

The Reliable Replacement Warhead (RRW) Program Can't Meet Congressional Objectives

ABBREVIATED TALKING POINTS

Los Alamos Study Group, 505-265-1200, gmello@lasg.org, 4/16 DRAFT
Background and questions for Congress available upon request

Summary

- **Already it is clear there is nothing "reliable" about the RRW program. It will be very costly, have high technical risk, incur higher safety risks and environmental hazards, and cause higher maintenance costs and risks.**
- **The RRW program lacks social and political support and is therefore likely to exacerbate, not fix, warhead complex personnel problems.**
- **The RRW program will not result in significantly safer, more secure, or easier-to-maintain warheads, even discounting the above dominating factors.**
- **For these reasons the RRW does not meet congressional objectives.**
- **In fact, through its grandiosity and attendant panoply of risks, the RRW program may compromise the U.S. nuclear deterrent.**
- **The RRW program will increase a variety of nuclear dangers by stimulating and enabling nuclear weapons programs in other countries and by undercutting support for nonproliferation efforts.**
- **Instead of the RRW program, Congress must lead the way in articulating rational, conservative, simpler, cheaper, and better-defined missions for the National Nuclear Security Administration (NNSA) based on properly maintaining current warhead types or a subset of them.**
- **As part of this mission clarification, Congress should remove NNSA from nuclear weapons policy forums, councils, and decisions.**
- **Congress should at the same time enhance NNSA staffing and contractor oversight and apply more federal staff to fewer missions and tasks within the Weapons Activities budget line.**
- **To truly increase nuclear security and to actually lower nuclear dangers, other kinds of decisions are needed. These decisions have little or nothing to do with stockpile maintenance, the supposed main purpose of the RRW program.**
- **Greater cost-effectiveness, overall system reliability, and reduced nuclear danger all lie along a "smaller is less ugly" path that leads toward Non-Proliferation Treaty (NPT) compliance and Comprehensive Test Ban Treaty (CTBT) ratification.**

Congressional RRW objectives
(from CRS RL33748, in quotes, then rephrased)

Tentative Conclusions
(Background and suggested clarifying questions for Congress to follow under separate cover)

1. “Maintain high warhead reliability.”

Throughout development, production and deployment of the proposed RRW, specifically the so-called “RRW-1,” maintain the high confidence in reliability generated by the current arsenal, specifically the W76 and pending W76-1 life extension program (LEP) product.

- Internal, third-party, and congressional confidence in the reliability of existing, maintained devices (i.e. nuclear explosive packages, NEPs) will always exceed confidence in RRW device reliability because fully-tested devices with an objective data pedigree will always inspire more confidence than partially tested ones.
- Confidence in warhead reliability depends not only on the warhead but on the entire “warhead system” including the warhead complex and its dependability relative to the missions required; the warhead complex may not be robust with respect to some of the expanded missions required by RRWs *but not LEPs*, especially including successful, dependable, large-scale, long-term pit production.
- Lack of confidence in the warhead complex as it relates to long-term confidence in warhead reliability has been the subject of several congressionally-requested reports, including those of the Congressional Research Service, the Foster Panel, and the Chiles Commission.
- Confidence in reliability can’t be asserted *a priori* for a warhead which doesn't exist and which therefore hasn’t been actually tested as built in *any* physical way, let alone tested via a high-fidelity flight test or nuclear explosion, and which may be unbuildable for a variety of reasons independent of design merit.
- Adequate social and political support for the multi-decade, high-cost, high-risk effort required to produce RRWs, even if presumed present today, cannot be assured in the face of rapidly-changing political, economic, fiscal, and security conditions.
- The total cost of the RRW program, with or without the new construction required, isn’t known, and more conservative alternatives to RRW have not been fully described or their costs estimated; for this reason alone RRW funding and hence confidence in RRW must be considered uncertain.
- The "customer" (the Navy) appears lukewarm about the RRW, contributing to a lack of confidence in RRW funding and hence in the overall reliability of the RRW program and its future products.

