Recent Rule Changes to Some of the Geological Survey's Regulatory Programs

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In 2020, the Geological Survey amended two existing rule chapters and created two new ones. Three of these rule changes were a result of potential changes in the mineral and geothermal industries and the fourth was a set of rules for the recently created high-level radioactive waste law.

In Situ Leach Mining

The Subsurface Minerals Program, North Dakota Century Code (NDCC) 38-12 regulates all mineral production in the state other than the three major mineral extraction activities, oil and gas, coal, and sand and gravel. Because it encompasses everything from surface mining to deep solution mining, the program requires four different rule chapters to administer the law: Subsurface Mineral Exploration and Development, North Dakota Administrative Code (NDAC) 43-02-02, In Situ Leach Mineral Mining Rules (NDAC 43-02-02.2), Surface Mining (Noncoal) (NDAC 43-02-02.3), and Solution Mining (NDAC 43-02-02.4).

In 2008, the In Situ Leach Uranium Mining rule (NDAC 43-02-02.2) was created to regulate the in situ leach mining of uranium. In situ leach mining (isl), also known as in situ recovery mining (isr), involves pumping treated groundwater (typically by the addition of an oxygenator) into an aquifer that is mineralized with the desired mineral, resulting in the desired mineral going into solution, and bringing the mineralized solution to the surface through a series of recovery wells. In 2008, the Geological Survey had issued the first uranium exploration permit in 28 years. The renewed interest in North Dakota's uranium deposits (mined in western North Dakota from 1958-1967) had come about because the price of uranium oxide, which had floated around $10 per pound for decades, had jumped up to $137 per pound as the world's stockpile of uranium had decreased. It was believed at that time that any uranium mining going forward in North Dakota would likely be in the form of in situ mining. However, the spot price quickly dropped and over the past five years has ranged between $20 - $30 and no additional exploration or resource development has since taken place.

The In Situ Leach Uranium Mining rule was expanded this year to include all minerals regulated under the Subsurface Mineral Program and the rule chapter name was changed to In Situ Leach Mineral Mining (NDAC 43-02-02.2). The driving force behind the change was to enable critical elements (including the rare earth elements) to be developed by in situ leach methods if ongoing research determines this is feasible.

Figure 1. A well field at Cameco Resources' Crow Butte in situ leach uranium mine near Crawford, Nebraska. The photo was taken in 2008 during a mine tour as I was drafting the in situ leach mining rules for uranium. Cameco Resources suspended operations at the mine site in 2016.

Figure 2. A shallow, closed-loop geothermal system being installed at the Minnkota Power Cooperative site in Grand Forks during the spring of 2016. A total of 646 wells were each drilled at this site to an approximate depth of 285 feet.

Deep Geothermal

The Geological Survey has regulated geothermal energy production in North Dakota since 1984 under NDAC 43-02-07 Geothermal Energy Production. Under this program, we have issued 1,772 permits (1,232 residential permits and 540 for commercial facilities). To date, the vast majority of permits have been issued for shallow, closed-loop systems (fig. 2). A total of 37,110 holes have been drilled under this program, typically averaging 150 – 200 feet deep, with a cumulative total depth of 7,773,485 feet.

In 2019, we became aware that Deep Earth Energy Production Corporation (DEEP) had begun drilling a deep geothermal test well to the Deadwood Formation near Torquay, Saskatchewan, approximately 10 miles north of the North Dakota/Canadian border (fig. 3). To date, DEEP has drilled five geothermal wells into the Deadwood Formation and brine (at a temperature of 251.6˚ F) has been pumped to the surface from a depth of approximately 11,500 feet (DEEP, 2020a and 2020b). DEEP is in the process of designing a 20 MW geothermal energy power plant that will utilize ten horizontal wells (6 producers and 4 injection wells). Each well to be drilled to a vertical depth of approximately 11,500 feet with a 6,600-foot-long horizontal leg (DEEP, 2020b).

Because the rocks in the Williston Basin dip towards the basin center near Watford City, ND, the Deadwood Formation in several North Dakota counties is deeper and, therefore, hotter than it is in Saskatchewan. Several years ago, the Geological Survey initiated a temperature logging project to obtain accurate subsurface temperatures in temporarily abandoned oil wells in North Dakota. To date, we have temperature logged 25 wells in 11 western counties including two wells that recorded temperatures of 297 and 299˚ F at depths of approximately 13,000 feet within the Interlake and Stony Mountain Formations, respectfully, in McKenzie County (McDonald, 2015). These temperatures were obtained 1,700 – 1,800 feet above the Deadwood Formation at those locations.

