T r i – V a l l e y C A R E s

Communities **A**gainst a **R**adioactive **E**nvironment

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January 29, 2010

Pam Gorman
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800 Oak Ridge Turnpike, Suite A-500
Oak Ridge, TN 37830

Re: Comments on Draft Site-wide Environmental Impact Statement for the Y-12 National Security Complex (DOE/EIS-0387) (Draft Y-12 SWEIS)

Dear Ms. Pam Gorman,

Tri-Valley CAREs (TVC) is a non-profit organization founded in 1983 by Livermore, California area residents to research and conduct public education and advocacy regarding the potential environmental, health and proliferation impacts of the Department of Energy (DOE) nuclear weapons complex, including the nearby Lawrence Livermore National Laboratory.

Since its inception, TVC has participated in numerous National Environmental Policy Act (NEPA) administrative review processes involving the nuclear weapons complex, including Y-12. The group has also participated in federal litigation to uphold NEPA at Y-12 and other sites in the DOE National Nuclear Security Administration (NNSA) complex.

Due to concerns in our community about the implications of increasing the US nuclear weapon production capabilities, TVC submits the following comments on the Draft Site-wide Environmental Impact Statement (SWEIS) for the Y-12 National Security Complex (Y-12) at Oak Ridge, Tennessee.

There is a recognized need to increase the security and safety at Y-12, which has long been the NNSA's primary site for enriched uranium (EU) processing and storage. This stated purpose of this (SWEIS) is to analyze the potential environmental impacts of alternatives for ongoing and foreseeable future operations, facilities, and activities at Y-12. However, the document is limited almost exclusively to analyzing just one large construction project at Y-12, the Uranium Processing Facility (UPF). Though over $100 million dollars has been earmarked for upgrading existing facilities at Y-12 through 2018, this SWEIS focuses all attention on justifying a UPF to enable the production of uranium secondaries and cases. We note the "preferred alternative" would build an oversized, unneeded and wrongly-missioned UPF to produce 50/80 nuclear weapons' secondaries and cases annually.

This draft SWEIS document lacks sufficient analysis in a number of ways described below.

I. Lack of need for a UPF.

The Obama Administration has communicated to the world that the US will be taking a leadership role in nuclear disarmament through various means, including shrinking the US nuclear weapons arsenal. In his April 2009 speech in Prague, President Obama declared the US will show global leadership in getting to zero nuclear weapons. In September 2009, the US presented a UN resolution, adopted by the security council, which calls on nuclear weapons states to renew their efforts to meet their obligation (in the Non-Proliferation Treaty) to "pursue in good faith…disarmament at an early date." It is also estimated that the follow on agreement to the START Treaty with Russia will reduce the US stockpile to 1,675 strategic nuclear warheads; when President Obama announced this, he also said it was the starting point for deeper cuts. It is clearly foreseeable that the size of the US stockpile will be going down in both the near and long term future.

Currently, the US has a safe, secure, reliable stockpile. Since 1996, more than $90 billion has been spent on so called Stockpile Stewardship activities. By 2018 the US stockpile of refurbished "Life Extended" warheads will exceed the maximum foreseen in the new START Treaty. Yet if one includes all of the nuclear weapons in the US stockpile that have been refurbished since the late 1980s, by 2012 we will have 1,786 warheads of recent vintage and by 2018 that number will have grown to 2,986, and that is without a UPF or Chemistry and Metallurgy Research Replacement (**CMRR**) Nuclear Facility at Los Alamos National Lab.

With nearly 3000 nuclear weapons in the stockpile already refurbished by the time the UPF is constructed (2018), the need for a UPF of the scale proposed in the Preferred Alternative, or even one of the size proposed in the No Net Capability Alternative clearly does not exist.

Additionally, the existing facilities at Y-12 are already being upgraded to meet health, safety, security and environmental standards whether a new UPF is built or not. More than $100 million will be spent on upgrades to existing facilities between now and 2018. These upgrades will not expire and ensure that the existing facilities can maintain the stockpile through 2018, giving ample time to allow for the planned reductions in the stockpile to become a reality. Indeed, those reductions should be the basis for planning the future of Y-12, as we will describe below. Instead, NNSA offers only <u>production</u> based alternatives.

It has repeatedly been found by the JASON and others that narrowly defined, careful surveillance and evaluation of the existing arsenal is sufficient (and essential) to assure its safety, security and reliability, as it awaits dismantlement.

These narrowly defined maintenance activities can be performed in existing facilities. For example, consolidating operations in a down-sized, upgraded existing facility (capable of performing 10 or fewer assessments a year, a number considered "reasonable" in the draft SWEIS) could provide mission confidence and send a powerful signal to the rest of the world that the US is not investing enormous amounts of money in new production capability.

Moreover, the draft SWEIS does not distinguish between the equipment "needs" for dismantlement of nuclear weapon secondaries at Y-12 and the equipment "needs" for their production, including the production of new and modified designs. While there is some crossover or dual use, it is nonetheless true that one can draw a line between equipment for dismantlement and equipment fo production. They are not the same from a technical perspective. They are not the same from a NEPA

compliance perspective. Further, the people of the US and the world can and do distinguish between disarmament and dismantlement of nuclear weapons and producing new ones. They are not the same in terms of policy and political impacts.

The draft SWEIS is fatally flawed by its willful refusal to substantively distinguish between these two different activities (production and dismantlement). All of the UPF options presented, including the "preferred alternative" fail to analyze a dismantlement-missioned UPF and distinguish it from the production oriented UPF options. Thus, the alleged alternatives in the draft SWEIS are reduced to being mere variations on the same production theme with only a marginal difference in square footage between them.

II. Improper segmentation/ failure to analyze cumulative impacts.

This project is connected to the already completed HEUMF, both physically and in terms of its environmental impacts. In addition the Consolidated Manufacturing Complex (CMC) that is planned for the near term future at Y-12 will also be linked to these facilities. The DOE is required by NEPA to analyze connected actions together in one Environmental Impact Statement. By improperly segmenting the HEU storage (HEUMF), HEU processing (UPF), and the "production operation zone" upgrades, (which are envisioned as developing into a small complex or possibly a CMC) the required "hard look" at the cumulative impacts of these facilities together is avoided. Pursuant to the CEQ's NEPA regulations, "'Cumulative impact' is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions." 40 C.F.R. §1508.7. The cumulative impacts section of the draft SWEIS unreasonably fails to include a look at the connected impacts of the three facilities in one NEPA review document.

While, ideally the cumulative impacts of the three projects should have been analyzed in the NEPA review for the HEUMF before any action was taken, a comprehensive "hard look" at their cumulative impacts should be taken in this SWEIS. Clearly additional information about the CMC will need to be developed and included for this analysis to meet NEPA's statutory requirements.

Additionally, the "preferred alternative" in this Draft SWEIS suggests that the UPF should produce 50/80 secondaries and cases per year, a figure that matches the number of pits to be produced in the preferred alternative for the proposed CMRR. These two projects are inextricably linked in that, together, they will produce the physics packages for nuclear weapons in the US arsenal. It is no coincidence that the CMRR project proposes this same 50/80 figure. Due to the connected nature of the projects, there should be an analysis into the cumulative impacts of the projects together, specifically regarding the proliferation and environmental contamination that these projects will cause.

III. Failure to adequately prepare for upcoming nuclear posture review.

The Draft SWEIS relies on the 2001 Nuclear Posture Review (NPR) as a principal national security policy for guidance on nuclear weapons policy. The draft SWEIS states conclusively that to achieve the goals in support of the Nuclear Posture Review of 2001, the continued operation of a facility such as Y-12 is necessary. However, the draft SWEIS fails to take into account the anticipated changes that will be implemented in the new NPR (due in March 2010). Drafting a SWEIS that relies on a document that, given the new administrations disarmament positions, is expected to drastically change in the upcoming months is unreasonable. The new NPR will provide guidance on the new nuclear weapons policy and as such, NNSA should not issue a draft SWEIS for public comment that relies

entirely on national security policies that are likely to be rendered irrelevant in the near future, let alone in 2018 when the UPF is set to open.

The Y12 SWEIS has no urgent driver that compels a decision prior to the release of the NPR in march and the Non-Proliferation Treaty (NPT) Review Conference in May, since NNSA confirms that work is being done safely and responsibly now. Both the NPR and the NPT, along with the START follow on agreement and other measures are expected to clarify the nuclear terrain and will redefine "mission requirements" across the nuclear weapons complex, including at Y-12.

The Congressional Bipartisan Commission on US Strategic Nuclear Posture said as much, as the SWEIS notes: delaying the process to allow clarification will allow for a better decision. Further, it will permit the public to better comment on alternatives.

