FACING REALITY

The Future of the U.S. Nuclear Weapons Complex

PROJECT DESCRIPTION:

This report grew out of an April, 1991 meeting of members of the Military Production Network, other groups concerned with nuclear weapons issues, and a wide variety of funders, hosted by the Tides and W. Alton Jones Foundations, the Rockefeller Family Fund and the North Shore Unitarian Universalist Society/Veatch Program.

The report seeks to contribute to policy formation in this period of rapid change. It is a guide for Members of Congress and their staffs, state and local leaders, journalists, and members of allied organizations including citizens' research and advocacy groups throughout the United States. The report presents a comprehensive set of policies stressing the interrelationship of safety, the environment, security, health,employment, and the crucial role of citizen advocacy and oversight.

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*Secretary – **Richard Boone,** Director of the Project for Participatory Democracy, The Tides Foundation.*

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OVERVIEW

by Peter Gray

The Cold War has ended. Although important differences remain, Presidents Bush and Yeltsin have proposed reducing strategic nuclear weapons to 4,500 (Bush) or 2,500 (Yeltsin). Including the drastic reductions in tactical nuclear weapons, the U.S. and C.I.S. are on their way to cutting their arsenals by about 80 percent from levels of the late 1980s. Successful arms control treaties and initiatives, and withdrawal of strategic forces from alert, have reduced the risk of all-out nuclear war, whether through accident or design.

After all these welcome steps, why is this report necessary? Isn't the U.S. Nuclear Weapons Complex, operated by the Department of Energy, on the right track? What about newspaper headlines reporting that "U.S. Plans Big Cuts In Its Production Of Nuclear Arms – Emphasis Put On Cleanup – Budget Constraints and End of Cold War Cause Revamping of Weapons Industry"?[1] The short answer is that – despite promising rhetoric – the bureaucracy that built more than 60,000 nuclear weapons during the Cold War will not achieve fundamental reduction and reform on its own.

For four decades military planners and their counterparts in DOE have prepared for every imaginable contingency – except the end of the Cold War. Weapons complex managers and contractors are ill-prepared to carry out what should be their new mission of cleanup, weapon dismantlement, proliferation control, victim compensation, and conversion to peacetime endeavors.

To capture the full benefits of the Cold War's end, citizen organizations and elected officials must vigilantly press for change. The apparatus that was built to run the arms race must be assisted in taking on the huge burden of radioactive and toxic waste it has created. Similarly, the Nuclear Weapons Complex must be retrained to see the effects of its actions on U.S. and international non-proliferation policies. The United States, with an arsenal of many thousands of weapons, cannot convince or force other countries to forego nuclear weapons production if it continues to develop and test new generations of weapons itself.

This report is the first compendium of analysis and policy recommendations for the Complex that directly responds to post-Cold War imperatives. After a 45-year buildup, the U.S. Complex now must drastically scale down its operations. The buildup resulted in strategic overkill,[2] cost overruns,[3] massive environmental contamination,[4] health hazards,[5] and an absence of democratic accountability.[6] The new mission should be to:

- Redefine the priorities of the Complex away from weapons production.
- Firmly cap the arms race and become, by example and through diplomacy, part of the solution to the problem of nuclear proliferation.
- Safely and efficiently close and decommission obsolete plants.
- Safely dismantle thousands of nuclear weapons.
- Safely and verifiably store dangerous, proliferation-sensitive materials, and isolate them from the environment.
- Efficiently manage and clean up numerous contaminated weapons production sites.
- Constructively employ displaced weapons specialists and others who might be proliferation risks.
- Respond to the economic and health needs of the communities and people who fought on the front lines of the Cold War.
- Operate with the openness and democratic spirit required to win long-lost public trust. The Complex must work with citizens' organizations rather than against them.

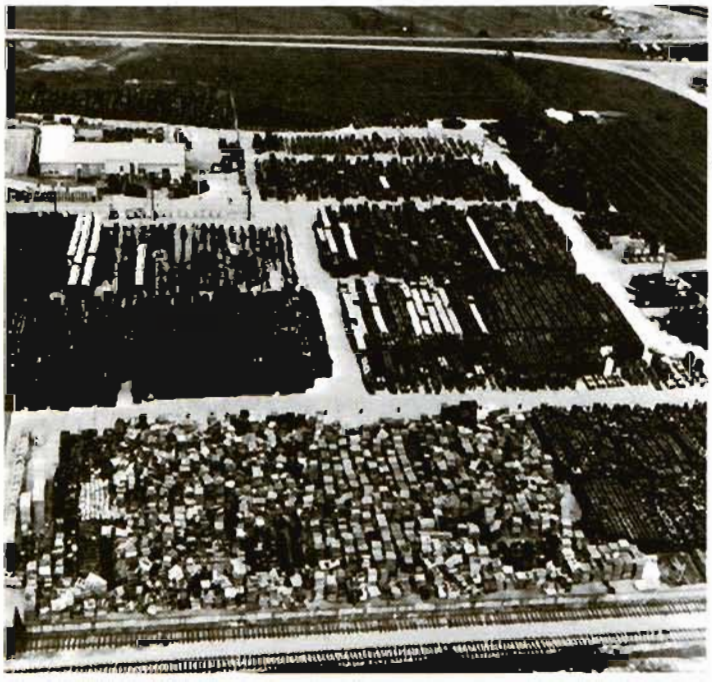
As the Cold War began to wind down in the late 1980s, the environmental devastation of nuclear weapons production gradually came to light. ["DOE's Legacy" page 6]. DOE did not search for alternatives to business-as-usual, nor did it begin a genuine effort to clean up old messes before creating new ones. Instead, it has asked the country for a vast spending program to build an array of new plants – that it calls "Complex 21" – to support warhead development and production through the mid 21st century.

After a 45-year buildup, the U.S. Complex now must drastically scale down its operations. The buildup resulted in strategic overkill, cost overruns, massive environmental contamination, health hazards, and an absence of democratic accountability.

The Complex remains stuck in a bureaucratic rut, unable to anticipate change or respond to it effectively.

Although the most outrageous abuses have ended, and some measure of independent oversight is in place, the ingredients of disaster, present since the 1940s, and the archaic assumptions behind them, continue to drive the Complex:

- **Conflict of interest** – The careers and fortunes of Complex managers and private contractors have depended on continuous development and manufacture of new nuclear warheads. Although supposedly conceived in the public interest, the Complex has been mismanaged, and safety considerations take a back seat to production.
- **Lack of oversight** – The extreme secrecy of the Manhattan Project became a habit that spread a "national security" shield over every aspect of the Complex. Weapons plants frequently are not subject to regulations that apply to the rest of society, and they are isolated from outside perspectives.
- **Extremely hazardous materials** – When the Complex is operating, it produces and processes many of the most deadly substances ever identified, and handles them with inadequate concern for where the materials eventually go. Huge quantities of radioactive isotopes are created by routine plant operations and nuclear test explosions, as well as through accidents. Secrecy makes it convenient to conceal these hazards from the public.



U.S. Department of Energy

Contaminated shipping pallets and various radioactive materials are stored at Fernald, Ohio.

At least rhetorically, DOE Secretary James Watkins has attempted to break with the past by acknowledging a long record of environmental, safety, and health abuses committed by the Complex. Watkins has criticized DOE's "management culture," and promised to reform it. He finally conceded that there is no foreseeable need to produce more of two essential nuclear materials for weapons, plutonium and highly-enriched uranium. Watkins has dropped the assumption that the arsenal must continue to hold 20,000 nuclear warheads, and he has slated several obsolete facilities for decommissioning.

At the same time, however, DOE has:

- lobbied for the restart of plutonium operations at Rocky Flats, despite the lack of any strategic need for new warheads;
- refused to support a formal ban on producing plutonium and highly-enriched uranium for weapons, even though there is no foreseeable need to make more;
- pushed to run an obsolete and risky tritium production reactor at Savannah River, and poured billions of dollars into an attempt to build an oversized New Production Reactor, while the need for new tritium has receded from several years in the future to several decades;
- fought for continued research and development of new warheads that have lost all semblance of a military mission;
- blocked progress toward a Comprehensive Test Ban Treaty;
- fought against legislation that would require DOE to comply with established environmental, safety, and health statutes.

The Complex remains stuck in a bureaucratic rut, unable to anticipate change or respond to it effectively. For example, the Administration's proposal for "Complex 21" assumes that the future arsenal will contain between 3,000 and 17,000 warheads. In practice, this approach would result in a Complex capable of supporting the upper limit of the planning range. Although weapons manufacture has been stalled for several years, the research, development, and production budget remains at more than seven billion dollars.

