

# COUNTERING PROLIFERATION, OR COMPOUNDING IT?

*The Bush Administration's Quest for Earth-  
Penetrating and Low-Yield Nuclear Weapons*

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### Comments Welcome

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## EXECUTIVE SUMMARY

For reasons best known only to themselves, the Bush Administration and its Republican allies in Congress are provoking a political confrontation over repeal of an obscure restriction on nuclear weapons research and development that has been settled law for nearly a decade.

The so-called *Spratt-Furse* Amendment, named after its original House co-sponsors, was enacted into law in November 1993. It bars the Secretary of Energy from conducting “research and development which could lead to the production by the United States of a new low-yield nuclear weapon,” defined in the statute as a weapon with a yield less than five kilotons.

To encourage repeal of this restriction, senior defense officials have testified to Congress that they interpret the law as requiring them to refrain from even “research leading to development” of such weapons, a phrase that appears nowhere in the statute. They suggest that the only remedy for the “chilling effect” of the restriction on “scientific inquiry” at the nation’s defense laboratories is to get rid of it.

There is considerable irony in President George W. Bush’s apparent zeal to overturn this law, as the political-military consensus favoring it was largely established during the administration of his father, when the current Secretary of State, Colin Powell, was Chairman of the Joint Chiefs of Staff. In September, 1991, as the Soviet empire disintegrated, the first President Bush announced that all U.S. tactical nuclear weapons deployed with land forces and surface fleets worldwide would be removed from overseas storage sites and surface ships, retired from the stockpile, and ultimately destroyed, and he challenged the Soviet Union to do the same. Russia reciprocated with a massive removal effort of its own, securing thousands of nuclear warheads in the newly independent states of the former Soviet Union and shipping them back to Russia, where a large but indeterminate number of them have been destroyed. The United States assisted in this efforts, under the aegis of the Nunn-Lugar program.

In July 1992, the elder President Bush went a step further, issuing an Executive Order stating that in the changed security environment, the United States had no military requirements for new nuclear weapons, and would henceforth limit its efforts to evaluating and improving the safety and maintaining the reliability of the U.S. nuclear stockpile. Following this White House directive, new warhead development efforts not already terminated by Congress were scrubbed, and shortly thereafter Congress cut off funding for nuclear test explosions. According to Administration testimony on April 8, 2003, this situation remains true today—the military services do not have any approved military requirements for new nuclear weapons..

“What will the world think of a nation that one day launches a “preventive war” in the name of nuclear non-proliferation, and then the next day turns its attention to developing a new generation of more usable battlefield nuclear weapons?”

The successor Clinton Administration pursued and achieved a multilateral Comprehensive Test Ban Treaty (CTBT) in September 1996, which was signed by all five nuclear permanent members of the UN Security Council and ratified by Russia, the United Kingdom, and France. China has yet to ratify the treaty, while a Republican controlled Senate rejected it in September 1999.

In the current political context of heightened global concern about nuclear weapons proliferation in East Asia, South Asia, and the Middle East, the current Bush Administration's sudden resurgence of interest in tactical nuclear weapons could hardly be more anomalous and discordant, or more damaging politically to the credibility and moral standing of the United States as it pursues the indispensable task of shoring-up the global nuclear nonproliferation regime. What will the world think of a nation that one day launches "preventive war" in the name of nuclear nonproliferation, and then the next day turns its attention to developing a new generation of more usable battlefield nuclear weapons?

Not only is this degree of hypocrisy dysfunctional from a foreign policy perspective, it is not warranted by the marginal technical prospects for improved military performance from a new generation of low-yield nuclear weapons. In other words, there is no military silver lining to the cloud of cynicism, anger, and angst that would envelop U.S. foreign policy if the Congress should signal, by repeal of the *Spratt-Furse* provision, that it intends to develop these weapons.

**"The technical characteristics of shallow buried nuclear explosions do not favor discriminate use."**

Administration officials claim that their interest in earth-penetrating and other low-yield weapons derives from their potential to provide a more discriminate capacity for destroying hardened and deeply buried targets (HDBTs), and thus a more "credible" deterrent military posture for the United States.

But the technical analysis contained in this paper [Sec. I] shows that improved EPWs, sufficient to damage hardened buried targets at even moderate depths, cannot penetrate nearly deep enough to achieve substantial containment of the radioactive debris created by their detonation. This "fallout" actually increases with increasing depth, due to the greater volume of earth lifted by the blast.

Another significant conclusion reached in our analysis is that the expected improvement in ground-shock coupling, and hence in the destruct radius of an EPW, tails off rapidly after the first 8-12 feet of penetration for nuclear yields in the range of interest, between 1 and 100 kilotons. The current U.S. earth-penetrating weapon, the B61-Mod 11, with a nuclear yield estimated at 300 kt, can penetrate roughly 10 feet in frozen tundra. Employing a hypothetical reduced yield (1-10 kt) alternative—such as the primary fission trigger stage of the B61-7 or B83 warhead candidates proposed for the Robust Nuclear Earth Penetrator (RNEP)—while doubling its putative penetration depth to 20 ft. in hard rock, would only increase its destruct radius against a hard buried target by about 25 feet. A tripling of the penetration depth, to its probable physical limit at around 33 feet in hard rock, produces only about a 50 foot increase in the depth of the damage zone [see Fig. 7]

Even at this probable maximum limit of penetration, a 10 kt robust penetrator could not cause severe damage to hard targets buried below about 275 feet, and protected by intervening layers of hard rock. To severely damage such a target buried at 1000 feet, for example, would require a weapon in the megaton-range.

In sum, there would appear to be little *military* justification for replacing or augmenting the current B61-11 capability with a lower-yield enhanced penetrator. With a 10-kt yield, it would create relatively less, but still very substantial levels of lethal fallout over a wide area (see Figure 2), while overlapping none of the deeper damage zone covered by the B61-11. A one-kt enhanced penetrator could not destroy any targets below about 150 to 250 feet (depending on the geologic media). The low yield would require it to be placed directly above its intended buried target, with little margin for error, but it would still produce substantial local fallout.

Perhaps most significant of all, an improved low-yield penetrator weapon would encourage military planners to identify shallower targets and lesser contingencies for “credibly” threatening the use of nuclear weapons, all the while ignoring the global political, moral, and legal consequences of legitimizing the possession and threatened use of such weapons.

At the other end of the spectrum, an EPW like the proposed RNEP currently under study—having both improved penetration capability and nuclear yields in the range of 500-1000 kt, significantly higher than the current B61-11—*would* increase the U.S. capability to strike deeply buried command and control and leadership targets. But the vast resulting collateral damage to noncombatant populations would presumably limit employment of the weapon to retaliatory, or “intra-war” preemptive use in scenarios of all-out warfare, involving another nuclear weapon-state with the resources to both construct such deeply buried targets and threaten the survival of the U.S. as a nation-state—that is, China and Russia.

The RNEP proposal is symptomatic of an increasingly disconnected nuclear weapons establishment continuing to search for a mission. On the one hand, the weapon is strategically, legally, and morally unsuitable for preemptive or retaliatory counter-proliferation warfare, and should not be developed with that mission in mind. On the other hand, the alternative justification—improved nuclear “deterrence” against Russia and China—seems gratuitously provocative politically, and militarily unnecessary.

While adding little to the US capacity for deterring nuclear conflict among the major powers – a capability that hardly needs reinforcing in light of the demise of Communism as a global political force – the RNEP could well exacerbate fears and miscalculations in conventional crises involving the major powers, especially as the United States continues

“The Administration’s attempt to market the ‘robust’ nuclear earth-penetrating weapon as a humanitarian gesture is ludicrous, as DoD’s hidden baseline for measuring ‘reduced’ collateral damage from RNEP is the *nine megaton* surface burst of the B53 strategic bomb, now retired from the arsenal.”

to enhance conventional precision-guided “global strike” capabilities that rely on long-range strategic delivery systems.

## **POLICY RECOMMENDATIONS**

### ***Bipartisan agreement on clarification of the Spratt-Furse restriction to allow “Concept” and “Feasibility” studies can be readily accomplished.***

If the Bush Administration’s recent assurances—regarding the lack of any *present* plan or intention to develop or produce new low yield nuclear weapons—are indeed sincere, then there should be no difficulty in reaching bipartisan agreement on minor modifications to the Spratt-Furse restriction that would remove the ambiguities that are ostensibly causing scientific paralysis at our nation’s defense laboratories. For example, by merely replacing the more open-ended “could lead” with the more definitive “leading,” the restriction would be revised to more clearly bar “research and development leading to production” of a low-yield nuclear weapon—and therefore not earlier stages of research.

The Armed Services Committees could adopt a statutory definition or conference report language further clarifying that this restriction is intended to apply to the kind of research and development activities typically associated with the Phase 2A Joint Definition and Cost Study, Phase 3 Development Engineering Project, and Phase 4 Production Engineering stages of the warhead life cycle, and *not* to Phase 1 Concept Definition or Phase 2 Feasibility Studies.

This simple fix would take care of the issue until such time as this or any future Administration had formulated and assessed the technical feasibility of various alternative design concepts and approaches, and wanted to proceed to the next stage (Phase 2A or above) of estimating engineering and production costs and schedules, and evaluating specific design trade-offs involving safety, security, survivability, and use-control features for the weapon—in other words, to “research and development leading to production.”

Specific congressional authorization and appropriation of the funding to take this step for a new low-yield nuclear warhead design—a step that this report finds would be both technically unwarranted and politically unwise—would have the effect of repealing the *Spratt-Furse* restriction, so we perceive no justification for alarming the world *now* to pave the way for a full-scale development decision that may never crystallize, and must be revisited in any event.

The proposed RNEP warhead is nothing more than “workfare” for NNSA’s nuclear weapons laboratories and a retread of the very Cold War policies the Bush Administration pledged to move away from. Congress should deny all RNEP funding.



## INTRODUCTION

The laws of physics confound claims by the Bush Administration that significant technical potential exists for development of a militarily effective nuclear earth penetrator weapon (EPW) with “acceptable” collateral damage characteristics. According to our calculations, achieving a militarily effective nuclear weapon against hardened deeply buried targets (HDBT’s), *while also* containing its radioactive fallout, is not feasible.

Prospective weapons are unlikely to penetrate deeper than about 10 to 15 meters in hard rock or dry rock soil, a depth that is insufficient to fully contain the radioactivity from even a 10-ton nuclear explosion. An EPW at any yield and penetration depth will create an open crater or pathway through which radioactive gases and debris from the explosion would be dispersed into the above-ground environment. While reducing the yield of new weapons below the minimum five kilotons required under existing law would reduce fallout relative to a surface burst weapon capable of destroying the same buried target, such a low-yield earth penetrator would be ineffective against hard targets at even moderate depths, while still releasing substantial fallout.

Nevertheless the Bush Administration is forging ahead with plans for the National Nuclear Security Administration (NNSA) to spend \$45 million over the next three years assessing the feasibility and production costs of an enhanced EPW, dubbed the “Robust Earth Penetrator Weapon” (RNEP). In addition, the Defense Threat Reduction Agency (DTRA, formerly the Defense Nuclear Agency) has launched a \$1.26 billion fast-track program to develop and procure computer hardware and software “that could take in structural and other data on a prospective underground target, calculate the amount of force needed to destroy it, [and] then determine whether a nuclear ‘bunker-buster’ would be required.”<sup>1</sup>

However, contrary to the impression left by much media reporting and official testimony before Congress, the immediate goal of the Administration’s RNEP effort is not a low-yield counter-proliferation weapon, but the development of a deeper penetrating, *high-yield strategic* weapon. This project picks up right where the U.S. nuclear weapon design effort left off when the Cold War ended 12 years ago, and undermines the credibility of Administration claims that its nuclear policies have “moved beyond” the Cold War. The targets of such high-yield, massive-fallout-producing weapons are not likely to be relatively shallow-buried bunkers suspected of holding biological or chemical agents in Libya or Iran, but rather deeply buried and hardened nuclear command centers and leadership shelters of major “potential nuclear adversaries” – Russia and China – and possibly including North Korea.

A smaller NNSA effort, funded at \$6 million in FY 2004, will seek to implement the Administration’s aggressive “preemptive counter-proliferation” doctrine by examining “Advanced Concepts” for a low-yield nuclear “bunker-buster,” with the hope of identifying promising candidates for further development as so-called “Agent-Defeat” weapons. These would ostensibly incinerate or otherwise neutralize chemical and biological agents without dispersing them in the explosion, or creating significant radioactive fallout from the attack.

## **Short History of U.S. Earth Penetrator Weapons**

The U.S. military has maintained a longstanding interest in EPW's. In the 1950's, it fielded two EPWs, the Mark 8 and Mark 11 bombs. The uranium gun-type Mark 8 bomb (nicknamed "Elsie" for LC or Light Case) was almost ten feet long, 14 inches in diameter, weighed some 3,250 lbs, and had a yield of approximately 25 kilotons. In service from 1952 to 1957, the Navy developed the Mark 8 for targeting underground facilities, enemy submarines located in sheltered pens, and armored ship decks. The Mark 11 was an improved version of the Mark 8, slightly heavier, and, according to the National Atomic Museum, "able to penetrate up to 22 feet of reinforced concrete, 90 feet of hard sand, 120 feet of clay, or five inches of armor plate," and fuzed to detonate 90-120 seconds after penetration.

In the 1970s, the Army developed an earth-penetrating W86 alternative to the W85 Pershing II warhead. In one test a Pershing 1A was launched from Fort Wingate, NM and the earth penetrator unit impacted at White Sands Missile Range. The penetrator contained warhead electrical system components, a depth of burial fuzing component, and a telemetry package, but not the actual nuclear explosive package. It traveled a total of 57 meters through soil on a diagonal trajectory coming to rest 33 meters beneath the surface. The W86 was cancelled in September 1980. But during the 1980s, further penetrator tests were carried out to measure stress and strain. These were done in Nevada and Alaska. At the Tonopah Test Range in Nevada a 10-meter long recoilless rifle called the Davis gun, was used to fire a penetrator into soft rock. In Alaska, EPWs were dropped from helicopters onto frozen tundra, near Deadhorse, on frozen soil at Eielson Air base, and on a frozen boulder field at Fort Greeley. A penetrator dropped from about 3,000 meters achieves velocities approaching 300 m/s.

In the period from 1986 to 1992, the Department of Energy's Defense Programs Office, (now a quasi-independent agency called the National Nuclear Security Administration, NNSA) conducted underground nuclear explosive tests of "candidate" warheads for a "ruggedized," high G-force tolerant "Strategic Earth Penetrator," and another weapon, based on the design of the B61-7 strategic bomb, was designated as an "Interim Earth Penetrator." The latter program, intended to produce a warhead for a "shallow" penetrator dropped from aircraft, was completed and entered production in the mid-1990's as the B61-11 gravity bomb. Development of the strategic earth penetrator warhead, probably intended for higher velocity delivery by ballistic missile, appears not to have been completed prior to the end of nuclear testing in 1992, and the effort was shelved for the decade of the 1990's.

