What is the National Nuclear Security Site – Nevada Test Site?

Brief History

The National Nuclear Security Site (NNSS) is a land area of approximately 1,360 square miles (larger than the state of Rhode Island) and is one of the largest restricted access areas in the United States. The December 13, 1950 meeting of the Atomic Energy Commission approved the Nevada Test Site (NTS) as a continental nuclear weapons proving ground, but only for emergency uses. However, the "emergency" was quickly justified by the invasion of North Korean troops into South Korean territory.[1] On January, 21, 1951, a month after the AEC meeting, in a test code-named Able, a two kiloton atomic bomb was airdropped to the floor of the Nevada desert at the Las Vegas-Tonopah Gunnery Range, marking the first of five atomic tests conducted that spring and the first of over one thousand tests eventually conducted there.

The U.S. War Department (now Defense Department) deemed it necessary to create a domestic nuclear weapons testing location. The process to determine a continental location for nuclear weapons testing, documented in the "Nutmeg" papers, which reveal a process in which stated safety criteria for site selection gradually gave way to unstated sociological and political criteria.[1] Despite assurances from the government about the lack of danger to the general public the Nevada Test Site was chosen because its populations were politically powerless and its landscape was judged expendable, not because it was the safest area in terms of fallout risks.[1] However, there were and remain populations "downwind" of the site which were impacted by radioactive fallout.

[NOTE: In the interest of continuity of nomenclature and also recognizing that an official name change has taken place, NTS and NNSS are used interchangeably in this Brief.]

Current Activities

Weapons design and development was and remains primarily the responsibility of the U.S. National Laboratories at Los Alamos New Mexico (birthplace of the first nuclear weapon), Livermore California, Oak Ridge Tennessee, and Hanford Washington. The NNSS (Nevada Test Site) has been the proving grounds taking the brunt of the environmental and human health impacts; however, fallout effected people far beyond the boundaries of the Nevada Test Site. Experiments are generally conceived and overseen by teams from Los Alamos or Livermore and then carried out at the NTS in conjunction with employees and contractors from Nevada. The Nevada Site Office of The National Nuclear Security Administration of The Department of Energy officially oversees operations at the Nevada National Security Site. National Security Technologies, LLC. is a private contractor which manages the NNSS for the NNSA-NSO.

From 1951 to 1962 100 atmospheric nuclear explosions occurred at the Nevada Test Site with an overall explosive power of ~1,327 kt[2] (1 kt = 1,000 tons TNT equivalent) and releasing millions of curies of radioactivity into the atmosphere. In 1963 the US government signed the Limited Test Ban Treaty, which ended ground and air nuclear explosions, but nuclear weapons explosions testing continued underground until 1992. The below ground testing resulted in 828 underground tests, (consisting of 921 weapons detonations)[3] releasing in excess of 132 million curies (from 1994 inventory)[4] of radioactive particles; some within the groundwater.

Current activities at the Nevada Test Site (NNSS) still revolve around weapons experimentation. The primary mission of the NNSS is to support "nuclear weapons stockpile reliability through subcritical experiments."[5] This means to assure that US nuclear weapons can deliver the explosive power expected without failure. To do so "special nuclear materials" such as plutonium are needed in a variety of experiments to verify computer modeling and enhance the understanding of these materials under the physical condition leading up to a nuclear explosion (conditions just prior to criticality, so subcritical). The Nevada Test Site remains an integral part of the U.S. nuclear weapons complex and in the development of new nuclear weapons.

The Nevada Test Site also serves as a waste disposal site, which includes low-level radioactive waste (LLW), mixed low-level radioactive waste (MLLW), transuranic (TRU) waste, mixed TRU waste, hazardous waste, asbestos and polychlorinated biphenyl (PCB) wastes, hydrocarbon-contaminated soil and debris, and solid wastes such as construction debris or sanitary solid waste. Some this waste is generated on-site, but a large volume is from other government facilities since 1997. These shipments vary in radioactivity considerably ranging from xx to xx and have amounted to about 18 million cubic feet from 2000 to 2010.[6] An average of 1,550 (this figure varies widely) shipments per year have been arriving at the Nevada Test Site truck using route shown to the right and is dumped in unlined trenches at the Nevada Test Site.

Towards the northwest corner of the NNSS is Groom Lake, also known as Area 51, one of the most secretive areas for military research in the world. UFOs and stealth aircraft coexist there and in people's fanciful imaginations. At the same time, secret airstrips for drone aircraft tests have been photographed from satellite.[7]

In addition the Nevada Test Site supports other research, development, and testing programs related to national Security, and provides opportunities for various environmental research projects and the development of commercial-scale solar energy projects, as well as innovative solar and other renewable energy technologies.