The Need for Watchdogs: DOE Plans Don't Match the Rhetoric

This record indicates that the public, press, and lawmakers cannot relax their vigilance. Long historical experience has shown that few bureaucracies will reform merely because they

DOWNSIZING THE NUCLEAR WEAPONS COMPLEX

Facility and Purpose	Status	DOE's Plan	Reduced Arsenal Plan
Savannah River Site (SRS): P, K, & L Reactors.Tritium and plutonium production	All 3 reactors closed since 1988 due to severe safety problems	Restart one reactor at low power to test capability. Build new production reactor at Hanford, SRS, or INEL.	Put reactors on standby. Over long term, investigate alternatives such as a linear accelerator for tritium production.
Savannah River Site (Tritium Facility). Tritium loading and recycling.	Operating.	Operate and move other tritium work from the Mound Facility to SRS.	Operate but scale back to recycling operations.
Hanford Reservation (N Reactor and PUREX plant). Plutonium production.	Both closed due to safety, environmental problems.	Decommission N Reactor, restart PUREX plant to process backlog of fuel.	Decommission both plants, store spent N Reactor fuel,. and clean up.
Idaho National Engineering Lab (INEL). Chemical processing and fuel reprocessing.	Shut down due to safety, environmental problems.	Renovate, operate, process naval and research reactor fuels. Recovered uranium would be used in SRS reactors—is not of a grade for use in current U.S. weapons.	Decommission, store reactor fuel, and clean up.
Fernald Plant. Uranium processing.	Shut down since 1989 due to environmental problems.	Decommission and clean up.	Decommission, dismantle, and decontaminate.
Y-12 Plant. Uranium and lithium-deuteride components.	Operating, but many environmental problems.	Renovate, continue large-scale operations or build new plant at another site.	Scale back and delay production operations at least 5-10 years and clean up.
Rocky Flats Plant. Plutonium processing and component manufacturing.	Plutonium precessing and component mfg. shut down since 1989 due to serious safety, environmental problems.	Renovate and put in "contingency status." Ultimately move plutonium processing and component manufacturing buildings to a new site.	Decommission and clean up. Put plutonium processing operations at other sites on standby.
Pantex Plant. Warhead assembly and disassembly.	Operating, but having environmental, safety problems.	Renovate and operate.	Delay new warhead production at least 5-10 years. Use for dismantlement.
Nevada Test Site. Nuclear weapons testing.	Operating.	Continue operations indefinitely.	Halt testing, put on standby.
Livermore, Los Alamos, Sandia National Labs. Weapons research and development.	Operating.	Operate, consolidate redundant operations. Maintain Cold War funding levels.	Cut funding, stop new weapons development, consolidate Los Alamos and Livermore.
Kansas City, Mound, Pinellas, Rocky Flats, and Pantex Plants. Non-nuclear components.	Operating.	Consolidate and contract with private industry.	Consolidate, scale back.
Verifiable Warhead Dismantlement Facility.	Does not yet exist. Congress supports.	Unclear. No plans to build.	Develop and build as soon as possible.

Unless the Complex is firmly and positively redirected, precious opportunities, as well as ominous hazards, are likely to be ignored.

are obsolete: they must be actively redirected or dismantled. Allowing DOE to operate its weapons-related programs with inadequate scrutiny would risk far more than a 12 billion dollar annual budget. Unless the Complex is firmly and positively redirected, precious opportunities, as well as ominous hazards, are likely to be ignored.

Controlling nuclear proliferation, and cleaning up after the Cold War, are daunting prospects. However, the effort, measured in dollars or in technical expertise, that the U.S. has applied to these problems is hundreds of times smaller than what it has spent on the arms race that helped create the threats. More than cash, the missing ingredients are political will and a long-term, positive vision of a U.S. role in creating a safer, healthier world.

The First Step: Setting Firm Limits on the Complex

This report proposes an alternative scenario for the future Complex, consisting of limitations on its traditional activities, and a mandate for future work. The primary limitations must be:

1. DOE's planning range should be inverted. Instead of assuming 3,000 to 17,000 warheads, the Complex should be designed to support a future arsenal in the range of zero to 3,000 at most, subject to further revision downward. (see sections 5, 6, 7)

2. Decisions about the purpose of any remaining weapons, as well as the site-by-site details, must be made democratically, by an informed public. For many years, the nuclear arms race has been pursued without public participation, while information about its consequences has been suppressed and distorted. Citizens are entitled to a clear explanation of why they should bear the burden and hazard of further nuclear weapon production. (sections 13 & 16)

3. All activities of the Complex must comply with state and federal environmental, health, and safety regulations. (section 12)

4. All research and development of weapons with new military characteristics should halt. Nuclear testing should be phased out, and RD&T must be limited to modifications for safety, component reuse, and durability, to support a small, stable arsenal at most. Even these endeavors should not be allowed without independent oversight and public discussion. A testing moratorium would demonstrate U.S. willingness to join Russia and Kazakhstan in moving toward a global ban. It could save hundreds of millions of dollars in testing costs, and provide time for serious consideration of the need for any further tests. (sections 3 & 4)

The implications of acknowledging that the production mission of the Complex is essentially over, and that the U.S. needs, at most, only a small fraction of its present arsenal, are profound:

- The tacit halt in production of fissile materials (plutonium and highly-enriched uranium) for weapons can be translated into a positive step: clear renunciation and a formal call for a global ban on making those materials.
- Plutonium recycling and fabrication are unnecessary for at least 5 to 10 years.
- Tritium production can be delayed for at least 10 to 40 years.
- Warhead production and remanufacture can be delayed for at least 5 to 10 years.
- Many billions of dollars can be saved by canceling unnecessary construction and production projects.

Step Two: Toward a Complex That Responds to the Public Interest

In addition to setting limits on development and production activities of the Complex, a new vision must outline the future mission of DOE or of other agencies that take on post-Cold War tasks. The highest future priorities should include:

1. Non-proliferation – While the chance of a massive nuclear attack is now remote, the threat of regional nuclear war or nuclear terrorism continues to grow. Scientists at the national labs should turn their expertise away from designing exotic new weapons and toward strengthening the treaty obligations, intelligence analysis, export controls, and UN inspections that are the world's hope of avoiding catastrophe. (section 2)

2. Warhead dismantlement – Thousands of nuclear warheads will be withdrawn from deployment during the next several years. They must be disassembled and made inoperable as quickly as possible, and their critical components stored safely. (section 9)

3. Waste disposal – During the past 35 years, while spending billions of dollars, DOE has developed no safe disposal site. This failure is rooted in heavy-handed political tactics and a lack of candor that continues to fuel opposition to waste sites. Nevertheless, satisfacto-

ry solutions for long-term storage of existing waste must be found. (section 10)

4. Environmental mitigation, compliance, and cleanup – Constant and careful scrutiny will be needed to ensure that "cleanup" funds are used to rectify environmental damage, rather than to support future production. Decontamination and decommissioning of closed plants will be a long and costly process. Since DOE and its contractors have exhibited little experience or interest in environmental mitigation, other agencies should be considered for managing these tasks. Whoever does the work, all cleanup costs must be included in the nuclear weapons budget: none of the burden should be shifted to state or local governments. (section 11)

5. Environmental restoration leadership – The U.S. can and should become the world leader in toxic and radioactive waste technology. This is a growing market that could provide economic as well as human health benefits.

6. Worker and community peacetime transition – Genuine effort should be devoted to minimizing the economic hardships imposed on Complex workers and surrounding communities when plants are shut down. At the very least, the DOE budget should immediately include a fund for continuing health and life insurance for former plant employees. Here again, public oversight is essential, because retraining and conversion conflict with Complex managers' desire to resume production. In many cases, DOE has used the threat of layoffs as a political lever to maintain production funding. However, the labor needed for cleanup will rival previous production employment for years to come. Former plant workers should be given preference on retraining for cleanup work, but their safety should also be given high priority.[7]

7. Comprehensive health effects studies – Much of the epidemiological research performed by DOE has been badly flawed. More complete and less biased studies are needed for better understanding of the risks faced by workers and offsite populations. (section 8)

8. Victim compensation – The best available epidemiological results should be applied toward determining who should be compensated for illnesses that may have come from exposure to toxic and radioactive substances. If epidemiology is carried out openly and independently, instead of in secret by DOE, a fair compensation scheme could be quite expensive. Nevertheless, the true costs of the arms race must be recognized. (section 14)

9. Permanent public oversight and regulation – Some measure of secrecy is inevitable in order to restrain the spread of nuclear weapons know-how. The costs of excessive secrecy, however, are written clearly in the mismanagement and disregard for safety that were the theme of nuclear weapons programs since the 1940s. Continuous citizen participation must be accepted as a fact of life for any agency charged with the public interest. To complement outside involvement, DOE and its contractors must be subject to effective whistleblower protection laws. (section 12)

Unfortunately, close examination of the details shows that the agency responsible for nuclear weapons production has not recognized that its mission must be fundamentally revised. Whether by inertia, habit, or material interest, the nuclear weapons establishment has proven itself incapable of genuine reform. This report reflects and is a product of dozens of grassroots and national organizations that have struggled for the past decade to reform the Complex. It brings the knowledge of a wide array of concerned citizens to bear in designing the weapons complex of the future. ☣