From 1988-1992, at least three underground nuclear tests, together costing on the order of \$150 million in today's dollars, were also conducted by Defense Nuclear Agency (now called the Defense Threat Reduction Agency) for predictive modeling of EPW ground shock effects against hardened buried structures.<sup>2</sup>

### **Low-Yield Penetrators for "Agent Defeat"**

At the shallower end of the buried target "spectrum," the Bush Administration's military planners reportedly want to explore the use of low-yield bunker-busting nuclear weapons to incinerate or neutralize stocks of biological and chemical agent. It is this proposed application of nuclear penetrator technology – above and beyond the Administration's general hostility to any form of constraint on nuclear weapons

development – which is apparently fueling the Republican drive to repeal the current ban on development and production-engineering of low-yield nuclear weapons.

Research by independent technical experts, however, suggests that a low-yield nuclear earth penetrator (with a yield of 1 to 10 kt) is not likely to prove a reliable means for destroying biological weapons stocks, and will have significant collateral effects.<sup>3</sup> But development of such weapons *will* prompt U.S. military planners to identify a range of shallow-buried targets – and various “preventive war” counter-proliferation “contingencies” – for “credibly” threatening the use of U.S. nuclear weapons, all the while ignoring the fact that such actions will tend to legitimize nuclear proliferation, and encourage other countries to make similar deterrent threats to employ nuclear weapons.

Indeed, international treaty regimes and norms restraining the growth and spread of nuclear weapons have deteriorated markedly under the influence of the Bush Administration’s preoccupation with unilateral military solutions to the problem of nuclear security.

### **CAN YOU “VALIDATE” BAD THEORY WITH “PRECISE ENGINEERING ANALYSIS”?**

“[Sen. Wayne] ALLARD: Now my understanding on maybe some of these low-yield weapons that would penetrate down to the earth, that actually contamination on the surface would be much less than [the]more conventional nuclear weapons that we have now. Is that right?

[Admiral James] ELLIS: Well, again, we've not been able to do the depth of analysis that can give us that type of information.

ALLARD: That's one of the theories.

ELLIS: That's one of the theories. There are many experts who believe that as you tunnel down many feet, particularly with the lower-yield weapons, that there would be much less probability that the blast would emerge from the hole and contaminate the environment. So conceptually, that's a theory, but again it needs to be validated by the rigorous and precise engineering analysis that the ambassador was talking about so that we're all dealing with the same set of facts here as we discuss this very important issue for the future.”

—SASC Strategic Subcommittee Hearing, April 8, 2003. Allard is Chairman of the Subcommittee. Ellis is the Commander, U.S. Strategic Command.

## I. TECHNICAL CHARACTERISTICS OF EARTH PENETRATING NUCLEAR WEAPONS DO NOT FAVOR DISCRIMINATE USE.

As discussed in detail later in this study, Bush Administration officials have claimed their interest in earth-penetrating nuclear weapons derives from their potential to provide a more discriminate, reduced-yield capacity for destroying hardened and deeply buried targets (HDBT's), and thus a more "credible" deterrent military posture for the United States. But as common sense suggests, and analysis shows, the technical characteristics of shallow buried nuclear explosions do not favor discriminate use.

There is a yawning gap between the Pentagon and NNSA's assertions and the underlying technical realities, and sufficient data *already exists* from decades of nuclear weapon experimentation to make definitive determinations regarding the military efficacy and moral acceptability of such weapons as instruments of preemptive counter-proliferation. A new research effort in this area is not needed, and merely constitutes "workfare" for NNSA's nuclear weapons laboratories.

Nuclear EPWs powerful enough to destroy deeply buried targets will merely reduce the collateral consequences of preemptive nuclear weapons use from the realm of the unthinkable to the realm of the morally monstrous, that is, substituting EPW's in the 300 – 1000 kt range for multi-megaton surface bursts.

The crux of the problem is summarized in **Figures 1 and 2**. Figure 1 displays the explosion depth required to substantially contain radioactive fallout from a nuclear "bunker buster" warhead for nuclear explosive yields ranging from 10 tons to 1,000,000 tons (of TNT equivalent). "Substantial containment" in this case means that the superheated gas cavity formed by the explosion does not rupture the earth's surface, thereby preventing immediate injection of large amounts of radioactive debris into the atmosphere. However, the assumptions of the calculation used to generate this chart do not account for possible subsequent atmospheric "venting" and "seeps" of radioactive gases from the explosions through fissures in the earth created by the explosion—a common occurrence—nor do they account for possible radioactive contamination of underground water resources.

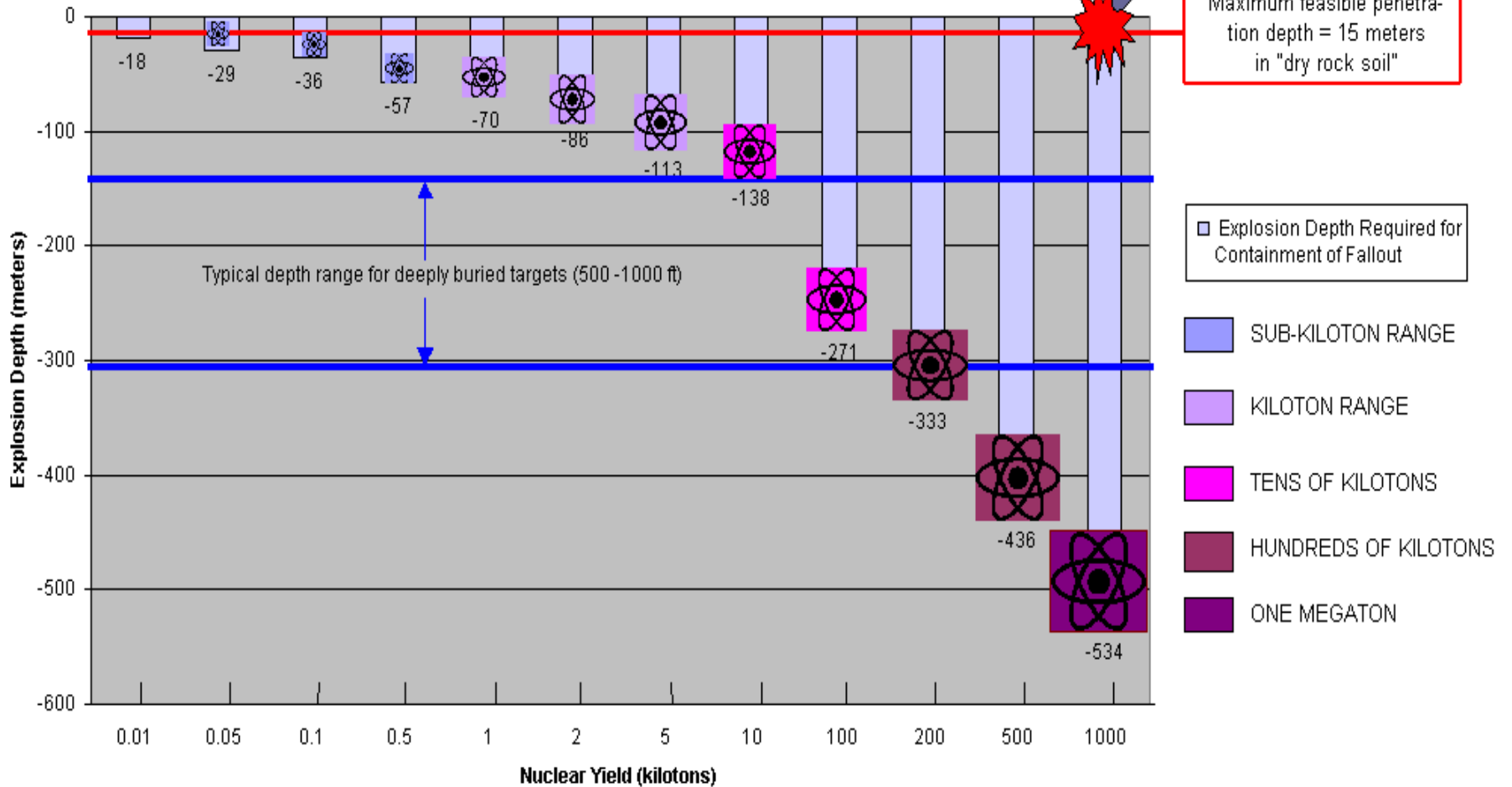
Basic physical constraints on material strength, as a function of impact velocity and the density of the penetrated media, limit the probable maximum depth of burial for an earth-penetrating weapon to no more than 15 meters in "dry rock soil," or 10-12 meters in concrete or medium-hard rock.<sup>4</sup> From Figure 1, it is evident that at this depth only a nuclear explosion of about *10 tons or less* would achieve "substantial containment" of the radioactive fallout. But an earth penetrator weapon with this low a yield could not destroy hardened underground structures at even modest depths, and it has too small a kill radius to ensure destruction rather than dispersal of biological agents stored within a large hardened facility.

Every other size explosion shown in the chart—including even larger sub-kiloton explosions—would unleash a large fraction of its radioactivity into the above-ground environment, where it would disperse unpredictably, creating deadly radioactive fallout on civilian populations.

In fact, shallow earth penetration actually *increases* the amount of fallout for a given yield, at and even beyond probably achievable penetration depths. This effect is illustrated in Figures 2 and 3, which show the area (in square kilometers) receiving greater than a 150 rem radiation dose within a 48-hour period, as a function of burst depth, for 0.3, 1 and 10 kt (Figure 2) and 80, 300 (B61-11),

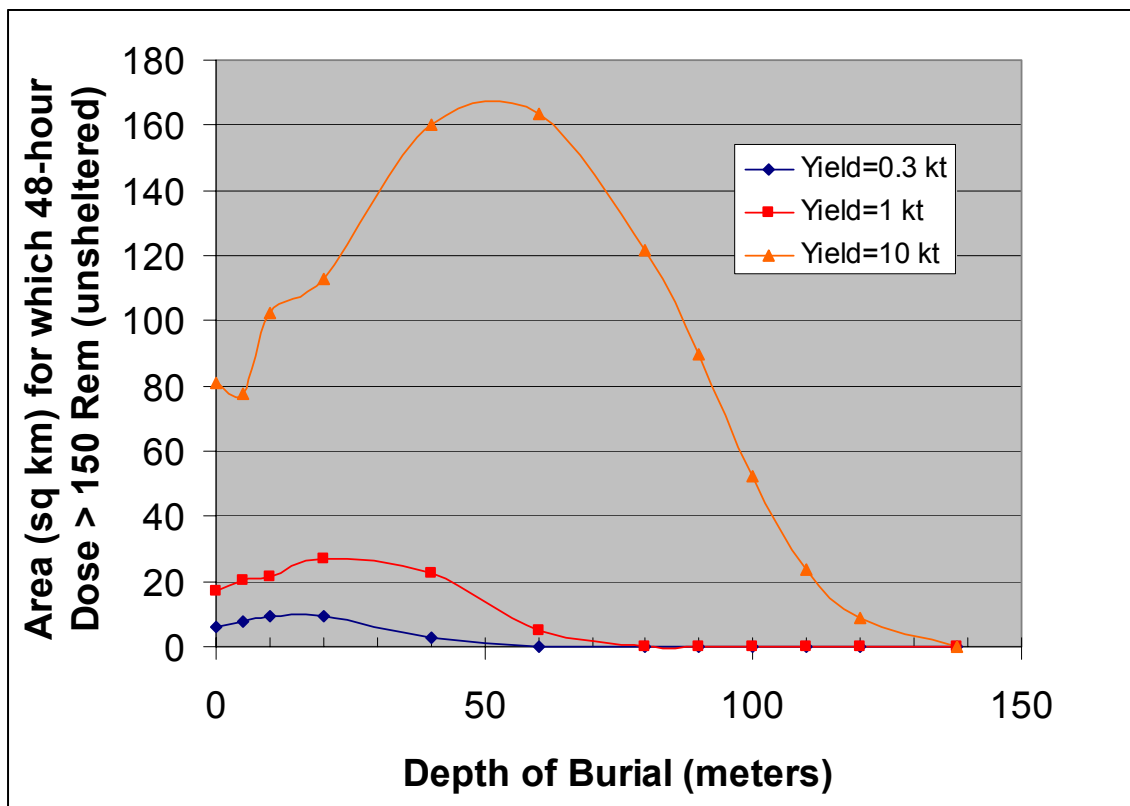
**FIGURE 1**

**Explosion Depth Required to Substantially Contain Radioactive Fallout from Nuclear "Bunker Buster" Warhead of a Given Yield**



and 1,000 kt (Figure 3) as calculated using the Defense Threat Reduction Agency's computer code, HPAC (Hazard Prediction Assessment Capability). Mortality studies of radiation victims suggest that 25 percent of those receiving the minimum dose of 150 rem at the contour boundary would die within a few months. For those receiving twice this dose, or 300 rem, the expected mortality jumps to 60 percent, and at 400 rem, the expected near-term mortality is 90 percent.<sup>5</sup>

**Figure 2. Radioactive Fallout Area as a Function of Depth of Burial for 0.3-kt, 1-kt and 10-kt Earth Penetrator Nuclear Weapons. HPAC calculations assume a fission fraction of one and a uniform wind speed of four meters per second. The areas were calculated from 48-hour dose contours assuming an unsheltered population.**

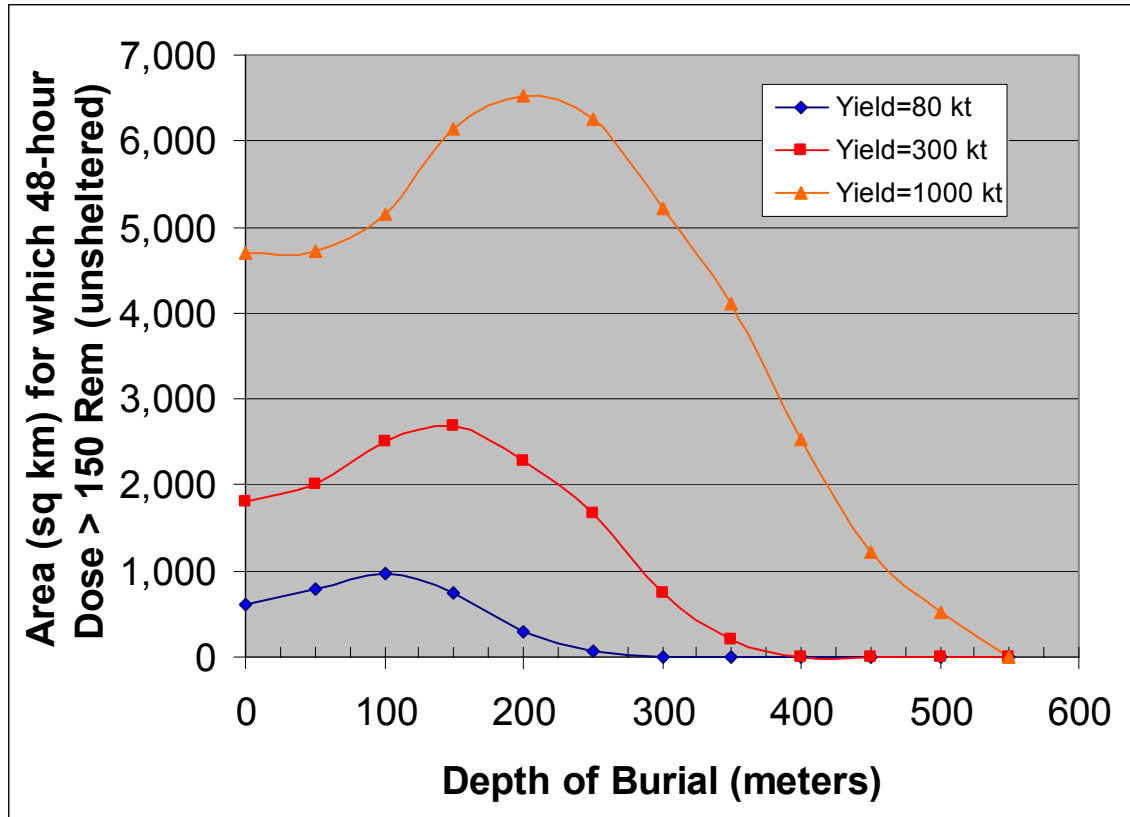


From **Figure 2**, we see that a nuclear explosion buried deeper than about five meters actually *increases* the amount of fallout relative to a surface burst, and that this increased fallout effect is sustained all the way out to 90 meters, well below the depths to which such weapons can plausibly penetrate. For example, increasing nominal earth penetration from 5 to 20 meters increases the contaminated area by some 40 percent. Only very shallow burial (< 5 meters) does not appear to increase fallout relative to a surface burst, but neither does it appreciably reduce it.

