Earth-Penetrating Nuclear Weapons, Nuclear Testing, and Depleted Uranium Weapons: Medical Consequences and Implications for NPT Compliance

IPPNW Statement at the 2003 NPT PrepCom

The shift in US nuclear policy away from the strictly deterrent function of nuclear weapons and toward development of a new generation of low-yield nuclear weapons intended for battlefield use represents a repudiation of disarmament obligations under Article VI of the NPT and places new pressures on non-nuclear weapon states to acquire nuclear weapons. Any use of nuclear earth-penetrating weapons (EPWs) -- such as the B61-11 currently in the US stockpile or any new "bunker busters" developed by the US Department of Energy – would cause serious local health and environmental damage. Development of new nuclear EPWs is called for in the US Nuclear Posture Review delivered to Congress in December 2001 and the Bush administration has requested funds for the Robust Nuclear Earth Penetrator in both its Fiscal Year 2003 ($15.5 million) and FY 2004 ($15 million) budgets. A nuclear EPW research and development program would almost certainly lead to a resumption of nuclear test explosions by the US and would place additional – perhaps fatal – stress on the non-proliferation regime.

The claim made by Pentagon officials and their Congressional supporters that nuclear EPWs could be used against deeply buried and hardened underground bunkers with "minimal collateral damage" is demonstrably false. Building on the work of Princeton University physicist Robert W. Nelson, IPPNW published a study on the medical consequences of nuclear EPW use in March 2003. We concluded that even a very low-yield nuclear EPW exploded in or near an urban environment will cause radioactive dirt and debris and other radioactive material to fall out over several square kilometers. A nuclear EPW with a yield less than one-tenth of that of the nuclear weapon used on Hiroshima or Nagasaki could result in fatal doses of radiation to tens of thousands of victims. Biological and chemical agents stored in targeted bunkers may be dispersed into the atmosphere without being destroyed by an EPW, potentially injuring or killing unprotected civilians.

The 2003 DOE budget specifically requests funding for a "Robust Nuclear Earth Penetrator" (RNEP) that would burrow more effectively than the existing modification of the B61. As tests at the Nevada Nuclear Test site have shown, a 1-kiloton explosion must be buried and carefully sealed more than 300 feet (100 meters) below the surface to fully contain the radioactive products. Yet a missile made of the hardest steels cannot survive severe ground impact stresses at velocities greater than about 900 meters per second without destroying itself. This limits the maximum possible penetration depth of the missile into reinforced concrete to about four times the missile length—approximately 12 meters for a missile three meters long. Even for the strongest of materials, impact velocities much greater than one kilometer per second will crumple and destroy the penetrator and its warhead.

At this relatively shallow depth, the explosion will inevitably breach the ground surface and throw out radioactive dirt and debris. The resulting base surge of radioactive fallout will extend over an area of several square kilometer. Anyone remaining in this area for more than a few hours would receive a fatal dose of radiation and shorter exposure would cause significant injury. The number of casualties from a nuclear EPW attack would depend on the location of the target, the density of the surrounding population, the extent of debris dispersal, and the possibility of escape or evacuation.

In addition to the risk of radiation exposure, analysis of the effects of EPWs used on underground storage sites indicates that all the hazardous stored materials are unlikely to be incinerated by an EPW. Instead, some may be disseminated to the ground surface and to the atmosphere. In a memo to US Senators in September, 2002, Mello, Nelson, and von Hippel stated: "A nuclear attack would be much more likely to release than to destroy any biological or chemical agent present. Thus, the most likely outcome . . . would be to disperse lethal agents into the atmosphere, potentially killing

unprotected civilian populations in a large area downwind. Military forces would be more likely to have protection."

Fallout from a sample 0.43 KT underground nuclear test (comparable to a small nuclear EPW), buried to a depth of 34 meters, was dispersed in such a way that people within several hundred meters would have received a radiation dose of 1,000 rads per hour or more. Those a little farther away would have received a radiation dose of 100 rads per hour. A dose of 1,000 rads per hour would cause radiation sickness in the majority of victims in about 10 minutes and fatal injury in about 45 minutes. A dose of 100 rads per hour would be likely to produce radiation sickness in one to two hours and fatal injury in four to five hours. Those exposed would have to leave the area of exposure —or be evacuated from it—as quickly as possible.

Radiation injury affects multiple organ systems. First symptoms often reflect damage to the gastrointestinal tract, with protracted vomiting, diarrhea, and fluid and electrolyte loss. Bone marrow (white cells) and other immunological defenses are also vulnerable, and profound anemia, hemorrhaging, and secondary infection are common phenomena. For those exposed to lethal doses, death may take several days to a week or more to occur. After the early symptoms, death can occur in a matter of hours, days, or weeks, depending upon the type and duration of exposure. Infants, children, the elderly, the chronically ill, and women of reproductive age are especially vulnerable.

There are no specific therapies for acute radiation injury; supportive treatment is all that can be offered. In most cases, there will be no way for physicians to determine the level and type of radiation exposure in any individual patient. Effective triage, separating those who are certain to die from those for whom recovery is a possibility, will therefore be impossible. Unless hospitals, clinics, and other sources of medical care have adequate decontamination facilities, physicians, nurses, and other health workers will themselves be at risk for radiation exposure from patients' contaminated clothing. Given the time course of radiation injury and illness, the effects of even a single exposure of the type most likely to result after the explosion of a nuclear EPW as described above will occur over a period of weeks, rather than as an acute, self-limiting event.