Conclusion: RRWs could never be as confidently reliable as are current warheads maintained through LEPs.

2. “Increase performance margins.”

In the proposed RRW devices, provide greater performance margins than are present in devices now in the arsenal, specifically in the W76 and pending W76-1.

- The labs and JASONs have repeatedly stated that device performance margins are completely adequate and could be increased if desired through maintenance, not to mention LEPs. They could also be increased through changes in obsolete military requirements having to do with hostile in-flight environments.
- Neither component aging nor LEPs responsibly conducted need lower performance margins, especially if the recommended compensatory measures were taken.
- The W76-1 LEP will incorporate measures to create higher performance margins than the W76 "just in case."
- In the final analysis, “finished-product” performance margin is really an overall systems property like reliability, requiring in the RRW case ambitious, even unprecedented, management successes in facility design, construction, and operation to achieve; the prospects for these unprecedented successes are uncertain.

Conclusion: There is no value added by performance margins made greater than necessary. Even so, there can be no confidence that RRWs will provide performance margins greater or even equal to today's, given the overall program risk. Existing programs, if well-managed, can maintain current, adequate performance margins or increase them if desired.

3. “Stay within the design parameters validated by past nuclear tests.”

In designing the proposed RRW, stay within the design parameters validated by past nuclear tests for the current arsenal.

- There is no unambiguous set of “design parameters validated by past nuclear tests.” It is not clear how such “design parameters” relate to the certification of nuclear warheads, which is or should be the point.
- Whatever the criterion may mean, the “design parameters” of fully tested devices will remain at least as well validated by nuclear tests because it was precisely the “design parameters” of existing warheads, more so than would be possible for any new warhead, that were “validated” in those tests. Even if RRW designs were fully and easily certifiable, existing designs must remain more so.
- Future RRW certification would depend on political and social conditions and upon subjective individual actions, not just on objective data. Such certification would be a political, not scientific or technical, act.

Conclusion: There will never be as complete, objective confidence that RRW designs lie within known design parameters as for current warheads properly maintained.

4. “Design warheads for ease of certification without nuclear testing.”

Design proposed RRW warheads for ease of certification without nuclear testing.

- Current doubts about RRW certification are just that: *real doubts*. The problem is already at hand. Certification is already contested and the same is highly likely to be true later; therefore existing fully-tested warheads alone meet this criterion.
- LEPs can be as easily certified as existing warheads unless capricious changes are introduced. No changes which could open the door to future lack of confidence should be allowed.
- The Navy has stated it is fully satisfied with the W76-1 LEP.

Conclusion: RRW certification is now and will remain controversial. Current warheads are fully certified, meeting this criterion already, and will remain so indefinitely if desired.

5. “Increase the ability of warheads to prevent unintended nuclear detonation.”

In the proposed RRW, increase nuclear detonation safety over the existing arsenal and over the W76 and W76-1 in particular.

- Detonation safety is a problem that is fully solved; further design advances would have no benefit.
- Changes in stockpile size and operational conditions do offer safety benefits.
- Nuclear detonation risks from proliferation exceed risks due to accidents by orders of magnitude and RRW will make them worse.
- Therefore to lower nuclear detonation risks, bolster nonproliferation efforts, not device safety.
- Investments in detonation safety mitigation have a very low benefit/cost ratio compared with other societal safety efforts, causing net harm to society through the high opportunity costs.

Conclusion: Nuclear detonation risk cannot be lowered from its present very low level and there is much increased danger in trying. The RRW program would thus increase overall detonation risk. LEP warheads add less risk. Real nuclear risk reduction must be achieved in wholly other ways.

6. “Increase the ability of warheads to prevent unauthorized nuclear detonation.”

In the proposed RRW, increase protections against unauthorized nuclear detonation over the warheads in the current arsenal, specifically the W76 and W76-1 LEP.