As shown in **Figure 3**, radioactive fallout from an 80 kt EPW detonated at a depth of 10 feet would cover an area of approximately 700 square kilometers with a 48 hour dose

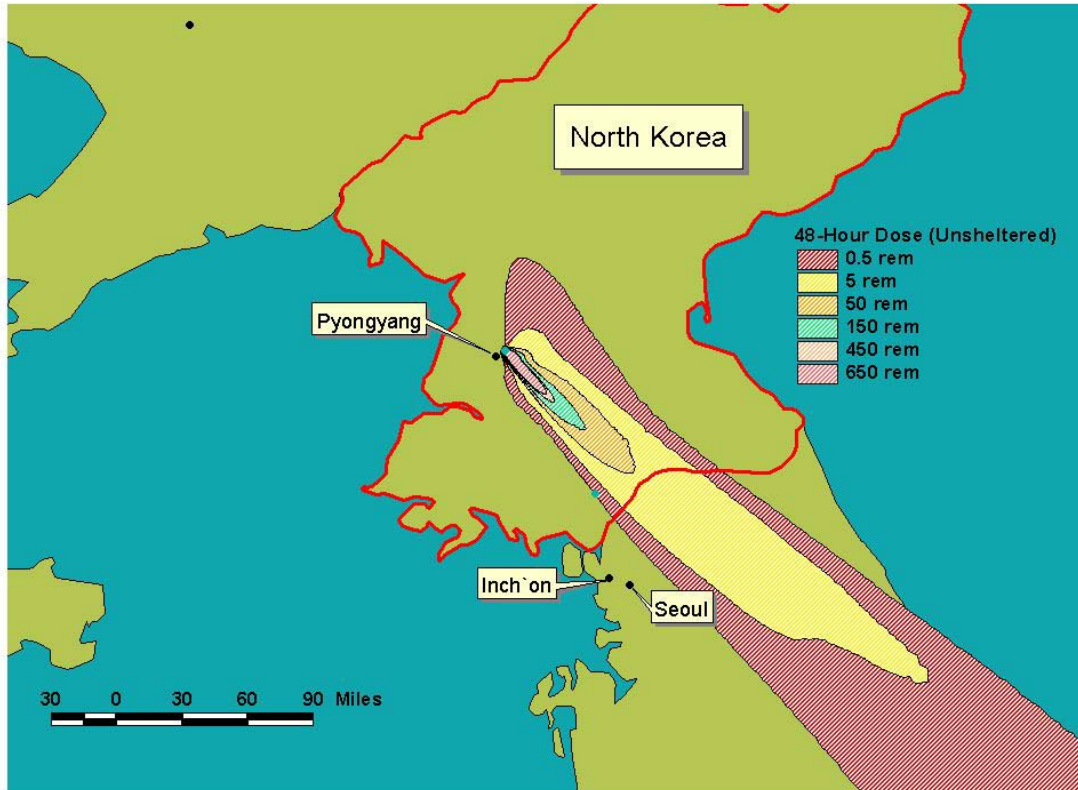
exceeding 150 Rem. The 300 kt B61-11 currently in the arsenal would irradiate a 1,900 km area, and 1000 kt (one megaton) would irradiate a 4,800 km area.

**Figure 3. Radioactive Fallout Area as a Function of Depth of Burial for 80-kt, 300-kt and 1000-kt Earth Penetrator Nuclear Weapons.** HPAC calculations assume a fission fraction of 0.75 and a uniform wind speed of four meters per second. The areas were calculated from 48-hour dose contours assuming an unsheltered population.



**Figure 4** maps an HPAC simulation of the fallout pattern from attacking a hypothetical underground facility in a hill in west Pyonyang, North Korea with a B61-11 EPW (300 kt) detonated at a depth of 30 ft. HPAC calculates from 430 to 550 thousand casualties would result from such attack (ranging from casualties based on a sheltered to an unsheltered population).

**FIGURE 4. Radioactive fallout from a B61-11 (300 kt) explosion in North Korea after EPW penetrates to 30 feet. HPAC calculations assume a fission fraction of 0.75 and using historical weather data for the month of May.**



It should be clear from the foregoing analysis that earth penetrating weapons are not a magic bullet for the problem of massive “incidental” noncombatant casualties from fallout. As will become clear in the next section, to be effective against hardened deeply buried targets, EPWs must have substantial yields *and* achieve increased penetration, but both characteristics also increase radioactive fallout, drastically limiting their tactical flexibility and moral acceptability as an instrument of preemptive counter-proliferation warfare.



### Would a Reduced Yield Weapon with Improved Earth Penetration Represent a Significant Increment in Military Capability?

To answer this question, in **Figures 5 and 6** we have plotted the expected depth of the EPW “severe damage” zone for a hard target as a function of the weapon’s nuclear yield and depth of penetration, for both “hard rock” and “wet soft soil,” representing the limiting cases that bracket the range of plausible penetration depths.

The curves in each chart have nearly identical shapes, the major differences being that in the wet soil case, damage zone depths for a given weapon yield and depth of burial are roughly twice those of hard rock, and the curves extend further to the right, in deference to the fact that maximum penetration depths in the softest media will be deeper—here we have generously assumed a factor of two—than in the hard rock case. It should be noted, however, that the values given for wet soft soil clearly overstate what can be achieved, because while *penetration* may occur in soft soil, *propagation* of the shock wave will inevitably occur in heterogeneous geologic media that includes rock of some type – a less plastic medium – if the target is at any significant depth.

From **Figure 5**, we see that a 100-kt EPW, penetrating 12 feet in hard rock, would produce as much damage against a buried hard target at 400 feet as a one *megaton* surface burst. In other words, the first 12 feet of burial enables a ten-fold reduction in yield. Similarly a 10-kiloton penetrator buried at 8 feet, has the same damage zone underground as a 100-kt surface burst, again showing an order of magnitude reduction in yield from shallow burial in order to achieve equivalent damage at depth.

But this sharp increase in the fraction of explosive energy coupled into the ground does not hold true for the *next* 10 feet of penetration, or succeeding increments of depth, indicating that a distinct “knee” in the “coupling” curve is reached at about 8 to 12 feet for weapons from 1-100 kt. For example, increasing the hard rock penetration depth of a reduced yield EPW to twenty feet—effectively doubling the 10-foot penetration of the current B61-11—would be a significant engineering achievement, but it would have marginal military significance.

From **Figure 7** we see that doubling the penetration depth of a 1-10 kt EPW would increase its destruct radius against a hard buried target by only about 25 feet. A tripling of the penetration depth, to its probable physical limit at around 33 ft in hard rock, produces only about a 50 foot increase in the depth of the damage zone. Even at this probable maximum limit of penetration, a 10-kt EPW could not cause severe damage to hard targets buried below about 300 feet and protected by intervening layers of hard rock. To severely damage such a target buried at 1000 feet, for example, would require a weapon in megaton-range.

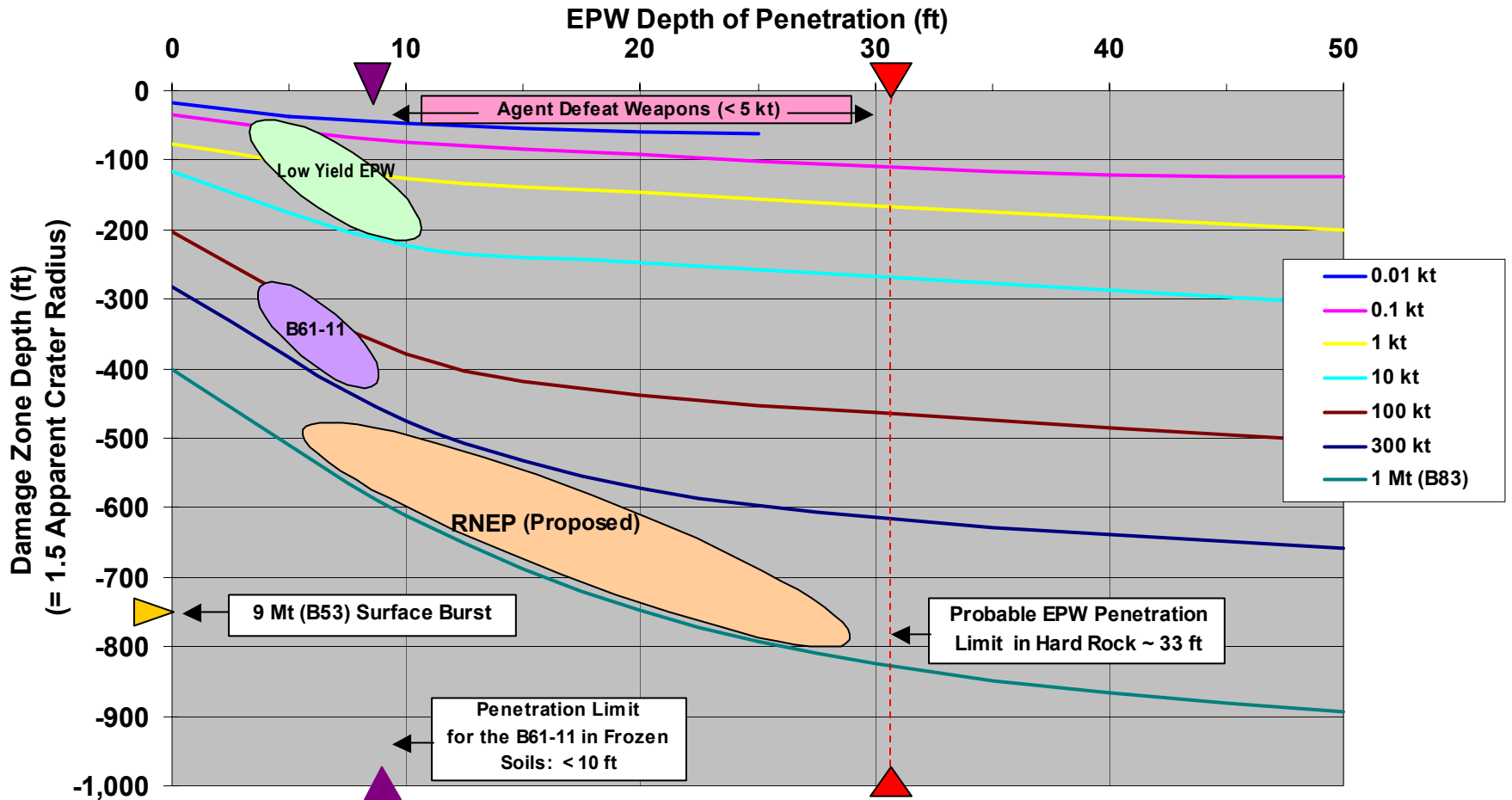
In sum, there would appear to be little *military* justification for replacing or augmenting the current B61-11 capability with a deeper-penetrating, but lower-yield weapon. A more robust 10-kt to 80-kt EPW, for example, would create relatively less, but still very substantial levels of lethal fallout over a wide area (see **Figure 2**), while overlapping from none to only the top third of the damage zone created by the B61-11. A 1-kt robust penetrator could not destroy *any* of the strategic underground targets of the B61-11, or indeed any targets below about 150 to 250 feet, (depending on the geologic media). The low yield would require it to be placed directly above its intended shallow-

buried target, with little margin for error, but it would still produce substantial fallout. Such a weapon, however, would encourage military planners to identify shallower targets and lesser contingencies for “credibly” threatening the use of nuclear weapons, all the while ignoring the global political, moral, and legal consequences of legitimizing possession and threatened use of such weapons. Indeed, the stepped-up nuclear targeting effort recommended by the Bush *Nuclear Posture Review* against non-nuclear weapons states is already well underway.

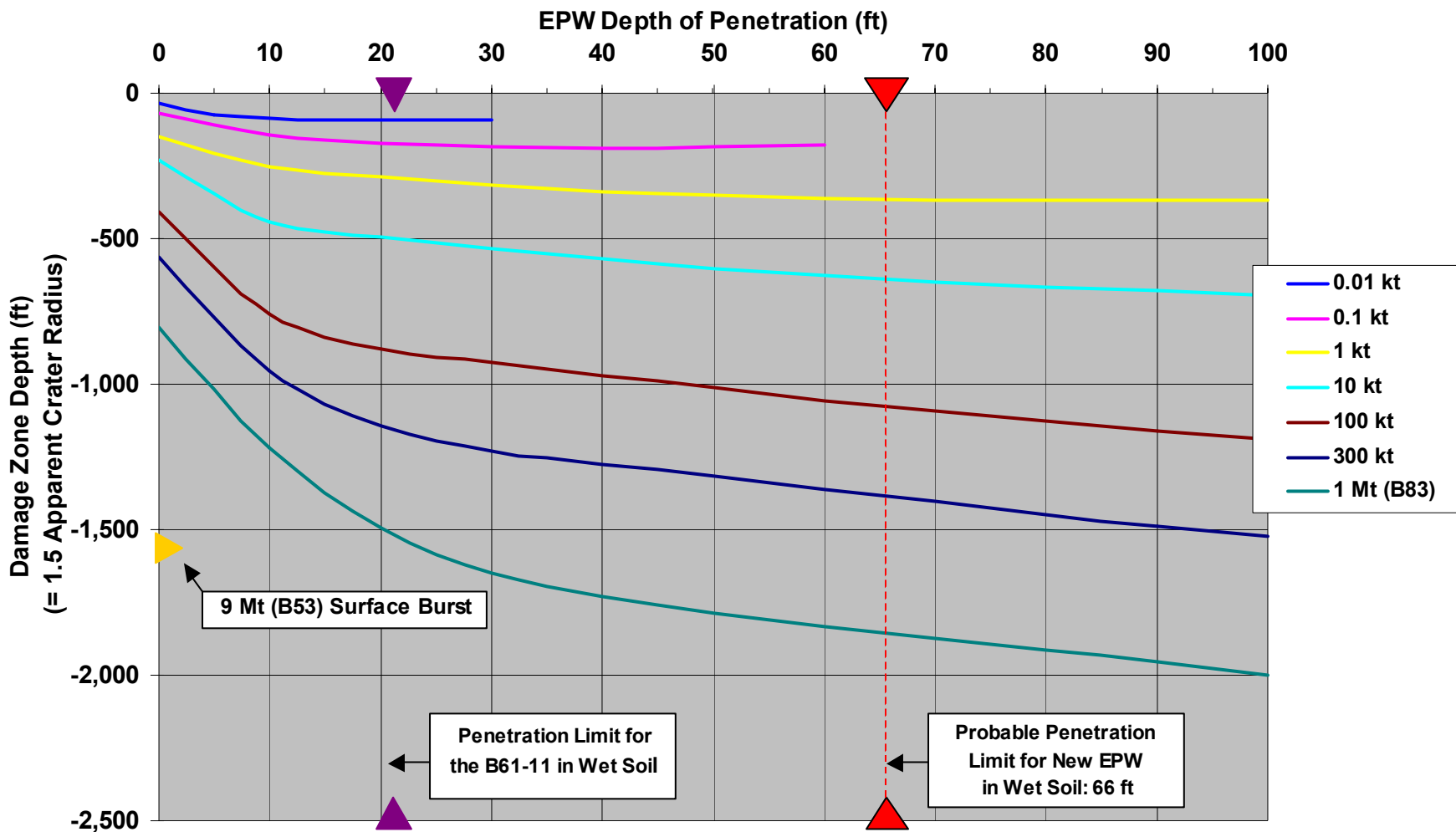
If the Bush Administration persists with its reported plan to develop a high-yield “Strategic EPW” with improved penetration over the B61-11 – the RNEP now under study -- it is useful to consider both the incremental military effectiveness and increased collateral effects of such a weapon.

