



Global Technical Training Services, Inc. Newsletter



### The State of the Industry

Sid Crouch, GTTSi Chief Technical Consultant

Is the reliability of our electric grid fading away? Since 2015 we added 220,000 MW of solar and wind and have retired 64,000 MW of coal-fired plants. Since more power has been added than lost, one might think this is good, but it's not. Why? Because the accredited capacity for coal-fired power plants is 90% while wind is only 17% and solar is currently 50% and will decrease to 20% as more solar is brought online. The result is a "shortfall" of grid supply capacity. The MISO (*Midcontinent Independent System Operator*) projects a shortfall of 71,000 MW by 2031. A loss of 37,000 MW is already planned for 2026-2028, but the EPA's proposed *Ozone Transportation Rule* will accelerate and increase retirements by 10% by 2025, and there are five more rules planned - *Coal Combustion Residual Rule*, *Effluent Limitations Guidelines*, *Regional Haze Rule* which replaces the Affordable Clean Energy Rule, the *revised Mercury and Air Toxics Standards*, and *Control of Air Pollution from New Motor Vehicles*. One way we could offset the shortfall is to keep our current nuclear fleet operating (*nuclear accredited capacity is 95%*), such as the situation at Diablo Canyon and working to bring Palisades back online. Another way is to bring on more natural gas-fired generation in areas where natural gas supply can accommodate it (*natural gas accredited capacity is 90%*). Another is for FERC (*Federal Energy Regulatory Commission*) and NERC (*North American Electric Reliability Corporation*) to work with the EPA in assessing our reliability risks and convince the EPA to hold back on some of their plans, at least until our grid reliability can be assured.

***I welcome your comments or questions - [sid.crouch@gttsi.com](mailto:sid.crouch@gttsi.com)***

## Highlights

Heroic Efforts This Past Christmas at Davis Besse

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Electrorefining-Based Reprocessing

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Lack of Fuel Delays Demo of TerraPower's Sodium Design

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Did You Know?

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GTTSi Job Board Update



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## HEROIC EFFORTS KEEP DAVIS-BESSE OPERATING CHRISTMAS 2022



*Lake Erie waves on lakeshore communities in northeastern Ohio and western New York.*

*Photo Credit: Energy Harbor*

*This past Christmas, when a rare weather disturbance called a seiche resulted in a low-level water intake situation for Davis-Besse's Nuclear Power Station, operators sprang into action to make sure the plant stayed operational. Their actions averted a potential shutdown of the plant and ensured continued power to customers during extreme weather conditions.*

Christmas day of 2022 was a brutal one for Ohio and Buffalo. The Ohio Turnpike had a 40-car pileup with 4 fatalities; Lake Erie's Lake level in the western basin reached the lowest level ever recorded; lakeshore communities in northeastern Ohio and western New York were dealing with water overflowing its banks, and Buffalo suffered over 40 fatalities from the freezing weather.

These extreme weather conditions were taking their toll and the plant operators at Energy Harbor's Davis Besse Nuclear Station were working to keep the plant operating and avoid a plant shutdown.

Due to the unique weather situation, a rare weather condition called a seiche (**pronounced SAY-sh**) was created by 30-50 mph sustained winds blowing from the west-southwest over Lake Erie. Water was being pushed from the

west to the east, resulting in a low-level condition for Davis-Besse's Intake Forebay (**below Technical Specification limitation**). The Intake Forebay level being below Tech Specs required a plant shutdown to Mode 3 within 6 hours. This was a major concern as the weather emergency was causing problems everywhere and a shutdown would mean rolling blackouts at the very least. So the Davis-Besse operators went into action - their experienced and well qualified team began to prepare documentation to enter a special Nuclear Regulatory Commission (**NRC**) process called a Notice of Enforcement Discretion (**NOED**). An NOED is a rarely used process recognizing that continued plant operation provides less risk to the public than a plant shutdown. Two critical factors weighed into the NOED decision; 1) the lake level would return to normal as the wind diminished and 2) a Cold Weather (**continued**)