In anticipation that a deep geothermal energy facility could be developed in North Dakota, we removed the deep geothermal rules from NDAC 43-02-07 and created a new rule chapter to regulate that type of venture (NDAC 43-02-07.1 Deep Geothermal Energy Production). Many of the sections in this new chapter came directly out of the oil and gas rules (NDAC 43-02-03).

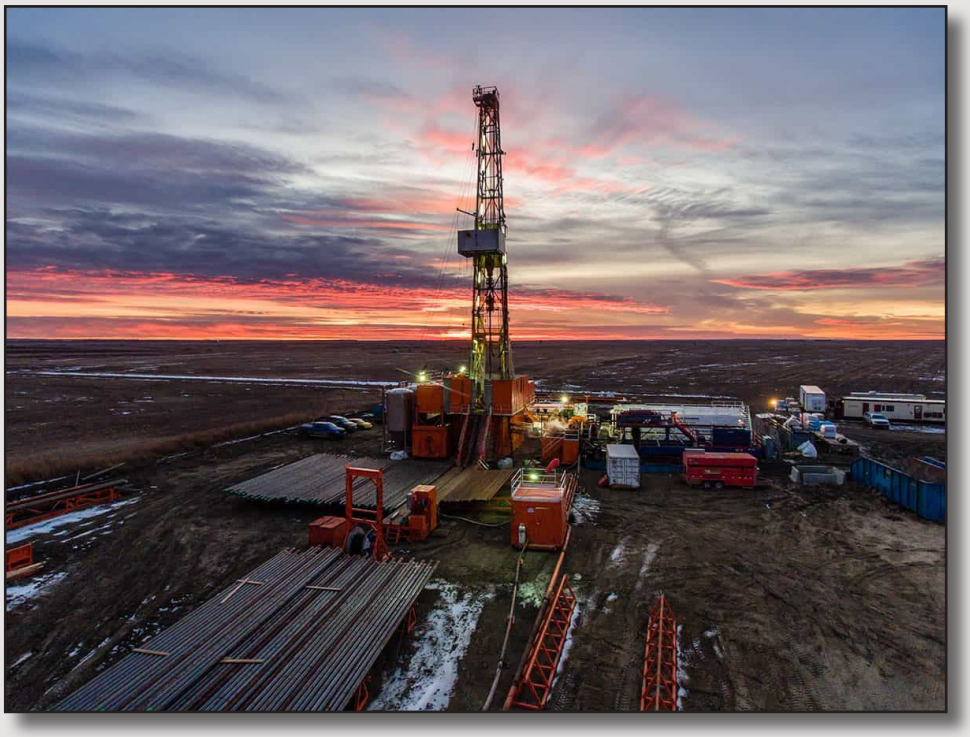

Figure 3. Deep Earth Energy Production (DEEP) drilling a deep geothermal well to the Deadwood Formation near Torquay, Saskatchewan (http://deepcorp.ca/gallery).

High-Level Radioactive Waste

Last legislative session we assisted in the passage of a bill (Senate Bill 2037) that did three things: 1) it repealed NDCC 23-20.2 Disposal of Nuclear and Other Waste Material, 2) created NDCC 38-23 High-Level Radioactive Waste, and 3) created NDCC 38-24 Underground Storage and Retrieval of Nonhydrocarbons. The prior law (NDCC 23-20.2), championed by former State Geologist Lee Gerhard, went into effect in 1979. It was determined that the state law needed a major overhaul to be in step with federal high-level radioactive waste regulations which could best be done by a total rewrite rather than amend the existing law. Among many things, the new law established a High-Level Radioactive Waste Advisory Council that consists of four legislators (two state senators and two state representatives), the state engineer, state health officer, the commerce commissioner, and the directors of the game and fish department, department of transportation, and department of environmental quality. In addition, the Governor appoints three of the members: a representative of county government, a representative of city government, and a representative of the agricultural community. The state geologist serves as executive secretary and State Senator Jim Roers is currently the council chairman. The advisory council met on November 4, 2019 to discuss the federal regulations and issues facing high-level radioactive waste and again on May 6, 2020 so that the council could review and approve a draft of the high-level radioactive waste rules written by the Geological Survey. The high-level radioactive waste rules (NDAC 43-02-13) went into effect on October 1.

