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The Manhattan Project in the 21st Century

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Today, the Los Alamos and Lawrence Livermore National Laboratories – *the direct descendents of the Manhattan Project* – are engaged in a **new** arms race. The Livermore Lab was founded in 1952 to compete with Los Alamos - the original home of the Manhattan Project - to develop a hydrogen bomb, orders of magnitude more powerful than the U.S. atomic bombs that destroyed Hiroshima and Nagasaki in 1945. This time, the Labs are working on competing designs for a "Robust Nuclear Earth Penetrator." This new kind of *high yield* nuclear weapon – not to be confused with low-yield or "mini-nuke" concepts, also under development - is intended to destroy deeply buried and hardened targets, such as command and control centers and underground storage facilities for chemical or biological agents, in line with the new U.S. "preventive war" doctrine. Livermore is working on modifying an existing B-83 gravity bomb, while Los Alamos is studying modifications to the B-61. As described by a reporter who has covered the U.S. nuclear weapons establishment for many years: "*The 'design contest' between the two labs is intended to generate enthusiasm among their workers, who have engaged in a spirited nuclear competition for five decades*."[1]

Against this historical background, the Labs are modernizing every weapon type in the U.S. nuclear arsenal, including gravity bombs, and cruise missile and Trident submarine warheads, in many cases giving them enhanced military capabilities. "Advanced weapons concept teams" have been established at the Labs, and research is underway on both low-yield nuclear warheads and on targeting techniques to make nuclear weapons more "useful," particularly against deeply buried targets. Congress has recently repealed a 10-year-old ban on the development of mini-nukes and given the go-ahead to a huge new bomb factory.[2]

In addition, the Pentagon and its contractors are poised to begin development of a new generation of long range delivery systems, capable of carrying either conventional or nuclear weapons**.** Such systems, intended primarily to increase the already formidable U.S. advantage in conventional weapons, may in the long run be more dangerous than proposed improvements in nuclear warheads. At the same time, the U.S. government is considering options for replacement of the intercontinental ballistic missiles that are the core of the U.S. nuclear arsenal. New delivery systems for nuclear weapons would involve many of the same technologies that would be developed for long-range missiles carrying non-nuclear payloads. These technologies could provide the building blocks for new nuclear capabilities, particularly in combination with warhead modifications now in progress or under consideration.[3]

Long past the collapse of the Soviet Union and the hollow justification of "mutually assured destruction," nuclear weapons are gaining - rather than losing - legitimacy, as the world's only remaining superpower blurs the distinction between nuclear and conventional weapons and expands the role of nuclear weapons in its "national security" policy. The heirs to the Manhattan project have played a pivotal role – *especially over the past decade* – in creating the conditions that have led to this crisis. This powerful scientific elite, as the price for their

eventual *apparent* acquiescence to the Comprehensive Test Ban Treaty (CTBT) in the mid-1990s, extracted the promise of a massive investment in a new generation of laboratory-based facilities to "compensate" for the loss of underground nuclear testing – and to secure their own futures - to the detriment of global security, the international legal order, and post-Cold War aspirations for the elimination of nuclear weapons. Today, the implications of the "deal" made with the scientists in exchange for the CTBT are becoming all too clear.

The Defense Department's January 2002 Nuclear Posture Review (NPR) underlines the fundamental policy and technological underpinnings for the Bush administration's aggressive "preventive war" doctrine, and serves as the primary justification for the current $6.5 billion budget for nuclear weapons research, development and testing activities – not including delivery systems. The NPR expanded the role of nuclear weapons in U.S. national security policy, including the possible use of nuclear weapons in "immediate, potential, or unexpected contingencies" against a number of named countries such as Iraq, Iran and North Korea, called for indefinite retention of a large, modern, and diverse nuclear force, and rejected ratification of the CTBT. **Significantly**, the NPR also elevated the weapons research and development infrastructure – *including the nuclear weapons laboratories* – to one leg of a "New Strategic Triad," intended to support **both** "offensive" and "defensive"nuclear and non-nuclear high-tech weapons systems that will enable the U.S. to project overwhelming global military might. The NPR specifies: **"The need is clear for a revitalized nuclear weapons complex that will: …be able, if directed, to design, develop, manufacture, and certify new warheads in response to new national requirements; and maintain readiness to resume underground nuclear testing if required."** To accomplish this, the NPR calls for: "Transfer of warhead design knowledge from the current generation of designers to the next generation" through an "Advanced Concepts Initiative."[4]