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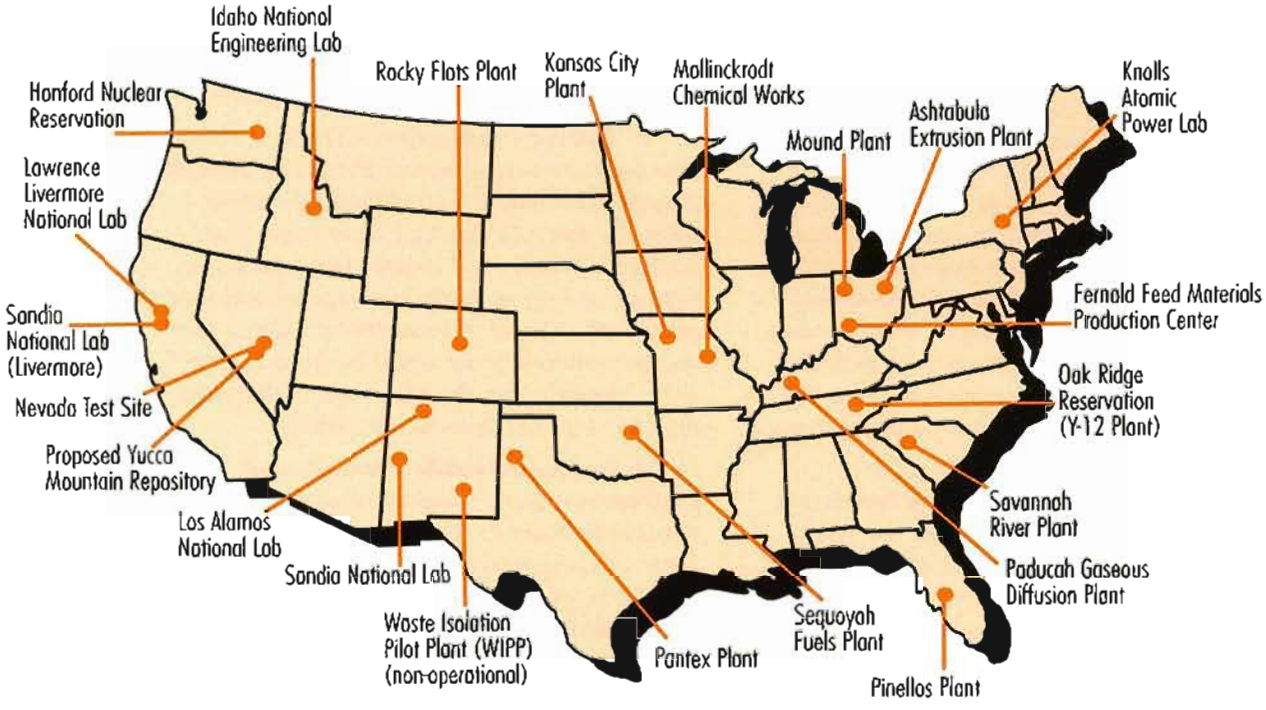
DOE'S LEGACY



A CONTAMINATION SAMPLER

- The **Fernald** Feed Materials Production Center (renamed Environmental Management Project) in **Ohio** emitted between 600,000 and 3,000,000 pounds of toxic uranium dust into the air and water. Known contamination of residential well water was kept secret for years during the 1980s.
- Plutonium processing at the **Rocky Flats** Plant in **Colorado** has contaminated the region's air and water with toxic and radioactive substances. Serious plutonium fires, and plutonium accumulation in ventilation ducts, have endangered plant workers and local populations.
- **Hanford** Reservation in **Washington** State has released massive quantities of radioactive isotopes into the air, soil, groundwater, and Columbia River. Dozens of huge tanks are filled with waste of unknown composition; some of them have generated compounds that risked causing a disastrous explosion. Thousands of cubic feet of highly radioactive reactor fuel rods were recently buried in shallow trenches.
- **Los Alamos** National Laboratory in **New Mexico** has one of the world's largest radioactive dumps, containing more than 12,000,000 cubic feet of radioactive waste, and is still adding about 180,000 cubic feet per year. More than 2,000 contaminated sites have been identified, with an expected cleanup cost of more than $2 billion.
- When a DOE biologist at **Oak Ridge** National Laboratory in **Tennessee** discovered extremely high levels of mercury in the local environment, he was reprimanded for "failure to perceive bureaucratically positive solutions." DOE later admitted that more than two million pounds of mercury had been lost to the environment.
- At the **Idaho National Engineering Laboratory,** waste—including nearly 1,000 pounds of plutonium, more than 200 tons of uranium, and 90,000 gallons of organic solvents—was dumped into shallow trenches. This and other hazardous waste is seeping toward the Snake River Plain aquifer. From 1957 to 1963, scientists at INEL knowingly released 6 million curies of radioactivity into the atmosphere.
- Since 1960, **Lawrence Livermore** Laboratory in **California** has emitted tritium-contaminated water into the soil, and more than 750,000 curies of tritium into the air.
- In 1988, when workers at **Knolls** Atomic Power Laboratories in **New York** complained about radioactive contamination, General Electric, the site contractor, issued a "security newsletter" to all employees, threatening termination, $100,000 fines, or life imprisonment if they spoke to outsiders about the plant.
- In 1989, at the **Pantex** warhead assembly/disassembly plant in **Texas,** 40,000 curies of tritium gas were released, exposing five workers. The Advisory Committee on Nuclear Facility Safety reported that "events are marked by confusion, misread instruments, and uncertain actions... It is still unclear that effective control of the situation by an adequately prepared response team ever took place."

2

THE NUCLEAR WEAPONS LABORATORIES: OPTIONS AND CONSEQUENCES

by Jackie Cabasso, John Stroud, and Marylia Kelley

The Department of Energy's plans for its weapons laboratories merit the description "business as usual." The Administration's 1.9 billion dollar 1993 budget request for nuclear weapons research, development and testing is up eight percent from the 1991 level set before the breakup of the Soviet Union. Official DOE projections indicate the same level of funding for research, development, and testing (RD&T) at least through the year 2000.

At both Los Alamos and Livermore National Labs, the FY93 budgets for nuclear weapons-related programs are up from 1992. Since the Soviet Union dissolved late in 1991, such a diversion of resources at Cold War levels hardly seems necessary. Not only are the labs' primary activities costly and environmentally hazardous – they are also detrimental to genuine national security. Continued development of new kinds of nuclear weapons threatens to undermine international proliferation controls.

It is difficult to overestimate the labs' influence on the future of the entire Complex. According to a recent official report: "Livermore is heavily involved in DOE studies of the future nuclear weapons complex – studies that will have far reaching implications for the character of the future facilities, the weapon design and production process, and the relationship between the design laboratories and the production plants."[8]

But following recent Congressional action and Presidential initiatives, Livermore has only one weapon left in advanced development – the W89 warhead. The SRAM II missile, for which this warhead was designed, was canceled last year, yet lab physicists are planning more underground nuclear tests of the W-89. This "warhead in search of a mission" is expected to be completed by 1994.

Despite Secretary of Energy James Watkins' assertions to the contrary, the DOE's FY 1993 budget request contains funding for a variety of new weapons.[9] These include the Hypervelocity Aircraft Delivered Weapon; the strategic High Power Radio Frequency Weapon; low yield advanced electromagnetic radiation weapons; weapons for use with stealth aircraft; and advanced earth penetrators for deeply buried targets or third world delivery systems.

At best, these programs are a "wish list" of weapons dreamed up for a world that no longer exists. At worst, they are consistent with recently revealed Pentagon scenarios of a "new world order" in which the United States solidifies its position as the only superpower, using a nuclear threat to dominate global affairs. And whether or not these projects ever reach production, they are sure to cost the country more than just money.

According to a Draft Environmental Impact Statement for Livermore, released March 12, 1992, the lab plans to resume emitting tritium into the atmosphere – an unexplained "programmatic" requirement. Business as usual at Los Alamos is likely to be hazardous, too. Recently revealed documents show that the lab has discharged more than three million curies of radioactivity during the past decade.[10]

Citizens around the country are attempting to address an urgent need for environmental cleanup and economic conversion of DOE nuclear facilities to safe, socially beneficial purposes, where possible. DOE weapons research and supporting programs overwhelmingly dominate present and planned Los Alamos and Livermore operations, while neither lab has any significant solar or renewable energy research programs. Meanwhile, lab scientists have begun proposing farfetched ways to use nuclear weapons material and technology for civilian energy generation.[11]

At Livermore, a large "plant scale" demonstration of a new Atomic Vapor Laser Isotope Separation (AVLIS) technology is underway. This experiment, designed to simulate commercial production conditions, is the first step in an ambitious joint DOE-nuclear industry plan to make the United States the leading supplier of fuel for civilian nuclear power plants. AVLIS operations could cause serious environmental damage. And because AVLIS technology can be used to enrich either uranium or plutonium for weapons as well as for commercial fuel, its ac-

Continued development of new kinds of nuclear weapons threatens to undermine international proliferation controls.

quisition by other nations could have serious consequences for nuclear proliferation. AVLIS is not an acceptable "conversion plan" for Livermore.

Recognizing that the job of nuclear weapons design is essentially done, the labs should have a passive "caretaker" role for the remaining arsenal, as long as the country relies on it for deterrence.

The labs should also play an active role in supplying expertise and technology to support nuclear non-proliferation and verifiable arms reductions. There could be no greater, more societally beneficial role for the weapons labs than to respond to the challenge of reversing the nuclear arms race. Accepting this challenge will require a fundamental change in attitude, and a recognition that continued nuclear weapon development conflicts with non-proliferation efforts and will ultimately damage national and global security.

