting time for the uranium industry.

David Cates, Denison's president and CEO, underscored the successful complement of SABRE mining at McClean North with operations since 2008, praising Orano Canada's global leadership in innovation and operation. He further highlighted Orano's dedication to the development of SABRE mining and its commercialization as a key technological advancement for the MLJV.

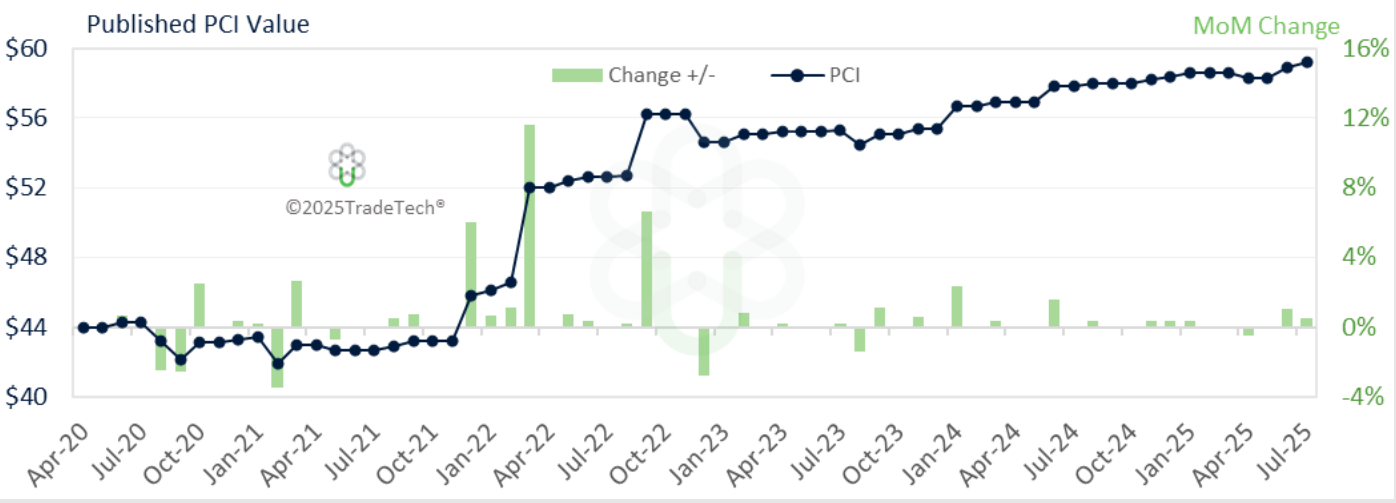

Figure 1 **TradeTech's Production Cost Indicator with Month-on-Month Percent Change**
Source: TradeTech

Mining Technology & Implementation

SABRE is an innovative mining equipment invention and development initiative that began in 2004, with testing successfully concluded in 2021. This method involves using high-pressure water jets placed at the bottom of a drill hole to excavate a mining cavity, separating the cuttings from the excavation process, and then lifting them to the surface for stockpiling. SABRE is considered a highly efficient and environmentally conscious method, particularly well-suited for extracting small high-grade ore bodies in the Athabasca Basin that are otherwise challenging or too deep to be economically mined using conventional open-pit or underground methods.

From inception to commercial readiness, the planning, design, permitting, piloting, and implementation of SABRE spanned two decades. Its commissioning at MLJV showcases the cooperative expertise of Orano Canada and Denison Mines—two experienced and seasoned operators in Saskatchewan's Athabasca Basin.

While SABRE offers a viable pathway to unlock future uranium resources in the Athabasca Basin, its application is currently tailored to relatively small ore bodies. In contrast, other emerging innovations elsewhere in the uranium industry are targeting significantly larger deposits. Integrating any new technology into existing mining systems presents challenges and can lead to project commissioning delays. The larger the scale or complexity of such an innovation, the more susceptible the project becomes to development schedule disruptions.