These NPR requirements track closely testimony to Congress by of one of the most powerful and influential nuclear weapons scientists, Sandia National Laboratory Director C. Paul Robinson.[5] In March 1996 – six months before President Clinton signed the CTBT - Robinson argued the need to maintain laboratory nuclear weapons competencies to Congress: "New designs for components and subsystems will be a continuing requirement which will require all the original core competencies we needed to make new weapon designs, as well as contemporary capabilities in advancing technology. . . . *The engineers and scientists who will do that work are probably entering kindergarten this year*...They have to design whole systems with real deliverables to fully develop their capabilities...*It is my belief that nuclear weapons will remain important for a long time to come*."[6]

Today, nuclear weapons research, development and production in the United States is being conducted under the massive, misleadingly-named "Stockpile Stewardship" program, the result of a pledge made to the Labs by the Clinton Administration as the centerpiece of its failed strategy to secure Senate ratification of the CTBT. An array of new nuclear weapons research facilities of unprecedented sophistication – some already completed, some currently under construction, and some still on the drawing board – will allow the continued testing of many aspects of nuclear weapons. Together with the world's most powerful supercomputers and so-called "subcritical" or zero yield underground tests involving plutonium and high explosives,

these devices will allow the weapons labs to train a new generation of nuclear weapons scientists and to explore new weapons concepts, with or without full scale nuclear testing.

Originally called "Science Based Stockpile Stewardship" (SBSS), the term was coined to describe the transition from an engineering based understanding of how nuclear weapons work to a scientifically-based understanding. Legislation passed by Congress in 1993, called on the Secretary of Energy to "establish a stewardship program to ensure the preservation of the core intellectual and technical competencies of the United States in nuclear weapons." In November 1994 the JASON group, a think tank of top physicists and other scientists who advise the Pentagon and the Energy Department on applying science and technology to military problems, issued a report on SBSS at the request of the Department of Energy (DOE), which operates the nuclear weapons labs. "The basic principle of this plan," they wrote, "is to compensate for the termination of the underground testing program by improved diagnostics and computational resources that will strengthen the science-based understanding of the behavior of nuclear weapons, thereby making it possible for the United States to maintain confidence in the *performance* and safety of our nuclear weapons during a test ban." (emphasis added)[7]

As part of the Stockpile Stewardship program, Los Alamos Lab, in April 2003, announced that is had successfully manufactured the first nuclear weapons pit (plutonium trigger) in 14 years that meets specifications for the U.S. stockpile. The newly-made pit is for the 475 kiloton W88 warhead, carried on the Trident II D5 Submarine-Launched Ballistic Missile, and described in the Los Alamos press release as "a cornerstone of the U.S. nuclear deterrent.[8]" Plans are underway for a "modern pit production facility" with a capacity of at least 450 pits per year. *At this rate, one year's production would equal the third largest nuclear arsenal in the world (after the U.S. and Russia)*[9].

