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NRC considers eliminating half-century-old radiation standard

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The principle that radiation exposure should be as low as possible to protect human health has endured at the Nuclear Regulatory Commission for more than half a century.

The NRC is now taking its first steps to end that standard.

Under a policy proposal circulating inside the NRC, nuclear power plants would no longer be required to keep radiation doses "as low as reasonably achievable," called the “ALARA” principle. Instead, nuclear power operators and medical workers would need to keep radiation levels under maximum dose limits, some of which would be loosened under a draft rule, according to three people familiar with the proposal.

The ALARA principle has been the subject of fierce debate since it was first put forward in the 1950s, and then made into a regulatory standard in the mid-1970s. Many in the nuclear industry argue that it has made it more expensive to build and maintain nuclear power plants without enhancing safety. Regulators have defended the principle as appropriately conservative in light of limited data about whether low-dose radiation causes cancers.

“We have learned a lot more about the impact of radiation exposure on public health, and it's time that we reconsider that,” NRC Chair Ho Nieh told reporters last week.

The proposal to relax the radiation standard comes as the Trump administration pushes to expand nuclear power after decades of slow or no growth. The White House has thrown support behind the development of smaller-scale advanced reactors, a corner of the nuclear industry that's attracted Silicon Valley startups. The administration has set the goal of quadrupling U.S. nuclear output by 2050, largely to power energy-intensive artificial intelligence data centers.

The commission action comes 10 months after Trump signed an executive order calling ALARA “flawed” and telling the agency to “reconsider reliance” on the standard. In January, Energy Secretary Chris Wright signed a memo to remove ALARA from all Energy Department directives and regulations.

While the memo decision only applied to DOE sites, the NRC's move would apply to nearly the entire U.S. nuclear industry — including all 54 nuclear power plants, 11 fuel cycle facilities and thousands of medical facilities, universities, and industrial entities that use radioactive materials.

The DOE's move at the start of the year sparked a sharp divide in Washington, pitting proponents who view the move as a necessary step to accelerate nuclear energy against critics who warn that weakening such foundational safeguards is a danger to public health.

“There is no safe level of radiation, and ALARA is a foundational safeguard that protects workers and surrounding communities,” Rep. Diana DeGette (D-Colo.) told POLITICO's E&E News after DOE stripped the standard from its regulations.

"We've already seen how political interference and understaffing at the NRC undermine safety, and I strongly oppose any effort — whether at DOE or NRC — to weaken standards in the name of speed,” said DeGette, an original co-sponsor of the ADVANCE Act, the nuclear regulatory overhaul passed in 2024.

'Graded approach'

Sources with knowledge of the NRC proposal, granted anonymity to discuss sensitive information, said the draft rule would discontinue ALARA terminology, the Linear No-Threshold model and a 2 millirem hourly dose limit from NRC regulations.

The proposal would further add regulatory mechanisms to enable licensees to exceed the annual radiation dose limits of 5 rem for workers and 100 millirem for the public. It would increase the maximum dose a caregiver of a medical patient exposed to radiation treatments could get by tenfold to 5 rem.

The draft would adopt a "graded approach," which typically means tailoring the stringency of regulatory requirements to the level, likelihood and potential consequences of radiation risk.

It features an occupational dose limit extension that would allow workers to exceed the annual 5 rem limit by drawing from a pool of unused exposure accumulated over the previous five years, according to one NRC staffer.

A February peer-reviewed study published in the journal Nature Communications suggests that adults living near nuclear power plants face a higher risk of death from cancer. But the paper has been criticized by some nuclear experts, including for not measuring actual radiation doses.

People typically receive 300-400 millirem of radiation pear year from natural sources, such as cosmic rays and radon gas. A rem measures the biological effect of ionizing radiation on the body.

"The good news is that even at the levels that we see of 100 millirem for public dose and 5 rem for occupational dose, these are still very low levels of radiation," said Steven Biegalski, chair of the Georgia Institute of Technology's Nuclear and Radiological Engineering program. "We have really no evidence to show that there is a negative health effect as a result of those doses."

Nieh, the NRC chair, confirmed that commissioners have a draft rule before them on ALARA's fate, but he did not disclose its contents. He further stressed that a final decision had not been made and that the agency was "not being pressured" by the White House to take specific action.

An NRC spokesperson said the commission aims to publish the proposed rule for public comment by April 30.

'We don't have scientific certainty'

High radiation doses have long been understood to cause a variety of cancers, but the lower doses emitted from operating nuclear reactors have a shakier link. There is evidence that low-dose radiation is harmful, neutral, or even beneficial to human health.

"We don't have scientific certainty," said Mike Lewandowski, president of the Health Physics Society, which was created in 1956 to help address radiation risks.