In order to be timely and reasonable, the draft SWEIS should proceed on the basis of the 2010 NPR and its force structure, and the SWEIS should not proceed with a decision on the UPF based on an insider guess, however educated, when waiting six more months (after a four year delay) will offer significantly more certainty about the future.

Building a new bomb production plant now will corrupt President Obama's overall vision and negate any gains we might hope to make in nonproliferation efforts through the START follow on agreement, the Comprehensive Test Ban Treaty ratification, the NPT Review, or a Fissile Materials Cutoff Treaty, among other measures being considered.

The US is expending huge amounts of political capital to try to constrain the worldwide spread of nuclear weapons. Building a new bomb production plant will undermine these efforts to establish credibility on nonproliferation on the global stage.

It is not overreaching to say that building a new bomb plant in Y-12 will likely trigger nuclear proliferation in nations that believe they need to protect themselves from possible US aggression. At a minimum it will stymie progress toward a safer and more peaceful world without nuclear weapons.

A policy which attempts to discourage other nations from pursuit of nuclear capability while expanding our own capacity to proliferate our own arsenal is duplicitous and inconsistent.

IV. The analysis of the "preferred alternative" fails and is inadequate

The stated "preferred alternative" of the NNSA is the 'Capability-Sized UPF Alternative'. This veiled attempt to split the difference (between the full scale 125 warhead per year UPF and the No-Net Capability UPF alternatives) is not adequately analyzed in this SWEIS and fails on several counts:

• Building new production facilities with a 50-80 warhead/year capacity will be a provocative act that undermines US moral standing and credibility and, more practically, negates our nonproliferation efforts.

• Little detail is given to support the need for the production figures of the Capability-Sized UPF, nor is there any discussion of the fact that the "preferred alternative" here for new secondaries equals the production level for new pits at the CMRR nuclear facility and what the implication of that are for international nuclear proliferation.

• Building a Capability-Sized UPF when the demand for production capacity is expected to decline to near-zero in the next decade is unacceptably wasteful. By the time any production facility is completed, it will no longer be needed, as US stockpile levels will, by treaty commitments, have declined to a level below that of the current Life Extended stockpile.

• Building a Capability-Sized UPF will require an investment in expensive technology that will cost Oak Ridge workers jobs and, ultimately, prove to be a waste as the demand for production operations diminishes and then disappears.

• The only conceivable motive for building a Capability-Sized UPF is transparent to other nuclear weapons, nuclear-capable, and nuclear wannabe states: to maintain an enduring nuclear arsenal far into the future and to pursue production of new or modified warhead designs.

• There is no reasonable or rational scenario under which a throughput capacity of 50-80 warheads/year would be required to maintain our current stockpile in its present safe, secure and reliable status.

• The draft SWEIS does not adequately provide information to support the square footage requirements asserted for the space in the preferred alternative, what amount of the UPF would be used for what stated purpose and what amount of the facility is set aside for future purposes. This failure to adequately describe space requirements for the individual operational requirements of UPF violates NEPA and prevents the public, elected officials and decision makers from their ability to comment on the analysis. A much more detailed and thorough description of space requirements for the each purpose of the project, the amount of space set aside for future purposes and other information relevant to analyzing the adequacy of the size and scale of the facility proposed in the preferred alternative is required by law.

V. Failure to analyze the impacts of increased uranium mining that would be necessary to meet the preferred alternative's uranium needs.

The exploration and mining of uranium causes significant destruction to the environment. Yet, the draft SWEIS fails to include an analysis of the environmental impacts that the increased demand caused by the "preferred alternative's" 50/80 secondaries a year production level will have on the sure to follow increase in uranium exploration and mining. The DOE already exerts significant pressures on ecosystems around the United States where there is uranium speculation, including a 42-square-mile uranium leasing program that threatens water and wildlife in the Dolores and San Miguel rivers in western Colorado and eastern Utah.

NEPA requires the indirect cumulative impacts of an action be analyzed in an EIS. Cumulative Impacts include indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. CEQ 1508.8(b). The increase in uranium exploration and mining caused by the preferred alternative are an indirect cumulative impact of the facility that must be fully analyzed in the SWEIS.

VI. Failure to adequately analyze special needs for likely increase in dismantlements above 2009 levels.

The future of Oak Ridge must include the dismantling of many thousands of nuclear weapons. Because this part of Y12's mission has been largely neglected for decades, there is a 12-15 year backlog of retired secondaries and subassemblies awaiting dismantlement and disposition. The backlog is large enough to create storage issues and, on more than one occasion, criticality safety violations, yet the dismantlement responsibility goes largely unmentioned in the Y-12 draft SWEIS.

Y12 projects future dismantlement at a steady rate—but this is not enough to meet the country's needs and certainly not enough to persuade other nations we are aggressively acting to reduce our stockpile and meet our obligations under the NPT.

Y12 should establish the capability to more than double its throughput for dismantling nuclear weapons; a dedicated, single-use facility, with security, safeguards, and transparency designed in, should be constructed, in either a renovated or new building. A full assessment of dismantlement facilities and realistic future projections of dismantlement demand should be conducted as part of the SWEIS for Y12.

The SWEIS's treatment of the UPF fails to give exact figures and details about the extent of the dismantlement work that can be done under any of the alternatives, including the extent of the floor space, if any, that will be designated to dismantlement under each alternative and the number of dismantlements that can be accomplished under any of the alternatives.

VII. Failure to adequately analyze costs.

The SWEIS does not provide sufficient cost figures for the alternatives for regulators and decision makers to make comparisons. The price tag for a new, full-blown UPF is $3.5 billion. The price tag for the NNSA's preferred alternative, a "Capability-Sized UPF," which is 10% smaller than the full-size UPF, would likely approach $3 billion. Even the "No Net Production" Alternative proposes a near-full size facility (same as Capacity-Size UPF).

It is irresponsible to spend billions on a bomb plant which, by the time it is completed in 2018, should no longer be needed due to forecasted weapons reductions. This is especially true considering that the existing facilities at Y12 will be upgraded to meet health, safety, security and environmental standards, whether a new UPF is built or not. Already, more than $100 million is to be spent on upgrades to existing facilities between now and 2018; however it goes unmentioned in the draft SWEIS.

A full assessment of dismantlement facilities and realistic future projections of dismantlement demand should be conducted and a responsible decision reached about the wisdom of building a dedicated single-purpose dismantlement facility in conjunction with the Highly Enriched Uranium Materials Facility already nearing completion.

In addition, the recent GAO Report to the House Subcommittee on Energy and Water Development, Committee on Appropriations entitled 'Actions Needed to Develop High-Quality Cost Estimates for Construction and Environmental Cleanup Projects' assessed the Cost-Estimating Criteria for the UPF and found that the NNSA did not meet the standards for credibility and used improper estimations for the "foundation for the cost estimate" for the facility that was submitted to Congress.

Beyond just the costs associated with the UPF the SWEIS fails to analyze other site plans, including the costs of maintaining current facilities at Y-12 in a "ready-to-use" state as proposed in the "preferred alternative."

VIII. Failure to adequately consider environmental risks posed by lithium and other hazardous materials used in Y12 operations.

The draft SWEIS mentions lithium in numerous places but neglects to detail the forms in which it is used and the attendant environmental risks. Lithium hydride, for example, is "extremely hazardous" to health (requiring full protective suits); it is flammable, and reactive. In particular, it reacts violently with water (including human perspiration).

In general, lithium is corrosive to the eyes, the skin and the respiratory tract. It is corrosive on ingestion. Inhalation may cause lung oedema. Lithium may spontaneously ignite on contact with air when finely dispersed. Upon heating, toxic fumes are formed. It reacts violently with strong oxidants, acids and many compounds (hydrocarbons, halogens, halons, concrete, sand and asbestos) causing fire and explosion hazard. Lithium in various forms reacts violently with water, as noted.

Because little was said about it in the draft SWEIS, it is impossible to comment more fully on the specific hazards posed by lithium at Y-12 and how to mitigate them. We note, however, that the weapons activities at Y-12 that would use lithium generally would present all of the above-listed hazards. Therefore, a more complete analysis of lithium risks and mitigation measures must be included in the SWEIS. In this context, we note also the failure to include other hazardous materials used at Y-12 in this draft SWEIS.

IX. Failure to adequately analyze and prioritize cleanup of existing contamination.

In its February 2001 comment, Tri-Valley CAREs urged DOE to prioritize environmental justice and the cleanup of polluted areas near the Y-12 site in its SWEIS, including contamination around the community of Scarboro. The draft SWEIS does not comply. Thus, we repeat that comment here. Additionally, we have learned of other areas around Y-12 that are known or suspected of being contaminated. Groundwater to the west and east, and aquifers below Y-12 have reportedly been contaminated by radionuclides, metals, and hazardous chemicals such as TCE.