The effort by nuclear advocates to introduce new low-yield nuclear weapons into the U.S. arsenal is part of a growing trend to lower the nuclear threshold and make the use of nuclear weapons more acceptable. Furthermore, the use of low-yield nuclear weapons may lead to weakening the restraints against the use of nuclear weapons of greater yield and in other environments, such as in the air, underwater, and in space. Further development of new nuclear weapons such as EPWs by the United States may require renewed underground nuclear testing, breaking the current world moratorium and destroying prospects for eventual universal accession to the Comprehensive Test Ban Treaty (CTBT). It would almost certainly fuel a new cycle of global nuclear weapons proliferation as other nations respond with their own new weapons.

Nuclear EPWs are not the only source of concern that continuing proliferation and the pursuit of new nuclear weapon designs will have a deleterious impact on health and the environment. Disturbing reports from India and Pakistan about health effects from the series of nuclear tests conducted by those countries in 1998 are a clear warning that a collapse of the global testing moratorium resulting from a new nuclear arms race contains the seeds of a public health catastrophe.

The more than 2,000 nuclear tests conducted throughout the world since the middle of the 20th century have had direct, serious and long term adverse health and environmental effects. Every human alive now and over the next tens of thousands of years will carry radioactive elements created by nuclear tests, causing an increase – however small -- in their lifetime cancer risk.

Increases in the rates of radiation-related cancers have been documented in military personnel involved in nuclear tests, and also within communities downwind of test sites in Australia, Kazakhstan, the United States, and the Micronesian Pacific Islands. It is estimated that due to atmospheric testing alone, 430,000 fatal human cancers had been produced by the year 2000, and that eventually the total will be 2.4 million. The effects have been far broader than those related to radiation and often involve:

- displacement from traditional lands and disruption of traditional communities;
- economic, social and military domination; and
- non-radiation related health problems such as, in the Marshall Islands and French Polynesia, outbreaks of ciguatera fish poisoning.

If the proliferation of nuclear weapons to other countries or the development of new generations of weapons by the current nuclear weapon states leads to new rounds of testing, as we believe it must, these deleterious impacts on public health and social well being can only increase.

Nuclear test sites are, in effect, unstudied, unlicensed and high-level radioactive waste dumps, without legislative or public scrutiny such as environmental impact assessment. Test sites seldom meet the most basic criteria for a nuclear waste repository such as exclusion of ground water, lack of fractures or fissures, and high absorption of radionuclides. Furthermore, the health burdens of nuclear testing, uranium mining, and other impacts of nuclear weapons development have fallen most heavily on colonised, indigenous, or minority groups – Aboriginal people in Australia, Micronesian and Polynesian Pacific islanders, Uygur people in China, Western Shoshone people in Nevada, the Kazakh people in the former Soviet Union, and, most recently, tribal villagers in Pokhran, India and Chaghi, Pakistan.

Finally, while they are not technically nuclear weapons as defined for arms control purposes, depleted uranium munitions such as those used in the Balkans, Afghanistan, and both Iraq wars, are radiologic and toxic weapons made from the by-products of the nuclear weapons complex and have been profoundly implicated in deaths and illnesses suffered by civilian populations exposed to radiation and heavy metals from aerosolized DU particles and ground contamination. Pentagon estimates that about 320 metric tons of DU remained in Iraq, Kuwait, and Saudi Arabia at the end of the 1991 Gulf war have been challenged by independent experts who believe that amounts of 1,000 metric tons or more are closer to the reality.

Concerns about the potential health effects of DU weapons arise primarily from immediate and long term uranium contamination in the areas where they are used. On penetration, for example, about 20% of the DU burns spontaneously, creating a fine aerosol smoke of uranium oxide that can be easily inhaled and lodge itself in the lungs. Fragments of DU weapons are scattered around battlefields, and can become embedded as shrapnel in human and animal flesh.

In the months and years following armed conflicts where DU has been used, large numbers of soldiers, UN peacekeepers, and civilians have exhibited unexpected and unexplained health problems, including excess leukemias and other cancers, neurological disorders, birth defects, and a constellation of symptoms loosely gathered under the rubric "Gulf War Illnesses." Depleted uranium, because of its radioactivity and chemical toxicity, has been linked to these acute health effects, leading IPPNW and others to call for comprehensive, independent epidemiological studies.

A basic principle in radiation protection is that all exposures beyond those from natural background should be justified; that is, the benefit for those exposed should exceed the risk. This is the standard for medical radiography. The military utility of DU weapons for the users does not justify any added health risk for non-combatants, no matter how small. The precautionary principle states that in the absence of convincing proof that a substance or process is harmless, the presumption must be risk. This principle applies clearly to the use of DU weapons. Furthermore, DU weapons indiscriminately contaminate the places in which they are used, and the contamination persists long after the conclusion of hostilities, adding to the radioactive and toxic burden imposed upon civilians, wildlife, and ecosystems.

IPPNW believes that DU munitions, as radiological and toxic weapons, are in violation of the United Nations Charter, the Geneva Conventions, the Conventional Weapons Convention, and the Hague Conventions, which forbid the use of “poison or poisoned weapons” and “arms, projectiles or materials calculated to cause unnecessary suffering.”

In conclusion, the development, deployment, and use of low-yield nuclear weapons by the US or any other State would undermine global security and further weaken the NPT and the CTBT, along with the non-proliferation regime built upon these treaties. The use of radiological weapons poses its own health threats and is similarly damaging to non-proliferation goals. Crossing the nuclear threshold for the first time since the US used nuclear weapons on the cities of Hiroshima and Nagasaki would be not only morally repugnant, it would start us down the slippery slope to the use of nuclear weapons of greater yield — something the entire world has been trying to prevent for more than 50 years.

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