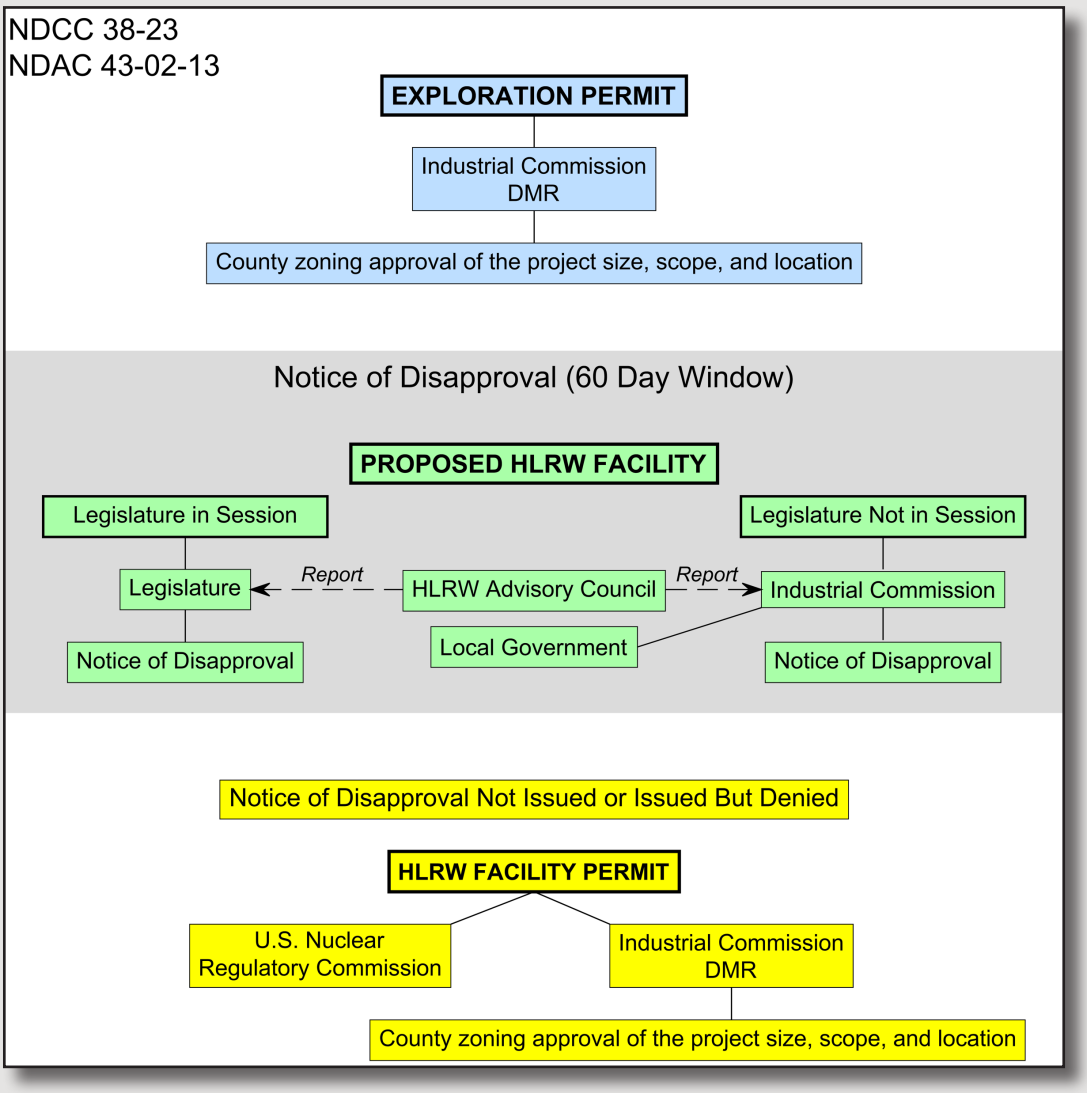

Figure 4. A flow chart of the state and federal high-level radioactive waste regulatory programs.

References

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