New Technologies, New Challenges

Parallel to the successes of its SABRE method, Denison Mines is also pioneering a new uranium mining technology called freeze wall *in-situ* recovery (ISR) at its Phoenix deposit in the eastern Athabasca Basin. This innovative method involves creating a frozen barrier around the underground ore body to contain mining solutions, thereby controlling groundwater flow and mitigating environmental contamination. By using this hydraulic containment, Denison aims to extract uranium efficiently with minimal surface disturbance, eliminating traditional tailings and waste rock.

In the Patterson Lake South region of the Athabasca Basin, NexGen Energy's Arrow [Rook I] project proposes the use of an underground tailings management facility (UGTMF) for the secure and long-term storage of tailings. According to NexGen Energy, this method significantly reduces the environmental footprint of the project by minimizing surface disturbance and the need for conventional tailings dams. By containing waste materials underground, the UGTMF is a key component of NexGen's sustainable and responsible mining strategy and initiative.

In the USA, Grants Energy is developing Precision ISR aimed at revolutionizing uranium extraction by combining traditional ISR with horizontal well technology, a method commonly used in oil and gas extraction. Coined "ISR 2.0," Grants Energy's application of horizontal well technology proposes a reduction in ground disturbance (up to 95% fewer wells) and lowering carbon emissions (up to 90% reduction from well construction) compared to conventional ISR operations.

Elsewhere, in China this month, China National Nuclear Corp. (CNNC) hailed a breakthrough at its National Uranium No.1 demonstration project with the successful production of uranium products from the Ordos deposit in Inner Mongolia. According to CNNC subsidiary China National Uranium Corp., the project proposes the application of "third-generation uranium mining and processing technologies" within recently discovered aeolian (wind-blown) sandstones. The application of conventional ISR is largely attributed to fluvial sandstone geologies.

After the announcement, CNNC also reported the detection of a similar deposit at a record depth of 1,820 meters (5,971 ft) in the Tarim Basin within the Xinjiang Uygur autonomous region. By comparison, average depths of uranium deposits in Kazakhstan are approximately 650 meters (2,150 ft).

On the African continent, Morocco's state-owned company URANEXT is pursuing the application of continuous ion exchange processing technologies to produce uranium concentrates as a co-product of the country's vast phosphate reserves. Last month, URANEXT, affiliated with the OCP Group (Office Chérifien des Phosphates), reported $100 million of sovereign investment directed toward fostering local innovation and scientific development within the phosphate value chain.

Implications on PCI Value

Integrating any innovation into existing mining systems is a multifaceted process and prone to commissioning delays, with the risk escalating proportionally to the technology's scale or complexity. This is further compounded when applying these methods to newly discovered geologies, especially at depth, or indeed in jurisdictions new to uranium mining.

TradeTech recognizes that the development and implementation of such advanced techniques, particularly for larger deposits or in unfamiliar geological contexts, are potentially susceptible to schedule disruptions, which can ultimately lead to increased production costs and delays in delivering uranium concentrates to the market. These risks are recognized and accounted for in TradeTech's proprietary cost analysis.

Since the MLJV is now characterized as existing supply (as opposed to (re)emerging production), it has been removed from the cohort of projects from which the PCI value is derived. For newly restarted operations, such as the MLJV, the focus now shifts to production ramp-up and generating sufficient product inventory to underpin future sales opportunities.

As evidenced through 2024 and H1 2025, the successful ramping-up of operations is also a complex process. Boss Energy, which restarted its Honeymoon ISR Project in South Australia in Q4 2023, noted this month that recent drilling indicated less continuity in mineralized horizons versus Feasibility Studies, potentially necessitating additional well installations and increasing sustaining capital costs in the future.

Summary

TradeTech's independent and iterative assessment of published economic studies, in conjunction with an ongoing assessment of inflationary pressures, idiosyncratic risk, and an evolving supply and demand dynamic, yields a PCI of $59.20 per pound U_3O_8 in July.