Historical Radioactive Contamination

There are three main sources of radioactive contamination from the nuclear testing period (1951 – 1992): 1) above ground weapons tests, below ground weapons tests, and safety tests. The above ground tests resulted in enormous amounts of air borne radioactivity, which then fell out over "downwind" areas often as far away as New York state. In 1997 the National Cancer Institute published fallout maps for radioactive Iodine-131 and dose estimates. These maps yield a sense of the scope of impact from the above ground testing period. Scores of other kinds of radioactive particles were released as well, some disintegrating almost immediately, but others persist today.
The below ground tests have created pockets of radioactive rock where the nuclear explosion occurred, and for those tests conducted below or at the groundwater level come radioactivity has migrated into the groundwater. The full extent of this is still not clear. Safety tests were conducted with plutonium primarily and did not involve nuclear explosions but rather high explosives that spread large amounts (in terms of the toxicity of plutonium) in the Nevada desert. These tests were done in the northern most portion of the Nevada Test Site and just north in the Nevada Test and Training Range, and the Tonopah Test Range.

Surface Contamination

The Nevada Test Site has a "Soils Program" to determine the extent of surface contamination and develop mitigation plans for these areas, which may involve soil remove. There are approximately 100 radioactive soils sites[5], where the hot spots have been from the safety tests, "plowshares" test (Sedan Crater area), and some above ground test areas. However, extent to which these areas have been cleaned up is unclear. Over time some of the longer lived radioactive particles have been taken up by plants in the area or concentrated in drainage gullies. The figure below indicated locations of the radioactive soils sites.

Groundwater Contamination

The greatest risk to the public is the contamination of the groundwater from the numerous underground nuclear explosions. Of the radioactive atoms, tritium (radioactive hydrogen) has been identified as the most likely to present a public impact. It is the tests conducted at Pahute Mesa (see map) that are nearest to the boundary of the Nevada Test Site and where groundwater is flowing in the direction of drinking water wells. Tritium has already been detected at off-site wells[5], but not at any drinking water source as of yet. The half-life of tritium is about 12.3

years, which means that it will remain in the environment and a potential hazard for about 200 years. The plan of the Dept. of Energy (DOE) has been to monitor groundwater and supply replacement water if the tritium reaches drinking water sources. The only other method of remediation is to install a series of pumpback wells to prevent the tritium from traveling off-site. This procedure has been done in other places, and it is very expensive. It is likely that DOE does not consider this action to be feasible.

In addition to tritium is a whole host of other radioactive isotopes (types of atoms that have the potential to migrate in the groundwater. When an underground nuclear explosion occurs a large amount of the rock is liquefied, and as a liquid the rock takes up less space. Once the test area cools the liquefied rock solidifies in a "glass ball" leaving a large air space above it, which typically collapses to some extent, leaving what is called a subsidence crater on the surface. It has been assumed that most of the radioactive atoms are trapped in the "glass ball," with tritium and a few other radioactive isotopes leaching out over time. So, DOE remains focused almost entirely on tritium as a public health risk. Yet there is data that these other isotopes have migrated out of these nuclear explosion areas (test shots). Most notable was the appearance of plutonium 1.3 kilometers from the "Benham" test shot in Pahute Mesa in ~30 years, reported in 1999.[8] Up to that point it had been assumed that plutonium could not travel in the ground water at that rate, but there is a mechanism previously not considered involving microscopic clay particles that "taxied" the plutonium. Plutonium like other radioactive isotopes such as cesium-137 may be a greater long-term threat since they have much longer lifetimes (plutonium-239 has a half-life of 24,000 years, so a hazard life of about 200,000 to 300,000 years).

Conclusion

Despite an end to the Cold War and a decrease in the number of nuclear weapons in the United States stockpile and worldwide, spending on nuclear weapons has increased steadily. (See graph other side.) The purpose of maintaining nuclear weapons remains arguable within military circles, yet secrecy makes it difficult for the general citizenry to weigh in or even know the parameters of the discussion. Environmental Impact Reviews are rare instances for public involvement, but they are extremely limited in scope. Even some in the military question the need for further testing of missile, bomb and warhead components to be certified for use as expected.[9] Finally, it must be stated that the Western Shoshone Nation, Newe Sogobia, still have legal rights to the NNSS (and most of Nevada, as well as parts of Idaho, Utah, California and Arizona) per the Treaty of Ruby Valley, signed in 1863. Old as it is, that law remains valid and should be respected once and for all.

[1] Mackedon, Michon, “Southern Sunrise; Northern Exposure,” In Focus, Volume 11, 1997-1998,

[2] U.S. Dept. of Energy, *United States Nuclear Tests July 1945 through September 1992,* DOE/NV--209-REV 15, December 2000.

[3] U.S. Dept. of Energy, 2005, page 1-5.

[4] Los alomos National Laboratory, “Nevada Test Site Radioactive Inventory, 1951-1992.” LA-13859-MS, September, 2001.