## DAVIS BESSE continued



*Photo Credit: Energy Harbor*

Alert had been issued by the grid operator. If Davis-Besse could safely continue operation, the electrical demands of the public could be met. The NRC was notified of the NOED request while the plant operators took action to meet the six-hour shutdown requirement. In parallel, the Outage Control Center called in several plant personnel (**on Christmas Day**) to assist in pumping Lake Erie into the Intake Forebay to keep the unit online. Temporary pumps and piping were set up to bring in water from Lake Erie to the Intake Forebay. About two and a half hours into the six-hour shutdown window, the NRC granted a one-time, 48-hour exemption on the Tech Spec limit and provided a temporary lake level limit based on the NOED. This temporary lake level limit would ensure the Service Water Pumps could continue to provide cooling to safety-related plant equipment and ensure plant safety. Therefore, the plant shutdown was suspended and the plant was able to continue operation supplying the much-needed electricity for Ohio.

Recognition for this response goes to Shift Manager **Alex Huber** and his crew of **Josh Gregg, Spenser Spacek, Matt Allan, Tim Weldy** and **Josh Moses**. Duty Team members responding to the OCC including **Ryan Morris, Mike Boles, Rob Garber, Jon Strah, Greg Michael**, and **Barry Muller** also deserve a tip of the hat. Others to be recognized are Fleet PRA: **Aaron Quaderer** and **Ray Fine**, Engineering: **Robert Garber**, Regulatory Compliance: **Rob Oesterle** and **Gerry Wolf**, and Operations: **Dave Willard** and **Nick Downing**. Also recognized are other members of the fleet and the station teams who supported peer checks, reviews, and last but not least their experienced trainers **GTTSi team members Larry Gentry** and **Christine McKim**. 🇺🇸



**GTTSi Consultant Larry Gentry (middle -burgundy shirt) provides instruction on the Davis-Besse Simulator with one of the Initial License Operator Training Classes (not affiliated with the Christmas Day Event).**

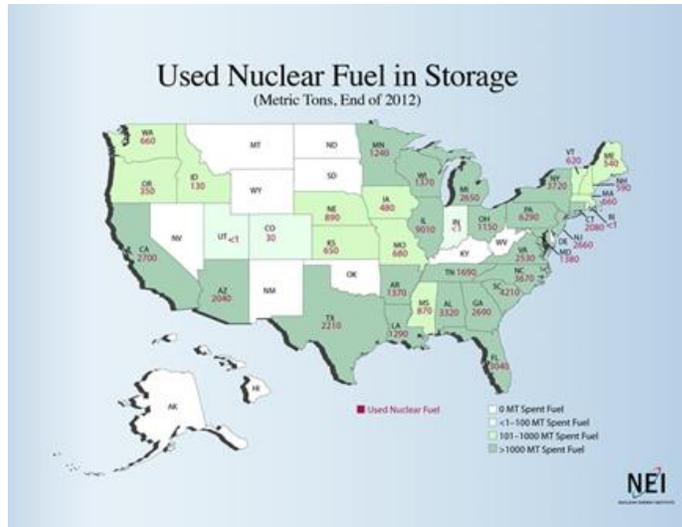
*Photo Credit: Larry Gentry*

## IS ELECTROREFINING-BASED REPROCESSING THE ANSWER?

Oklo Incorporated, founded in 2014 and the company that has the Aurora 1.5 MW Micro-reactor design, may have a solution for disposal of the used nuclear fuel assemblies in storage across 30 of our states (~80,000 metric tons).

Oklo has submitted an LPP (**Licensing Project Plan**) to the NRC (**Nuclear Regulatory Commission**) for a Fuel Recycling Technologies Facility. The LPP essentially outlines the company’s plans for “pre-application engagement activities that support the future licensing of a first-of-a-kind fuel recycling facility,” the company said on January 25, 2023.

The privately funded commercial-scale fuel recycling facility will produce a mixture of fissionable uranium and transuranic element isotopes, using an electrorefining-based technology to recycle the used nuclear fuel. This process differs from the legacy reprocessing method because electrorefining keeps the major and minor actinide elements combined. For this reason, many refer to the electrorefining process as inherently ‘proliferation-resistant’. Oklo also plans to use these materials to manufacture fuel for their fast micro-reactors. Once the Aurora 1.5 MW micro-reactor becomes operational, it will become "the first fuel-recycling commercial reactor in the United States". The DOE's Idaho National Laboratory (**INL**) said it will provide 10 tons of HALEU (**High Assay Low Enriched Uranium**) for the test reactor. Reprocessing would occur at INL's Materials and Fuels Complex (**MFC**) and possibly their Idaho Nuclear Technology and Engineering Center (**INTEC**), neither of which are yet operational.