As shown in **Figure 5**, if the RNEP warhead were to retain the full one megaton yield of the current B-83 strategic bomb – one of two candidates for conversion to the “robust” penetrator mission – and *double* the penetration depth currently achieved by the B61-11 in frozen soils to 20 ft. in hard rock, it would approximate the underground damage zone of a 9 megaton surface burst, but still would not be able to destroy targets buried below 800 feet.

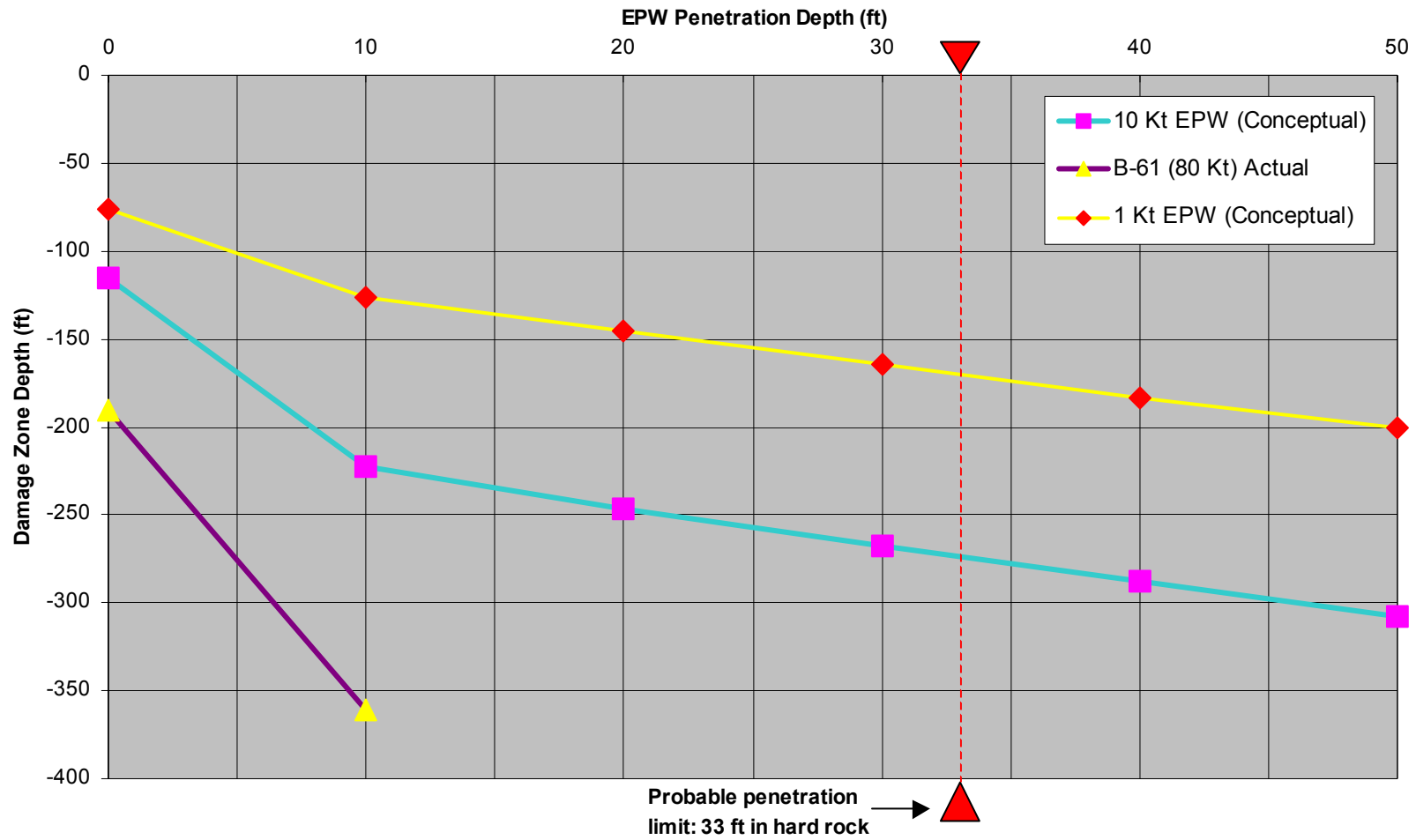
**Figure 5: Earth Penetrator Weapon (EPW) Targeted Against a Hardened Underground Bunker in Hard Rock**  
**Damage Zone Depth as a Function of Nuclear Yield and Depth of Penetration**



**Figure 6: Earth Penetrator Weapon (EPW) Targeted Against a Hardened Underground Bunker in Wet Soil**  
**Damage Zone Depth as a Function of Nuclear Yield and Depth of Penetration**



**Figure 7: Earth Penetrator Weapon (EPW) Targeted Against a Hardened Underground Bunker in Hard Rock**  
**Damage Zone Depth as a Function of Nuclear Yield and Depth of Penetration**



## II. LEGISLATIVE AND POLICY BACKGROUND

The resurgence of Republican interest in so-called “Precision Low Yield Weapons Development (PLYWD/“Plywood”) began in the waning months of the Clinton Administration. Senate Armed Services Committee Chairman John Warner (R-VA) and Strategic Forces Subcommittee Chairman Wayne Allard (R-CO) placed a provision [Sec. 1044] in the FY 2001 Defense Authorization Act, requiring the Secretaries of Defense and Energy to prepare a joint report to Congress on the “Defeat of Hard and Deeply Buried Targets” (HDBT).

This action was provoked by Pentagon intelligence reporting a rapid global increase in the number of hardened and deeply buried facilities. These facilities were suspected of shielding “strategic sites” (nuclear-biological-chemical weapon facilities, ballistic missile basing, leadership or top echelon command and control). A further impetus for demanding the report was a Los Alamos National Laboratory draft strategy paper, which concluded that “precision delivery of nuclear weapons would enable some classes of hard targets to be defeated with much lower yields than are currently employed.”<sup>6</sup> The report to Congress also required a discussion of how to defeat “chemical and biological agents” (“Agent Defeat”) that might be produced or stored in the well-protected facilities.

“The total Bush NNSA FY2004 budget request for nuclear weapons is \$6.63 billion, a 65% increase over the long term average level of comparable spending during the Cold War.”

Completed in July 2001, the HDBT Report stated, “DOD and DOE have completed initial studies on how existing nuclear weapons can be modified to defeat those HDBTs that cannot be held at risk with conventional high-explosive weapons or current nuclear weapons.” The report noted that the two departments “continue to consider and assess nuclear concepts,” and had formed “a joint Nuclear Planning Group to define the appropriate scope and option selection criteria for a possible [weapon] design feasibility and cost study.”

Regarding a possible chemical-biological weapon (CBW) “Agent Defeat” mission for nuclear weapons, the report asserted:

Nuclear weapons have a unique ability to destroy both agent containers and CBW agents. Lethality is optimized if the fireball is proximate to the target. This requires high accuracy; for buried targets, it may also require a penetrating weapon system. Given improved accuracy and *the ability to penetrate the material layers overlaying a facility*, it is possible to employ a much lower-yield weapon to achieve the needed neutralization. *The ability to use a lower yield would reduce weapon-produced collateral effects.* The current nuclear weapons stockpile, while possessing some limited ground penetration capability and lower yield options not yet certified), was not developed with this mission in mind.<sup>7</sup>

As discussed below, the preceding italicized passages are “forward-looking” in the extreme.\* Standing alone they present a grossly misleading picture of what might plausibly be achieved militarily with nuclear earth- or reinforced concrete-penetrating weapons. The full extent of erroneous information already presented to legislators on this topic is difficult to ascertain. Further information in the HDBT report was contained in “Classified Annex A- Section 3 – Nuclear Weapons.” Nevertheless, it is doubtful that more than a handful of congressional offices have reviewed the classified annex, and even fewer are likely to have staff sufficiently well versed in the basic sciences to independently evaluate the validity of the National Nuclear Security Administration’s (NNSA) nuclear technology claims.

The Administration’s July 2001 HDBT Report noted that “any development and procurement of advanced nuclear capabilities would be considered in the broad context of nuclear stockpile policy, plans, and priorities, as well as future DoD strategic programs.” That broad review—the *Nuclear Posture Review Report (NPR)*—was delivered in classified form to Congress six months later, early in calendar year 2002. The failure of the DOD to release a declassified version of the report led to numerous leaks, and subsequent publication of lengthy excerpts from the classified report on the worldwide web.<sup>8</sup>

Prior to the leaks, the Bush Administration sought to “spin” the conclusions of its secret review, by suggesting that the new nuclear policy would reduce the role of nuclear weapons in the nation’s overall military deterrent strategy. The reality, unfortunately, is different, reflecting a pattern of deception and dissembling that is characteristic of this Administration.

**The Nuclear Posture Review (NPR):  
“Moving Beyond the Cold War” by Making Nuclear Weapons Usable?**

The *NPR Report* responded to legislative provisions (Sec. 1041-42) added by the Republican majority during election year 2000 to the FY 2001 Defense Authorization Act, requiring, *inter alia*, that the Secretary of Defense, in consultation with the Secretary of Energy, “develop a long range plan for the sustainment and modernization of United States strategic nuclear forces to counter emerging threats and satisfy the evolving requirements of deterrence, “ including “appropriate warheads . . . to satisfy evolving military requirements.”

Under the heading, “Limitations in the Present Nuclear Force,” the NPR cited “moderate delivery accuracy, limited earth penetrator capability, high-yield warheads, [multiple warhead missiles] and limited retargeting capability,” and stated:

“New capabilities must be developed to defeat emerging threats such as hard and deeply buried targets (HDBT), to find and attack mobile and relocatable

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\* If made in willful negligence or with an intent to mislead, analogous forward-looking statements by corporate managements are frequently subject to shareholder lawsuits and enforcement action by the SEC. No comparable citizen avenue for redress exists for fraudulent technology claims made by government agencies. That job is supposed to be performed by Congress, but today rarely is, especially in the areas of nuclear and military technology. Since one of the first Republican acts after assuming control of Congress in 1994 was to abolish the Congressional Office of Technology Assessment (OTA), for almost a decade members of Congress have had no independent source for obtaining timely technical advice, and it shows.

targets, to defeat chemical or biological agents, and to improve accuracy and limit collateral damage.

Development of these capabilities, to include extensive research and timely fielding of new systems to address these challenges, are imperative to make the New Triad a reality.”

The NPR noted that the number of “known or suspected strategic (WMD, ballistic missile basing, leadership or top echelon command and control sites) sites worldwide” had grown to “over 1400,” and that a majority of the strategic facilities are “deep underground facilities.” The report complained:

“The United States currently has a very limited ground penetration capability with its only earth-penetrating nuclear weapons, the B61 Mod 11 gravity bomb. This single-yield, non-precision weapon cannot survive penetration into many types of terrain in which hardened underground facilities are located. Given these limitations, the targeting of a number of hardened, underground facilities is limited to an attack against surface features, which does not provide a high probability of defeat of these important targets.”

“With a more effective earth penetrator,” the NPR Report claimed:

“Many buried targets could be attacked using a weapon with a much lower yield than would be required with a surface burst weapon. *This lower yield would achieve the same damage while producing less fallout (by a factor of ten to twenty) than would the much larger yield surface burst.* For defeat of very deep or large underground facilities, penetrating weapons with large yields would be needed to collapse the facility (emphasis added). . . . Desired capabilities for nuclear weapons systems in flexible, adaptable strike plans include options for variable and reduced yields, high accuracy, and timely employment. These capabilities would help deter enemy use of WMD or limit collateral damage, should the United States have to defeat enemy WMD capabilities.”

As in the past neither DOD nor DOE presented test results or analyses to document the claimed potential for a “more effective” nuclear earth-penetrating weapon that would reduce fallout by a factor of 10-20 over a surface burst weapon with comparable crushing power against buried targets. As demonstrated in Section 1 of this paper, it is all important in such discussions to set the scale. What is being compared to what? For example, in the above example, an earth penetrator weapon capable of crushing hard targets buried twice as deep as those now within range of the 300 kt B-61 would require an EPW with a warhead more than three times as large penetrating twice more than twice as deep. Such weapons would generate vast quantities of radioactive fallout.

To whom, exactly, would it matter that the Pentagon’s baseline (in the above excerpt) for measuring a reduction in collateral damage appears to be, in this instance, a 9 MEGATON explosion at the surface. Only minds numbed by the calculus of nuclear destruction could take solace in the “reduction” in collateral damage inherent in this comparison. To the great mass of humanity who are threatened by such weapons, it is a comparison that is devoid of moral, legal, or political significance.

Even more disturbing is the off-hand manner in which the NPR Report treats the prospective military use of such weapons, as though they existed in a political and diplomatic vacuum, completely outside the context of longstanding U.S. treaty



obligations, international humanitarian law, and norms of inter-state behavior that have helped prevent their use over the past 58 years.

No U.S. military interest in responding to or averting a chemical or biological attack *on its combatant forces*, which can be prepared to protect themselves against such attacks, would justify the disproportionate harm likely to be inflicted on *non-combatants* and the natural environment from use of a nuclear weapon. The Bush Administration's professed strategy and willingness to use nuclear weapons *first*, before a proportionate, or indeed *any* attack is launched against U.S. or allied territory, or on U.S. military forces, is morally abhorrent, and constitutes an anticipatory breach of international humanitarian law. (This aspect of the Bush doctrine is explored in greater depth in the Appendix to this report).