There could be no greater, more societally beneficial role for the weapons labs than to respond to the challenge of reversing the nuclear arms race.

The end of the Cold War is an unprecedented opportunity to stop developing and testing new nuclear weapons and convert the labs to socially constructive purposes. In a February 8, 1992 statement Congressman George Brown, Chair of the House Committee on Science, Space and Technology, offered an approach to the task of "conversion."[12] The following recommendations expand upon Congressman Brown's proposals:

First, all nuclear weapons work at Livermore should be assessed with an eye toward termination. Any remaining arms work – the minimum necessary to maintain a "repository" of nuclear expertise – should be consolidated at Los Alamos as soon as possible.

Second, DOE must redefine its mission in terms of pursuits such as developing safe, renewable sources of energy, and new technologies to clean up the environmental legacy of the Cold War. These programs are urgently needed, and the national laboratories are well equipped to take them on. The labs' unique blend of top scientists, engineers and technicians make them ideal candidates for conversion to "civilian technology centers" or "national institutes for environmental research." But successful conversion will require planning, coordination, and real commitment to the ultimate goal.

DOE's refusal to contemplate reductions in its weapons RD&T budget or changes in its mission, regardless of world events, lacks credibility. It is up to informed citizens, working through their elected representatives, to regain control over this institution and to redirect its activities to the common good. ☢

3

NUCLEAR TESTING AFTER THE COLD WAR: WHAT'S LEFT TO DO?*

by Tom A. Zamora

The failed Soviet coup last August, according to President Bush, provided "an unparalleled opportunity to change the nuclear posture of both the United States and the Soviet Union." Indeed, Bush's recent arms control initiatives could reduce the U.S. nuclear arsenal by 70 percent or more. But while the President called for major weapons cuts, he did not suggest ending nuclear test explosions.

Nuclear testing in the former Soviet Union, however, has halted. Last October, Gorbachev declared a twelve-month unilateral moratorium, and asked the U.S. to join in negotiating the "earliest and complete cessation of all nuclear tests." Russia has not tested since 1990, and the main test site in Semipalatinsk has been permanently closed, largely because of intense opposition from citizens around the site.

*This article adapted from "Put A Safety Cap On Testing," *The Bulletin of the Atomic Scientists*, March 1992, p. 25.

Russian President Boris Yeltsin has renewed the call for a one-year moratorium. However, testing may resume on the arctic island of Novaya Zemlya, unless the U.S. announces its own moratorium by October. In April, France announced a unilateral moratorium for the rest of 1992. A U.S. moratorium this year would help keep Russian testing shut down, and would move the world toward a complete ban.

U.S. movement toward a ban on testing would be especially important now, since it would help secure long-term extension of the Non-Proliferation Treaty (NPT) in 1995. As the threat of nuclear proliferation assumes greater importance at the end of the Cold War, the U.S. has no excuse not to place a higher priority on non-proliferation than on continued testing.

But instead of declaring a Cold War victory and accepting the Gorbachev-Yeltsin challenge, weapon designers are searching for new missions to keep nuclear testing alive. After Bush announced his first arms initiative in September, one weapons laboratory scientist said that lab leaders were "rallying to come up with good reasons as to why weapons work should continue."

But the main purpose of testing – the pursuit of more sophisticated weapons – has collided with tight budgets, nearly unanimous global opposition, and the unraveling of the Cold War. The Strategic Defense Initiative's X-ray laser program, has been cut by 90 percent from its $350 million peak in 1987. And in the past three years six new nuclear weapon systems have been canceled for lack of need, including the SRAM-II missile in September 1991 and the W88 warhead for the Trident submarine in January 1992. For the first time since the Cold War began there are no nuclear weapons planned for production.

Although the weapons laboratories would have it otherwise, there are few compelling reasons to continue nuclear testing. Any remaining goals for the testing program are not urgent. The U.S. should declare a 12-month moratorium, and use that time to hold an open debate to identify the real needs, if any, for more tests.

New rationales for a new world

Finding themselves deprived of an external threat, the weapons laboratories have shifted their emphasis away from Soviet-era military improvements to more "socially responsible" reasons to continue nuclear testing. "Warhead safety" has become a top priority issue. The shutdown of critical facilities in the Complex has led the Energy Department to explore a new means of production that might also require testing: reuse of existing weapon components in new models. And the labs are advocating a host of other reasons to keep the Nevada Test Site running, such as designing new weapons that are less complex, more reliable, and better suited to a smaller arsenal.

If left to themselves the labs would continue nuclear testing indefinitely. This policy should be rejected. No tests should be allowed unless DOE can publicly show that they are necessary and are consistent with the following guidelines:

Replace unsafe weapons with safer ones of existing designs

Shortly after the fall of the Berlin Wall, concerns were widely publicized about the safety of nuclear weapons, in particular artillery shells deployed in Europe and the SRAM-A missile. The findings of a warhead safety panel, appointed by the House Armed Services Committee and chaired by Sidney Drell of Stanford University, led to safety becoming the most often cited reason for more testing.

The possibility that some warheads may scatter deadly plutonium in an accident is a legitimate concern. But the arsenal can be made safer through incremental changes. Because the most risky weapons (those that do not have the most modern safety features) are already scheduled for retirement, only three weapons that are expected to be retained in the arsenal lack insensitive high explosive (IHE). IHE is the most effective safety feature for preventing plutonium dispersal.

The three warheads without IHE are the W76 and W88 for Trident missiles, and the W78 for Minuteman missiles. In a report commissioned by five members of Congress on the implications of warhead safety for nuclear testing, Dr. Ray Kidder of Lawrence Livermore National Laboratory concluded that "...only a modest number (10-20) of nuclear tests would be needed to develop warheads with...IHE to replace existing Minuteman and Trident warheads... should that be deemed necessary."[13]

Because the President canceled the W88 warhead after only 400 copies were produced (compared to more than 3,000 W76's), it should be possible to replace both the W76 and the W88 with the same safer warhead type instead of producing two. The W89 warhead intended

The U.S. should declare a 12-month moratorium, and use that time to hold an open debate to identify the real needs, if any, for more tests.

for the SRAM-II could be modified for this role. Similarly, the President has said that MX missiles would be eliminated if the former Soviet Union scraps its multiple-warhead ICBMs. The 500 W87 warheads now on the MX could replace the less-safe W78's on the Minuteman. Both the W89 and the W87 have IHE, and would not require more than a few tests at most to be modified for these new missions.

New handling and deployment procedures might suffice to improve safety.

New handling and deployment procedures might suffice to improve safety, however. According to Richard Claytor, DOE assistant secretary for defense programs, "...existing mitigating procedures may be effective enough such that incorporation of [IHE] may not significantly reduce the risk."[14] For example, out of concern that a dropped Trident missile might explode, burn its warheads and disperse plutonium, the Navy now loads warheads onto missiles after, rather than before, they are in submarine launch tubes. And President Bush's decisions to place strategic bomber weapons in secure storage and to reduce the number of deployed weapons greatly reduces the risk of an accident.

The U.S. nuclear testing record shows that the arsenal is already reliable.

Reuse plutonium components

The 1989 closure of the Rocky Flats Plant, the only facility capable of mass-producing plutonium cores, or "pits," for nuclear warheads, has generated a new rationale for more tests. DOE is developing a way to bypass Rocky Flats by using pits from old weapons instead of making new ones.

But nuclear testing for pit reuse is necessary only so long as new weapon designs are being built. Stockpiled weapons can be rebuilt using the same pit again, without testing. Livermore Lab has already modified the W89 warhead (intended for the SRAM-II missile) to use existing pits. Although the SRAM-II has been canceled, development of the W89 is continuing. A successful nuclear test of a W89 warhead with a reused pit was conducted last spring, and according to Livermore director Dr. John H. Nuckolls only "a couple of extra tests" would be needed to finish the job.[15]

Standardize existing warheads

Instead of designing new standardized warheads, the same effect – greater production efficiency and less pollution – can be achieved using the present arsenal. Existing warheads are already standardized to some degree. Warheads from the Pershing II and Ground-Launched Cruise missiles eliminated under the INF treaty were not destroyed, and some have been repackaged into B61 bombs. Warheads can also be moved from one system to another without significant modifications, as in the case of the W76 warhead originally deployed on the Trident I missile, that can also be used on the Trident II.

Restructure delivery systems only

As arsenals decline, the national labs have argued that remaining weapons must be more "survivable." But this depends far more on delivery systems than on warheads, since deterrence depends on the ability to retaliate after an attack. If new, more survivable delivery systems are needed, they could be designed to fit existing types of warheads. This does not call for nuclear testing, and in some cases has already been done. For example, the Midgetman, a single-warhead missile canceled by President Bush in January, was designed to use the same warhead type as the MX missile.

Prepare to remanufacture existing warheads

Assuming that the U.S. maintains a nuclear deterrent for the foreseeable future, weapons may eventually wear out and have to be remanufactured. Under a test ban no proof-tests would be allowed, but this does not mean a new class of weapons is needed. The U.S. nuclear testing record shows that the arsenal is already reliable. Only one of the many so-called "stockpile confidence tests" conducted in recent years revealed a possible problem. This indicates that warheads that have been adequately tested during development can be rebuilt without testing if they are rebuilt to their original specifications.[16]

The labs should strive to remove any remaining barriers to remanufacture. Lab officials are quick to point out that due to certain vendors going out of business, and to changing environmental regulations, some warhead materials now in use may not be available when a weapon is remanufactured. Adequate supplies of such materials should be stockpiled, and acceptable backup materials identified. Most important, the labs should develop detailed production specifications for weapons to be retained in the future stockpile.