The Deal for the CTBT

Conclusion of CTBT negotiations by 1996 was the most solid commitment the United States and the other nuclear weapon states made in exchange for the acquiescence of the non-nuclear weapon states to the indefinite extension of the Nuclear Nonproliferation Treaty (NPT) in 1995. Ironically, it was this commitment that the U.S. nuclear weapons establishment exploited to fuel the absurd argument that whatever it took to conclude a CTBT - *even if it meant rebuilding the entire nuclear weapons complex to buy their support* – would be **good** for nonproliferation. The NPT, which entered into force in 1970, established a direct link between nuclear nonproliferation and disarmament: those states without nuclear weapons promised not to get them; those states with nuclear weapons promised to give them up. The CTBT was viewed by most of the world as a means to cut off the development and modernization of nuclear weapons, and thus, as a meaningful disarmament measure. The CTBT deal brokered with the Labs flew in the face of the NPT's central bargain.

In August 1995, citing the promise made in connection with indefinite extension of the NPT, President Clinton announced his support for a "zero" yield CTBT by 1996, in order to "reduce the danger posed by nuclear weapons proliferation." He also announced the U.S. intent, "as part of our national security strategy," to "retain strategic nuclear forces. . .In this regard," he stated, "I consider the maintenance of a safe and reliable nuclear stockpile to be a supreme national interest of the United States." Clinton strongly endorsed the nuclear weapons labs'

"Science Based Stockpile Stewardship" program as a means of maintaining the U.S. "nuclear deterrent" without nuclear testing, and he appealed to Congress for bipartisan support for the program *"over the next decade and beyond."* Clinton also set forth a set of conditions for U.S. agreement to a CTBT including, "[t]he conduct of a Science Based Stockpile Stewardship program to insure a high level of confidence in the safety and reliability of nuclear weapons in the active stockpile. . ." and "[t]he maintenance of modern nuclear laboratory facilities and programs. . .which will attract, retain, and ensure" a continuing supply of nuclear weapons scientists. He also directed that the capability to resume underground nuclear testing be maintained.[10]

This trade-off reprised the deal struck in 1963, when the U.S., Great Britain, and the Soviet Union negotiated the Partial Test Ban Treaty (PTBT), which banned nuclear tests in the atmosphere, in space, and under water. The weapons laboratories are credited with keeping underground tests out of the treaty. Then, as in 1995, there were concerns that the Senate might not ratify the treaty - at that time, because the U.S. would be unprepared if the Soviet Union broke out of the treaty and resumed testing. Therefore, in 1963 the Joint Chiefs of Staff and their allies in the Senate insisted as a condition for ratification that the U.S. pursue certain initiatives, referred to as the "four safeguards." These included an extensive underground nuclear weapons testing program, maintenance of "modern nuclear weapons laboratories and programs which will attract and retain 'human scientific resources'," and maintaining the capacity to quickly resume atmospheric testing.[11] In the years immediately following the PTBT, the weapons labs were strengthened, U.S. nuclear testing increased, and the arms race surged ahead. Yet in 1995, with the former Soviet Union splintered both economically and geopolitically, the labs and the military made essentially the same arguments they put forth at the height of the Cold War, and President Clinton duly updated and expanded the 1963 safeguards.

When Clinton submitted the CTBT to the Senate for its "advice and consent" on ratification in September 1997, his transmittal letter made clear that his endorsement of the Treaty was conditioned on Senate support for the Stockpile Stewardship program as a central requirement of *"our national security strategy."* Clinton repeated the conditions he first announced in August 1995, and added: "I am assured by the Secretary of Energy and the Directors of our nuclear weapons labs that we can meet the challenge of maintaining our nuclear deterrent under a CTBT through a Science Based Stockpile Stewardship program without nuclear testing... This program will now be tied to a new certification procedure... I am committed to working with the Congress to ensure this support."

The link between control over nuclear weapons-relevant information and influence over nuclear weapons policy was formally institutionalized by the "certification" process, in which the weapons laboratories "certify" the safety and reliability of the nuclear arsenal once a year. There apparently is no external check on this process, and the determination is essentially a judgment call by the laboratories. If it is determined "that a high level of confidence in the safety or reliability of a nuclear weapon type...critical to our nuclear deterrent could no longer be certified," Safeguard "F" provides that "the President, in consultation with the Congress, would be prepared to withdraw from the CTBT under the standard 'supreme national interests' clause in order to conduct whatever testing might be required."[12] The "safeguards" provide an opportunity for the weapons laboratories to threaten an administration with termination of the

CTBT regime if they are not given what they consider adequate resources to "certify" the reliability of the stockpile.

