

## BYU statistician calculates uncertainty of aging U.S. nukes

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(PhysOrg.com) -- How do you test a not-so-young nuclear stockpile for the effects of age when you can't detonate any for the sake of finding out?

The U.S. government has not conducted live nuclear tests since the early 1990s, but a BYU scientist is providing some solid answers - without setting off any weapons.

In a new study for the journal *Technometrics*, statistics professor Shane Reese and his former colleagues at Los Alamos National Laboratories calculated the certainty of America's nuclear weapons working if they're supposed to (and not working when they're not supposed to).

"The purpose is to perform science experiments to get at the efficacy of a weapons system that has exceeded its original design life and certainly experienced some effects due to aging," Reese said.

With non-nuclear weapons, reliability testing is a simple matter of going out in the desert every so often and firing a few rounds.

But with their nuclear arsenal, the government instead selects 11 weapons at random from each of nine stockpiles. Scientists completely dismantle the sampled weapons and inspect every component for signs of degradation. More details about the process can be [found here](#).

Since that gets expensive, the point of Reese's study is to compare how

the level of reliability would change if fewer nukes were inspected each year - or none at all.

Using sophisticated statistical techniques, Reese and his coauthors arrived at two main conclusions. If the government cut monitoring in half, confidence in the system's reliability would drop from 95 to 80 percent within seven years. And if monitoring stopped altogether, the reliability would drop to almost the same odds that you'd find with flipping a coin.

"It's commonly suggested that we turn off data collection or slow down data collection," Reese said. "When you are fairly certain that you have an aging stockpile, our study shows that ignoring the problem by not collecting data is a huge mistake."

The project is personally fulfilling to Reese because his father-in-law lived downwind from the Nevada Test Site and ultimately died from the effects of radiation exposure. Statistical research like this reduces pressure to resume live tests.

"I do think what we're doing has an impact and removes the need for gathering data using traditional testing that has adverse impacts on human and environmental health," Reese said. "It at least helps us manage the uncertainty."

The National Academy of Sciences has also invited Reese to participate in a panel that will analyze how to destroy biological and chemical weapon stockpiles in a way that's safe for the staff involved and for the environment.

Provided by Brigham Young University

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