These issues may already be resolved. A 1990 DOE remanufacturing study concluded that for three recently developed warheads, "no issues were found that would preclude replication. But it adds that "certification of weapon performance by underground nuclear test would still be required."[17] According to a Government source, the classified section of

this report gives no justification for the certification test; it is apparently a "pro-forma" requirement.

The end of the Cold War has pulled the logical rug from under the nuclear testing program. But the U.S. nuclear weapons bureaucracy refuses to see the writing on the wall, and the weapons laboratories continue to search for new reasons to keep on testing. Meanwhile, the costs of continued testing, in terms of the hazards of nuclear proliferation, are growing. Instead of a vague, open-ended program, the nation needs a rational policy aimed at a comprehensive test ban as soon as possible. ☢

4

ENVIRONMENTAL, SAFETY, AND HEALTH EFFECTS OF NUCLEAR TESTING

by Arjun Makhijani, PhD

Since 1945, the five acknowledged nuclear powers have conducted some 1,900 nuclear test explosions. About half the total have been U.S. tests, including 20 joint U.S./British underground explosions in Nevada. Soviet testing came to a virtual standstill in 1989, and the two republics where testing had been performed, Russia and Kazakhstan, announced a one-year moratorium in late 1991.

The 518 known above-ground weapons tests, the great majority of them within the atmosphere, have caused the most widespread environmental and human health damage of any nuclear weapons related activity (assuming nuclear war is avoided). Many tens of thousands of military people were exposed – many heavily – to radiation during war games or other activities at or near the test sites. Similar numbers of civilians, living in areas downwind from nuclear tests, were exposed to fallout without their knowledge or consent.

Fallout distributed around the world will increase cancer incidence for thousands of years. Other ill effects, such as genetic disorders, will occur in addition to these cancer fatalities. Based on the most recent analysis of radiation health effects, using cancer coefficients from the U.S. National Academy of Sciences, combined with United Nations data on fallout distribution, our best estimate of additional deaths from cancer alone is 430,000 caused by doses received through the year 2000.[18] Assuming a constant future world population of 10 billion, our estimate of the fatal cancers over all time from atmospheric tests is 2.4 million. Because doses and population densities are highest in the mid Northern latitudes, the effects will be greatest there, both in terms of risk to individuals and number of cases.

During and after the 18-year period of U.S. atmospheric testing, the Atomic Energy Commission deliberately misled exposed populations as to the risk they faced. Guarding the program from criticism was ranked consistently higher than protecting human health. In many cases, keeping information from citizens prevented them from taking simple steps to reduce their exposure by factors of ten or more. One government document even spoke of using atmospheric testing for a "re-education" of the public, so as to calm their "hysterical" fears about radiation.

During the atmospheric testing program, the government denied causing any damage, injury, or death. Instead, AEC, and later DOE, officials lied and covered up information on the atmospheric tests of the 1950s, well into the 1980s. This deception was practiced not only in official reassurances, but in sworn court testimony as well. One of the most egregious aspects of the tradition of secrecy combined with public relations campaigns to calm the public has been that no government has yet begun a serious effort to estimate the long-term consequences of underground testing.

Health consequences of testing throughout the world have fallen most heavily on minority, rural, or disenfranchised populations because governments have placed their test sites in re-

Based on the most recent analysis of radiation health effects, we estimate that additional deaths from cancer alone will total 430,000 from doses received through the year 2000.

Each test creates the equivalent of an unlicensed underground nuclear waste dump.

U.S. Department of Energy

Some of the subsidence craters from underground nuclear tests, at Yucca Flat, Nevada.

mote areas inhabited by such groups. The U.S., France, and Britain have tested in parts of the South Pacific that they had colonized or that were entrusted to their care by the United Nations. The U.S. continues to test on land that, by treaty, belongs to the Shoshone Indians. Both primary Soviet test sites, and the Chinese one, are in areas occupied by minorities with little political influence. The worst health and environmental ravages have usually been imposed on these rural, minority, or colonized populations.

The U.S., the U.K., and USSR ended atmospheric testing in 1963, in part as a result of protests by a large number of people in the U.S. who were concerned about fallout constituents particularly hazardous to children: Cesium-137, Strontium-90, and Iodine-131. But driving tests underground did not eliminate their hazard. Through 1970, underground tests in the U.S. "vented" some 25 million curies of radioactive fission products to the atmosphere. After 1970, test containment was improved, and fallout emissions have been reduced to low levels. Venting has reportedly been more common and more serious in the former Soviet Union.

Underground testing is not harmless. It injects large quantities of plutonium and various long-lived fission products into fractured rock cavities, without serious concern for future containment.[19] Each test creates the equivalent of an unlicensed underground nuclear waste dump. Nuclear wastes continue to accumulate underground in Nevada, at a site with unproven ability to contain these materials for thousands of years.

All nuclear weapons testing comes at a real cost to human health and the environment. The world should take the following steps to bring this desecration to an end:

- All countries that have tested nuclear weapons must reveal all information pertaining to the health and environmental effects of their testing programs. This applies particularly to France and China, because they remain the most secretive.
- While billions of dollars are being committed throughout the world to study and realize the disposal of highly radioactive wastes, virtually no attention has been paid to the dispersal of long-lasting radionuclides from underground nuclear weapons tests. Until a comprehensive test ban is achieved, there should be a moratorium on underground testing so that its environmental effects can be studied, understood, and openly debated.
- Epidemiological studies are needed to identify high-risk populations and assess their exposure and cancer risk – separating them from larger groups for whom exposures were lower. This will give a better understanding of the health costs of testing.
- To recognize and repair the harm from nuclear weapons testing, special attention, including injury compensation, should be given to downwind communities, including the colonized, tribal, and national minorities who have so frequently been in harm's way. ☢

5

TRITIUM OPERATIONS

by Brian Costner

The United States has come to rely on a radioactive gas – tritium – to boost the explosive power of fission weapons and to initiate fusion in thermonuclear weapons. Tritium permits the design of smaller, lighter, more destructive weapons than would be possible using only plutonium and/or uranium.

In 1950, the Atomic Energy Commission (AEC) selected a 300-square-mile site in South Carolina, along the Savannah River, for facilities to produce tritium and add to the United States' plutonium production capacity. Fuel and target fabrication facilities, five nuclear reactors (called C, K, L, P, and R), two chemical separation plants, and various support facilities were constructed at the Savannah River Site (SRS) between 1951 and 1956.

The SRS reactors work much as commercial power reactors do, but at lower temperatures and pressures. Instead of generating electricity, "targets" inside the reactor core are irradiated to produce radioactive materials. Lithium targets are used for tritium production.

Unlike commercial reactors, military reactors operated for decades without independent oversight. Maintenance, safety systems, operator training, and quality assurance programs were often neglected in order to cut the costs of nuclear weapons production.

By 1986, two SRS reactors had been shut down. When the National Academy of Sciences assessed the remaining DOE reactors, it concluded in October 1987 that:[20]

- DOE did not know how its reactors would behave during an accident;
- filter and confinement systems might not prevent radioactive releases during an accident;
- reactors showed signs of "acute aging that could affect safety;"
- confusion about safety objectives was prevalent within DOE.

Despite these criticisms, the K, L, and P Reactors ran until mid-1988 when they were shut down for minor maintenance and upgrades. However, a failed attempt to restart the P Reactor in August 1988 focused national attention on reactor operations.

DOE responded by asking Congress for $250 million to repair and restart the three tritium reactors. Failure to do so, officials said, would lead to "unilateral nuclear disarmament." They also warned that unless tritium production resumed by the end of 1988, the United States would face a national security emergency.

The restart effort proved much more difficult than DOE had projected. By the end of FY92, the restart program will have cost nearly $3 billion, and DOE has requested an additional $400 million for restart activities in FY93. Meanwhile, tritium recycled from retired weapons has greatly reduced the need for future production.

When a warhead is disassembled at the Pantex Plant in Texas, its tritium reservoir is removed and sent either to the Mound Plant in Ohio or to SRS. Tritium reservoirs are also returned to Mound and SRS directly from Defense Department sites where nuclear weapons are deployed. Mound and SRS have facilities to remove tritium from its reservoir, purify the gas (primarily by removing helium left after tritium decay), and re-load the reservoir. The reservoir is then sent back to Pantex for use in a new warhead, shipped to a Defense Department site to be loaded into a deployed weapon, or stored for later use.

Recycling is far cheaper, safer, and cleaner than producing new tritium. However, even tritium recycling – particularly in the 1950's-era facilities at SRS – can be risky for workers, and has released thousands of curies of tritium to the environment. DOE hopes to operate a new tritium loading facility at SRS in the near future and ultimately to consolidate all tritium operations at SRS.