The draft SWEIS fails to adequately analyze the existing contamination and then compounds the failure by not properly prioritizing cleanup in considering the future of Y-12. Cleanup and dismantlement of secondaries are examples of two crucially important (and reasonable) future missions for Y-12 that must receive a more detailed consideration than given in the draft SWEIS.

X. Failure to adequately and appropriately describe security considerations in a manner that would allow public comment.

The effects on the population surrounding Y-12 of a terrorist detonating an improvised nuclear device would be devastating. At the request of the Project on Government Oversight, the Natural Resources Defense Council (NRDC) performed a simulation of the effects of a 10-kiloton nuclear explosion at the approximate location of the HEU storage site at Y-12. NRDC's calculation concluded that the detonation of an improvised nuclear device at Y-12 could cause over 60,000 casualties, including nearly 5,000 fatalities, if the detonation occurred during the day. Casualties were calculated based on the residential population only. That does not include the 13,000 workers at Y-12 and ORNL,

who would be killed immediately. The total number of fatalities would likely be about 18,000 people. Because a disaster scenario of this magnitude at Y-12 exists, a thorough analysis of the terrorism risk in for any new actions at Y-12 should be includes in the action's NEPA review.

In order for interested stakeholders to "take a hard look" at the safety and security of the new UPF and the significant changes and reduction to the high-security area and overall security that the project proposes, the SWEIS must make enough disclosures to enable interested stakeholders of information to "take a hard look" at the safety and security of the new project in the context of the overall facility.

However, the analysis of terrorism risks in the SWEIS relegates much of this information into a classified summary. An unclassified or declassified summary that particularly includes information regarding the potential health impacts and other information that does not disclose access or other security vulnerabilities must be made available for public review. It is neither appropriate nor legally adequate to tack on a classified appendix without first carefully analyzing what information can and should be disclosed in the body of the SWEIS. For example, an analysis of the risks to workers and nearby populations in the event of a terrorist attack can be accomplished without revealing specific security vulnerabilities. NEPA is a procedural statute, intended to inform elected officials, other stakeholders and the public and to involve them in decisions. Here, public comment on the risks and on possible mitigation measures to address the risks is stymied by excessive classification. This must be remedied.

XI. Failure to include a reasonable range of Alternatives.

a. Moving uranium processing activities into the HEUMF rather than constructing a stand-alone UPF.

Another reasonable alternative is the possibility of moving small-scale uranium processing activities, or a portion of thereof, into the existing HEUMF. Regarding production, it is reasonable to analyze whether the floor space needed for an annual throughput of approximately 5 secondaries a year, which is sufficient to provide assurances of the safety, security and reliability of the stockpile as it awaits dismantlement, is available in the large and already constructed HEUMF. The draft SWEIS goes into great detail to describe the rational for placing the UPF in close proximity to the HEUMF, thus it is reasonable to examine the impacts of downsizing, re-missioning to dismantlement (as opposed to production) and constructing it into the existing building.

b. Alternative 6, the Curatorship Alternative

A reasonable Curatorship alternative should be added to the SWEIS. This Curatorship alternative would analyze management of the nuclear weapons stockpile to assure its existing safety, security and reliability. The implications for the Y-12 SWEIS include that a Curatorship alternative could reasonably be performed in a down-sized facility at Y12, with major activities reoriented to enhance surveillance and evaluation as well as dismantlements. The Y-12 facilities, under Curatorship, would not focus on producing new and modified secondaries (as is the case with the alternatives in the draft SWEIS). Under Curatorship, parts are replaced only if the safety or reliability of the weapon is compromised by the part's degradation (usually called an "actionable defect"). In such cases, parts are remanufactured as close to the original specifications as possible. Adding "new" and "modified" designs is avoided. In this regard, we note that the capacity to produce new and modified designs for secondaries and cases is central to the alternatives in the draft SWEIS, and to the "preferred alternative" in particular. Thus, the

Curatorship alternative is a truly different, albeit reasonable, approach. Included in a Curatorship alternative would be a new dismantlement area, with designed-in safeguards and appropriate transparency per foreseeable treaty requirements. To offer some parameters showing how the Curatorship alternative should be analyzed in the SWEIS, we provide the following details explicating this approach:

The Curatorship Path and Why it is a Reasonable and Better Alternative for Maintaining the Nuclear Weapons Stockpile as it Awaits Dismantlement

In 1992, the U.S. Congress cut off funding for nuclear test explosions unless certain conditions were met. This led the United States into negotiations on a Comprehensive Test Ban Treaty and an immediate moratorium on underground testing of nuclear weapons, which continues today. In 1993, Congress directed NNSA's predecessor, DOE's Office of Defense Programs to initiate a modest program, called "Stockpile Stewardship," for maintaining nuclear warheads in the absence of testing. Fearful that its traditional nuclear weapons research programs, which were heavily tied to testing and development of new warheads, would be cut drastically, Defense Programs defined Stockpile Stewardship as requiring it to replace nuclear testing with the enormously technically challenging goal of using computers to model precisely the behavior of exploding nuclear weapons. This new goal required vast new experimental and computational capabilities. As a result, rather than experiencing serious post Cold-War consolidation and funding cuts, the Defense Programs/NNSA weapons R &D complex actually prospered. Appropriations for nuclear weapons activities soared, from a low of $3.2 billion in 1995 to over $6.6 billion in FY 2005. While the growth has flattened out, NNSA spending on the activities and facilities of the nuclear weapons complex remains around $6.4 billion per year.

While it has been enormously costly, NNSA has made considerable progress in its efforts to model nuclear weapons explosions. NNSA now claims its modeling and simulation capabilities are sufficient not only to maintain existing weapons, but also to design and certify certain new nuclear weapons, without underground nuclear testing.

There is a fatal flaw in this strategy. The more confident the weapons labs have become in their modeling capabilities, the more they have been tempted to modify the nuclear weapons in the stockpile. However, computer simulations cannot provide the same level of confidence in modified warheads that was provided for the original warheads through full-scale nuclear tests. Over time, <u>if changes continue to be introduced into warheads</u>, the level of confidence in the stockpile will inevitably diminish. NNSA officials themselves have repeatedly stated their concern that as changes accumulate in existing warheads, it will become increasingly difficult for the laboratories to certify their performance. However, instead of adopting a policy and process to scrupulously avoid changes, NNSA proposed designing a completely new, so-called "Reliable Replacement Warhead" (RRW), which would only compound the problem. Without nuclear testing, questions will always remain about the performance of any new warhead, particularly one that is outside of the existing "design envelope" of test-proven designs. Furthermore, designing and producing a new warhead is a provocative act that runs counter to U.S. commitments under the NPT.

We recommend a more conservative approach to maintaining the existing test-certified stockpile, which is based on adhering to the original design parameters and characteristics of the nuclear explosive package. A key to this approach is our conclusion that there is no need for the United States to design any new nuclear weapons or to make performance or safety-enhancing modifications to existing ones. Presidents Clinton and Bush, on the advice of their Secretaries of Defense and Energy, have repeatedly certified that the nuclear weapons in the current stockpile are safe and reliable. We would continue and

strengthen that record by ensuring that those safe and reliable warheads are not changed in any way unless there is a well documented finding that corrective action is needed to fix a component or condition that could significantly degrade the performance or safety of the warhead and that no compensating measures are feasible.

We call our methodology "Curatorship." Just as a museum curator maintains artistic treasures and occasionally restores them to their original condition, so too would NNSA and DoD maintain nuclear weapons to their original design and condition, with occasional restorations. NNSA's role in maintaining nuclear weapons would focus on scrupulous surveillance and examination of warheads to determine if any component has changed in any manner that might degrade the safety or performance of the warhead. If so, it would restore that part as closely as possible to its original condition when the warhead was first certified to enter the stockpile. If that were not possible, NNSA could craft a replacement part conforming as closely as possible to the performance specifications of the original component. With changes to warheads strictly controlled, confidence in the performance of the remaining warheads would be higher than under Stockpile Stewardship, but the financial cost and the loss of international credibility regarding nuclear proliferation would be much lower under Curatorship.

