

Issue Update—Subcritical Tests

Western States Legal Foundation

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We have received several inquiries about the current status of “subcritical” nuclear tests at the Nevada National Security Site (NNSS, formerly known as the Nevada Test Site).¹ This update provides a brief summary of current information on subcritical tests, but some open questions remain regarding the nature and timing of the next round of subcritical experiments.

“Subcritical” tests (officially labeled “subcritical experiments” or SCE’s) are conducted underground at the NNSS U1A complex, a vast warren of tunnels deep beneath the desert. These tests are called “subcritical” because they use fissile materials but create no self-sustaining nuclear chain reaction. Most subcritical tests employ plutonium which is imploded with high explosives or shocked in various ways. The data from these tests is integrated, using some of the world’s fastest supercomputers, with that from a variety of other physical experiments and archived data from more than 1000 full scale nuclear test explosions in a continuing effort to expand nuclear weapons knowledge that both sustains the huge existing U.S. nuclear arsenal and contributes to efforts to develop nuclear weapons with new capabilities.

The United States has conducted 26 subcritical tests at the U1A complex since 1997. The most recent were “Barolo A,” December 2010 and “Barolo B,” February 2011. A full list of subcritical experiments can be found in Jonathan Medalia, “Comprehensive Nuclear-Test-Ban Treaty: Background and Current Developments,” Congressional Research Service Report for Congress, October 5, 2011, pp. 31-32.² Subcritical tests are now reported after the fact in the quarterly “Summary of Experiments Conducted in Support of Stockpile Stewardship,” although they are not listed by name. These summaries can be found at <http://nnsa.energy.gov/ourmission/managingthestockpile/sspquarterly> More information about subcritical experiments appears occasionally in the Nevada National Security Site publication “Sitelines,” including test names and official descriptions of the purpose of the tests (although it seldom amounts to more than boilerplate language).³

The next subcritical test series originally was expected to be completed by the close of the 2012 Fiscal Year, which ended on September 30, 2012.⁴ The National Nuclear Security Agency (NNSA), which runs the U.S. nuclear warhead program, has dubbed the series “Gemini.” The Gemini series is slated to include two preparatory tests, “Leda” and “Castor,” using surrogates for special nuclear material, followed by “Pollux,” a test using special nuclear material (likely plutonium). Castor and Pollux are to be conducted using a large, dual beam high energy x-ray imaging system called Cygnus, located underground in the U1A facility where the tests are conducted.⁵ According to materials submitted by the Department of Energy to the Defense Nuclear Facilities Safety Board, “[t]he Gemini Project was designated by the NNSA Defense Programs Deputy Administrator as a high-priority demonstration that integrates a scaled subcritical experiment with special nuclear material.”⁶

According to the Federation of American Scientists and the Union of Concerned Scientists,

“...scaled experiments are subcritical, core-punch, hydrodynamic tests designed to conduct experiments in an implosion geometry that is essentially identical to an actual warhead design,

but reduced in size. Rather than a full-scale warhead with the plutonium replaced by other material, a one-third to one-half scale model is built that does use plutonium. At a half-scale size, only one-eighth of the plutonium in an actual warhead is required. The smaller amount of plutonium keeps the explosion from beginning a nuclear chain reaction. Eventually, NNSA wants to build scaled experiments to almost three-quarters (0.7) the size of a full primary.” [emphasis added].⁷

However, as the above 2011 FAS and UCS commentary on subcritical tests pointed out, the Senate Energy and Water Appropriations Subcommittee included language aimed at barring funding for scaled subcritical tests in FY2012.⁸ At the time of this writing, we have not been able to discover when the Gemini test series, apparently including a scaled subcritical experiment, will be conducted, or whether it will be conducted in a manner consistent with the Senate report language.

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² <http://fpc.state.gov/documents/organization/175898.pdf>

³ See, e.g. “NNSA Successfully Completes Major Subcritical Experiments,” *Sitelines*, V.2#1, Winter 2012, http://www.nv.doe.gov/library/publications/sitelines/SI_Vol02_Iss01.pdf

⁴ U.S. Department of Energy, “Supplement to Department of Energy Activities Relating to the Defense Nuclear Facilities Safety Board Fiscal Year 2011 Site-Specific Activities,” May 2012, p. 21. <http://www.hss.doe.gov/deprep/archive/documents/DOE-AR2012May-Supplement.pdf>

One of the inquiries we received regarding subcritical testing directed us to an article published by the web site NuclearCrimes.org, “First U.S. Subcritical Nuclear Test Involving Warhead Mockup To Happen By Year's End,” September 25, 2012, <http://www.nuclearcrimes.org/pollux.php>, another version published as “Revival of Nuclear Arms Race: US Conducts New Underground Nuclear Tests,” September 30, 2012, by Global Research at <http://www.globalresearch.ca/revival-of-nuclear-arms-race-us-conduct-new-underground-nuclear-tests/>

⁵ Deyoung, Anemarie and Smith, John R., “P-23 Highlights 6/10/12: Cygnus Dual Beam Radiographic Facility Refurbishment completed at U1A tunnel in Nevada NNSA meeting Level 2, milestone,” Los Alamos National Laboratory Report, LA-UR-12-21102, June 10, 2012, p.1.

⁶ U.S. Department of Energy, “Supplement to Department of Energy Activities Relating to the Defense Nuclear Facilities Safety Board Fiscal Year 2011 Site-Specific Activities,” May 2012, p. 20. <http://www.hss.doe.gov/deprep/archive/documents/DOE-AR2012May-Supplement.pdf>

⁷ Union of Concerned Scientists, “Hydrodynamic Tests: Not to Scale,” September 15, 2011, <http://allthingsnuclear.org/post/10248715583/fy12ssmpost3>

⁸ Senate Report 112-75, Energy and Water Development Appropriations Bill, September 7, 2011, [To accompany H.R. 2354] p. 101. <http://www.gpo.gov/fdsys/pkg/CRPT-112srpt75/pdf/CRPT-112srpt75.pdf>

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