In early 1991, DOE scaled back the reactor restart program – canceling restart of the P Reactor, delaying L, and focusing only on K Reactor. A year later, Energy Secretary Watkins concluded that, "we now need no actual tritium production until about the year 2005-2010." DOE again changed its plans and now intends

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to restart the K-Reactor just to test its ability to produce tritium – then shut it down within about a year.

This history suggests that the entire restart effort has been misguided. The program was driven by a hurried effort to restart three old reactors before thoroughly analyzing their safety or developing a proper plan to guide improvements. Restart was rationalized on the basis of national security "requirements" that, when subjected to scrutiny, proved exaggerated. Today restart appears driven more by DOE's desire to restore political credibility in its operations than by national security.

U.S. Department of Energy

This production reactor at Savannah River first operated in 1954.

New Production Reactor

In addition to the restart program, DOE is pursuing construction of a new reactor to replace the SRS units sometime after the turn of the century. The new production reactor (NPR) program began during the early 1980s drive to modernize the nuclear arsenal, and by the end of the decade, DOE was proposing to build two NPR's – using different technologies and located at different sites.

In early 1991, the program was cut back to a single NPR, with final siting and technology decisions to be made before year's end. But in November 1991, after completion of the START agreement and the announcement of unilateral arms reductions, the final decision on the NPR was delayed until 1993. Tritium production requirements for the NPR have now been reduced to about 25 percent of 1990 levels.

Through FY92, the NPR program will have cost about $1.1 billion, with an additional $278 million requested for FY93. The most recent estimated total cost for the project is $5.6 billion, although history suggests that real costs are likely to be several times higher. Three technologies are being considered: a heavy water reactor (HWR), a modular high-temperature, gas-cooled reactor (MHTGR), and a non-reactor device called a linear accelerator. Potential sites for tritium production are Hanford, SRS, and Idaho National Engineering Laboratory.

The HWR would be a modern version of the SRS reactors. The design entails certain inherent safety risks – including violent explosions in some accident conditions – associated with the use of metallic fuel in a water-cooled reactor. Because a HWR is not cost-effective on a small scale, it requires a large capital investment for unused capacity if tritium requirements are low.

The MHTGR is a new technology that is modular in design, allowing a plant to be better matched to tritium needs. It would operate at high enough temperatures to generate electricity and recover some costs. In fact, the MHTGR is being promoted as a new taxpayer-subsidized generation of commercial power reactors that also happen to be able to make tritium.

The MHTGR has many sophisticated safety features – although some of these may be weakened by the requirements of tritium production. With any new technology come many uncertainties, including: the difficulty of fabricating the reactor's fuel and targets on a production scale (both are vastly different from those used in HWR's), the need to demonstrate new tritium recovery techniques, and incomplete design, qualification, and testing of several important systems.

In a linear accelerator, subatomic particles would be fired into a lithium target to produce tritium. Numerous reports have concluded that an accelerator would provide substantial cost savings, be far safer, and generate very little radioactive waste compared to any nuclear reactor. However, development of tritium-producing targets is incomplete, and an accelerator consumes electricity – with the attendant environmental impacts.

In the past few years, DOE has spent near-

ly four billion dollars on projects related to tritium production. If present plans continue, DOE could spend an additional six to seven billion during the next ten years to maintain and rebuild its tritium production capacity. Meanwhile, arms reductions are providing a tritium surplus at very little cost.

Recommendations:

- Plans to restart any reactor at Savannah River should be abandoned, and DOE should safely maintain the plants until they can be decontaminated and decommissioned.
- The NPR should be reconsidered in light of dramatic reductions in the U.S. nuclear arsenal.
- DOE should stop the construction-driven NPR schedule and begin a research program that investigates a wide range of options for long term tritium supply. A FY93 budget of $25 million would be adequate. ☢

6

FISSILE MATERIAL PRODUCTION

by David Albright and Peter Gray

On a human timescale, the essential "fissile materials" for nuclear weapons – plutonium and highly-enriched uranium (HEU) - last forever.[21] They are fully recyclable, and the United States has a huge excess of both – a glut that will only grow as arms agreements and initiatives take effect. Arsenal reductions to 5,000 weapons will leave the United States with about 50,000 surplus kilograms of plutonium and 250,000 kilograms of HEU.[22] Since plutonium is one of the most dangerous materials ever discovered, and both isotopes pose the risk of diversion to clandestine weapons use, fissile materials have become liabilities rather than assets.

DOE announced in early 1991 that it does not plan to produce more fissile materials for weapons in the foreseeable future. Existing reactors and fuel fabrication and reprocessing plants for plutonium production can be decommissioned, and new ones need not be built.

The former Soviet Union, while still making plutonium (it stopped making HEU for weapons in 1989), has repeatedly promised to halt if the United States would agree to a formal cutoff. Russian president Yeltsin reiterated this vow in a January 29, 1992 decree. However, the U.S. Administration has adamantly rejected a negotiated ban on production, and until recently has pushed to build and maintain fissile material production capacity.

Although the arms race appears to be ending anyway, a fissile materials cutoff would build confidence in the disarmament process by ending Russian plutonium production and easing fears that Russia might create a secret stockpile and use it to "break out" of a treaty. And by formally agreeing to end their own production of fissile materials for weapons, the two largest nuclear-armed states would be far more credible when they call on other countries to do the same, as President Bush did in his recent Middle East nonproliferation initiative.

The Administration has remained opposed to extending such a ban to itself and Russia, supposedly to avoid limiting future options. But since the United States has no conceivable need to resume production, it has nothing to lose from a formal cutoff – and important security benefits to gain. ☢

By formally agreeing to end their own production of fissile materials for weapons, the two largest nuclear-armed states would be far more credible when they call on other countries to do the same.

7

PLUTONIUM RECOVERY OPERATIONS

by Brian Costner

All recovery operations generate toxic and radioactive waste, potentially expose workers to these dangerous substances, and produce environmental and safety hazards that could harm local populations.

All plutonium operations – production, separation, fabrication, and recovery – generate plutonium-contaminated waste. This waste can take a wide variety of forms, from gloves and laboratory equipment tainted by small quantities of plutonium to pieces of plutonium metal with impurity levels too high for nuclear weapons use. For more than 40 years, DOE has sought to recover and purify the plutonium from these materials for recycling into the weapons stockpile.

There are two broad categories of plutonium processing technology. Aqueous processes employ acids, usually nitric acid, for chemical separation of the plutonium from other constituents. Aqueous processes are central to operations at the Hanford Reservation's PUREX Plant and the F and H Canyons at the Savannah River Site. These huge buildings contain such intense radioactivity that their industrial operations are done by remote control.

Pyrochemical operations involve reactions in a dry environment, usually in a molten salt medium. The three primary types of pyrochemistry – molten salt extraction, direct oxide reduction, and electrorefining – were developed at Los Alamos National Laboratory and have been used for recovery at the Lab and at the Rocky Flats Plant. Los Alamos and Rocky Flats also have aqueous processing capabilities.

All recovery operations generate toxic and radioactive waste, potentially expose workers to these dangerous substances, and produce environmental and safety hazards that could harm local populations.

Recovery operations in the past were driven by military demands and were highly secretive. But as the nuclear arsenal has shrunk, a surplus of weapon-grade plutonium has become clear. According to DOE, continued recovery of plutonium – except from some of the components retired from nuclear warheads – is no longer necessary for defense requirements.[23]

Instead, DOE has proposed to continue some recovery operations in order to clean up contaminated facilities and process its existing volume of plutonium-bearing materials. The Department has also proposed using recovery operations to prepare plutonium for storage should it be deemed necessary to resume nuclear weapons production or if military plutonium is ever used in commercial reactor fuel.

Existing plutonium processing facilities need substantial upgrades and repair. Most are about 40 years old and do not meet modern safety and environmental standards. Operating these facilities through the rest of the decade would cost hundreds of millions of dollars, at least.

DOE is pursuing the construction of new plutonium processing facilities, primarily to replace Rocky Flats' capacity to mass produce plutonium components for nuclear weapons. Constructing new facilities for plutonium recovery would take several years and cost billions of dollars.

Before continuing recovery operations, DOE should compile and release an inventory of the plutonium scrap and contaminated materials awaiting processing. An advisory committee should then write recommendations for managing these materials. Management options should cover the full spectrum of materials, and should each account for lifecycle costs. Particular attention should focus on the handling of wastes that would be generated as by-products of the various alternatives. A national discussion, followed by preparation of an Environmental Impact Statement, should precede any decision on the use of plutonium in commercial reactor fuel. ☢

8

HEALTH EFFECTS OF NUCLEAR WEAPONS PRODUCTION: DOE RESEARCH*

by H. Jack Geiger, M.D. and Daryl G. Kimball

A basic function of government is to protect the health and safety of its citizens. But when a single government agency creates threats to health and safety – and is charged with giving protection from those hazards, the production activity will clash with safety.

Nowhere is this conflict of interest more conspicuous than in the Nuclear Weapons Complex. The Complex produces and handles extremely toxic and radioactive materials, and it has used its immunity from checks and balances to distort and conceal scientific research aimed at understanding the risks it imposes on workers and nearby populations.

Secrecy shields not only the design, manufacture and testing of nuclear weapons – with their clear national security implications – but also basic data on radiation and toxic releases, and on workers' exposures and health. Independent scientific studies of illness and death in potentially affected workers and nearby communities have often been impossible.

