What Ever Happened to My 'World-Class' Nuclear Regulator? U.S. Showcases Dangerous Nuclear Reactor Designs

By Kelly Lundeen

If you do an online search for "world-class nuclear regulator" your results are filled with references to the "independent" and "rigorous" U.S. Nuclear Regulatory Commission, but that is changing. Maybe you've read headlines: "NRC Approves Construction Permit for TerraPower," the first commercial sodium-cooled fast reactor to ever reach this milestone. It is one of several risky reactor proposals that may finally get their day in the spotlight amidst a sweeping series of federal mandates calling for mass deregulation. Rules that would have kept "small," "modular," or "advanced" nuclear reactors safer are being wiped from the books. Proposals that were previously discarded as fantastical appear to be gaining traction in regulatory processes. And you're left wondering — how did we get to this point?

It's been almost one year since the nuclear industry was gifted with four executive orders. In a press conference, the president, the leaders of the Department of War and Department of Energy, and nuclear industry executives shared their plan to achieve "American energy dominance" with nuclear.

Unashamed, Secretary of Interior Doug Burgum explained that they simply plan "to turn the clock back on over 50 years of overregulation of an industry." The executive orders continue the degradation of an already highly flawed licensing process that began under former president Biden with passage of the 2024 ADVANCE Act. Through a fast-tracked licensing process, about 20 new reactors are making some regulatory headway, or at least headlines.

Reactor Licensing: Speeding Up and Slowing Down

A March 4 NRC press release announced the TerraPower Natrium reactor construction permit approval, "following a streamlined mandatory hearing process," and bragged that the "NRC staff finished their technical review of this new design in less than 18 months." This allowed little time for public input or environmental review. Whether the process is slow or fast, regulators nearly always give their seal of approval to nuclear projects, but cutting the licensing process down to a fraction of its previous timeline saves the nuclear industry a lot of money. Under a proposed Department of Energy (DOE) licensing process, some new reactors will be entirely exempt from adhering to the National Environmental Policy Act, which requires environmental assessments. Opposing the proposal, almost 50 organizations submitted comments to the DOE, which will serve as the basis for a lawsuit.

The new set of reactors are not the large, water-cooled, commercial units that have been operating for decades, and received licenses after a lengthy process under the NRC. So-called small modular nuclear reactor (SMNR) designs are lining up for approval through new programs; either expedited under the NRC, or extra-expedited under the DOE or Department of War.

The Nuclear Reactor Pilot Program was created under one of the May 2025 executive orders. Through this program, the hope of nuclear proponents is that the Department of Energy will give the initial thumbs up for a test version of SMNR designs without much hassle. Then, under a required, accelerated new process, the NRC will be asked to rubber stamp the DOE's initial approval.

One of the questionable proposals selected for this program is the hole-in-one Deep Fission 15-megawatt-electric (one megawatt is one million watts)reactor that would be buried one mile under Parsons, Kansas in a borehole that serves double duty as a waste storage site. It would be a pressurized water reactor using low-enriched uranium fuel. The sudden announcement of a groundbreaking ceremony in December produced a clamor of opposition by local residents. July 4, 2026 was the deadline set by Trump for a minimum of three of the eleven DOE reactor pilot projects to reach "criticality," the stage in which a reactor has a stable, self-sustaining fission reaction. On March 25, KRPS radio announced that the goalpost for this design was downgraded from "criticality by July 4" to "drilling test wells," without a specified end date.

Changing Coolant Does Not Make it Cool

Vital safety issues have been overlooked in the rush to produce electricity for the booming numbers of data centers under the guise of "national security." These reactor designs would have coolants different than water, including gas, liquid sodium metal, and molten salt. Physicist and mathematician Dr. Gordon Edwards recently laid out the essentials of why exploring any of these designs is illogical in a February webinar "Debunking Nuclear 'Hopium,'" just as other nuclear experts have done many times in the past.

Gas-cooled reactors have the same problem as any conventional water-cooled reactor. Meltdown is caused by loss of coolant, which can happen whether the coolant is water or gas. Liquid sodium metal burns spontaneously and explodes in a violent chemical reaction on contact with water. At the temperature required inside the reactors, sodium also burns upon contact with oxygen. Molten salt, on the other hand, explodes when exposed to air. Of the new test designs selected by the DOE and the Dept. of War, at least four are cooled with gas, four with liquid sodium, three with molten salt, two with light water and two with water, but nuclear energy doesn't change much no matter the coolant used.