No New Nuclear Weapons or Changes to Existing Ones

The current U.S. nuclear weapons stockpile is diverse, resilient, and more than sufficient for any conceivable nuclear deterrent mission. Its broad range of capabilities could be preserved in our proposed 500-warhead stockpile. Depending on which weapons the Government chooses to keep, a 500-warhead stockpile could include as many as seven types of strategic warheads and four kinds of delivery vehicles -- land-based ballistic missiles; submarine-based ballistic missiles; aircraft; and cruise missiles. Such a stockpile would retain considerable flexibility for responding to new security demands should they arise. Warheads in the current stockpile have explosive yields that vary from 0.3 kilotons to 1,200 kilotons. None of that diversity need be lost at the 500-warhead level, but on cost-effectiveness grounds, some reduction in the number of warhead types retained in the stockpile may well be warranted. U.S. nuclear warheads can explode at various heights above the ground, on impact with the ground, with a delay after ground impact, and even after penetrating several feet into the ground to attack underground bunkers. With the exception of an improved earth-penetrating warhead, which Congress has emphatically rejected, the Defense Department has not identified any new capability that it proposes to add to the existing stockpile.

It is impossible to conclude categorically that there will never be any new threat against which a new type of nuclear weapon might be useful. However, in a time when there is a political imperative for the U.S. and other nuclear nations to devalue nuclear weapons, as a precursor to their eventual elimination, it is very difficult to foresee a new threat that would compel the U.S. to respond by designing a new nuclear weapon. The Curatorship approach would not preclude designing a new warhead, should the President and the Congress decide to do so in the future. Rather, it would suspend research on new nuclear weapons technologies and efforts to develop new warheads, pending identification of a new threat justifying such activities.

Existing U.S. nuclear weapons are extremely safe, secure, and reliable. An accidental nuclear explosion of a U.S. weapon is precluded by its inherent design. To initiate a nuclear explosion, the chemical high explosive, which surrounds the weapon's plutonium pit, must first explode and compact the pit in a highly symmetrical manner. This requires the explosive to detonate in at least two specific places simultaneously. All U.S. nuclear weapons are certified to be "one-point safe." One-point safe

means that if the chemical explosive were accidentally detonated, at the worst possible place, there would be no nuclear yield greater than the equivalent of two kilograms of high explosive. Designers conducted numerous underground tests of one-point safety in which they detonated weapons at their most sensitive points under a variety of conditions. Over the past decade, the weapons labs have repeatedly checked and verified the one-point safety of U.S. warheads using the modeling and simulation methods developed in the Stockpile Stewardship program. Even if a projectile is shot into a nuclear weapon or some other shock to the system initiates a chemical explosion, it is exceedingly unlikely that there would be any nuclear explosion.

The chemical explosive in most types of U.S. nuclear weapons is so-called "Insensitive High Explosive" (IHE). IHE can withstand severe shocks without exploding, which lowers the risk that a chemical explosion might disperse plutonium and other hazardous materials over a wide area. The only U.S. nuclear warheads without IHE are the W-76 and W-88 warheads on submarine-launched ballistic missiles (SLBM), and the W-78 on Minuteman III ICBMs. Little would be gained by redesigning those warheads to function with IHE. The SLBMs use a very energetic propellant, which is relatively easy to detonate. Any accident that causes the missile propellant to detonate would likely break the warhead apart and scatter plutonium, regardless of whether the warhead contains IHE. All W-78s could easily be replaced by the more modern W-87, which has IHE, as the stockpile is reduced in size. Furthermore, procedural changes, including the removal of all nuclear weapons from aircraft in peacetime and loading/unloading missiles without their warheads mounted aboard, have significantly reduced the risk from warheads that lack the most modern safety features.

Proponents of developing new warheads have claimed that over time, as nuclear warheads age, their safety and reliability might degrade. However, safety can only improve with age. Extensive tests have shown that the chemical high explosive becomes more stable and predictable as it ages, further reducing the risk of accidental explosions. Surprisingly, key measures of performance, such as detonation-front velocities have also been shown to improve systematically with age.[1]

To prevent accidental or unauthorized initiation of a weapon's normal firing systems, U.S. nuclear weapons have so-called enhanced nuclear detonation safety (ENDS) systems. The ENDS system typically includes at least one "weak link" and two "strong links." All of them must be closed in order to arm and fire the warhead. The weak link is normally closed, but is designed to fail (open), like a circuit breaker, and prevent power from reaching the detonators in an abnormal environment, such as lightening, fire, or physical shock. The strong links generally isolate the systems that arm the warhead and fire the detonators from their power sources using devices such as motorized switches or mechanisms that physically interfere with the implosion until the proper arming sequence is followed. One strong link, called a Permissive Action Link (PAL), requires that the weapon receive properly coded electronic signals. Two different codes must be received simultaneously. This is the "two man rule," which ensures that an individual acting alone cannot arm a nuclear weapon. The other strong link can be closed only by a particular environmental event or sequence of events that would occur during the normal delivery of the warhead. Such events may be a deceleration force, a temperature, or a pressure that would normally occur only during delivery. Thus, if terrorists were somehow to obtain a U.S. nuclear warhead, they could not detonate it without first making complex internal adjustments. In the unlikely event that the terrorists were capable of making the necessary adjustments, the time required would provide a substantial opportunity for the U.S. to recover or destroy the weapon.

[1] "Science-Based Stockpile Stewardship," Dr. Raymond Jeanloz, Physics Today, December 2000, p. 5, www.physicstoday.org/pt/vol-53/iss-12/p44.html

Even though nuclear weapons are extremely safe and secure, it is possible to do even better. The NNSA and the Department of Defense can and should make additional operational improvements in how nuclear weapons are handled and protected that would improve their safety and security. One significant measure would be to reduce the alert status under which the military maintains many nuclear weapons. If the alert status were reduced, the frequency of handling live weapons, including loading, unloading, and transporting them would be greatly reduced as would the opportunities for their exposure to accidents or hostile actions. And obviously, other things being equal, the fewer nuclear weapons there are, the less chance there is of a safety or security lapse.

Proponents of weapons development claim that they can design and fabricate new warheads that would be safer and more secure than existing weapons. That may be true, but the relevant question is whether the marginal improvements to safety and security, which NNSA may make through design changes, are worth the substantial negative effects that weapons development programs have on our national security. It is also worth noting that new warheads may just as well wind up being less safe and reliable than existing warheads. Designing and building new nuclear warheads without testing them is risky, even with the sophisticated models of the Stockpile Stewardship Program. As Hoover Institution fellow, Sidney Drell, and former U.S. Ambassador, James E. Goodby, have stated, "It takes an extraordinary flight of imagination to postulate a modern new arsenal composed of such untested designs that would be more reliable, safe, and effective than the current U.S. arsenal based on more than 1,000 tests since 1945."[2]

The latest argument from weapons designers is that we need to improve the "surety" of existing weapons. Surety is a single word that incorporates the safety, security, and control of nuclear weapons. Proposals that strive for near absolute surety designed into the weapon itself should be viewed with deep skepticism. We believe that surety is simply the justification *du jour* for more weapons development. Built-in surety mechanisms, such as a mechanism to destroy a warhead remotely on command, may have potential utility in some very low probability theft scenarios. On the other hand, they may have a higher probability for affecting the pit implosion process in unexpected ways. Such new systems could severely degrade confidence in reliability. Arguably, only a full-scale nuclear test could truly resolve confidence issues regarding some built-in surety measures. Moreover, when it comes to keeping U.S. nuclear weapons secure, there will always be a need for "guards, guns and gates" that should never be qualitatively diminished (although we do hope to dramatically lower security costs by having far fewer nuclear weapons and storage sites, less separated fissile material, and smaller areas to guard). Furthermore, development of new and potentially improved warheads, whether the improvement is limited to surety or includes new yields and missions, is counter to U.S. non-proliferation goals.

Behind the superficially appealing promise of higher levels of nuclear warhead "surety" lies a thinly disguised effort by weapons advocates to circumvent obligations inherent in the NPT and the CTBT to abandon the technological competition in nuclear armaments. Improved "surety" is but one of several technological trap doors leading to reinvigoration of the nuclear arms race, which would restore prestige and resources to the nuclear weapons laboratories, but only at the cost of diminishing national and international security.

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[2] "What are Nuclear Weapons For? Recommendations for Restructuring U.S. Strategic Nuclear Forces," Sidney Drell and James Goodby, an Arms Control Association Report, October 2007, p. 20.

How Would Curatorship Differ From Stockpile Stewardship?

Curatorship would fundamentally change how the weapons laboratories go about their business. The biggest difference would be that the numerous changes that NNSA makes to nuclear weapons each year would be strictly limited.