For more than 40 years, occupational and public health monitoring at the weapons plants was the duty of DOE and its predecessors, primarily the Atomic Energy Commission (AEC). Much of this responsibility was passed on to the agencies' contractors. An essential component of such an effort is epidemiologic study, which should entail:

- precise, continuous definition and measurement of radiation and other toxic exposures;
- careful long-term tracking of the distribution of illness and death among workers and surrounding communities;
- meticulous comparison with the health outcomes of less-exposed or unexposed individuals.

How well has the government dealt with its responsibility to investigate the health impact of its nuclear weapons activities? Both during and after its worst abuses, the Complex has violated the principles of unfettered scientific investigation as consistently as it has violated environmental and safety concerns.

In official publications, Congressional testimony, and press releases, government assurances about the health impact of the Complex were unvarying. While often lacking data to support their claims, officials of the Complex asserted that all necessary occupational health and safety precautions were in force, that rarely, if ever, had there been serious accidents or hazardous releases to the environment, and that there was no immediate threat to public health.

For example, in the 1950s at the Nevada Test Site, the AEC radiation safety committee's internal guidelines stated that "we have tried to keep in mind the somewhat delicate public-relations aspect of the affair.... It is felt that figures [on fallout levels] must be used as general guides but that no drastic action which might disturb the public should be taken unless it is clearly felt that such action is essential to protect local residents from almost certain damage. It is assumed that any member of the general public may receive external exposure up to 25 rem without danger."[24] This assumption contrasts sharply with U.S. standards at the time for maximum annual radiation exposure. For the general public, 0.5 rem were allowed in 1956, 0.17 rem by 1960. For nuclear workers the standard was 5 rem beginning in 1957.

For the first two decades of nuclear weapons production, although measurements of radiation exposure (for some, not all) nuclear weapons workers were taken, the government failed to do thorough health effects research. The only tacit acknowledgement of risk came in 1963, when atmospheric weapons tests were banned. But this change was opposed, not initiated, by the AEC. Vehement protest over radioactive fallout was the stimulus, and the public was informed by independent scientists who collected their own data on radioactive contamination.

Both during and after its worst abuses, the Complex has violated the principles of unfettered scientific investigation as consistently as it has violated environmental and safety concerns.

*Adapted from *Dead Reckoning: A Critical Review of the Department of Energy's Epidemiologic Studies*, a report to be released by Physicians for Social Responsibility in May 1992.

U.S. Department of Energy

High-level waste storage tanks being built at Savannah River in the early 1980's.

When researchers published evidence of excess cancer risk at Hanford, in a peer-reviewed journal, their AEC contract was canceled and they were denied further access to the health data they had collected.

The first comprehensive epidemiologic study of the workforce was initiated in the mid-1960s by researchers from the University of Pittsburgh, led by Dr. Thomas Mancuso. His group published evidence of excess cancer risk at Hanford, in a peer-reviewed journal. Their AEC contract was then canceled and they were denied further access to the health data they had collected.

There have been other incidents of intimidation, censure and dismissal of scientists whose results were seen as harmful to the interests of the Complex. In 1986, Dr. Gregg Wilkinson, an epidemiologist working for the DOE's Los Alamos National Laboratory, circulated the draft of a paper to be submitted to a respected peer-reviewed publication, the *American Journal of Epidemiology*, showing an excess of brain cancer among Rocky Flats workers.

According to sworn testimony, one supervisor at Los Alamos told Dr. Wilkinson that he should do research "to please the DOE, your sponsors, not satisfy peer reviewers."[25] Wilkinson was pressured to withdraw the paper, a request that was canceled only when he threatened to resign. The DOE made no effort to publicize the findings – in contrast to a major public relations effort that had followed publication of a very preliminary Wilkinson paper on Rocky Flats that contained no positive findings.

The past several years have seen a steady stream of reports from DOE and contractor scientists who were treated as hostile "whistleblowers" for reporting findings of unusual health risk, or for questioning DOE methods and assurances. Such treatment can damage scientific inquiry and increase public skepticism about reassurances contained in DOE-sponsored scientific studies.

The credibility of DOE-supervised health research was eroded further in 1986 – again with an outside impetus. Public concern following the Chernobyl accident led Secretary of Energy John Herrington to ask the National Academy of Sciences to assess the safety of DOE reactors (some of them similar in design to Chernobyl) that produced nuclear weapons materials. The resulting report described major accidents, melted fuel, radioactive contamination, serious structural defects, gross violations of safe operating procedures, and inadequate DOE oversight of contractors.[26] Major environmental and safety violations, and evidence of contamination, were found at almost every major DOE facility.

Trust in the government's 40-year record of assurances that no threats to human health had ever occurred was severely damaged by this series of revelations. Current Energy Secretary James D. Watkins admitted that the Complex had been "cloaked in secrecy and imbued with a dedication to the production of nuclear weapons without a real sensitivity for protecting the environment".

Watkins, facing a lawsuit against DOE calling for release of the Mancuso health data, and with pending Congressional legislation that would transfer health research from DOE to the Department of Health and Human Services (HHS), appointed a panel to investigate the DOE epidemiology program. The Secretarial Panel for the Evaluation of Epidemiologic Research Activities (SPEERA) held public hearings from September 1989 to March 1990.

SPEERA strongly backed full public participation in epidemiologic research on the Complex. In its final report, SPEERA advocated removing some epidemiologic functions from DOE control through a Memorandum of Understanding (MoU) between the Secretary of Energy and the Secretary of HHS.[27]

However, this is a flawed and incomplete solution, and its implementation to date suggests that there is much less change than meets the eye. The MoU gives responsibility to HHS for long-range, analytic studies, but leaves DOE responsible for data collection, quality control, descriptive epidemiology and occupational health surveillance and safety programs. Through the MoU, funding for these epidemiologic research activities, even for HHS work, still comes from DOE. Budgetary discretion permits control over the scope and direction of research, and in this case, the HHS research effort will be limited by DOE's budget. In Fiscal Year 1992, for example, DOE allocated only 15.9 million dollars for the research activities that will be transferred to HHS.

The MoU also fails to determine which agency ultimately directs health research activities related to the Complex. An uncoordinated array of eight federal sub-departments,[28] plus more than 12 state health departments, are involved in the epidemiology, but DOE maintains control over dollars and data.

DOE recently interpreted the MoU to mean that it need not collect any new radiation and worker health data for the HHS analyses. The DOE plans to put only existing data into the Comprehensive Epidemiologic Data Resource (CEDR), and has indicated that it will not survey its own facilities to prepare an accurate inventory of the data it has, to determine what might be useful for research.[29]

Finally, the MoU does not have the force of law. It can be altered or canceled by private agreement between the two current Secretaries – or future Secretaries – and it fails to decisively remove DOE involvement in monitoring, analyzing and reporting on the human health consequences of its own activities. There has been some change – but much more remains the same. The situation is not irremediable, and the following steps are within short-term reach:

1. Establish a new Office of Radiation and Toxins Health Assessments. DOE supervision of epidemiologic research should be ended entirely and replaced by an aggressive and coordinated investigatory process. This should be mandated by Congress, within HHS or EPA, superseding the present DOE-HHS MoU. Additional money from DOE's "050" defense production accounts should be used to support the office, which would coordinate research with DOE, other HHS offices and institutes, EPA, and state health departments.

2. Ensure worker and public participation. Health research should involve oversight by non-governmental panels of qualified independent scientists and representatives of DOE workers and surrounding communities.

3. Unrestricted access to data. Access to DOE and contractor records, and to all other relevant epidemiologic data, must be guaranteed to HHS and to non-governmental scientific researchers, with no restraint on publication or presentation of findings other than the normal processes of peer review.

4. Fully fund an improved CEDR program. Adequate funding should be provided for a Comprehensive Epidemiologic Data Resource available to scientists, with the assurance that all relevant data from the Complex and its planned health surveillance system will be entered.

5. Enhance regulatory power of OSHA and EPA. The Occupational Safety and Health Administration and EPA should have the authority to impose fines or shut down operations at DOE facilities that violate safety and environmental standards or otherwise pose an unacceptable public health threat.

6. Consider negative impacts of nuclear weapons activities. The putative benefits of nuclear weapons should be weighed against the health and safety risks before any production is resumed.

DOE supervision of epidemiologic research should be ended entirely and replaced by an aggressive and coordinated investigatory process.

9

NUCLEAR WARHEAD DISMANTLEMENT: FASTER, MORE OPEN

by Tom A. Zamora

There are several steps the United States can take to ensure that the disarmament rate is not limited by the capacity of one plant, and that the former Soviet republics also rapidly disarm.

With the end of the Cold War, the arms race has shifted into reverse. Recent U.S. initiatives would reduce the nuclear arsenal by at least 70 percent, from 21,000 weapons in 1990 to 6,300 weapons or fewer[30] According to DOE, dismantling the withdrawn weapons will take through the year 2000. Warhead dismantlement is thus setting the pace for disarmament in the United States – and the Commonwealth of Independent States (C.I.S.). But it would be better to disable these weapons more rapidly while the political motivation is strong.