Livermore Lab Director Bruce Tartar demonstrated how this might work, when he warned Congress in 1997, *"My greatest concern regarding the success of the SSMP [Stockpile Stewardship and Management Program] is the possibility of a lack of timely and sustained support...*Program support must be timely because we must get on with the task before existing experienced people retire or leave to pursue other endeavors. In addition, the support must be sustained at an adequately funded level because every element of the SSMP is needed for the success of the program as a whole. *The technical risks in SSMP will be significantly greater if we are forced to stretch out activities in time or reduce the scope of planned research activities to meet more constrained budgets*." [13] (emphasis added)

Secretary of Energy Federico Peña took the argument the rest of the way: "[L]et me stress that if I am advised by the nuclear weapons laboratory directors that there is a problem with the stockpile that is critical to our nuclear deterrent and that we are unable to correct without returning to underground testing, I will not hesitate to advise the President of such."[14]

By providing for the preservation and expansion of U.S. nuclear weapons capabilities through underground testing, the 1963 safeguards represented a tragic lost opportunity to stem nuclear proliferation and move toward disarmament. Similarly, the substitution of a laboratory-based infrastructure for underground testing in the 1990s recapitulated the profound failure of the PTBT to end the nuclear arms race, and strengthened a driving force, the nuclear weapons labs.

What is The Role of the Nuclear Weapons Laboratories?

According to Los Alamos Lab Director Sig Hecker, in 1997 testimony to the Senate: "Our job is to help the U.S. Government ensure that no one in the world doubts that the *United States has the capability to project overwhelming force in the defense of its vital interests... Nuclear weapons are the 'big stick' that defends our homeland and are the ultimate deterrent force against any potential aggressor.[15]"* (Emphasis added.)

It is difficult to overestimate the Labs' historical influence on the proliferation of nuclear weapons. Since their inception, the U.S. weapons labs have competed with each other to develop ever more sophisticated nuclear weapons systems, "selling" their ideas to Presidents, Congresses and the Pentagon, and actively opposing an end to nuclear testing.

The Laboratories' successful opposition to a nuclear test ban dates back to the late 1950's, when Lab representatives talked President Eisenhower out of putting a halt to nuclear tests.[16] Illustrative of the Labs' hostility to placing limits on research and development of nuclear weapons, the Livermore Lab deliberately stockpiled plutonium above its authorized limit, in anticipation of the end of the Kennedy-era nuclear testing moratorium in 1961. According to then-Lab Director John Foster: "The Lab's view was that the test ban was not likely to continue indefinitely. So we chose to be ready to test once the ban was lifted. We decided to staff up and procure materials above the authorized levels. These moves were a little at odds with the administration in Washington...*I guess it is an example of the value of a*

relatively independent Laboratory, one that could execute actions at slight variance to the consensus in Washington.[17]" During the Carter Administration, Los Alamos Lab Director Harold Agnew and his Livermore Lab counterpart Roger Baetzel, each took pride in claiming that they had personally talked President Carter out of a Comprehensive Test Ban. In September 1992, Robert Barker, Deputy Associate Director at the Livermore Lab, told a group of Lab employees, "One of the major jobs this institution has is to help the country realize this legislation [the Nuclear Testing Moratorium Act] was a mistake.[18]"