A key activity for maintaining nuclear weapons under Stockpile Stewardship is the so-called Life-Extension Program (LEP). NNSA, in cooperation with the DoD, has taken an aggressive approach to LEPs. In practice, "life extension" has become a misnomer for nearly complete rebuild and upgrade of a warhead system that is nowhere near the end of its life. Under the Life Extension Program, NNSA and DoD have jointly reexamined the performance features, specifically military characteristics and stockpile-to-target sequence requirements, of almost all U.S. weapons designs and reevaluated the design of every component in those weapons against revised requirements. The two agencies have authorized hundreds of changes to nuclear weapons, adding new components and modifying weapons' military characteristics. Few, if any, of the replacements were required to extend the life of aging components. Rather, NNSA and DoD have chosen to make weapons lighter, more rugged, more tamper proof, and more resistant to radiation. In addition, NNSA installed new components that improved design margins, added arming and fuzing options, improved targeting flexibility and effectiveness, and put in advanced tritium delivery systems.

Under LEPs, DOE is seeking to upgrade every type of nuclear warhead in the planned arsenal. Upgrades have already been done on the W87 and B61 warheads. NNSA is now ramping up the LEP for the most numerous weapon in the stockpile, the sub-launched W76, which it estimates will cost over $3 billion. The planned modifications are so extensive that the weapon is being given a new number: the W76-1/Mk4A (the latter refers to its modified reentry vehicle). Under the W76 LEP, NNSA is replacing organics in the primary; replacing detonators; replacing chemical high explosives; refurbishing the secondary; adding a new Arming, Fuzing & Firing (AF&F) system, a new gas reservoir, a new gas transfer support system, a new lightning arrestor connector and making numerous other alterations to components that still function adequately.[3] The change to the AF&F system alone is creating a weapon with significantly improved military capability over the old version. While the old fuze permitted targeting of only soft targets via air bursts, the new AF&F system would add a ground burst capability, which delivers much greater damage to underground facilities. In addition, a new reentry body and other modifications would allow the W76 to be delivered by the D5 missile, which has much greater accuracy than the previous delivery vehicle. Taken together, these changes give the W76 a hard target kill capability against missile silos, command and control centers, etc. for the first time.

With the exception of replacing some organic adhesives, few, if any, of the changes under the W76 LEP address age-related problems that would require fixing under the Curatorship option. The Bush Administration planned to convert 2,400 W76 warheads to W76-1s.[4] Needless to say, the Obama Administration will have to clarify exactly how many W76s, if any, it plans to convert to W76-1's and how many it plans to retire and dismantle under its new proposal for bilateral reductions with Russia to reduce each nation's stockpile to 1,000 nuclear weapons. We recommend that the existing W76 LEP, and ongoing LEPs for other warheads, be suspended pending institution of the change control process described below that would constrain new Life Extension Programs to replace only components that demonstrably need to be replaced.

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[3] "Administration Increases Submarine Nuclear Warhead Production Plan," Hans M. Kristensen, Federation of American Scientists, www.fas.org/blog/ssp/2007/08/us_tripples_submarine_warhead.php

[4] Ibid.

Recently, following the congressional rejection of funding for the RRW program, officials at the weapons laboratories and with the U.S. Strategic Command have called for expanding the Life Extension Program even further.[5,6] To date, NNSA has refrained from modifying or replacing plutonium pits during an LEP. Under a concept referred to as "extensive reuse LEP" (erLEP), also referred to as a "heavy LEP," that Rubicon would be crossed. NNSA would be allowed to reuse pits from retired warheads to provide "higher system margins" for warheads remaining in the stockpile. NNSA would make additional modifications to those warheads directed at improving their surety. Under the new erLEP concept, NNSA could also modify and reuse secondaries from retired warheads, recycle and reuse difficult to fabricate materials, such as fogbank,[7] and modify and add new electronic components using "modern technologies." It is not clear what changes NNSA wants to make to warheads using these recycled or rebuilt components.

In contrast, Curatorship would take a very conservative approach to modifying warheads. Only if NNSA could present compelling evidence that a warhead component has degraded, or will soon degrade, and that such degradation could cause a significant loss of safety or reliability, would NNSA replace the affected parts. The replacements would be remanufactured as closely to their original design as possible.[8] These replacement parts would truly extend the life of the warhead, without modifying its performance. NNSA currently takes apart approximately eleven warheads of each type per year and examines them under its Surveillance and Evaluation Program. Under Curatorship, NNSA would increase the scope and importance of the Surveillance and Evaluation Program to assure that sufficient numbers of every component of every warhead design are scrupulously examined and tested each year. The Surveillance and Evaluation program would supplant the Life Extension Program as the predominant mechanism for determining when components are replaced.

Scientists and engineers at the weapon labs are working to develop sensors that they can embed into existing warheads under NNSA's proposed erLEP program. The sensors would monitor each warhead's condition and identify if there is any degradation that might affect its performance. According to the laboratories, such sensors would allow NNSA to reduce its surveillance activities. We believe that reducing surveillance is the wrong way to go. Embedded sensors cannot possibly provide as much information as disassembling a warhead and examining and testing its components. Embedding sensors into existing, well-tested warheads could provide new opportunities for component failure. Even worse, it could affect the performance of the warheads in poorly understood ways. We prefer to minimize stringently any changes to the well-tested and certified safe and reliable warheads of the existing stockpile.

Stockpile Stewardship requires a massive R & D enterprise and the use of ever expanding modeling capabilities in a complex process to certify each year that the changing stockpile is safe and reliable. Under Curatorship, continued confidence in the stockpile would be based on an absence of

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[5] "Military's RRW Alternative is Warhead Life Extension," Elaine Grossman, Global Security Newswire, Sept. 12, 2008, www.gsn.nti.org/gsn

[6] "Stewarding a Reduced Stockpile," Bruce T. Goodwin and Glenn L. Mara, AAAS Technical Issues Workshop, April 24, 2008, Washington, DC.

[7] Fogbank is a codeword for a classified material that is believed to be an aerogel (somewhat like Styrofoam) used in some warheads as interstage material between a nuclear weapon's primary (i.e. the plutonium pit and surrounding high explosives) and its secondary.

[8] In some cases, current environmental regulations might not allow exact remanufacture of old components. In others, original specifications have been lost or are incomplete. In those cases, NNSA would attempt to match the performance of the old component as closely as possible. Those cases would require more analysis and testing than exact replacements, but would still be far less costly and introduce much less uncertainty than under the current approach, which allows for major modifications.

change and reference to the extensive historical testing and certification activities that have already demonstrated existing warheads to be safe and reliable. Absent any observed physical changes to a warhead, or hidden changes in performance that may be inferred from nonnuclear test and evaluation activities, the warhead's continued safety and reliability would be assumed, because of its known testing pedigree. In other words, "If it ain't broke, don't fix it." The key to maintaining the stockpile would be determining whether significant degradation has occurred. NNSA would still need skilled engineers and designers, with good judgment, to examine warheads and to determine if components are degrading and when they must be replaced. NNSA would continue to operate state-of-the-art testing and engineering facilities to examine components. It would retain sufficient scientific and computing capabilities to apply analytical models to questions of weapon safety and reliability using all the knowledge that the NNSA has gained to date through the Stockpile Stewardship Program. NNSA would make use of evolutionary improvements in computing technology to better appraise problems with weapons systems, but it would no longer be the engine for making and funding such improvements.

On the other hand, NNSA would have no need to continue enhancing its understanding of weapons science or to maintain cutting edge research facilities in a wide range of technologies. Those capabilities are needed primarily to design and certify new components. Under Curatorship, most of NNSA's weapons-related research and experimentation programs would cease and numerous facilities would be closed.

The Curatorship approach to managing the nuclear weapons stockpile builds on an impressive lineage. It stands on basic concepts advocated by Norris Bradbury, Director of the Los Alamos Laboratory (LANL) from 1945-1970, J. Carson Mark, former head of the LANL's Theoretical Division, Richard Garwin, former nuclear weapon designer and current JASON, Ray Kidder, senior staff scientist and former weapons designer at Lawrence Livermore National Laboratory (LLNL) and others.

Curatorship is Better than Stockpile Stewardship

The NNSA is currently engaged in a major effort to rebuild the nuclear weapons complex, the aforementioned Complex Transformation. According to the NNSA, the benefits it is seeking through Complex Transformation include, "improved safety, security, and environmental systems, reduced operating costs, and greater responsiveness to future changes in national security policy."[9] Curatorship would be more beneficial in all of these areas than any of the alternatives that NNSA considered under Complex Transformation.