Plutonium may become the fuel for the Oklo Inc. reactor sketched here under a DOE reactor pilot program. The nuclear industry relies on public and politicians' ignorance and fascination with technology to promote dangerous nuclear reactors. Photocredit: Oklo

Changing Fuel Does Not Make it Cool

Nuclear fission has some fundamental problems whichever way you split the atom. The new test reactor projects would be fueled by low-enriched uranium, high assay low-enriched uranium (known as HALEU), or metallic uranium-zirconium, and only whispers have been heard about Oklo Inc.'s Pluto reactor, which would use (shhhhh) weapons-grade plutonium as fuel. Nuclear energy involves the creation of radioactive waste, the risk of accidents, the task of decommissioning, and the creation of weapons material that is a target for terrorists. None of these problems goes away by switching to "small" or "advanced" reactors.

A Nuclear Catastrophe is Catastrophic

The nuclear industry works very hard to convince the public that nuclear power is safe. One company went so far as to name itself the "Ultra Safe Nuclear Corporation," but then it went bankrupt. Nano Nuclear Energy, Inc. bailed out Ultra Safe Nuclear Corporation and is reviving its project at the University of Illinois Urbana-Champaign to build a 15-megawatt helium gas-cooled "Kronos" research microreactor on campus.

Nano Nuclear Energy, Inc. submitted a construction permit application to the weakened NRC April 2, but has acquired $6.8 million from the state of Illinois.

CEO Jay Yu assured the public on Fox 32, "our technologies have no liquid coolant. They can't melt down. Even if you shoot a rocket at our fuel, it just passively cools. It would never blow up." This might be theoretically possible if the only type of nuclear accident is meltdown, defined as "heat damage causing significant change in the physical structure of the core and penetration of at least one barrier." Dr. Edwards clarifies, "when the uranium atoms are split, you have all those fission products building up and they're there.... You can't wish them out of existence. Anything that releases that material into the environment is going to be catastrophic for the neighboring environment.... That's what nuclear catastrophes are."

Reactors Breaking Ground

The federal government is pushing for eleven new reactors to be handled through the Nuclear Reactor Pilot Program. Under new expedited rules created by the DOE for the program, there are four stages: a design safety agreement, a preliminary safety analysis (based on the design being partially built), a final design phase (with the completion of construction), and a readiness review prior to startup. The first three steps are to be completed in 45 days. However, of those eleven reactor projects selected in August 2025, only four have reached the second step in the DOE process as of early April. Two more designs have completed the first step and several have "broken ground," but it's always fun to play in the dirt with a shovel if the newspapers will come to take a picture, whether you dig a hole or not.

"Small" Does Not Mean Clean, Affordable, or Fast

"S" stands for "small" in SMNRs, however, that is not reflected in the amount of radioactive waste that will be produced. Results published in the Proceedings of the National Academies of Sciences in 2022 "reveal that water-, molten salt-, and sodium-cooled [SMNR] designs will increase the volume of nuclear waste ... by factors of 2 to 30."

The TerraPower Natrium reactor is already on track to be the most expensive electricity produced in history. The 2025 World Nuclear Industry Status Report explains the economics. "TerraPower frequently states that the projected cost of the Natrium project is $4 billion; however, in a July 2024 interview, the company's co-founder, former Microsoft CEO Bill Gates, stated that its full development cost could be 'close to $10 billion.' With 345 megawatts of nuclear generation capacity, the cost would be $12,000-$29,000" per kilowatt.

The disadvantages of SMNRs are many, but the primary problem is the inherently dangerous nature of atomic fission. Reactor designs similar to those being proposed have been tested since the 1950s, and have caused serious accidents. Years of research and development are still required to get SMNRs past the testing phase.

The billions of dollars in federal and private investment in SMNR development is money stolen from market-proven renewable energy installation and battery technology innovation that don't produce deadly long-lived wastes.

Through bipartisan support of deregulation and expedited licensing, the nuclear industry seeks to shut the public out of the licensing process. This was already the case for DOE and Dept. of War projects, but is now also expanding under the NRC.

Communities nation-wide are exercising their right to be involved and slowing, if not stopping, some reactor proposals. Public involvement needs to be swift in shortened application process times and will be most effective pressuring local or state agencies. Smaller nuclear reactors are not safer, cleaner, cheaper, or faster. That's what renewables are for.

— Sources for this report are with the online version.