In March 1994, Livermore Lab Director John Nuckolls reinforced the terms of the impending deal for the CTBT in lurid testimony to Congress advocating massive funding increases over the next decade for "Defense Programs" at the weapons labs. Unless funding is provided for "vastly more advanced computational and experimental facilities" for nuclear weapons research, development, and testing, he warned, "the building blocks of modern civilization" will be put at risk by the "incalculable and catastrophic threats" posed by nuclear proliferation and nuclear terrorism.[19] **Even that sector of the nuclear weapons community professing to support the CTBT contributed to its demise and helped lay the groundwork for a resurgent arms race by promoting technical solutions to what are fundamentally political problems.** A letter sent to key members of Congress in May 1996 by three of the most prestigious icons of the nuclear weapons establishment, physicists Hans Bethe, Herbert York, and Henry Kendall, urged Congressional support for Science Based Stockpile Stewardship in the strongest possible terms, arguing that "The implementation of the [SBSS Program] can help achieve a CTBT" and that "[T]here must be strong and sustained support for the entire [SBSS Program] so that the U.S. and other nuclear weapons states can undertake a true CTBT without sacrificing security, safety and reliability in the remaining weapons." And they declared: "*Achieving a CTBT will signal the real end to the nuclear arms race and demonstrate that the nuclear weapons states are fulfilling their obligations under the recently extended [NPT]"*. Almost in the same breath, the authors completely contradicted themselves: "*These new elements - advanced computer capabilities and new experimental facilities - do not detract from the core weapons science capabilities, **they strengthen and sustain them.**[20]"* (emphasis added)

It can't be both ways. First, the claim that SBSS was necessary to achieve a CTBT was pure assertion, based on political speculation about how the United States Senate might vote regarding ratification of the CTBT. *It had nothing to do with science or technology*. And indeed, it proved to be wrong. The Clinton administration relied on the Stockpile Stewardship deal it had made with the Labs to secure Senate ratification of the Treaty. But in the end, the Lab Directors raised questions about whether Stockpile Stewardship would "work" and on October 13, 1999, the U.S. Senate voted down the CTBT. Thus the weaponeers got everything they wanted – no CTBT *and* a massive infusion of funding and prestige, while the U.S. Senate signaled to the world that the United States has little interest in the elimination of nuclear weapons.

Secondly, laboratory testing and other signs of ongoing reliance on nuclear weapons were matters of great controversy at the NPT Review and Extension Conference in 1995 and the 2000

Review Conference. Non-nuclear countries ***rightly*** expect the nuclear states to meet their obligations under Article VI of the treaty to negotiate an end to the arms race and nuclear disarmament. More than thirty years after the NPT went into effect, they ***should*** be concerned that the United States is spending billions of dollars on a new generation of laboratory facilities in order to replace underground testing and augment an already extensive nuclear weapons research and development infrastructure. What does this demonstrate, other than a "nukes forever" attitude?

However, some in the U.S. weapons establishment continue to hold the view that they are above the law. According to Paul Robinson:

> "In truth, I believe that the NPT was intended more as a confidence-building measure than as a real arms control treaty that we were willing to bet our country's survival on. We would never have negotiated an arms control treaty with the ridiculous verification inspections by the International Atomic Energy Agency prescribed in the NPT, which missed the programs in Iraq and Iran and even Israel. Where has the IAEA spent the most money in terms of inspections? In Germany, Canada, and Japan. Why? Because it is a confidence-building measure among friendly countries eager to prove they are not violating it. It was never set up to catch cheaters. *That's why I disagree with people who infer that the NPT is a real arms control treaty. It's not*."[21] (emphasis added)

If the world's leading nuclear state continues to insist, "do as we say, not as we do," while openly threatening to preemptively attack – *including with nuclear weapons* – any country that even thinks about acquiring nuclear, chemical or biological weapons claiming to defend ***its*** "national security," can the nonproliferation regime last? And, how is it that the Bush administration can so easily make that threat credible? Because of its overwhelming nuclear capabilities***, unimpeded by the end of the Cold War and augmented by the Stockpile Stewardship deal.***