- Warhead security is only inconsequentially a device design problem; little overall security improvement is possible that way. High impact speeds would destroy "duds."
- Inevitable security risks of RRW manufacturing far exceed any possible gains through device design
- RRW will stimulate proliferation, lowering security overall and increasing risks in multiple dramatic ways.

Conclusion: There could be only trivial security increases from new RRW designs, but the effort would generate insecurity in multiple ways, causing great net insecurity. Genuine security improvements must be pursued in other ways.

7. “Reduce the consequences of an accident or attempted unauthorized use that does not produce nuclear yield.”

In the proposed RRW, reduce the consequences, relative to the current arsenal and specifically relative to the W76 and W76-1 LEP, of an accident or attempted unauthorized use that does not produce nuclear yield.

- Material dispersal risks and the resulting hazard are both very low already and warhead changes to further mitigate them have not been of interest to the Navy.
- Third-stage missile modifications, even omission of the third stage, could lower them at a much lower cost than RRW, as could changes in stockpile size and deployment intensity.
- Warhead plutonium dispersal hazard is lower than hazard from proliferation by orders of magnitude and efforts to mitigate the former would exacerbate the latter, causing dramatic hazard increase.
- RRW production would significantly increase plutonium dispersal hazard in the complex.
- Investments in device designs to improve safety have an extremely low benefit/cost ratio compared with other societal safety efforts, incurring great safety opportunity costs.

Conclusion: RRWs can offer no net decrease in plutonium dispersal hazard; in fact the RRW program will increase it.

8. “Reduce the environmental burden imposed by warhead production.”

In the proposed RRW, reduce the environmental burden imposed by warhead production relative to the current arsenal, specifically to the W76-1 LEP.

- RRW necessarily entails manufacturing of device components, especially pits, secondaries, and cases, which LEP does not necessarily require.
- RRW requires construction of new factories, especially for pit production, which LEP does not.
- The environmental burden of construction, operation, and waste management for RRW is very great, favoring LEPs.
- The LEP process could be repeated at least once without incurring any decrement in reliability whatsoever, deferring pit manufacturing past ~ 2070.
- The number, schedule, and type of RRWs and hence the nature of factory capacity required are not known, have recently changed, and appear unstable.

Conclusion: The RRW program would cause much more environmental harm than existing warheads maintained through LEPs.

9. “Design warheads for safety of manufacture.”

Design the proposed RRW to have fewer manufacturing dangers than current warheads, especially the W76-1 LEP.

- RRW device component manufacturing, especially for pits, entails greater dangers than no or less manufacturing (the LEP option).
- Manufacturing of non-nuclear components is similar or comparable for both options
- RRW attempts to remove only a very small part of device manufacturing dangers anyway.
- NNSA and the Department of Energy (DOE) extensively promote many technologies with far more dangerous materials than those in question
- This objective really boils down to "ease of manufacturing," #10.

Conclusion: The RRW program would create much more manufacturing danger than existing warheads maintained through LEPs.

10. “Design warheads for ease of manufacture.”

Design the proposed RRW to be easier to make than current warheads, especially the W76-1.

- RRW device component manufacturing entails far greater technical risk than little or no such manufacturing (i.e. LEP), causing low likelihood of success overall. Since December 1988, DOE and NNSA have launched at least nine public proposals for significant new pit production capacity, not including closely-held contingency plans. None of these have yet been successful. At least six have failed.
- The manufacturing of non-nuclear components is similar for both options.

Conclusion: RRWs would create a much greater manufacturing burden, with far greater technical risk, than LEP warheads.

11. “Design warheads for ease of maintenance.”

Design the proposed RRW to be easier to maintain than the current arsenal, especially the W76 and W76-1.