One valuable attribute of the Aurora design is that it can be configured to operate on transuranic-based or HALEU-based fuel so an ultimate dependence on INL is not required.

According to Jacob DeWitte, co-founder and CEO of Oklo, launching the first-of-a-kind facility that will recycle used fuel from other reactors, as well as Oklo’s own reactors, marks an important next step for the company. “The ability to economically recycle fuel is an important attribute for developing domestic fuel supplies, and offering recycling services also presents a sizeable opportunity,” DeWitte said. “We are taking a major step forward in bringing meaningful fuel recycling capabilities domestically that will produce cost-competitive fuel.”

Although the NRC staff recommended the NRC discontinue Spent Nuclear Fuel reprocessing and the recommendation was approved in 2021, Oklo sent a letter to the NRC acknowledging that its submittal of an application for a fuel recycling (*continued*)

## ELECTROREFINING continued

facility “would be the first in many years, therefore requiring alignment with NRC staff on approaches to complying with existing requirements.” They believe there is a pathway to licensing a commercial fuel recycling facility through the existing NRC regulations with no need for new rulemaking. They are already engaged with the NRC staff on fuel recycling, and they intend to use the existing regulations “without delay”.

While the NRC denied their COLA (**Combined Operating License Application**) for the nuclear micro-reactor project planned for the INL, Oklo relaunched the licensing process for this project in September 2022.

To date, Oklo has won four Department of Energy (**DOE**) competitive awards for fuel recycling, including three awards granted in 2022. The four awards, which amount to about \$17 million, “involve technology development in support of commercializing production of advanced reactor fuel from used nuclear fuel (**UNF**)” – also referred to as spent nuclear fuel (**SNF**) or nuclear waste. In 2019, Oklo also notably received a “first-of-its-kind” site-use permit to build its Aurora plant at the INL site in Idaho Falls, Idaho; and in 2020 it became the first modern advanced reactor design firm to secure access to recycled HALEU fuel from INL for demonstration purposes. 🌐



*A rendering of the Aurora powerhouse, a 1.5-MW fission power system being developed by Oklo Inc.*

*Photo Credit: Oklo Inc.*

# LACK OF FUEL DELAYS DEMO OF TERRA POWER'S NATRIUM DESIGN

**Plans for the Natrium nuclear reactor being built in Kemmerer, Wyoming as a demonstration plant have been delayed about 2 years due to...the war in the Ukraine?**

The Natrium sodium-cooled nuclear reactor being built at the Naughton coal-fired power plant site was to be online by 2028 but is facing delays because its only source of fuel – HALEU (***High-Assay Low-Enriched Uranium is greater than 5% U-235 but less than 20% U-235***) is only available from Russia, which is at war with Ukraine. HALEU fuel is needed for the first core load. Afterwards depleted or spent fuel can be used because it creates or breeds new fissile material.

Chris Levesque, President and CEO, said, "TerraPower remains fully committed to bringing the Natrium demonstration plant to Kemmerer, Wyoming. While there is much we can't control as it relates to fuel availability, what we can control is construction of the plant, licensing applications and engineering and design work; and Terra Power is moving full steam ahead on those fronts."

TerraPower, the Department of Energy (**DOE**), Congressional allies, and project stakeholders have aggressively explored potential alternative sources for HALEU and are working with Congress to support HALEU manufacturing



*Photo Credit: Adobe Stock*

options in the U.S. Those options, however, will not be available in time to meet the 2028 in-service date originally proposed.

Kemmerer Mayor Bill Thek said, "I'm not overly concerned. It is still going to happen. It will be better for the state and for our country if we mine our own uranium over on South Pass and send it to Utah to be enriched. Then we won't have to depend on other countries for our energy needs. TerraPower is still on track for starting construction this spring. This delay just gives the government and industry time to solve the problem of getting our own uranium."