The same John Foster who as Livermore Lab Director took credit for stockpiling plutonium above the authorized limit in anticipation of the end of the nuclear testing moratorium in 1961, currently heads perhaps the most influential group of scientific advisors to the U.S. government. Known as the "Foster Panel" in honor of its Chair, the panel is made up of eminent weaponeers including a former Los Alamos Lab Director Harold Agnew. The Panel to Assess the Reliability, Safety, and Security of the United States Nuclear Stockpile, was established by Congress in 1999 to "to examine whether the United States can expect to sustain confidence in its nuclear stockpile while continuing our voluntary moratorium on underground nuclear testing." Virtually all of the recommendations in the Foster Panel's Fiscal Year 2003 Report to Congress were rubberstamped in Fiscal Year 2004 defense legislation which repeals the 10-year-old ban on development of mini-nukes, authorizes design of a "Robust Nuclear Earth Penetrator," shortens the lead-time to conduct a full scale underground test, establishes advanced warhead design teams at the labs, and provides initial funding for a new plutonium bomb factory.[22]

Conclusion

In August of last year, the John D. and Catherine T. MacArthur Foundation announced that it will commit more than $50 million over the next six years to engage scientists and engineers at leading universities and research facilities in the U.S. and internationally in efforts

to help reduce the threat posed by weapons of mass destruction. *Meanwhile, disarmament research and advocacy groups are facing the most serious funding crisis in two decades*. According to Jonathan F. Fanton, president of the MacArthur Foundation: "With the retirement or passing of the scientists who were involved in the early development of nuclear weapons in the United States, the number of specialists conducting independent research and analysis on weapons of mass destruction has decreased markedly. . . .We believe this grantmaking will result in a significant increase in the number of independent scientists and engineers in the field of international and national security policy and that it will support the production of knowledge and analysis that will contribute to strategies for reducing the threat posed by weapons of mass destruction."[23]

Ted Taylor was a brilliant young nuclear weapons designer working at Los Alamos in the early 1950s. Although upon hearing news of the Hiroshima bombing he had written to his parents that he would never work on atomic bombs, working side by side with world renowned scientists such as Enrico Fermi, John von Neumann, Hans Bethe, Edward Teller, and Stan Ulam, he quickly became fascinated by all aspects of nuclear weaponry. While others worked on the H-bomb, Taylor focused on increasing the explosive power of fission bombs, while reducing their size and weight. He later wrote: "Over the months, I learned that I was good at my work; and that gave me a sense of personal power over events of global significance. Our work at Los Alamos was strongly encouraged by the president of the United States, the Congress, the entire military establishment, and most of the general public."[24]

In 1964, Taylor became deputy director of the Defense Atomic Support Agency. He later wrote: "It was during the next two years, working most of the time in the bowels of the Pentagon, that my peacemaking rationalizations collapsed. I became privy to the actual characteristics and deployments of what, by then, were thousands of nuclear weapons. And I discovered willful deception at all levels of government concerning the effects of nuclear weapons on people, on buildings, on military equipment, on everything. The nuclear arms race had a force and a momentum I had never dreamed of. All proposals for major, verifiable disarmament actions had been rejected not only by the Soviet Union, but also by the United States. *I eventually resigned, and I have worked since then to rid the world of nuclear weapons*."[25] Yet, the Taylors and Rotblats were and are the exceptions to the rule. After several generations of "normalization" of nuclear weapons and the scientific, military, and academic institutions which spawn, modernize and sustain them, there are almost no inside voices demanding genuine disarmament measures. Instead of questioning the fundamental legitimacy, legality, and morality of these most destructive weapons of all, the scientists are for the most part devising methods to ensure that nuclear weapons remain "reliable" for the coming decades, or even worse, exploring ways to make nuclear weapons "more useable" in a constantly changing geopolitical context.