Improved Safety – Under Curatorship, and particularly with the stockpile reduced to 500 warheads, there would be far less work involved in maintaining the nation's nuclear deterrent. Thus, NNSA would significantly reduce the scale of plutonium and enriched uranium operations associated with maintenance. By reducing worker exposures and the risks of accidents, a lower workload is inherently safer. In addition, studies of defects in nuclear weapons have shown that many more problems have occurred in new weapons and components than in weapons that have been in the stockpile for a considerable period. Thus, maintaining existing weapons much as they are today, under Curatorship, is more likely to keep them problem free than introducing new components through LEPs or designing new warheads under Stockpile Stewardship. This is a familiar effect common to products as diverse as computer software, automobiles, and nuclear power plants. The reliability of software most often improves with age, as frequent revisions and updates in response to operational experience

[9] Final Complex Transformation Supplemental Programmatic Environmental Impact Statement (SPEIS), DOE/EIS-0236-S4, NNSA, October 2008, p.S-1.

progressively eliminate sources of error in the code. Similarly, with automobiles, if you want a problem-free vehicle, it is best not to rush out and buy the first year of any new model, particularly if it incorporates substantially new technology.

Improved Security – Security would be improved under Curatorship for the same reasons that safety would be better. Under Curatorship, the weapons complex would be more secure, simply because there would be fewer sensitive activities conducted at fewer sites. There would be fewer R & D facilities requiring protection and less new classified information to be safeguarded against espionage or inadvertent disclosure. There would be fewer contractor employees with access to sensitive facilities and classified information. There would also be fewer shipments of nuclear weapons and components around the country, which offer opportunities to terrorists. In addition, fissile materials would be consolidated to fewer and more secure facilities.

Improved environmental systems – Under the Curatorship approach, NNSA would close numerous facilities and in some cases entire sites that use high explosives, tritium, or other hazardous materials, such as Site 300 at LLNL. Those closures would produce significant environmental benefits and cost savings beyond the alternatives the NNSA is considering under Complex Transformation.

Reduced operating costs – Operating costs would be dramatically reduced under Curatorship, well beyond the obvious savings from reducing the number of nuclear weapons. NNSA currently spends about fifty percent of the Weapons Activities budget on R & D. That is appallingly out of step with any industrial activity in the United States. Large companies in the most research-intensive industries, such as computers and electronics, chemicals, aviation, and biotechnology, spend less than twenty percent of their revenue on R & D. Most spend less than ten percent. With over sixty-five years of experience in designing, producing, and maintaining nuclear weapons, there is no reason for NNSA to spend such a large percentage of its funding on R & D. Under Curatorship, NNSA would devote no more than twenty percent of its Weapons Activities budget to R & D.

Strengthen non-proliferation efforts -- Most importantly, Curatorship is superior to the Stockpile Stewardship Program, because it would more closely align with United States' responsibilities under the Non-Proliferation Treaty and the nation's non-proliferation goals. Strengthening non-proliferation is not one of NNSA's goals in Complex Transformation, but it certainly should be. The New Agenda Coalition (NAC), a diverse and influential group of signatory states to the NPT, has called upon the nuclear weapons states to stop modernizing their arsenals.[10] The NAC stated, "Any plans or intentions to develop new types of nuclear weapons or rationalization for their use stand in marked contradiction to the NPT, and undermine the international community's efforts towards improving the security of all states." Whether one agrees with the NAC that improving nuclear weapons is contrary to U.S. NPT obligations (and we believe it is), it is clearly detrimental to U.S. non-proliferation objectives. Stemming the proliferation of nuclear weapons requires the cooperation of all nations. To the extent that the NNSA's development of new and improved nuclear weapons alienates nations such as the New Agenda Coalition, it is undeniably contrary to U.S. non-proliferation goals.

Changes to Nuclear Weapons Should be Better Controlled

As noted above, NNSA and DoD have authorized hundreds of changes to nuclear weapons, the vast majority of which were not needed to extend the life of the weapon. The administrative control of nuclear weapon designs is currently under the auspices of the Nuclear Weapons Council (NWC). The NWC is a joint DoD/DOE organization established by Congress in 1987 to coordinate all joint activities

[10] The membership of the New Agenda Coalition includes: Brazil, Egypt, Ireland, Mexico, New Zealand, South Africa, and Sweden.

regarding the nuclear weapons stockpile. The NWC is chaired by the Under Secretary of Defense for Acquisition, Technology, and Logistics. The other members are the Vice Chairman of the Joint Chiefs of Staff, the Under Secretary of Energy for Nuclear Security (NNSA Administrator), the Under Secretary of Defense for Policy, and the Commander of the U.S. Strategic Command (STRATCOM). Among its activities, the NWC coordinates, determines, and schedules all activities regarding the maintenance and refurbishment of nuclear weapons. Much of that coordination is done in Project Officers Groups (POGs), which are chartered by the NWC with cradle to grave responsibility for each type of nuclear weapon. POGs typically have as many as a dozen members from various DoD organizations, the military services, DOE, NNSA, and the nuclear weapons complex's laboratories and production plants.

The POGs, working with the NNSA laboratories, annually assess each warhead type with regard to its military characteristics (yield, reliability, safety in normal and abnormal environments, nuclear hardness, weight and balance, use control features, and a host of other factors) and its stockpile-to-target sequence requirements for withstanding extremes of temperature, pressure, acceleration and other conditions a warhead might have to withstand throughout its lifetime. These assessments have become forums for examining, not only whether the warhead continues to meet it existing requirements, but also for considering changes to warheads to improve performance, add new capabilities, or modify components for any reason. Unfortunately, there is little resistance to making changes to warheads in this process. The POGs are simply too immersed in the mission of enhancing their weapon systems and are unable to see the forest for the trees. They have an institutional bias, which leads them to magnify minor questions about warhead performance, to look for potential improvements (including surety improvements), and to recommend modifications, without realizing the long-term problems with that approach.

We believe that a more rigorous and formal change control process is needed. A rigorous change control process is the embodiment of the Curatorship approach. The Administration and the Congress must first declare support for the Curatorship approach of minimizing changes to existing warheads and then establish a change control process to enforce it. We recommend that President Obama issue a Presidential Decision Directive (PDD) prohibiting any change in the military characteristics or the stockpile-to-target sequence requirements of any nuclear weapon, unless the change is essential for maintaining the safety or reliability of the existing warhead. However, announcing a policy to limit changes to warheads, by itself, is not enough. Congress must establish an institutional mechanism to enforce that policy.

Independent experts should review any proposed change to a nuclear weapon (no matter how seemingly minor) and make recommendations to senior Administration officials, who then would have the final say. To further that end, we recommend that Congress establish through legislation a stringent change control process for nuclear weapons, including a requirement for outside review of all changes. Major changes, including any that would alter the military characteristics or the stockpile-to-target sequence of a nuclear weapon in any manner, should require authorization and funding by the Congress as a separate line-item.

The process for independent assessment of proposed changes could take many forms, but we believe it should include some form of review from outside the weapons laboratories. Independent review might be solicited from the JASON scientific advisory group, the National Academy of Sciences, or a new entity established solely for that purpose.

Final decisions, except those requiring separate funding from the Congress, could remain with the Nuclear Weapons Council (NWC), be made by a new Federal nuclear weapons change control board, or be made by an expanded NWC to include senior Executive Branch officials who bring a big picture view of national security. Potential additions to the NWC include the Under Secretary of State for Arms Control and International Security and the President's National Security Advisor. In any event, we recommend that Congress establish the change control process in legislation and require that both outside reviewers and the decision makers weigh the potential benefits of any proposed change against the adverse non-proliferation consequences and the likelihood that the change could, over time, contribute to reduced confidence in the performance the warhead.

The Process for Assessing and Certifying Nuclear Weapons Should be Revised

When President Clinton submitted the Comprehensive Test Ban Treaty to the Senate for ratification in 1995, he enunciated a number of safeguards to assure the Congress that the nuclear stockpile could be maintained without testing. He announced, as "Safeguard F," that

> "*if the President is informed by the Secretaries of Energy and Defense, advised by the Nuclear Weapons Council, the directors of the weapons laboratories, and the Commander-in-Chief of Strategic Command that a high-level of confidence in the safety or reliability of a weapon type critical to the nuclear deterrent could no longer be certified, the President, in consultation with the Congress, would be prepared to withdraw from the CTBT under the Supreme National Interest Clause in order to conduct whatever nuclear testing might be required.*"

President Clinton also directed the DoD and DOE to conduct a rigorous annual certification process to determine the overall safety and reliability of the stockpile.