The intense fallout from a U.S. preemptive strike on an HDBT with an earth-penetrating nuclear weapon is likely to cause severe environmental damage, irrespective of the immediate extent of death and injury to surrounding populations of noncombatants, and this damage alone is a violation of the laws of war if it is intentionally inflicted in the knowledge that it will cause widespread, long-term, harm to the natural environment that is clearly excessive in relation to the "concrete and direct" military advantage anticipated.

With respect to a nuclear EPW, for example, these standards mean that the United States could not legally employ it to attack underground facilities, as it were, "on spec"—as we did with the caves in Afghanistan, guided by a vague belief or mere intelligence "indications" that potentially hostile actors with weapons of mass destruction may be lurking in such facilities.

The likely scale of harm to noncombatants from nuclear EPW use means the balancing test for employment of such a weapons in compliance with international humanitarian law are exceptionally stringent and demanding. Yet one hears conservative radio commentators and even politicians talking about how we might have employed such a weapon, had we had one, in Afghanistan to "get" Bin Laden, or to dig Saddam Hussein out of one of his many deep underground bunkers.

This is no merely academic concern. When the recent war in Iraq was practically over—and Saddam's whereabouts were already officially deemed inconsequential to the outcome of the conflict—the U.S. military nonetheless knowingly and deliberately targeted a civilian neighborhood in Baghdad, dropping four 2000-pound bombs and killing at least 14 noncombatants, based on reports that Hussein was visiting a restaurant in the area. A government that would launch such an attack, at the conclusion of a self-initiated, discretionary conflict in which its own national security was *never* remotely threatened, leaves one wondering what heedless war crimes might be committed by the same government equipped with low-yield earth-penetrating nuclear weapons.

### III. PRECISION LOW-YIELD WEAPONS DEVELOPMENT (PLYWD) LEGISLATIVE ISSUES IN FY 2003

In its current FY 2003 budget for the National Nuclear Security Administration (NNSA), the Bush Administration sought and obtained \$5.9 billion for nuclear “Weapons Activities,” a nineteen percent increase over the last Clinton budget. Within the Weapons Activities account, the Bush Administration sought \$1.36 billion for “Directed Stockpile Work,” a budget category that funds modifications and refurbishment of nuclear weapons in the current stockpile. Within that line item \$433 million is being spent for nuclear weapons “Stockpile Research and Development,” a *62 percent increase* over the last Clinton budget for this subcategory of funding.

Within this Directed Stockpile Work R&D account, the Administration obtained \$64.3 million for a vague category called “Supporting Research & Development,” an increase of almost 90 percent over the FY 2001 appropriated level for this budget line. Squirreled away within this account, and not specifically identified by line item, is where the Administration placed funding for a feasibility and cost study of the “NWC [Nuclear Weapons Council]-approved Robust Nuclear Earth Penetrator.”<sup>9</sup>

Table 1 shows the recent, current and projected funding for NNSA and the nuclear “Weapons Activities” budget title. The Bush FY 2004 \$6.4 billion request for nuclear Weapons Activities represents an astonishing 23% *real increase* over the last approved Clinton budget for this activity in FY 2001, which was itself already well above the Cold War (1948-1990) average level of spending on this category of approximately \$4 billion in current dollars.

**Table 1: NNSA Nuclear Weapons Funding FY 2001-2009.<sup>10</sup>**

	FY 01*	FY 02	FY 03	FY 04	Real Growth FY01-04	FY 05 #	FY 06	FY 07	FY 08	FY 09	Annual Avg. Growth Rat FY05-09
	Actual	Actual	Actual	Request		FYNSP	FYNSP	FYNSP	FYNSP	FYNSP	
<b>NNSA Total</b>	6,827	7,585	7,940	8,835	22%	9,162	9,471	9,830	10,014	10,193	3.0 %
<b>Weapons Activities</b>	4,951	5,542	5,895	6,378	23%	6,661	6,961	7,277	7,518	7,651	3.85 %

\* Last Clinton Budget

# “FYNSP” = Bush “Future Years Nuclear Security Program”

The actual request is higher still, because NNSA accounts for “Program Direction” funding (\$348 million in FY 2004) separately from its programmatic budget. Based on its share of NNSA’s total budget, Weapons Activities accounts for 72% of this amount, or \$251 million, bringing the Bush total NNSA FY2004 request for nuclear weapons to *\$6.63 billion*, a 65% increase over the long term average level of comparable spending during the Cold War. Clearly, the Cold War obsession with nuclear deterrence is not “over”—it has merely been redirected, and relabeled “counter-proliferation” and “global strike.”

Since Bush came into office, NNSA spending on Weapons Activities has increased an average of \$476 million per year, representing an annual growth rate of 8.2%, far in

excess of the rate of inflation, which has averaged around 2% since January 2001. From FY2005 to FY 2009, projected growth in the Weapons Activities account decelerates to 3.85% per year, well ahead of the present level of inflation. But remarkably, the out-year NNSA budget shows no savings from the implementation of the much advertised “two-thirds cut” in deployed strategic nuclear warheads under the Moscow Treaty. A nuclear stockpile that cost \$712 *thousand* per operationally deployed warhead to sustain in FY 2001 will actually cost \$2.55 *million* per warhead to sustain in FY 2009, more than three times as much.

Dr. Everet Beckner, NNSA Deputy Administrator for Defense Programs, testified in April 2002 that the RNEP weapon would be “the initial focus of the Advanced [nuclear weapons] Concepts Program”<sup>11</sup> called for in the Bush Administration’s *Nuclear Posture Review*. The NPR directed NNSA to “reestablish advanced warhead concepts teams at each of the national laboratories and at headquarters in Washington.”<sup>12</sup>

Beckner described a three-year “RNEP Feasibility Study” that would assess “modifying one of two candidate nuclear weapons currently in the stockpile to provide enhanced penetration capability into hard rock geologies, and develop out-year costs for the subsequent production phases, if a decision is made by the Nuclear Weapons Council to proceed.” He stated that \$15.5 million out of the FY 2003 request of \$426 million for “Stockpile Research and Development” would be used to support the first year of the effort.

### **The Demands of Bush’s Preemptive Nuclear Strike Posture are Putting Pressure on Existing Law**

Dr. Beckner claimed that the RNEP program would be conducted in conformity with the restrictions imposed a decade ago by the *Spratt-Furse Amendment* [Sec. 3136 of P.L.103-160, the FY 1994 National Defense Authorization Act], which bars “the conduct of *research and development that could lead to the production* by the United States of a low-yield nuclear weapon which, as of the date of the enactment of this Act [Nov.30, 1993] has not entered production.”

This statute defines a “low-yield nuclear weapon” as one having “a yield of less than 5 kilotons,” but enumerates three specific exceptions to the general prohibition: the Secretary of Energy may conduct the research and development necessary to “design a testing device that has a yield of less than five kilotons; to modify an existing weapon for the purpose of addressing safety and reliability concerns; or to address proliferation concerns.”

Obviously, these are significant loopholes, affording the Secretary of Energy some flexibility to pursue nuclear warhead research without running afoul of the provision. But this much is clear: *Congress ultimately appeared to draw a red line around the research and development steps needed to turn a weapons “concept” into a fully-engineered, producible nuclear missile warhead or bomb system.* In 1993, when the law was passed, those R&D steps that were unambiguously oriented toward production or a production decision were the “Phase 2-A Joint Design Definition and Cost Study,” “Phase 3 Development Engineering,” and “Phase 4 Production Engineering,” now designated “Phases 6.2A, 6.3 and 6.4, respectively, denoting that the proposed design and cost study and engineering work involve modifications to an already stockpiled weapon (Phase 6).

While the depth of burial required to substantially contain the fallout from a five kiloton explosion is on the order of 115 meters, the maximum penetration depth for a more “robust” penetrator would be on the order of 10 meters in hard rock, and more likely less, leading to the certainty of significant radioactive fallout from the explosion dispersing into the atmosphere. Thus it is difficult to imagine that any *tactically employable* nuclear weapon—of the type desired by the Bush Administration for preemptive or even “preventive” counter proliferation scenarios—would have a yield in excess of a few hundred tons.

Perhaps this explains why – despite assurances of being in compliance with *Spratt-Furse* – the Bush Administration is simultaneously pushing for its repeal in the FY 2004 defense budget now working its way through Congress. On the other hand, while possibly tactically employable, such low-yield earth penetrators could not damage many buried targets, and would be susceptible to target location uncertainties and an insufficient lethal radius if used in a bunker-busting role against near surface stores of biological or chemical agent .

“Clearly, the Cold War obsession with nuclear deterrence is not ‘over’—it has merely been redirected, and relabeled ‘counter-proliferation’ and ‘global strike’.”

The competing versions of the RNEP, under development by Los Alamos and Livermore, are based on stockpiled two-stage thermonuclear designs—the B61-7 and B-83, respectively—which were originally “certified” to produce nuclear yields in the range of tens to a thousand kilotons. Development engineering of an earth penetrator, for example, that relies solely on the “unboosted” yield (~300 tons) or the “boosted” yield (~2-5 kt) of the primary (trigger) stage of one of these weapons could technically place it in possible violation of the amendment, if an investigation determines that a certified low-yield option

for these designs had not entered production prior to November 30, 1993.

But continued development of an RNEP could also be viewed as consistent with the letter—if not the spirit—of the law, because both these weapons had “entered production” prior to enactment of the *Spratt-Furse* provision, and that means inherently that the performance of at least one “low-yield option,” a boosted primary for the B61, had necessarily been certified for production prior to imposition of the restriction.<sup>13</sup> But as the July 2001 HDBT Report to Congress noted, these lower yield options were not certified “with this [earth penetrating] mission in mind,” and the unboosted primary yields may never have been separately certified with an explosive underground test.

Only nine days before Beckner assured Congress in April 2002 that the planned RNEP program would comply with *Spratt-Furse*, the then NNSA Director, General John Gordon, had told defense reporters in Washington that a “repackaged” nuclear payload in an EPW “could be rendered as a lower yield ... by using only the primary nuclear charge that acts as the trigger for a nuclear explosion, and removing what’s known as the “secondary,” which provides the explosive energy. ‘I wouldn’t call it a new weapon, but some others might,’ he said.”<sup>14</sup>

A DOE Phase 2-A study typically estimates costs, production schedules, and design-tradeoff options involving the safety, security, survivability, and control features for a

proposed weapon. In effect it assembles the data needed to support a budget request for a transition to Phase 3 – Development Engineering, in which a particular warhead design is chosen for full-scale development and integration into a fully functional weapon system. Traditionally, early in this stage was when DOE also sought Congressional approval for the considerable funding needed for production engineering work (Phase 4), some explosive testing needed to certify a warhead for quantity production (Phases 5 and 6) and entry into the operational stockpile. Authorization of funding for Phase 3 historically conveyed Congressional intent to produce a particular weapon for the stockpile, and often entailed concurrent approvals for the procurement of “long-lead production items,” such as specialized tooling and materials.

*Bottom line: If the intended military application of a nuclear weapon concept will result in its having an explosive yield of less than 5 kilotons, it may not proceed beyond the Phase 2 feasibility study stage without violating the most permissive interpretation of the Spratt-Furse Amendment.* Phase-2A studies for low-yield nuclear weapons are clearly, unambiguously prohibited under existing law, as they are intended to assemble all the information needed for production engineering and cost tradeoffs and a subsequent full-scale development decision, and therefore “lead to” production.

From the legislative record, it is clear that the House Armed Services Committee (HASC) intended its original amendment—minus the exceptions—to have an even broader restrictive impact. The HASC report on the FY 1994 Defense Authorization Bill is a succinct statement of the case against such weapons, which advocates of low-yield nuclear war fighting had been promoting during the first Bush Administration.

The committee is aware of recent efforts by the department [DOE] to perform concept and feasibility studies for designing very low-yield nuclear weapons. The committee opposes these efforts. Very low-yield nuclear warheads threaten to blur the distinction between conventional and nuclear conflict, and could thus increase the chances of nuclear weapons use by another nation. In addition, the committee believes that the development of very low yield nuclear weapons undermines U.S. efforts to discourage nuclear weapons development by other nations, and would undercut U.S. efforts to negotiate an extension of the Non-Proliferation Treaty or a Comprehensive Test Ban. Finally, the utility of very low yield nuclear weapons is questionable given the increasing effectiveness of precision-guided conventional munitions.

The committee therefore recommends a provision ... that would direct the Secretary of Energy to discontinue the ongoing concept design work within the department’s nuclear weapons laboratories and to refrain from any future feasibility, engineering, development, or production work associated with very low yield nuclear weapons.”<sup>15</sup>

The final statute as passed, however, made no specific reference to banning future weapon concept development (Phase 1) or feasibility (Phase 2) studies, but rather emphasized the research and development steps “that could lead to production.” Since the R&D data produced by either of these preliminary R&D phases falls far short of what is needed to support production of a weapon, a fair reading of the amendment could conclude that these early stages of weapon development are not covered by the prohibition. Apparently this is what the Pentagon indeed concluded, as it issued a “Joint

DOE-DOE Phase 1 Study” on “Precision Low-Yield Weapon Design (PLYWD)” on 30 December 1994, over a year after the Spratt-Furse ban was enacted.<sup>16</sup>

What may be different now, however, ten years later, is that the NNSA is no longer structuring all of its weapons research and development in the same formal sequence of phases, and Congress should be alert to this possibility. For example, in February 2002 Dr. Beckner’s then boss, former NNSA Administrator John Gordon, testified:

“The [Advanced Concept] teams will carry out theoretical and engineering design work on one or more concepts, including options to modify existing designs or develop new ones. In some instances, these activities would proceed beyond the “paper” stage and include a combination of component and subassembly tests and simulations to introduce an appropriate level of rigor to challenge our designers.”<sup>17</sup>

“***New warhead design, development and initial production:*** New or emerging WMD threats from rogue states make it difficult to predict future deterrence requirements. If the U.S. is to have a flexible deterrent, it must be able to adapt its nuclear forces to changing strategic conditions....In certain cases, it may be appropriate to design, develop and produce a small build of prototype weapons both to exercise key capabilities and to serve as a “hedge,” to be produced in quantity when deemed necessary.”<sup>18</sup>

During House consideration of the FY 2003 Defense Authorization Bill, Rep. Curt Weldon (R-PA) proposed an amendment that would have repealed the *Spratt-Furse* restriction.<sup>19</sup> Rep. Spratt worked with Rep. Weldon to modify his amendment, leaving the prohibition nominally intact, but deleting the word “research” from the limitation, and adding the following definition of “development”: “the term ‘development’ does not include concept definition studies, feasibility studies or detailed engineering design work.” Lumped together in a package of amendments with several “appealing Russian-U.S. nuclear transparency measures,” the modified amendment easily passed the House on a roll call vote, 362 to 53.<sup>20</sup>

It is difficult to know exactly what Rep. Spratt was attempting to achieve with this compromise, as the exclusion of “detailed engineering design work” (i.e., Phases 3 and 4) would have completely vitiated his ban on low-yield nuclear weapon “research and development,” leaving in place only an implied restriction on *production* of low-yield nuclear weapons. As Rep. Spratt himself explained, under the modified amendment the labs “can do concept definition work, they can do research work, they can do design work, they can build a wooden mock-up, but they cannot bend metal or do fissile component parts.”<sup>21</sup>

It appears that, facing a likely losing vote on the repeal of his original amendment, Rep. Spratt sought to convert it at the nth hour into a kind of *ad hoc* ban on the fabrication of prototypes or outright production. This seemed to be more political jawboning on Spratt’s part than a plausibly binding legal interpretation, as the actual text of the Weldon-Spratt compromise contained neither a limitation on the extent of permissible “engineering design work,” nor any references to prohibiting work on “fissile component parts” or “bending metal.”