While it is not fair to lump all scientists together, there is no basis for believing that the scientists who brought us into the nuclear age have any special qualifications to lead us out of it. To the contrary, it is the scientists who have time and time again, imposed **technical** solutions onto the **political** problems of war and peace, often exacerbating those political problems in the process. At the same time, it is undeniable that *technological* problems resulting from the design, testing, production and deployment of nuclear weapons will require, in part, technological solutions. Only by working *with*, and taking guidance *from*, the people asking the **right**

questions, will scientists be able to make a unique and invaluable contribution to a world without nuclear weapons and war.

As Ted Taylor put it: *"We scientists, as Oppenheimer once put it, have known sin. For more than 50 years, many of us worked wonders as we made ever more efficient nuclear weapons. Can we-and especially our younger colleagues-now work with equal enthusiasm to bring the nuclear weapons age to an end? The work of disarmament is not as intellectually compelling, perhaps. But the rewards are far greater."*[26]

ENDNOTES

[1] "Work on Burrowing Bomb OK'd, Congressional Compromise Allows Livermore to Begin Weapon Design," Dan Stober, Mercury News, October 10, 2002, P. 5A.

[2] "An Analysis of Reduced Collateral Damage Nuclear Weapons," Bryan L. Fearey, Paul C. White, John St. Ledger, and John D. Immele, Comparative Strategy, Volume 22, Number 4 October 2003-December 2003, as reported in "Weaponeers defend developing mini-nukes," Ian Hoffman, Oakland Tribune, P. 1, November 8, 2003. Although not mentioned in the article, Comparative Strategy is a publication of the ultra-right wing National Institute for Public Policy, whose 2001 report, *Rationale and Requirements for U.S. Nuclear Forces and Arms Control,* foreshadowed the 2002 U.S. Defense Department Nuclear Posture Review (http://www.nipp.org).

[3] For an in-depth analysis of new developments in U.S. delivery systems and their implications see *Missiles of Empire: America's 21st Century Global Legions*, Western States Legal Foundation Information Bulletin Fall 2003, by Andrew M. Lichterman, available online at http://www.wslfweb.org/docs/missiles03.pdf

[4] Nuclear Posture Review, provided in "Nuclear Posture Review Excerpts," Global Security.org, at http://www.globalsecurity.org/wmd/library/policy/dod/npr.htm For a more detailed analysis of the Nuclear Posture Review and current U.S. nuclear weapons policies and their relationship to other high-tech weapons programs, see Andrew Lichterman and Jacqueline Cabasso, *The Shape of Things to Come: The Nuclear Posture Reivew, Missile Defense, and the Dangers of a New Arms Race*, Western States Legal Foundation special report, April 2002, http://www.wslfweb.org/docs/shape.pdf For additional information about the NPR from a variety of sources, see the WSLF NPR information page at http://www.wslfweb.org/nukes/npr.htm

[5] Sandia was established in 1949 in New Mexico to take over engineering functions from Los Alamos, to transform nuclear explosive designs into reliable, deliverable weapons. In 1956, Sandia established a branch in California to provide similar services for the Livermore Lab. Sandia is responsible for the development of Multiple Independently-targetable Re-entry Vehicle (MIRV) engineering and technology.

[6] Statement of C. Paul Robinson, Director Sandia National Laboratories, United States House of Representatives Committee on National Security, Joint Hearing of the Subcommittee on Military Procurement and Subcommittee on Research and Development, March 12, 1996.

[7] Drell, et al., *Science Based Stockpile Stewardship*, JASON, The Mitre Corporation, November 1994. The JASON "think tank" was founded in response to the Soviet Union's successful Sputnik program in the late 1950's, in order to strengthen the collaboration, begun during the Manhattan Project, between top U.S. physicists and the U.S. military.

[8] "Los Alamos restores U.S. ability to make nuclear weapons," official news release from Los Alamos National Laboratory, April 22, 2003.