Levesque confirmed that construction on the sodium-cooled reactor facility, slated to begin in the spring of 2023, will continue as planned, and Terra Power expects minimal disruption to the current projected start-of-construction date. He added that the company is still planning on a peak workforce of up to 2,000 workers in the mid-2020s and they currently have 800 engineers finalizing plant design and engineering. 🌐

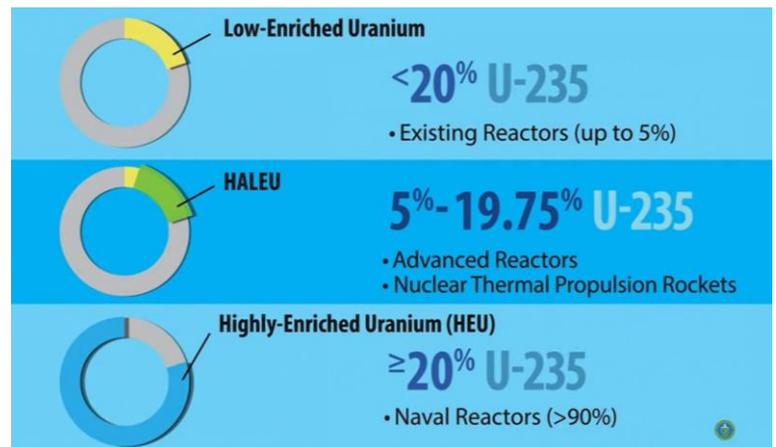
## DID YOU KNOW?



*Photo Credit: World Nuclear News*

NuScale filed an application for certification of their SMR (small modular reactor) design in December of 2016. The Nuclear Regulatory Commission (NRC) accepted it for review in March 2017. In August 2020 the NRC issued a final safety evaluation report, putting the design on track to receive full design certification. And just weeks ago the NRC certified the VOYGR SMR design. This makes the VOYGR SMR only the seventh reactor design approved for use in the United States. Final certification allows utilities to reference the NuScale design when applying for a combined license to build and operate a reactor. The Department of Energy is working with UAMPS (Utah Associated Municipal Power Systems) through their Carbon Free Power Project to demonstrate their six-module NuScale VOYGR plant at the Idaho National Laboratory. The first module is expected to be operational by 2029.

Nine of the 10 designs awarded under the DOE's Advanced Reactor Demonstration Program (ARDP), require HALEU (**High Assay Low Enrichment Uranium**) fuel. HALEU fuel is uranium that has been enriched so that the concentration of the fissile isotope U-235 is 5- 20% of the mass of the fuel. This is higher than the 3 -5% U-235 concentration, or "assay," of Low-Enriched Uranium that fuels our existing fleet of light water reactors in the U.S. Currently, HALEU is only available from the DOE via down-blending of existing stockpiles of material, or commercially via TENEX, a nuclear fuel company owned by Russian state-owned company Rosatom.



*Photo Credit: Image from the video "What is High-Assay Low-Enriched Uranium (HALEU)?" released by the DOE in April 2020. (Source: DOE)*



*The 120 MW Jackpot Solar Plant. Idaho ranks 28<sup>th</sup> in installed solar (630 MW) in the U.S.*

*Photo Credit: Duke Energy*

Duke Energy now has more than 10,000 MW of solar and wind energy. You might think it's in the Carolinas, where Duke is home-based out of Charlotte, NC, but it's not. Duke declared Idaho's largest solar plant commercially operable earlier this year. The 120 MW Jackpot Solar Plant will provide energy to Idaho Power Company through a 20-year PPA (Power Purchase Agreement). Jackpot Solar Plant sits on 952 acres, just south of Twin Falls, Idaho. Duke Energy not only owns the plant but will also operate it. This is just an extension of Duke Energy's plans to reach 16,000 MW of renewables by 2025 and 47,000 MW by 2050.

**MARCH 2023**

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## GTTSi Job Board

GTTSi has been providing professional services to the energy and nuclear industry since 1980. We are an MWBE (*minority woman-owned business enterprise*) and have served over 80% of the US commercial nuclear facilities, 8 Federal agencies and prime contractors, and one foreign government. If you are qualified and interested in any of the job opportunities listed below, please contact us at [ginfo@gttsi.com](mailto:ginfo@gttsi.com) or call **864.882.3111**.



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