Since *production* of a new nuclear weapon, or major modification such as the RNEP, would normally require specific authorization from Congress in any event, and such

authorization would effectively repeal the remainder of the Spratt-Furse amendment, there seemed to be little effective purpose behind the FY 2003 Spratt-Weldon compromise, other than political face-saving (for Democrats) and political cover for moderate Republicans, who could claim to their constituents they had not *really* voted in favor of developing new U.S. tactical nuclear weapons.

### **Senate Seeks to Reassert Congressional Control over Nuclear Warhead Development**

Fortunately, the *Weldon-Spratt* amendment did not become law in FY 2003, as the Senate did not adopt or even debate a similar provision, and it was dropped in conference. During the brief 18-month period in 2001-2002 in which the Democrats held a razor thin Senate majority, consideration of nuclear weapons issues took a somewhat different course than in the House.

The Senate Armed Service's Committee's press release on its "markup" of the FY 2003 Defense Authorization Bill stated:

"As a result of growing uncertainty about the Administration's plans for the nuclear weapons employment policy and future nuclear weapons development, the Committee prohibited the use of any funds for the development of a Robust Nuclear Earth Penetrator and directed the Secretary of Energy to clearly and specifically identify any funds requested in the future for new or modified nuclear weapons."

The SASC Report on the bill later revealed that the committee was also seeking a report, "not later than Feb.3, 2003," on the prospective targeting and employment policy for the RNEP, and the availability of conventional alternatives. The SASC bill set forth, in considerable detail, legislative requirements for line-item budget visibility and specific funding authorization for both "new" and "modified" nuclear weapons at two key decision points in the nuclear weapon life cycle, corresponding to initiation of Concept and Advanced Development (Phases 1 and 2), and entry into full-scale engineering development and preparations for production (Phases 2A, 3 and beyond).

Such controls had been the norm during the Cold War, but eight years of Republican disinterest in exerting responsible oversight over the DOE Defense Programs budget, combined with frequent budget "restructurings" and transition to a new paradigm of "stockpile stewardship," had greatly reduced the committee's visibility into what NNSA was doing with its steadily increasing appropriations. While only a modest step toward reasserting the Congress's constitutional role in such matters, the Senate's action still proved to be too much for the Republican-dominated House conferees, who managed to weaken the new oversight provision, and restore funding for the RNEP, which was recently released 30 days after receipt of the requested report (see below)

In contrast to the Senate bill's requirement for NNSA to specifically request line item funding authorization for initiating Phase 1 and 2 development of new or modified weapons, the final FY03 act allows "research and development activities for new nuclear weapons at the 2A phase and earlier [to] be aggregated in a single line."<sup>22</sup>

Still not compliant with even this more relaxed prescription, the FY 2004 NNSA Budget contains a nebulous line item requesting \$65 million for "Supporting Research

and Development,” accompanied by a brief narrative that explains: “...this category *includes* support for the Advanced Concepts Initiative to perform a small level of preconceptual\* and Concept Definition studies, and Feasibility and Cost Studies.”

“The Feasibility and Cost Studies will include the NWC [Nuclear Weapons Council] – approved Robust Nuclear Earth Penetrator (RNEP) study ...[and] subject to approval by the Navy in early FY 2003, ...an associated W76 [Trident missile warhead] study.” We are told “topics for the preconceptual and conceptual studies for FY 2004 have not yet been finalized”—[translation: ‘give us the money, and maybe later we might tell you what it’s for, if anyone remembers to ask’]. Despite professing not to know what these studies are, curiously NNSA already knows how much they will cost: \$21 million; \$15 million for RNEP; plus “\$6 million for additional and exploratory studies.”<sup>23</sup>

The final FY 2003 Defense Authorization Act included requirements for three reports to Congress on earth penetrating weapons and deeply buried targets. To gain the release of funding for the RNEP, the Secretaries of Defense and Energy had to prepare a report on the military requirements for RNEP and conventional strike alternatives, the receipt of which (on March 19) triggered the release 30 days later of the \$15 million in FY 2003 funds.<sup>24</sup>

Given the swift and costly proliferation of counter-proliferation programs within the U.S. military services and defense agencies, Sec. 1032 of the FY 2003 Act required “the Secretary of Defense in conjunction with the Secretary of Energy and the Director of Central Intelligence,” to report annually for the next five years on all research, development, and procurement activities being undertaken to “to defeat hardened and deeply buried targets.” The conference report expressed concern that “substantial amounts of money are being spent for a wide variety of hardened and deeply buried target-related activities within the defense and intelligence communities and that these many programs are not sufficiently coordinated.”<sup>25</sup>

A third reporting provision (Sec. 1033) directed the Secretary of Defense to request the National Academy of Sciences to:

conduct a study and prepare a report on the short and long-term effects on the surrounding civilian populations: (1) of the use by the United States of a nuclear earth penetrator weapon on a target; (2) of the use of a non-penetrating nuclear weapon on a hard or deeply buried target; and (3) of the use of a conventional high-explosive weapon on facilities to store and produce weapons of mass destruction when the involved materials or contaminants are released into populated areas.<sup>26</sup>

The provision called for the delivery of a National Academy of Sciences-EPW Report six months after enactment, a wildly unrealistic timetable that will clearly not be met.<sup>27</sup>

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\* According to *Webster’s Third New International Dictionary* (Unabridged), a “preconcept” is “a rudimentary idea intermediate between an ordinary recept and a fully developed concept,” with “recept” being defined as “a mental image or idea formed by repeated exposure to a particular stimulus or class of stimuli.” Apparently, Congress must pay NNSA weapons scientists some \$6 million per year to “stimulate” preconceptual mental processes that are, in evolutionary terms, somewhere between a rat’s and a dog’s. In reality, the term “preconceptual” has become fashionable within the weapons complex as convenient construct for avoiding both NEPA compliance and detailed Congressional budgeting and reporting requirements that govern project design and engineering funds.



As of mid-April 2003, five months after enactment, the Academy still did have a DoD contract for the study, had not yet nominated or vetted committee members, much less conducted meetings, or drafted, peer-reviewed, and issued a report. This NAS report process usually requires at least a year, so this report is not likely to be available until some time in the second half of FY 2004.

#### IV. LEGISLATIVE ISSUES FOR FY2004: BUSH RESURRECTS NUCLEAR WAR-FIGHTING

Consistent with the Administration's broad-brush rhetoric that it is liquidating the legacy of the Cold War by making dramatic reductions in the deployed U.S. strategic nuclear arsenal, NNSA Acting Administrator Linton Brooks recently claimed in testimony before the Senate Armed Services Committee that "nuclear weapons will play a reduced role in the overall United States security posture."<sup>28</sup> But the Administration's huge budget request for nuclear "Weapons Activities," and its proposed initiatives in nuclear weapons development and policy, belie that claim.

If reducing the role of nuclear weapons is really the object of the policy, why then is the Bush Administration's draft FY 2004 National Defense Authorization Bill seeking an outright repeal of the *Spratt-Furse* restriction on "development leading to production" of new nuclear weapons with yields under 5 kilotons, as well as new efforts to identify advanced nuclear weapons concepts, develop a "Robust Nuclear Earth Penetrator (RNEP) weapon, and improve readiness to resume underground nuclear test explosions at the Nevada Test site? Administration officials have tied themselves up in rhetorical knots trying to explain away these contradictions.

**"One signal we may be sending is that we are no longer going to constrain ourselves by a reliance on a type of retaliation that was appropriate for the Soviet Union."  
—Amb. Linton Brooks, Acting Director, NNSA**

For example, NNSA Administrator Brooks asserted, "We are not signaling through these programs any intention to lower the nuclear threshold or to blur the distinction between nuclear and non-nuclear weapons." But at the very same April 8 hearing, Admiral James Ellis, the commander of a newly unified Strategic Command that combines the resources and missions of the previously nuclear-only Stratcom with the former U.S. Space Command, testified that his new command had assumed previously "unassigned" mission areas, including "the creation of a nascent global strike capability" that will "bring in even sharper focus our deterrent missions *as we blend our now broader portfolio together* in innovative ways to enhance the nation's security (emphasis added).<sup>29</sup>

In his prepared statement, Ellis testified that "a fundamental assumption of the Nuclear Posture Review is that *a mix of advanced capabilities*, some yet to be designed, that include conventional, non-kinetic, special operations, *and nuclear*, is needed in order to offer the broadest range of options to our nation's leaders."<sup>30</sup>

“We are drawing on the best elements of both U.S. Space Command and U.S. Strategic Command,” Ellis noted, “in order to *eliminate seams*...we have reshaped and streamlined the command’s component and organizational structure to *enable an integrated and trans-regional approach* to matching global capabilities to global challenges. Importantly, we also implemented a comprehensive update to our [nuclear] deterrent force plans to reflect the needs of the new international security environment.”

Ellis testified that Stratcom’s longstanding nuclear “Strategic Warfare Planning System” had recently completed “an initial upgrade” and was now entering “a new modernization effort” that will incorporate “the *flexibility and responsiveness* envisioned by the Nuclear Posture Review,” now “*broadened* to support our newly assigned non-nuclear strategic and regional support missions.” Ellis concluded:

We no longer live in a world where strategic is synonymous with nuclear, and we are integrating and interlinking the command’s broad portfolio of missions to better and more flexibly meet the deterrent needs of the nation.<sup>31</sup>

“Blend,” “mix,” “eliminate seams,” “enable an integrated approach,” “flexible and responsive,” “broadened,” “integrating and interlinking,” “portfolio of missions”—sounds a bit like “blur,” doesn’t it? Of course it does, because that is precisely the intent of the Bush policy, as Administrator Brooks himself discussed at length with Senator Reed (D-RI) later in his testimony, when he sought to explain why the Administration was seeking repeal of the *Spratt-Furse* ban:

BROOKS: We have low yield weapons now. Is there a logic to saying that we can have older low-yield weapons, but that we know now that we aren’t going to ever want to produce new low-yield weapons? To some extent we are talking about an important signal, but I believe that it is wrong as a matter of principle to set forth arbitrary restrictions on even the development of weapons...

REED: Well, I think Mr. Ambassador, you’re right...it sends a very strong signal, and the signal that you tried communicating, I thought, was that this is just a technical issue about the breadth of research, yet this repeal goes far beyond that. It would signal to many people that we’re not only researching but we have the legislative authority—at least not the legislative prohibition – to produce new weapons, and that would an interesting signal around the globe in terms of many issues, [such as] other countries looking at what we do, the proliferation issues, [and] not discouraging disarmament efforts that we’re trying to encourage... As for the arbitrary nature of setting one class of weapons aside, I think that goes to an issue about a low-yield weapon, that there might be less of a threshold for use than a larger one.

BROOKS: Yes sir, and I understand that, and here you have the paradox we have faced in this country for the last 60 years, that, on the one hand, the more that you can see that the weapon is directly relevant to something you might want to do, the more effective a deterrent it is. And on the other, the more the argument that you make comes into play. I think that’s an inherent part of the dilemma of nuclear weapons. What signal will we be sending [by repealing the restriction]?

One signal we may be sending is that we are no longer going to constrain ourselves by a reliance on a type of retaliation that was appropriate for the Soviet Union, that in fact since deterrence depends on what the adversary values, we are going to hold open the possibility of a deterrent that is adapted to a future

adversary...[T]he overwhelming power of the United States is not always enough to ensure rational behavior on the part of other countries. So there is a possibility that in the future, one may need to have capabilities [i.e. the currently banned precision low-yield nuclear weapons] that we don't have now...[I]t is important to realize that people we try to deter by and large don't think like us, and therefore we may need a variety of capabilities to deter them. That's the point we had in the time of the Soviet Union and that's the point we have now."<sup>32</sup>

Is this not the same Administration that says it has “moved beyond” Cold War thinking about nuclear deterrence? In reality, the preceding exchange reveals that the thinking behind the Pentagon's current nuclear policy is fundamentally no different now than it was at the height of the Cold War. The Administration continues to spend billions whittling away at the “paradox” of nuclear deterrence. It is still striving to make the U.S. threat to employ nuclear weapons more “credible” in a wide range of contingencies—now involving non-nuclear-armed opponents not necessarily aligned with either Russia or China—by making the U.S. nuclear stockpile more “directly relevant to something you might want to do,”—e.g., destroying well-protected targets with less “collateral damage” than would be inflicted by current high-yield weapons designed for busting Soviet missile silos and command centers. The targets may have changed, but the Cold War nuclear war-fighting mentality remains essentially the same.

“Clearly aware of the rhetoric-reality mismatch afflicting its nuclear weapon policies, the Bush Administration continues to deflect criticism by arguing, in essence, that it is not yet *doing* what it is clearly *preparing* and *planning* to do.”

NSSA Acting Administrator Brooks averred in testimony that the Administration's nuclear weapons initiatives could be “subject to misinterpretation,” and he offered a series of assurances to the members Senate Armed Services Strategic Committee about “what we are not doing”:

“The President's made it clear that we have no near-term need, no requirement to resume nuclear testing.”

“We are not planning to develop any new nuclear weapons at all.”

“The Department of Defense has not identified any requirements for such weapons.”

“Within the time it would take to develop fundamentally new weapons, the current test readiness [36 months] would be more than adequate [emphasis added].”<sup>33</sup>

Members of Congress should note that the value of these assurances is diminished considerably by the weasel-wording employed—no “near-term” need, no “fundamentally new” weapons. Indeed, many members of the UN Security Council, and members of the U.S. Congress, are by now familiar with the Bush Administration's tactic of pleading open-mindedness on an issue while it steadily proceeds to fashion a *fait d'accompli* that implements its own ideological and political-military agenda, without the least hint of compromise.