[5] DOE/NNSA, *Draft Site-Wide Environmental Impact Statement for the Continued Operation of the Department of Energy/National Nuclear Security Administration Nevada National Security Site and Off-Site Locations in the State of Nevada*, July 2011 (DOE/EIS-0426D).

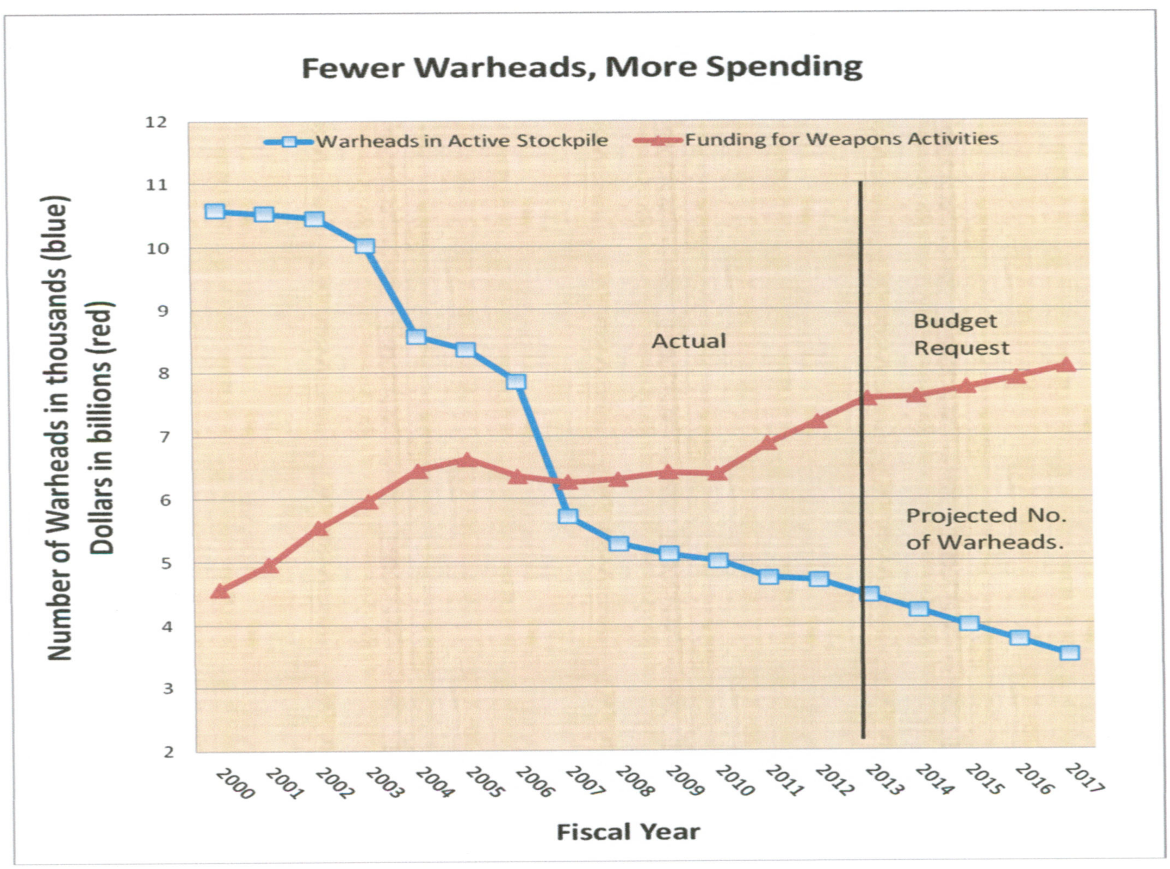
[6] National Nuclear Security Administration Nevada Site Office, “ANNUAL TRANSPORTATION REPORT - Radioactive Waste Shipments to and from the Nevada National Security Site (NNSS),” Fiscal years 2000 through 2010.

[7] Google unEarths image of secret US drone base in Nevada, http://rt.com/news/google-earth-us-drone-base-631/, 12 December 2011.

[8] A. B. Kersting*, D. W. Efurd[2], D. L. Finnegan[2], D. J. Rokop[2], D. K. Smith* & J. L. Thompson, Migration of plutonium in groundwater at the Nevada Test Site, NATURE, Vol. 397, January 7, 1999, pg. 56.

[9] Lifetime Extension Program (LEP), Executive Summary, JSR-09-334E, The MITRE Corporation, JASON Program Office, September 9, 2009. http://cryptome.org/0001/jason-lep.htm

ANALYSIS OF THE FISCAL YEAR 2013 BUDGET REQUEST FOR NUCLEAR WEAPONS ACTIVITIES



A Report for Tri-Valley CAREs

By Robert L. Civiak
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