Congress formalized this process in section 3141 of the National Defense Authorization Act for Fiscal Year 2003 (P.L. 107-314), which specifies a number of assessments that must be performed each year leading to an annual report on the stockpile to the President and the Congress from the Secretaries of Defense and Energy. The nuclear weapons establishment has responded to these requirements with an elaborate system of technical investigations and the preparation of seven major series of reports, including:

- *Weapons Laboratory Annual Assessment Reports (AARs)*: Prepared for each weapon type by the technical staff of the weapons laboratory responsible for the nuclear explosive package (LANL or LLNL) and their engineering counterpart at SNL.
- *Weapons Laboratory Red Team Reports*: Prepared by a separate "red team" at each weapons laboratory that peer reviews the technical information contained in the laboratory's AARs.
- *Weapons Laboratory Director Reports*: An assessment of the safety, performance, and reliability of the nuclear stockpile to the NWC and the Secretaries of Energy and Defense by the director of each weapons laboratory, based on the AARs and the Red Team reports.
- *Strategic Advisory Group Stockpile Assessment Team (SAGSAT) Report*: Prepared for the STRATCOM Commander, which expresses the SAGSAT's confidence as to whether each warhead type will perform as designed.
- *Commander of STRATCOM Report*: The Commander of STRATCOM's assessment of the safety, performance, reliability and military effectiveness of the nuclear stockpile, submitted to the NWC and the Secretaries of Energy and Defense.

- *POG Reports*: A technical assessment, submitted to the NWC, from each POG on the warhead type for which it is responsible.
- *Report on Stockpile Assessments*: The final package, prepared by the NWC on behalf of the Secretaries of Energy and Defense, which summarizes and transmits the above reports to the President and the Congress.[11]

The assessments in these reports, in actuality, have little to do with certification of the stockpile. According to NNSA and laboratory officials, "once a warhead is certified, it remains certified until it is either decertified or retired."[12] Furthermore, this convoluted process has nothing to do with notifying the President about the need for a nuclear test, which was ostensibly its original purpose. According to agency and congressional officials, "if an issue with a weapon were to arise that required a nuclear test to resolve, the Secretaries of Energy and Defense, the President, and the Congress would be notified immediately and outside of the context of the annual assessment process."[13] What the process has turned into is make-work for dozens of national laboratory scientists and technicians, as well as weapons specialists in NNSA, the NWC, the military services, STRATCOM, and other DoD agencies. It also serves as one more mechanism for the laboratories and the services to propose modifications to U.S. nuclear weapons.

The annual assessment process is a major underpinning for much of the research and development work at the weapons laboratories, which is performed under Stockpile Stewardship. In order to prepare their Annual Assessment Reports, the laboratories use all of their testing and simulation capabilities to quantify estimates of the margins and uncertainties for a host of factors, which they use to determine whether the nuclear explosive package of a nuclear weapon would meet its military characteristics. The labs continue to investigate minute details of nuclear weapons technology, in order to produce new and improved bottom up assessments each year.

This elaborate process of ever improving simulation capabilities and annual reviews is conceivably needed only if there are significant changes to the warheads each year. Under Curatorship, with few, if any, modifications to the well-tested designs in the stockpile, the laboratories would need only to analyze the potential effects of changes due to aging on components, which are identified under the upgraded surveillance program. Existing diagnostic, assessment, and modeling capabilities are sufficient for this task. As is the case now, if the surveillance program and subsequent analysis were to identify a problem that threatened the adequate performance of a weapon in the stockpile, the Nuclear Weapons Council, the Secretaries of Defense and Energy, and the President and Congress would all be informed promptly about the problem.

Thus, recurring annual assessments or certification of the safety and reliability of the stockpile should not be necessary. Nevertheless, to provide additional assurance that the weapons in the stockpile remain safe and reliable, the laboratories and the military services might update the assessment of each weapon system every five years. The assessments could be similar to those required under Section 3141, but would not be as elaborate since they would have to examine only the few changes that were produced by or made in response to aging. One change we recommend to the assessment process is to make the existing Red Teams at LANL, LLNL, and SNL truly independent. The Red Teams review the analyses of those laboratory scientists with direct responsibility for maintaining each warhead. The Red Teams consist primarily of other laboratory personnel who currently report to the same management

[11] From "Nuclear Weapons: Annual Assessment of the Safety, Performance, and Reliability of the Nation's Stockpile," U.S. Government Accountability Office (GAO-07-243R), February 2, 2007., p. 9.
[12] Ibid. p. 6.
[13] Ibid. p. 3.

team as those performing the initial assessments. We recommend that the Red Team members be hired under a separate contract from the management contract of the laboratories at which they are situated and that they report their findings directly to the NNSA, rather than through their laboratory directors.

As is the case now, if any of the laboratory analyses find a significant problem with a weapons system, their report should include a discussion of the options available to resolve the problem. The options should include replacing one or more components with new versions of the original design, replacing components with modified versions, changing weapon handling procedures, changing the military characteristics or stockpile-to-target sequences, retiring specific warheads, replacing warheads with others, and any other compensatory measures that could enable accomplishment of the missions of the nuclear weapon types to which the assessments relate. Only if it concludes that none of those options is feasible, should a laboratory be allowed analyze whether conducting one or more underground nuclear tests might help NNSA resolve the problem.

It is hard for us to imagine a circumstance in which one of the measures listed above could not resolve any problem, without a need to resort to nuclear testing. Nevertheless, to prepare for the remote possibility that a President might request authority from the Congress for NNSA to conduct a nuclear test, we recommend that Congress require any such request to be accompanied by independent analyses from the Central Intelligence Agency (CIA) and the State Department on the effects of a U.S. nuclear weapons test on the CTBT, the NPT, and all other nations possessing nuclear weapons or those which may be seeking to acquire them. Congress could then decide whether the benefits of a nuclear test outweigh the adverse national security consequences of withdrawing from the CTBT and/or breaking the current moratorium on nuclear weapons tests.

How Would Weapons Research, Development, and Testing Change Under Curatorship?

This section provides an overview of the changes we recommend to research, development, and testing facilities and activities in the weapons complex in accordance with the Curatorship approach.

Under the Curatorship approach, we recommend that the NNSA de-emphasize nuclear weapons science and technology and cease its quest for more and more detailed simulations of exploding thermonuclear weapons. The existing codes are sufficient, in conjunction with limited use of hydrotesting, for the analyses needed to maintain the stockpile as it is. Improved codes have little use except for designing new types of nuclear weapons or verifying the impact of major changes to existing ones. Designing new nuclear weapons would run counter to U.S. commitments under Article VI of the NPT and would set a bad example for the rest of the world. President Obama has already declared that the United States will not design new nuclear weapons. The NNSA's claim that it needs better computer codes to maintain existing weapons is tantamount to Iran's claim that it needs a domestic uranium enrichment capability for nuclear power. Both claims may provide fig leaves for thinly-veiled nuclear weapons development programs.

We recommend that NNSA dramatically reduce its research efforts in several areas, including equation of states studies, dynamic modeling, studies of the physical and chemical properties of Pu and HEU, hydrodynamics experiments, and sub-critical tests. Most of this research has no purpose for anything except improving nuclear weapons. We recommend that NNSA continue validating its codes against existing test data and applying those codes to questions of relevance to the existing stockpile. We would expand the testing and analysis of components taken from actual warheads in the stockpile to assure that any changes to components due to aging are discovered and analyzed before they become detrimental to nuclear weapons performance. This empirical approach to stockpile surveillance and

maintenance is far superior and should be prioritized over endless "nuclear weapons science." A simple way of putting it is that we recommend an "engineering" rather than a "science-based" approach to stockpile maintenance.

With significantly less weapons R & D under Curatorship, NNSA could shrink its R & D infrastructure. We recommend reducing the number of facilities and personnel dedicated to nuclear weapons research, development, and testing and consolidating the remaining efforts to LANL and SNL-NM. In particular, we recommend closing all nuclear weapons R & D facilities at LLNL or transferring them to other DOE programs for non-weapons research. Under our plan, LLNL would retain a small capability to examine surveillance issues and a "red-team" of experts to provide peer review for changes to nuclear weapons and for certification-related actions. The Red Team would report directly to NNSA rather than to LLNL management. Any related experimental investigation, which may be necessary to support that activity, would have to be performed elsewhere.

DOE would shift LLNL's primary mission from nuclear weapons research to basic science and energy research, while maintaining strong programs in non-proliferation, safeguards, transparency and verification of warhead dismantlement, intelligence, and nuclear emergency response.

In addition, we recommend that NNSA cease, or transfer to SNL-NM, all weapons-related activities at SNL-CA. All facilities at SNL-CA would be closed or transferred to other DOE offices or to other agencies.

Furthermore, we recommend that NNSA cease all sub-critical testing and most other nuclear weapons-related tests and experiments at the Nevada Test Site (NTS) and transfer the landlord responsibility for the site to another DOE office or other appropriate entity. Operations at the U1A facility should be suspended and the facility closed. DOE or other agencies could continue to operate other research, development, and testing facilities at NTS, including the Big Explosives Experimental Facility (BEEF) and large gas guns, as user facilities. The NNSA weapons program could use those facilities infrequently, but only for tests that are necessary to resolve problems identified with weapons in the existing stockpile.