But semantic subterfuges aside, the Administration's assurances are also contradicted by the plain language of the President's program, and by his subordinates explanations of it. For example, immediately after disavowing any Administration intent to develop new

nuclear weapons, Acting Administrator Brooks went on to testify, “We are seeking to explore, in conjunction with the Department of Defense, advanced concepts that might someday be needed for future presidents *or this president*, for a future Congress *or this Congress* to implement (emphasis added).” And the NNSA’s Deputy Administrator for Defense Programs, Dr. Everet Beckner, described the Administration’s proposed “Advanced Concepts” work in FY2004 as follows:

The teams will carry out theoretical *and engineering design work* on one or more concepts. These activities might proceed *beyond the “paper” stage* and include a combination of component and subassembly tests and simulations to introduce an appropriate level of rigor to challenge out designers. These activities might also culminate in *an integral flight or laboratory test*, or a subsequent decision to proceed with *further* development activities (emphasis added)<sup>34</sup>

In other words, the Bush Administration *is* “planning to develop new weapons,”—the exact opposite of the assurance Linton Brooks offered the committee—and this development includes “engineering design work” and “integral flight or laboratory tests.” Part of the credibility gap resides in the fact that the simmering dispute over what NNSA does or does not do with the \$21 million budgeted for “Advanced Concepts” work is overshadowed by a larger reality. Under Republican stewardship, Congress has gained little understanding or control over what NNSA is doing with the \$2.4 billion slice of “Weapons Activities” funding it now devotes to various ill-defined “Campaigns” to improve science-based “stockpile-stewardship” capabilities.

Under such campaign headings as “Primary Certification,” “Secondary Certification and Nuclear Systems Margins,” “Weapons System Engineering Certification,” “Advanced Design and Production Technologies,” and “Pit Manufacturing and Certification,” NNSA is continuing to conduct a wide range of nuclear weapons design and engineering activities. Dr. Beckner testified that these campaigns “contribute technology needed to carry out the Directed Stockpile Work” on “refurbishment” of existing weapons, “as well as *foster new ideas and concepts that will provide cutting-edge improvements*” to the stockpile (emphasis added).

Whether “new” nuclear weapons—or more likely new *components* that can be swiftly integrated into new designs—are already being developed in the interstices of these “stewardship” programs is not clear. What is clear is that given its current supine oversight posture vis-à-vis the defense-industrial complex, Congress is not likely to be informed of new weapons developments until they are well on their way to fruition.

### **No Urgent Requirement to Undo Congressional Low-Yield Ban**

If, for the sake of argument, one *were* to accept at face value the Administration’s assurances that it has no plans or requirements to develop new weapons, one is still left with the problem of trying to explain the current Republican push to overturn the *Spratt-Furse* restriction on low-yield nuclear weapon development. This provision can be interpreted, or could be easily revised to more clearly indicate, that only “new” weapon development activities “leading to production” fall within its purview, thereby excluding the concept and feasibility studies that the Administration claims are the sole object of its efforts.

As acting NNSA Administrator Brooks himself noted in recent Senate testimony, “I admit...since I’m not going to develop or produce anything without the permission of the Congress, and if the Congress decided to give me permission, *it could modify the ban in the future...*” Well, yes it could, so why are the Administration and its Republican congressional allies pressing to repeal the ban now?

According to Deputy Administrator Brooks, “we are seeking to free ourselves from intellectual prohibitions against exploring the full range of technical options. We don’t want to be limited in our thinking just because some options might imply a hypothetical weapon with a yield below an arbitrary value.” While acknowledging that “such warhead concepts could not proceed to full-scale development, much less production, still less deployment, without Congress authorizing and appropriating the necessary funds,” Brooks testified that repeal of this legislation would “remove the chilling effect on scientific inquiry that could hamper our ability to maintain and exercise our intellectual capabilities to respond to needs that one day might be articulated by the President.”

Not to put too fine a point on it, this rationale is a load of malarkey. The Administration is willfully over-interpreting the reach of the existing *Spratt-Furse* prohibition solely in order to make a broader *ideological* and *political* point—that any restrictions on U.S. military power—even those that are democratically self-imposed by the Congress in the interest of furthering a cooperative international approach to nuclear security issues—are inherently undesirable, because they could deprive a future U.S. Commander-in-Chief of “military options”.

“Why are the Administration and its Republican allies in Congress pressing to repeal the low-yield nuke ban now?”

It is clear that Congress did not – and did not seek—to “chill” the process of “scientific inquiry” at the nation’s scientific laboratories when it passed the *Spratt-Furse* ban in November 1993. If this had been the law’s intent, there would have been no point to adding the qualifying phrase, “which could lead to the production by the United States of a low-yield nuclear weapon.” The Congress would have simply banned “all research and development work on any new low-yield nuclear weapon,” or indeed “any new nuclear weapon.”

A commonly accepted judicial standard for statutory construction is that a law should not be interpreted in manner that tends to yield absurd or futile results. In light of this injunction, consider the following colloquy involving Sen. Wayne Allard, Chairman of the SASC Strategic Subcommittee, Admiral Ellis, commander of the now greatly augmented Strategic Command, and Senator Bill Nelson, ranking member of the subcommittee:

ALLARD: Now the way I understand the administration and you are both interpreting current law, which was just read to us here by Senator Nelson, is that you could not do any research at all, that somehow or other could be construed as leading to the development of [new low yield] nuclear weapons. There's a lot of lawyers out there that want to carry that language to the ultimate, and so it preempts us from [doing] some research out there that we ought to be doing, when we look at the full range of possibilities to defend this country, that's kind of the way you're looking at that.

ELLIS: Well, certainly the language has been subject [to] as much scrutiny as anything that has gone into law on the nuclear side in many, many years and as Ambassador Brooks has properly noted, we've taken a very conservative interpretation to that to ensure that we carry out fully ...the intent [of the law] and I think the term 'possibly' and a number of other generalities associated with that has engendered a real reluctance to begin to address any of these issues...

**“In my own mind I think I can conjure up where this definition ... could actually interfere with just basic research.”**

**—Sen. Wayne Allard, “judicial activist.”**

ALLARD: In my own mind I think I can conjure up where this definition ... could actually interfere with just basic research. For example, I'm trying to, just hypothetically maybe if you would run across an element that all of a sudden comes to light and somebody said, well, that has the potential of being nuclear, an element that would be used in a nuclear weapon, then that [Spratt-Furse restriction] could keep you from doing some very basic research as far as chemistry was concerned. Is that, could it be carried that far?

ELLIS: Well, I wouldn't speak for Ambassador Brooks here, but since I'm covering for him with this section, I think that that's kind of what he was alluding to in his discussion of the chilling effect. I mean it is important.

ALLARD: But it can be interpreted to the point where it interferes with basic physical research and basic chemical research, is that correct? Is that what you're trying to say?

ELLIS: Our interpretation is all research which could lead to the development of precision low-yield weapons is precluded by that language, and that's the issue at hand.

ALLARD: My time has expired. Senator Nelson.

BILL NELSON: Mr. Chairman, I'm reminded of debates on other matters that we have as to whether you're a strict constructionist or a judicial activist, and all of a sudden it sounds like you want to be a judicial activist.<sup>35</sup>

Senator Nelson's mild rebuke of the Republican chairman's sudden embrace of (normally reviled) “judicial activism” was too kind. Allard and Admiral Ellis were not merely “interpreting” the Spratt-Furse amendment. They were making it up out of whole cloth. The amendment does contain the word “possibly,” and the amendment does not prohibit “all research that could lead to the *development* of precision low-yield weapons,” but rather “research *and* development that could lead to the *production* of a low-yield nuclear weapon”—a rather significant difference.

Similarly, Ambassador Brooks intimated that “an enhanced cruise missile [warhead] which has different safety and surety features” might run afoul of the restriction, when the existing law already expressly exempts “research and development necessary: to modify an existing weapon for the purpose of addressing safety and reliability concerns; or to address proliferation concerns.”

**Clarification of *Spratt-Furse* Amendment to Allow  
“Concept” and “Feasibility” Studies is Easily Accomplished**

If the Administration’s assurances are sincere regarding the lack of any *present* plan or intention to develop or produce new low-yield nuclear weapons, then there should be no difficulty in reaching bi-partisan agreement on minor modifications to the Spratt-Furse restriction that would remove the ambiguities that are ostensibly causing scientific paralysis at our nation’s defense laboratories. For example, by merely replacing “could lead” with “leading,” the restriction would be revised to more clearly bar “research and development leading to production” of a low yield nuclear weapon – and therefore not earlier stages of research.

The Armed Services Committees could adopt a statutory definition or conference report language further clarifying that this restriction is intended to apply to the kind of research and development activities typically associated with the Phase 2A Joint Definition and Cost Study, Phase 3 Development Engineering Project, and Phase 4 Production Engineering stages of the warhead life cycle, and not to Phase 1 Concept Definition or Phase 2 Feasibility Studies.

This simple fix would take care of the issue until such time as this or any future Administration had formulated and assessed the technical feasibility of various alternative design concepts and approaches, and wanted to proceed to the next stage (Phase 2A or above) of estimating engineering and production costs and schedules, and evaluating specific design trade-offs involving safety, security, survivability, and use control features for the weapon—in other words, “research and development leading to production.” Specific congressional authorization and appropriation of the funding to take this step for a new low-yield nuclear warhead design would obviously constitute repeal of the *Spratt-Furse* restriction.

## APPENDIX

### Political and Legal Implications of the Bush Preventive War Doctrine

Following the NPR Report, which remained nominally classified despite numerous leaks and publication of excerpts on the web, the full extent of the Bush Administration's disdain for legal international obligations that might constrain U.S. conduct abroad subsequently emerged in two White House reports issued later in 2002: *The National Security Strategy of the United States*, issued in September, and the *National Strategy to Combat Weapons of Mass Destruction*, issued in December.

Taken together, these documents outline an aggressive new U.S. national security doctrine that empowers the President to “act preemptively” to “forestall or prevent hostile acts by our adversaries”—the latter now identified not as specific hostile nation-states or organizations, but rather as generic “terrorists” and “rogue states.” Threats worthy of preventive military action against another sovereign state now include not only threats of terrorist attack, but also “our enemies’ efforts to acquire dangerous technologies,” and President Bush pledges “America will act against such emerging threats before they are fully formed.”

Across the full spectrum of military operations, the new doctrine seamlessly, but heedlessly and dangerously melds covert “preemptive” and “preventive” special forces operations against *terrorists* with much larger conventional and even *nuclear* preemptive strikes against *sovereign states* that possess, or are in the act of acquiring, biological, chemical, or nuclear deterrent and war fighting capabilities.

This new doctrine inaccurately lumps together, and effectively equates possession and use of chemical, biological, and nuclear weapons, when in reality both the military and civil consequences of using such weapons can vary widely. For example, under the new Bush policy, a limited and (relatively ineffective) battlefield use of chemical weapons – or even imminent preparations for such use—could be the trigger for a disproportionate *nuclear* retaliatory or preemptive attack. President Bush's *National Security Presidential Directive 17*, issued September 17, 2002, states, “The United States will continue to make clear that it reserves the right to respond with overwhelming force—including potentially nuclear weapons—to the use of WMD against the United States, our forces abroad, and friends and allies.”<sup>36</sup>

The unclassified version of this directive, released three months later as the White House document, *National Strategy to Combat Weapons of Mass Destruction*, goes on to state:

“U.S. military forces and appropriate civilian agencies [a reference to the CIA's covert paramilitary and Unmanned Aerial Vehicle (UAV) operations] must have the capability to defend against WMD-armed adversaries, including in appropriate cases through preemptive measures. This requires capabilities to detect and destroy an adversary's WMD assets before these weapons are used.”

Outside the Beltway and around the globe, the blatant hypocrisy of the new Bush stance is difficult to miss, but inside the Beltway Administration officials and most Republican members of Congress seem oblivious to it. They apparently see no inconsistency in preventing other nations, by force if necessary, from acquiring nuclear



weapons, while they scuttle arms control agreements and spend billions to modernize the planet's largest arsenal by far of "weapons of mass destruction."

Official hypocrisy is one thing—and not uncommon in affairs of state and foreign policy. But a beggar-thy-neighbor strategy of "American security first," carried to the point ideological zealotry, is more than mere presidential posturing, it is rather the makings of a counterproductive, self-defeating and ineffective foreign policy.

In response to President Bush's threats of preemptive military action, a number of countries, not wanting to be left defenseless or be coerced, will more likely respond by reaching for—rather than rejecting—nuclear weapons. Meanwhile, the Bush Administration is systematically de-legitimizing international security institutions, such as the UN Security Council, the IAEA, the Nonproliferation Treaty, and the multilateral arms control regimes for nuclear, chemical, and biological weapons. For all of its military prowess, the Bush Administration has shown little ability to influence the nuclear policies of North Korea or Iran, or even its client state in the war on terror, Pakistan, which continues to import medium-range ballistic missiles and export nuclear dual-use technology.

The new Bush doctrine not only abrogates longstanding nuclear security assurances offered by the United States to the non-nuclear-weapon-state parties to Nonproliferation Treaty (NPT) of 1968, but also constitutes an "anticipatory breach" of the United Nations Charter, the post-WWII London Charter and "Nuremberg Principles," and international humanitarian law as set forth in the Geneva Conventions and subsequent protocols

- Since 1978, *United States policy* has extended a so-called "negative security assurance" to non-weapon state parties to the NPT: if they continue to refrain from acquiring nuclear weapons, and do not ally themselves with a nuclear weapon state in an attack on U.S. or allied forces, then they would not be subject to U.S. nuclear attack. As demonstrated by the discussion in the NPR of the Pentagon's secret planning for "nuclear contingencies," the Bush Administration is violating these assurances by preparing to attack hardened and deeply buried WMD and leadership targets in Iran, Syria, Iraq, Libya, and North Korea.
- Articles 2.4 and 51 of the *UN Charter* prohibit individual member states from using or threatening to use force in their inter-state relations, except in cases of "individual or collective self-defense" against an "armed attack." "Preventive" and "early preemptive" warfare of the type now being waged by the Bush Administration in Iraq is a clear violation of the UN Charter
- Article 6 of *Statute of the Nuremberg International Military Tribunal*, which was established by the victorious WW II allies in the *London Charter of 1945*, defines "crimes against the peace" as those aimed at the "planning, preparation, initiation, or waging of a war of aggression, or a war in violation of international treaties."
- Articles 51 and 57 of the *Additional Protocol to the Geneva Conventions* – yet to be ratified by the United States Senate—enshrine the principle of proportionality, prohibiting attacks that would cause "incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated."

- Article 8.2b.iv of the *Statute of the International Criminal Court (ICC)*—to which the Bush Administration refuses to be bound—likewise considers such disproportionate acts as war crimes, and adds to the preceding definition the act of “intentionally launching an attack in the knowledge that such attack will cause...widespread, long-term, and severe damage to the natural environment which would be clearly excessive in relation to the concrete and direct overall military advantage anticipated.”

## End Notes

<sup>1</sup> Richard T. Cooper, "Making Nuclear Bombs 'Usable': Pentagon wants to see whether deep bunkers can be blasted without the damage spreading," *Los Angeles Times*, Feb. 3, 2003, p. 1

<sup>2</sup> The tests were named "Mission Ghost," (6-20-87), "Misty Echo," (12-10-88), and "Diamond Fortune" (04-30-92). Mission Ghost helped prepare for Misty Echo, which was "a cratering and ground shock event to develop energy coupling and cratering prediction codes useful for assessing the vulnerability of strategic structures to nuclear attack, and to ensure the most effective allocation of strategic warheads for targeting purposes, including future weapons systems such as the earth penetrator warhead." Diamond Fortune as "conducted in a cavity to assess the energy coupling and cratering effects of a shallow earth penetrating weapon," which also "helped develop prediction codes to assess the vulnerability of strategic structures to nuclear attack." R.S. Norris and T. B. Cochran, *United States Nuclear Tests: July 1945 to 31 December 1992*, NWD 94-1, Natural Resources Defense Council, Washington, D.C., 1994, p. 51-53.

