

# Testing Nuclear Weapons without Explosions

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The Sandia National Laboratories in Albuquerque, New Mexico, use technology to solve challenging problems that affect the national security of the United States. Statisticians at the national laboratories participate in a full range of research and development projects that contribute to national security. The Sandia National Laboratories were born out of the World War II atomic bomb project, and many of their responsibilities still concern nuclear weapons. In particular, my group is responsible for guaranteeing that the nation's stockpile of nuclear weapons remains safe and reliable even though we no longer test weapons by detonating them. Statistics plays an important role in this work.

As a statistician and manager of the stockpile evaluation program, I oversee the development and operation of a statistical sampling plan for testing each weapon system in the nation's stockpile. On an annual basis, weapons are sampled from the stockpile, disassembled, inspected, denuclearized, and reassembled for testing either in a laboratory or in actual flights from military bases.We analyze the results of the laboratory and flight evaluations and investigate anything unusual disclosed by the data. The testing and investigation, in coordination with other assessment and certification efforts, help to ensure the health and performance of the overall stockpile. Other groups at Sandia are concerned with making certain that weapons cannot detonate accidentally and with improving our ability to detect weapons of mass destruction. Statistical simulations and data analyses play a role in these efforts as well.

As our stockpiles age and grow smaller due to nuclear weapons reduction agreements, and actual testing of weapons remains out of the question, evaluation will become yet more challenging. Because stockpile evaluation is based on statistical sampling, statistics will continue to play a key role in ensuring the continued safety, security, and reliability of the nation's stockpile.