- The existing arsenal is relatively easy to maintain and this effort consumes a small fraction of NNSA budget.
- NNSA public statements suggest the RRW program is already taking funds from surveillance and LEPs; NNSA focus on existing surveillance programs could and should be improved.
- New warheads, including RRWs, will initially have more defects than proven, fixed ones.
- No age-related increase in defects in device components has been observed.
- The RRW would cause difficult workload issues at Pantex and more so at LANL.
- The RRW would require retaining more warhead types for decades, increasing surveillance and maintenance burden.
- The managerial risk of RRW raises serious budgetary and maintenance questions.

Conclusion: A RRW arsenal would be much harder to maintain than an LEP arsenal for the foreseeable future.

12. “Increase warhead longevity.”

Design the proposed RRW to have a longer lifetime than current warheads, especially the W76-1.

- Existing warheads do not age and are not allowed to age; components which age in any significant way are replaced; "warhead lifetime" is therefore a fallacious concept and should be replaced by "component lifetime."
- All components which cannot be fully functionally tested (and replaced in LEPs as desired) have very long lives (many decades), including pits, secondaries, and cases.
- RRW proponents want both long RRW life and "churning" of the arsenal in order to exercise design and production -- goals which directly conflict
- Service life of LEP-ed warheads is already too long to suit RRW supporters.

Conclusion: "Warhead lifetime" is a fallacious concept. In any case RRW components would not last longer than LEP components -- except where the RRW program gratuitously retires hard-to-make, very expensive components with decades of functional life remaining, e.g. pits.

13. “Fulfill current mission requirements of the existing stockpile.”

Design the proposed RRW to fulfill mission requirements of the existing stockpile, especially the W76 and W76-1.

- The existing arsenal fulfills its missions exactly.
- RRW will open design space to new weapon system possibilities and is widely and accurately perceived (e.g. in Russia, elsewhere) as doing so.
- Congressional language limiting RRW is far too vague and narrow to halt overall weapon system innovation, which is to be in part enabled by RRW.
- Weapon systems innovation however achieved will not increase credibility of nuclear deterrent, which is inherently highly limited in role and scope by non-technical, moral and political factors
- If RRW led to nuclear testing, which is very possible, new capabilities could also be added in this way.

Conclusion: RRWs, if successfully built, would enable new nuclear weapon capabilities and provide potent excuses for similar work elsewhere in the world. LEP warheads do this to a lesser extent.

14. “Avoid requirements for new missions or new weapons.”

In the process of designing proposed RRWs, avoid any requirement for new missions, especially new relative to those of the W76 and W76-1.

- This guidance is relatively meaningless since "mission" is too vague and is aspirational in any case. Technical “military characteristics” may be closer to the control level Congress needs to achieve its goal.
- The "missions" of the existing stockpile already include addressing all current and possible future target classes while enabling technical evolution in overall weapon systems to do so.
- NNSA has repeatedly stated that a major purpose of RRW is to facilitate, via its role in creating a "responsive" infrastructure, new weapons for new missions.
- Cartwright of STRATCOM recently testified that the “modularity and interoperability” of RRW “will significantly increase the operational flexibility and responsiveness of the nuclear weapons stockpile and improve our ability to introduce new technologies and respond to technological and/or geopolitical surprise.” (Senate Armed Services, 3/28/07)

Conclusion: A primary stated purpose of the RRW program is to enable new nuclear capabilities; this is not the primary purpose of LEPs.

15. “Focus initial efforts on replacement warheads for submarine launched ballistic missiles (SLBMs).”

Design the first RRW to replace the W76 and W76-1.

- RRW cannot do this for about two decades at best (final production unit in 2021 at best plus multi-year prove-in period).
- Triple deployments (W76, W76-1, and RRW) are therefore likely to occur until at least ~ 2025.
- W76 and W76-1 retirements (the latter almost brand-new when it would be retired) may conflict with RRW assembly workload.
- W76 and W76-1 may, after being moved from deployment, expand reserve arsenal, not be dismantled, to provide hedge against failure of untested, unproven, un surveilled RRW.