[9] For an in-depth analysis of the Modern Pit Facility, see *Mass Producing Weapons of Mass Destruction: U.S. Plans for a New Nuclear Weapons Factory and the Global Resurgence of Nuclear Arms*, Western States Legal Foundation and the Los Alamos Study Group, Information Bulletin, Summer 2003, available online at: http://www.wslfweb.org/docs/mpfinfo.pdf

[10] Statement by the President, Comprehensive Test Ban Treaty, The White House, Office of the Press Secretary, August 11, 1995.

[11] *Nuclear Weapons Stockpile Stewardship, The Role of Livermore and Los Alamos National Laboratories*, by Jonathan E. Medalia, Congressional Research Service Report for Congress, May 12, 1994, pps. CRS-5, CRS-6. See also, Promise and Power, by Deborah Shapely, 1993, Little Brown & Co. (Canada) Limited, p. 246.

[12] President William J. Clinton, Letter of transmittal to the Senate of the United States, for the advice and consent of the Senate to ratification of the Comprehensive Test ban Treaty, September 22, 1996.

[13] Written testimony of C. Bruce Tartar, Director, Lawrence Livermore National Laboratory, submitted to the Senate Governmental Affairs Subcommittee on International Security, Proliferation and Federal Services, Hearing on the Condition of the U.S. Nuclear Stockpile, October 27, 1997.

[14] Secretary of Energy Federico Peña, Testimony before the Senate Energy and Water Appropriations Subcommittee, October 29, 1997.

[15] Written testimony of Sigfried S. Hecker, Director, Los Alamos National Laboratory. Hearing of the Subcommittee on Strategic Force, Committee on Armed Services, U.S. Senate, March 19, 1997.

[16] "Livermore lab holds key to any test ban," Oakland Tribune, August 30, 1987, p. A-4.

[17] 30 Years of Technical Excellence, Lawrence Livermore National Laboratory, 1982.

[18] "Knowing Pentagon Needs: A Key to Research Dollars," Newsline, Lawrence Livermore National Laboratory, September 29, 1992.

[19] Testimony of John H. Nuckolls, Director, Lawrence Livermore National Laboratory, United States House of Representatives Committee on Armed Services Military Application of Nuclear Energy Panel, March 22, 1994.

[20] Letter to Representative John T. Meyers from Hans A. Bethe, Henry W. Kendall, and Herbert F. York, May 8, 1996. Nearing 90 years of age at the time, Bethe, a Manhattan Project principal and former Director of the Theoretical Division at Los Alamos, was the most senior member of the group. York, a former Livermore Lab Director, is a member of the JASONs and a Professor at the University of California, which manages the weapons labs for the Department of Energy. Kendall, now deceased, taught at the Massachusetts Institute of Technology, and was the President of the Union of Concerned Scientists.

[21] "Pros and cons of new nuclear weapons debated," by James Kitfield, August 18, 2003, from the GovExec.com "Daily Briefing" at http://www.govexec.com/dailyfed/0803/081803nj1.htm

[22] FY 2003 Report to Congress of the Panel to Assess the Reliability, Safety, and Security of the United States Nuclear Stockpile, John S. Foster, Jr., Chairman, April 11, 2003. See also, "Congress Authorizes New Weapons Research, Enhanced Test Readiness," Christine Kucia, *ACT News Update*, November 14, 2003, Arms Control Association, http://www.armscontrol.org/aca/midmonth/November/congress.asp

[23] "John D. and Catherine T. MacArthur Foundation Announces $50 Million Program of Grants Designed to Help Reduce the Threat Posed By Weapons of Mass Destruction," news release, August 18, 2003, http://www.macfound.org/announce/press_releases/8_18_2003.htm

[24] Taylor, *supra.*

[25] Taylor, *supra.* Emphasis added.

[26] Theodore B. Taylor, "Circles of Destruction," The Bulletin of the Atomic Scientists, January/February 1996, Vol. 52, No. 1.