In the late 20th century, nuclear regulators worldwide decided to adopt the Linear No-Threshold model, or LNT, which assumes there is no safe dose of radiation. The model was, in part, justified by what's called the Benzene Case, a 1980 Supreme Court decision on regulating carcinogens.

"We have, for decades, applied Linear No-Threshold as a simplification that allows us to regulate radiation exposures from a number of different situations," Lewandowski continued.

Indeed, he said the ease of applying the model is a major reason LNT remains in use despite a general consensus among radiation health experts that it oversimplifies the relationship between radiation exposure and cancer risk. A recent survey of radiation protection experts published in *Health Physics* found that only 3 percent believe LNT is accurate, while 73 percent think evidence is inconclusive about the right model at low doses.

But once LNT was in place, ALARA was the natural result: If any radiation is harmful, it should be minimized — economic and social factors being taken into account.

By removing ALARA and reverting only to dose limits, it's unclear what health impacts would result. In the *Health Physics* paper, 61 percent of radiation protection professionals thought the 5 rem worker dose limit shouldn't change, while 53 percent thought the 100 millirem general public limit should increase.

Clear increased risk of cancer only starts at around 10 rem lifetime exposure, according to the Health Physics Society.

Members of the public wouldn't realistically reach that figure under the NRC dose limits. Although nuclear workers could hit that mark, historically, their exposure is low enough that few would reach 10 rem.

“Does that mean that there's no risk below that? It doesn't necessarily mean that,” Lewandowski said. “What it means is that the uncertainty is so great, we can't tell if it's of increased risk or not.”

'Mend it, not end it'

To aid its cost-benefit analyses, the NRC assigns a dollar value to the health benefits of decreasing radiation exposure. If it costs less than that value to remove radiation, it's generally worth it. If it costs more, it usually isn't.

After adjusting for inflation, the current NRC value is at an all-time high of $7,100 per rem per person — two-thirds higher than the NRC's 1995 value. Add in the inconsistent application of the dollar value, and many see the use of ALARA as too onerous and subjective.

The nuclear industry is filled with anecdotes about companies being sent back to the drawing board with plans that met dose limits but could reduce radiation even further. Maybe a reactor needs another layer of radiation insulation, or a worker needs more shielding before refueling can proceed.

“Even if we put in some sort of additional factor to account for our uncertainty at low doses and low dose rates, we've had situations that have gone far below that — and they cost American society billions of dollars,” Lewandowski said. “Every penny of that cost gets shifted to the ratepayer.”

Georgia Tech's Biegalski pointed to the Fukushima nuclear accident as another example, saying that a rushed evacuation driven by fear of radiation took sensitive patients out of needed care, ultimately resulting in their deaths.

Then, there's the cleanup of the Fukushima coast — such as removing radioactive topsoil.

“These radiation doses that they're targeting are lower than just natural levels that people would receive around the world, and this has impacts of tens of billions of dollars,” Biegalski said. “ALARA was used in a way that probably caused more harm than good.”

Judi Greenwald, president of the Nuclear Innovation Alliance think tank, noted in a February blog post that hard evidence of ALARA's cost impacts is scarce and cuts both ways.

“For example, requiring the use of respirators makes sense to avoid high radiation doses," she said. "But its benefits in low-radiation environments may not be worth the added costs and risks of heat stress and reduced visibility.”

She advocates to “mend it, not end it,” refining what is "reasonably" achievable in practice while maintaining ALARA as a general principle.

Emily Caffrey, director of the University of Alabama at Birmingham's Health Physics program, says the standard broadly works as intended. The 5 rem limit is the “ceiling,” but ALARA encourages individual facilities and jobs to enhance protection.

“In the real world, most monitored workers get a few dozen [millirem] a year, a tiny fraction of a percent of the legal limit. That's not an accident; it's the ALARA system working as designed,” she said. The question Trump's executive order provoked, she added, “is whether all those layers are still justified given the science, or whether some have become regulatory theater.”

Even so, the standard might continue in practice regardless of the NRC's decision.

For an advanced nuclear company such as California-based Oklo, it may not make sense to change its approach. The Sam Altman-backed startup plans to build its Aurora small modular reactors to service everything from military bases to data centers.

“Oklo has publicly committed to ALARA-based radiation protection,” said Oklo spokesperson Bonita Chester.

“If the NRC were to change that standard, Oklo would need to evaluate the implications carefully,” Chester continued. “At this stage it would be premature to speculate publicly on whether any such change would materially affect the Aurora powerhouse design or its construction and operations.”

Greenwald points to other institutions besides the NRC that could influence ALARA's cultural survival.

“The industry-led Institute of Nuclear Power Operations sets a high bar for radiation protection best practices with which its members comply and to which insurance companies pay attention,” she wrote.

But Caffrey notes that the culture of the industry and its institutes largely came from regulatory oversight.

“The safety culture of the existing plants was built over 60 years,” she said. The new reactor developers don't automatically have the same mentality.”