Conclusion: RRWs could not replace the W76 and W76-1 warheads for a very long time, if ever.

- 16 “Complement or replace LEP.”
- Repeats previous objective, except seems to admit that RRW may end up complementing W76-1 LEP.

Design the proposed RRW to complement or replace LEPs for the existing stockpile, especially the W76-1 LEP.

Conclusion: RRWs could only complement, not replace, W76 and W76-1 warheads for approximately two decades.

17. “Reduce the number of nondeployed warheads.”
- It is already clear from the above that RRW has a priori lower overall systems reliability, higher technical risk, serious and subjective certification issues, and would increase types of warheads for foreseeable future.

Design the proposed RRW in such a way as to facilitate decisions to reduce the number of non-deployed warheads.

- For these reasons RRW would likely increase, not decrease, the perceived need for non-deployed warheads.

Conclusion: RRWs and the RRW program would increase the perceived need to retain reserve warheads for the foreseeable future.

18. “Support upgrading of Complex capabilities.”
- A commitment to unnecessary warheads driving warhead complex expenditures and priorities describes a management fiasco, not an objective.

Design the proposed RRW in such a way as to require upgrading of warhead complex capabilities.

- Unnecessary upgrades are costs and burdens, not benefits.
- Making RRW and hence stockpile contingent upon successful complex reconstruction risks the U.S. nuclear deterrent.
- Warhead complex investments should instead focus on conservative, cost-effective, attainable consolidation and good management.
- RRW ambitions are unrealistic and risk dramatic warhead complex failures, continuing scandals in labs, plants, and NNSA, temporary or long-term losses in capability, and technical decline.

Conclusion: This objective invites a management fiasco. The RRW program is grandiose and risks the integrity of the U.S. nuclear deterrent.

19. “Exercise skills of the Complex.”

Design the proposed RRW in such a way as to require utilization of as many skills in the warhead complex as possible.

- Preservation of skills requires at a minimum:
 - a clear, focused mission (now absent);
 - social acceptance of those limited missions (absent for expansive missions like RRW);
 - good management, accountability, and good federal oversight (also absent, with some problems increasing);
- NNSA contractors currently have too many missions, people, facilities, and too much money and power relative to government to properly manage personnel or facilities.
- This congressional objective for RRW is a problem, not a solution, and expresses in itself a major reason for NNSA's current dysfunction.
- The solution lies in fewer missions well done, not more missions badly done.

Conclusion: The RRW program is already contributing to personnel and management problems, distracting NNSA's attention, and lowering the ability of the warhead complex to retain appropriate skills in an adequate number of workers at a high level of competence.

20. “Reduce life cycle cost.”

Design the proposed RRW in such a way as to reduce its life cycle cost relative to the current arsenal, especially the W76 and W76-1 LEP.

- RRW is extremely cost-ineffective, requiring gratuitous components (e.g. pits) costing 10s of billions of dollars to make.
- The discounted future cost of component production, for those components not needed now but needed after one 30-year LEP life cycle, would be 10-20% of today's comparable RRW costs. If it were possible to wait for two LEP life cycles, as it may be for nuclear components such as pits, production costs discounted from 60 years hence would be very small indeed. In any case large-scale pit production planning, let alone construction to provide such capacity, is premature.
- The total RRW effort is far more expensive than a consolidated subset of the current complex with simplified, conservative missions, which appears to be the only policy that can with confidence preserve the U.S. nuclear deterrent in the current political and social climate, let alone operate with higher safety and security.
- Treaty commitments and urgent proliferation concerns require leadership in disarmament as part of any successful initiative, the opposite of a grandiose new warhead program.

Conclusion: RRWs and the program to make them are dramatically more costly than LEP warheads. Greater cost-effectiveness, overall system reliability, and reduced nuclear danger all lie along a "smaller is less ugly" path that leads toward Non-Proliferation Treaty (NPT) compliance and Comprehensive Test Ban Treaty (CTBT) ratification.