<sup>3</sup> Michael May and Zachary Haldeman, "Effectiveness of Nuclear Weapons against Buried Biological Agents Targets," draft study, Stanford Center for International Security and Arms Control, April 2003.

<sup>4</sup> May and Haldeman, op. cit., p. 6, cite work performed three decades ago by scientists at Sandia National Laboratory that "leads to an upper limit estimate of 10 meters penetration for some types of rock, using reasonable parameters for the projectile weight, diameter and configuration." Robert Nelson, citing Sandia data on the penetration of steel rods fired into concrete, estimates 12 meters as the limit of penetration for a three meter long EPW in reinforced concrete, or hard rock of comparable density, and suggests that achievable real world penetration depths would likely be less. See R.W. Nelson, "Low Yield Earth Penetrating Nuclear Weapons," *Science and Global Security*, 10:1-20, 2002.

<sup>5</sup> P. J. Lindop and J. Rotblat, "Consequences of Radioactive Fallout," in *The Final Epidemic: Physicians and Scientists on Nuclear War*, Educational Foundation for Nuclear Science, Chicago, 1981, p. 134.

<sup>6</sup> Stephen M. Younger, *Nuclear Weapons in the 21<sup>st</sup> Century*, LAUR-00-2850, June 27, 2000, p. 19. At the time Younger was Associate Laboratory Director for Nuclear Weapons at LANL.

<sup>7</sup> *Report to Congress on the Defeat of Hard and Deeply Buried Targets*, Submitted by the Secretary of Defense in Conjunction with the Secretary of Energy, in Response to Section 1044, PL106-398, July 2001, p. 4, 18.

<sup>8</sup> *Nuclear Posture Review (NPR) Report* [Excerpts], <http://www.globalsecurity.org/wmd/library/policy/dod/npr.htm>.

<sup>9</sup> The previous year it was referred to as "Phase 6.2/6.2A Feasibility Study, Option Downselect, Design Definition and Cost Study on the RNEP [Robust Nuclear Earth Penetrator]."

<sup>10</sup> Sources: *FY 2003 and FY 2004 Congressional Budget Requests, National Nuclear Security Administration*, U.S. Department of Energy, and Statement of Linton F. Brooks, Acting Under Secretary of Energy and Administrator For National Security, NNSA, U.S. Department of Energy, before the Subcommittee on Strategic Forces, Committee on Armed Services, U.S. Senate, April 8, 2003, table, p. 3.

<sup>11</sup> *Statement of Dr. Everet Beckner, Deputy Administrator for Defense Programs, National Nuclear Security Administration U. S. Department of Energy*, before the Committee on Armed Services, U.S. Senate, April 10, 2002, p. 4. Dr. Beckner testified:

"Current weapons in the stockpile cannot hold at risk a growing category of potential targets deeply buried in tunnel facilities, possibly containing chemical, biological, nuclear, or command and control facilities. As a result the NPR endorsed NNSA's Advanced Concepts Initiative that could provide the Nation with options that could be considered for future production and deployment. Also, as required by the NPR, it would provide an opportunity for NNSA and its contractors to exercise critical skills necessary for the long-term sustainment of the nation's defense. By direction of the Nuclear Weapons Council, and in response to an Air Force requirement, the initial focus of the Advanced Concepts Program will be the Robust Nuclear Earth Penetrator (RNEP), for which \$15.5 million is requested in FY 2003 as part of the Directed Stockpile Research and Development activity. The three-year RNEP Feasibility Study will assess the feasibility of modifying one of two candidate nuclear weapons currently in the stockpile to

provide enhanced penetration capability into hard rock geologies and develop out-year costs for the subsequent production phases, if a decision is made by the Nuclear Weapons Council to proceed. This work complies with existing legislation, including section 3136 of the FY 1994 National Defense Authorization Act. The FY 2003 budget contains no other funds for Phase 6.X advanced concept study activities.”.

<sup>12</sup> *NPR*, op. cit., p. 35.

<sup>13</sup> Most U.S. nuclear weapons have two stages, a largely fission-driven “primary” or trigger stage, and a “secondary” stage that relies on fusion reactions to generate a large fraction of the weapon’s total yield. To reduce the weapon’s volume and weight for missile delivery, the primary stage relies on a process of “boosting” the fission reaction with burst of additional neutrons produced by the fusion of a small amount of deuterium-tritium gas early in the detonation process. To ignite the fusion reaction in this boost gas, the weapon must produce an initial fission yield on the order of a few hundred tons (of chemical explosive equivalent). Thus, by not bleeding boost gas into the core of the primary during the fuzing and arming sequence, the overall weapon can in theory be constrained to a yield of a few hundred tons, because the secondary stage will not ignite. On the other hand, a yield of a one to a few kilotons can be obtained by boosting the primary, and inerting or omitting the secondary stage.

<sup>14</sup> “Earth-Penetrating Nukes May Not Violate Restrictions, Says DOE Official,” *Aerospace Daily*, April 3, 2002.

<sup>15</sup> *Report of the Committee on Armed Services, House of Representatives, on H.R. 2401, National Defense Authorization Act for FY 1994*, July 30, 1993, p. 427.

<sup>16</sup> Lt. Col Roger F. Kropf and Robert W. Blankert, *Precision Low-Yield Weapon Design, Joint DOD-DOE Phase I Study*, (Final Report) (U) NWIE-TR-94-03, Nuclear Weapons Integration Division, Air Force Material Command, Albuquerque, 30 December 1994.

<sup>17</sup> Statement of John A. Gordon, Under Secretary for Nuclear Security and Administrator, National Nuclear Security Administration, U. S. Department of Energy, before the Committee on Armed Services, U.S. Senate, 14 February 2002, p. 9.

<sup>18</sup> Gordon statement, p. 5.

<sup>19</sup> Here is the text of Rep. Weldon’s original amendment, (CR, May 9, 2002, p. H2334.

“Sec. 3146. conditions under which prohibition on research and development of low-yield nuclear weapons is repealed.

(a) **PRESIDENTIAL CERTIFICATION.**--Subsection (b) shall take effect as of the date on which the President submits to Congress the President's certification that--

(1) another nation has conducted a nuclear test for the purpose of developing new or improved nuclear weapons;

(2) another nation is developing weapons of mass destruction in underground facilities, and such weapons could pose an imminent risk to the United States or to United States military personnel deployed abroad; or

(3) it is in the national security interest of the United States that subsection (b) take effect.

(b) **REPEAL.**--Effective as of the date provided in subsection (a), section 3136 of the National Defense Authorization Act for Fiscal Year 1994 (42 U.S.C. 2121 note) is repealed.”

<sup>20</sup> Kathryn Crandall, *The Bush Nuclear Posture Review’s First Budget in Congress*, British-American Security Council, February 2003, #43, p.4. <http://www.basicint.org/pubs/Papers/BP43.htm>. This paper is an excellent and comprehensive survey of nuclear weapons issues in the 107<sup>th</sup> Congress.

<sup>21</sup> Crandall, *The Bush Nuclear Posture*, p.4..

<sup>22</sup> *Conference Report on H.R. 4546, Bob Stump National Defense Authorization Act for Fiscal Year 2003 – Cong. Record – Nov. 12, 2002, p.H8528:*

*Requirements for specific request for new or modified nuclear weapons (sec. 3143).* The Senate amendment contained a provision (sec. 3134) that would require the Secretary of Energy

specifically to request funds before beginning research and development and engineering and production activities to support any new or modified nuclear weapon to meet a new military requirement. The provision would require a specific request in a specific line item or items at two distinct points in time for any work on new or modified nuclear weapons. This requirement is consistent with past practices at the Department of Energy (DOE), similar to current acquisition practices for major weapons systems at the Department of Defense (DOD), and similar to the way DOE budgets for construction projects. A new weapon would be defined by the provision as any weapon that contains a pit or canned subassembly that is not in the stockpile or not in production on the date of enactment of this Act.

The provision would require funding for all research and development activity leading to and including phase 1, 2, and 2A, for new nuclear weapons, and for all research and development activity leading to and including phase 6.1, 6.2 and 6.2A for modified nuclear weapons, be requested in a dedicated line item for each such activity. Funding for work at phase 3 or 6.3 and beyond would be required to be in a single line item for each new or modified nuclear weapon.

The provision would not apply to the nuclear weapon stockpile life extension programs (SLEPs), to modification of an existing nuclear weapon solely to address safety or reliability concerns; or to modifications that would address proliferation concerns.

The provision would not be construed to modify, repeal, or in any way affect the provisions of section 3136 of the National Defense Authorization Act for Fiscal Year 1994 (Public Law 103-160).

The House bill contained no similar provision.

The House recedes with an amendment that would require that the budget request for any research and development activities for modifications to nuclear weapons at the 6.2A phase and earlier, and research and development activities for new nuclear weapons at the 2A phase and earlier, would be aggregated in a single line.

The conferees agree that nothing in this section may be construed to modify, repeal, or in any way affect the provisions of section 3136 of the National Defense Authorization Act for Fiscal Year 1994 (Public Law 103-160) relating to prohibitions on research and development of low-yield nuclear weapons.

<sup>23</sup> *NNSA FY 2004 Congressional Budget Request, Weapons Activities/Directed Stockpile Work/Research and Development*, p.79.

<sup>24</sup> *Conference Report on H.R. 4546, Bob Stump National Defense Authorization Act for Fiscal Year 2003 – Cong. Record – Nov. 12, 2002*, p.H8528:

*“Limitation on obligation of funds for Robust Nuclear Earth Penetrator program pending submission of report (sec. 3146)*

The Senate amendment contained a provision (sec. 3132) that would require the Secretary of Defense, in consultation with the Secretary of Energy, to submit a report to the congressional defense committees no later than February 3, 2003, on the Robust Nuclear Earth Penetrator (RNEP) that sets forth: (1) the military requirements for the RNEP; (2) the nuclear weapons employment policy for the RNEP; (3) the detailed categories or types of targets that the RNEP is designed to hold at risk; and (4) an assessment of the ability of conventional weapons to address the same types of categories of targets that the RNEP is designed to hold at risk.

The House bill contained no similar provision.

The House recedes with an amendment that would fully fund the RNEP but prohibit obligation of any fiscal year 2003 funds for the RNEP until 30 days after the study is submitted to the Committees on Armed Services of the Senate and the House of Representatives.

<sup>25</sup> *Conference Report on H.R. 4546, Subtitle C, Strategic Matters*, p. H8469. *“Annual report on weapons to defeat hardened and deeply buried targets (sec. 1032)*

The Senate amendment contained a provision (sec. 1032) that would require the Secretary of Defense, in conjunction with the Secretary of Energy and the Director of Central Intelligence, to submit an annual report on the research and development activities under their respective jurisdictions during the preceding fiscal year to develop a weapon to defeat hardened and deeply buried targets. The report would be submitted no later than April 1 of each year.

The House bill contained no similar provision.

The House recedes with an amendment that would expand the report to include procurement and other activities undertaken to develop a weapon to defeat hardened and deeply buried targets. In addition, the activities of the defense agencies would be specifically included in the report, and the reporting requirement would be limited to five years.

The conferees are concerned that substantial amounts of money are being spent for a wide variety of hardened and deeply buried target-related activities within the defense and intelligence communities and that these many programs are not sufficiently coordinated. The conferees believe this report will be useful to ensure that the hardened and deeply buried target challenge is addressed in a coordinated way to meet established requirements and that the funds are spent efficiently.”

<sup>26</sup> *Ibid.* Report on effects of nuclear earth-penetrator weapon and other weapons (sec. 1033)

The House bill contained a provision (sec. 1018) that would direct the Secretary of Defense to request the National Academy of Sciences to conduct a study and prepare a report on the short and long-term effects on the surrounding civilian populations: (1) of the use by the United States of a nuclear earth penetrator weapon on a target; (2) of the use of a non-penetrating nuclear weapon on a hard or deeply buried target; and (3) of the use of a conventional high-explosive weapon on facilities to store and produce weapons of mass destruction when the involved materials or contaminants are released into populated areas. The report would be required to be submitted to Congress no later than 180 days after the day of enactment of this Act.

The Senate amendment contained no similar provision.

The Senate recedes with a technical amendment.

<sup>27</sup> SEC. 1033. REPORT ON EFFECTS OF NUCLEAR EARTH-PENETRATOR WEAPON AND OTHER WEAPONS.

(a) NATIONAL ACADEMY OF SCIENCES STUDY.-The Secretary of Defense shall request the National Academy of Sciences to conduct a study and prepare a report on the following:

- (1) The anticipated short-term effects and long-term effects of the use by the United States of a nuclear earth-penetrator weapon on the target area, including the effects on civilian populations in proximity to the target area at the time of or after such use and the effects on United States military personnel who after such use carry out operations or battle damage assessments in the target area.
- (2) The anticipated short-term and long-term effects on civilian population in proximity to a target area-
  - (A) if a non-penetrating nuclear weapon is used to attack a hard or deeply-buried target; and
  - (B) if a conventional high-explosive weapon is used to attack an adversary’s facilities for storage or production of weapons of mass destruction and, as a result of such attack, radioactive, nuclear, biological, or chemical weapons materials, agents, or other contaminants are released or spread into populated areas.

(b) REPORT.-Not later than 180 days after the date of the enactment of this Act, the Secretary shall submit to Congress the report under subsection (a), together with any comments the Secretary may consider appropriate on the report. The report shall be submitted in unclassified form to the maximum extent possible, with classified annexes as necessary.

<sup>28</sup> Statement of Linton F. Brooks, Acting Under Secretary of Energy and Administrator for national Security, national Nuclear Security Administration, U.S. Department of Energy, before the Subcommittee on Strategic Forces, Committee on Armed Services, U.S. Senate, April 8, 2003, p. 4.

<sup>29</sup> FDCH Political Transcripts, Committee Hearing, Senate Armed Services Committee, Strategic Forces Subcommittee, Federal Document Clearing House, Inc., April 8, 2003, p.7.

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<sup>30</sup> Statement of Admiral James O. Ellis, USN, Commander, U.S. Strategic Command, before the Senate Armed Services Committee, Strategic Subcommittee on Command Posture and Strategic Issues, April 8, 2003, p. 8.

<sup>31</sup> Ellis Statement, op. cit., p. 3, 6, 16.

<sup>32</sup> FDCH Political Transcript, April 8, 2003., p. 9.

<sup>33</sup> FDCH Political Transcript, p.4-5.

<sup>34</sup> Prepared Statement of Dr. Everet H. Beckner, Deputy Administrator for Defense Programs, NNSA, before the Senate Armed Services Committee, Subcommittee on Strategic Forces, April 8, 2003, p. 3.

<sup>35</sup> FDCH Political Transcripts, SASC, Strategic Forces Subcommittee April 8, p. 15.

<sup>36</sup> Nicholas Kralev, "Bush Approves Nuclear Response," *Washington Times*, January 31, 2003, <http://www.washtimes.com/world/20030131-27320419.htm>