Following is a summary of our recommendations by major classes of research, development, and testing facilities.

Advanced Simulation and Computing (ASC) - One of the major initial goals of the Stockpile Stewardship program was to improve NNSA's computing capabilities to better model nuclear weapons performance. Today, fifteen years and billions of dollars later, NNSA has gone from one-and two-dimensional codes, which modeled all nuclear explosions as if they were perfectly symmetrical, to three-dimensional codes that can model real-world issues that might affect the performance of aging nuclear weapons, such as cracks and corrosion. NNSA has also incorporated a vast amount of new experimental data into the codes, which reflect observed material properties and more refined extrapolations based on such new observations, rather than ad hoc assumptions. This is believed to have greatly improved the accuracy of the codes, as well as NNSA's confidence in their predictive results. Improved confidence in the codes has led some weapons designers to believe they are good enough to be used to design and certify new nuclear weapons, without full-scale underground nuclear weapons tests. Designers' ability to certify new nuclear weapons, without testing, is controversial. However, modeling existing weapons of the legacy stockpile is a much easier task. It is easier because the extensive results from nuclear testing of those weapons has been used to baseline the new sophisticated codes. In addition, this

original test data had been augmented by an enormous amount of test data from recent hydrodynamic and other tests on the legacy designs.

Consistent with the Curatorship approach, we recommend that NNSA halt all systematic efforts to improve the computer codes it uses to model nuclear explosions. This action would be a major step in abiding by the commitment to halt the arms race under Article VI of the NPT. In addition, it would save hundreds of millions of dollars per year that is now spent developing new computer codes and acquiring ever more powerful computing platforms. Furthermore, it would allow NNSA to close numerous nuclear weapons research facilities, whose primary purpose is to feed results into code development.

We also recommend that NNSA cease its current practice of subsidizing development of new computer technology by continually upgrading its computer facilities to the fastest computers in the world through joint development programs with supercomputer manufacturers. DOE might continue to subsidize development of supercomputing in this manner via other programs with greater scientific and social merit (for example, meeting the immense computing needs of predicting global climate changes). However, development of supercomputers would not be a mission of the nuclear weapons program under Curatorship.

Under Curatorship, as improvements in computer technology become available in the commercial marketplace, NNSA could adapt its existing codes to run on those faster computers. NNSA could also continue to validate its computer codes by comparing new calculations to existing test data and could continue to apply its codes to better understand the behavior of the legacy stockpile under a variety of conditions.

High Energy Density and Pressure (HEDP) R & D - NNSA has numerous facilities it uses to create high pressures, densities, and temperatures for studying the behavior of materials under conditions similar to those in an exploding nuclear weapon. These facilities, including large lasers, pulsed power machines, and gas guns, are referred to collectively as HEDP facilities. HEDP facilities are used primarily to provide information on material properties in extreme conditions. NNSA primarily uses that information to improve the computer codes used to model exploding nuclear weapons. NNSA also uses HEDP facilities for integrated tests of those codes. Since NNSA would no longer seek to improve its modeling capabilities under the Curatorship approach, all HEDP facilities would be candidates for closure, unless they had some other legitimate scientific use.

Some of the HEDP facilities can produce X-rays or other effects, which NNSA may use in "environmental testing" to qualify replacement components or as part of the surveillance program. NNSA has numerous other facilities that produce similar effects, many of which would remain in operation under Curatorship (see Major Environmental Test Facilities below). Selected HEDP facilities might also remain in operation, if they are cost effective or crucial to environmental testing. In addition, some HEDP facilities might have applications in fields other than nuclear weapons, including fusion energy, astrophysics, and as sources of X-rays for research in numerous areas. Those facilities might be transferred to other DOE offices or other agencies and remain in operation. The remaining HEDP facilities would be closed.

Hydrodynamic Testing - Hydrodynamic Testing is sometimes used (in conjunction with computer modeling) to examine issues that are discovered during surveillance. It is more often used to perform weapons physics research, to improve modeling of nuclear weapons performance, to study new nuclear weapons geometries, to design and certify new nuclear weapons, and to evaluate the performance of new materials and components. Under Curatorship, it would be used for the first purpose only. That would require only a small fraction of the current testing rate.

Under Curatorship, all hydrodynamic testing facilities would be closed, except for the ***Dual-Axis Radiographic Hydrodynamic Test*** (DARHT) facility at LANL. DARHT is the most modern of NNSA's hydrotest facilities. When DARHT becomes fully operational, it will be capable of performing tests with multiple shots from two different viewing angles on targets including full-scale mockups of any warhead in the current stockpile. About 100 hydrotests per year are performed at DARHT, which would be more than sufficient for all of the hydrotesting required under Curatorship. Under our plan, any planning for a follow-on Advanced Hydrotest Facility, part of NNSA's long-term vision for the Nevada Test Site, would end.

Sub-critical tests are a special class of hydrodynamic test, in which small amounts of Pu or HEU are compressed in ways that produce some fission, but cannot lead to a self-sustaining fast neutron chain reaction in the material. They are currently performed at the U1A underground test facility at the NTS. Sub-critical tests would cease under Curatorship and the U1A facility would be closed.

Major Environmental Test Facilities – NNSA's *Final Supplemental Programmatic Environmental Impact Statement (SPEIS) on Complex Transformation* identifies more than thirty "Major Environmental Test Facilities (ETFs)." NNSA uses those facilities for multiple purposes including R & D on new component and weapon designs and for certification of new components and weapons. Under Curatorship, there would be no development of new components or weapons and those uses would drop out. Some Environmental Test facilities have also been used to test and validate changes in computer models. Those uses would also drop out.

NNSA also uses many of the ETFs to test components from weapons randomly drawn from the stockpile as part of its surveillance program. That activity would expand under Curatorship. In addition, testing for certification and quality assurance of necessary replacement parts would also continue under Curatorship. Under Curatorship, NNSA would retain or replace only those ETFs that are essential to the surveillance program. Many of the facilities that are retained or replaced under NNSA's preferred alternative -- consolidate major environmental testing at SNL-NM -- appear to meet that criterion. There is, however, insufficient information in the SPEIS to determine whether each of those facilities would do so. Some ETFs are likely to have very limited roles under Curatorship and would be transferred to another DOE office, another agency, or closed.

High Explosives (HE) R & D - Most of the HE R & D that NNSA currently supports is focused on formulation of new explosives. This work would cease under Curatorship. Studies of aging of HE formulations in existing weapons and components could continue at Pantex. Surveillance activities and quality assurance (QA) studies of HE in existing components would be expanded.

Tritium R & D - NNSA performs R & D on tritium primarily to improve its understanding of mixing issues in imploding primaries or to design new gas handling systems. We recommend halting both of those activities under Curatorship. R&D at SNL-NM for production support and quality improvement of neutron generator production could continue.

Microsystems, Nanotechnology, and Advanced Electronic R & D - NNSA supports a substantial amount of R & D on microsystems, nanotechnology, and advanced electronics. This work is applicable only for designing and fabricating new nuclear weapon components. Under Curatorship, there would be little or no introduction of new components into nuclear weapons and little need for NNSA to perform such research. Research in microsystems, nanotechnology, and advanced electronics contributes to other missions, including fostering the competitiveness of US industry. However, unless

NNSA's state of the art facilities for R & D on those technologies are supported by other programs or agencies, they would be closed under Curatorship.

(NOTE: Significant portions of this comment's Curatorship section first appeared as part of the report, *Transforming the U.S. Strategic Posture and Weapons Complex for Transition to a Nuclear Weapons-Free World*, published in April 2009. Its lead author was Dr. Robert Civiak, with contributing authorship by Marylia Kelley, Christopher Paine, Jay Coghlan, Peter Stockton and Ingrid Drake. Additions and changes from the report's original text to highlight its NEPA relevance to the SWEIS are the responsibility of Marylia Kelley and Tri-Valley CAREs.)

XII. Conclusion

NEPA requires that the proposed SWEIS fully analyze an alternative for Y-12 that offers the site a future that differs substantially from its past. Tri-Valley CAREs looks forward to seeing these alternatives comprehensively and thoroughly described in the next iteration of the SW EIS. The other deficiencies of the draft SWEIS noted above must likewise be remedied.

As there is a significant difference between the present draft SWEIS and a NEPA-compliant draft SWEIS, we further request that NNSA re-circulate an adequate draft document for public comment before finalizing it and publishing a Record of Decision based thereupon.

Thank you for your consideration.

Sincerely,

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