Verification is the key to giving all parties confidence in arms agreements, and to avoiding ambiguities later, when supposedly taken apart weapons will outnumber those left deployed.

Dismantling nuclear weapons is nothing new for DOE. Weapons are routinely taken apart after retirement to salvage their nuclear materials for reuse in new weapons. The Complex has produced more than 60,000 weapons, of which about 40,000 have been retired, dismantled, and recycled.

The weapons complex, however, has never faced the formidable task of dismantling so many weapons so quickly. During fiscal year 1987, for example, the complex dismantled 280 weapons at its Pantex plant near Amarillo, Texas. To meet the post-Cold War demand, by 1993 DOE plans to increase capacity at Pantex to 2,000 warheads per year.[31] At that rate DOE could get down to a 6,000-weapon arsenal by 1999. Meanwhile, there are several steps the United States can take to ensure that the disarmament rate is not limited by the capacity of one plant, and that the former Soviet republics also rapidly disarm.

A new dismantlement policy

The first step in this direction would be for the Administration to announce that all withdrawn warheads will be dismantled. There is now no such assurance, although certain tactical weapons have been slated for destruction.

Secondly, the process could be sped up by retiring and disarming weapons in larger numbers than can be dismantled each year at Pantex. Such weapons could be separated from their delivery vehicles (missiles, aircraft, etc.) and otherwise rendered inoperable. Disabled warheads and bombs could then be sealed with tamper-proof tags in special containers and kept in storage facilities open to bilateral or international inspection. In this way the C.I.S. would have confidence that the weapons were not redeployed. U.S. inspectors could conduct similar verification activities in Russia.

The U.S., however, has no plans to conduct its dismantlement operations verifiably. Under the INF and START treaties, neither the U.S. nor the former USSR is required to dismantle its warheads. In his September 1991 arms initiative President Bush proposed "joint technical cooperation on the safe and environmentally responsible storage, transport, dismantling, and destruction of nuclear warheads," but he did not explain how this destruction would be verified.

In addition to ensuring that weapons have been adequately stored and disabled, the dismantlement process itself could be subject to inspection. In the U.S., however, this would require either the modification of existing facilities or the construction of a new facility designed to be open to inspection without revealing sensitive warhead information. Decisions about those matters should result from a broad-based public debate of the alternatives.

The problem with pits

U.S. warheads are considered dismantled once they have been broken down to their individual parts. This dangerous process must be done carefully to limit exposures to workers. All non-nuclear components (such as electronics and conventional explosives) are destroyed or reused. Tritium is sent to the Savannah River Site or the Mound Plant for reuse in weapons. Highly-enriched uranium (HEU) is sent to the Y-12 Plant in Oak Ridge, Tennessee, for processing and storage. And the plutonium components, or "pits," are now stored at

Pantex because of problems at the Rocky Flats Plant, where pits were processed.

What to do with the plutonium pits has not been resolved. DOE plans to continue storing pits at Pantex until it decides the final fate of the roughly 50 metric tons of plutonium that will be removed from warheads during the next several years.

Since pits can be reused directly in weapons, either by the host government or a terrorist (or other unauthorized) group, they must be stored in a safe and strategically stabilizing manner. One option is to alter the pits enough (either by slight deformation or contamination with an epoxy) so that they would have to be chemically processed to be reused. Even so, pits have traditionally been processed by the U.S. for use in new weapons. As the need for this activity is greatly reduced, the U.S. should declare that the nuclear material from surplus weapons will not be reused in weapons. Russia has reportedly agreed not to reuse its nuclear material from retired weapons in new ones, but to store it at sites subject to international monitoring, if the U.S. agrees to similar constraints.

More openness needed

Continued unverified dismantlement could have a negative effect on future arms reductions. The further dismantlement goes, the greater the unknowns will become – how many weapons have been destroyed? How many weapons were there to begin with? How many weapons are left? How much nuclear material is there and how much has been removed from weapons? What will become of it? These uncertainties are likely to grow as arsenals decline.

Adequate verification can give both sides better assurances about how many weapons are destroyed. This would establish a baseline of confidence from which the U.S. and the C.I.S. could pursue even deeper cuts in their nuclear arsenals. Moreover, an early emphasis on verification could prevent misunderstandings of weapons capability and intent in the event of a political reversal in the former Soviet republics. ☢

The U.S. should declare that the nuclear material from surplus weapons will not be reused in weapons.

10

RADIOACTIVE WASTE STORAGE AND DISPOSAL

by Don Hancock and Arjun Makhijani, PhD

Since the Manhattan Project of World War II, the Nuclear Weapons Complex has produced millions of cubic feet of radioactive wastes – and well over a billion curies of radioactivity.[32] Each step of the process – uranium mining and milling, enrichment, fabrication, production, and assembly – produces hazardous and radioactive waste. Waste storage and disposal have received insufficient attention for many reasons: the danger was not widely acknowledged; the Complex focused on weapons production rather than waste management; and the public was excluded from decision-making. The early decades of weapons production were notable for a cavalier attitude about the ease with which the nuclear industry could dispose of its wastes.

Consequently, waste management was at best haphazard. For many years the types and amounts of waste were not recorded properly, and the locations of many dumps were poorly mapped. "Disposal" was often by dumping wastes into rivers and shallow trenches or pumping them down injection wells. Other materials were "disposed of" by releases (intentional and accidental) into the air. Wastes were stored in plywood boxes, 55-gallon steel drums or steel tanks. High-level wastes are still stored in huge million-gallon tanks.

Dozens of Manhattan Project-contaminated sites were abandoned. Forty years later, the Formerly Utilized Sites Remedial Actions Program in 12 states continues, and many uranium mines remain unreclaimed.

The early decades of weapons production were notable for a cavalier attitude about the ease with which the nuclear industry could dispose of its wastes.

The present system sometimes puts a "low-level" designation on wastes that are several times more hazardous than other waste streams labeled "high-level."

Radioactive wastes are inappropriately categorized

Rational handling of radioactive waste would begin with classifying it based on the four primary qualities that determine its hazard to human health: raw radioactivity; longevity, or half-life; dispersibility; and biological pathway. Instead, they are defined solely by the processes that generated them. "High-level waste" is defined as spent reactor fuel or wastes from the reprocessing of spent reactor fuel. "Uranium mill tailings" is a self-explanatory category. "Transuranic waste" (TRU) includes synthetic radioisotopes generated in reactors, as well as materials contaminated with those elements. "Low-level waste" is a catch-all category for anything that doesn't fit the other three definitions.[33]

The present system sometimes puts a "low-level" designation on wastes that are several times more hazardous than other waste streams labeled "high-level." For example, the average radioactivity (300 curies per cubic foot) in the most radioactive portion of commercial low-level waste is three times higher than the average in high-level wastes from nuclear weapons production. Even a typical stream of low-level commercial reactor waste, which is routinely buried in shallow land trenches, is significantly more radioactive than some military high-level and transuranic wastes that are designated for disposal in a deep geologic repository.

A related problem in the definitions of radioactive waste is that they don't account for longevity. Both "high-level" and "low-level" wastes can contain significant quantities of both long- and short-lived radionuclides. Since the disposal problem is largely defined by the length of time a waste will remain hazardous, this makes little sense. For example, long-lived and extremely hazardous plutonium-239 has leaked from the now-closed commercial low-level waste disposal facility at Maxey Flats, Kentucky.

Waste disposal practices have improved greatly since Maxey Flats was in operation, but they are still based on distinctions that are often self-contradictory. For example, Nuclear Regulatory Commission (NRC) rules require monitoring at low-level waste disposal facilities for only 100 years on the assumption that they will pose an "acceptable hazard" to any intruder 100 years later. However, some of this waste, if retrieved from the disposal site after a century, and then re-buried as if for the first time, would, according to the same NRC regulations, require another 100-year control period. Indeed, by the NRC's own definitions, wastes can be buried that will be "unacceptably hazardous" for thousands of years beyond the time when the regulations say they should pose an "acceptable hazard."

The EPA has legal authority to promulgate low-level waste (LLW) standards and has drafted them. However, disagreements with NRC and DOE arising from the fact that EPA's draft standards are more comprehensive and stringent than those agencies support, have prevented their official publication. EPA's draft LLW standards are intended to provide comprehensive and consistent coverage of commercial and military facilities, and to protect ground

U.S. Department of Energy

Radioactive waste was buried in shallow trenches at Hanford through the mid 1980's.

water. The failure to allow EPA to publish draft standards for public comment is a serious flaw in the U.S. LLW program.

EPA issued standards for high-level and transuranic waste disposal in 1985. Environmental groups and state governments successfully challenged the standards in court because they were not sufficiently stringent. Since 1987, EPA has been considering revised standards, but DOE and the nuclear industry are advocating even weaker controls because it appears that neither of the two repository sites now under consideration will meet the 1985 regulations.

While radioactive waste management is a difficult issue, it does not have to be irrational. For instance, management in Sweden is based on the principle that disposal methods should be determined by the longevity of the waste. Thus, long-lived wastes (whether they would be considered "low-level" or "high-level" in the U.S.) are slated for disposal in a deep geological repository. Forty percent of the expected volume in Sweden's projected repository consists of material that would be considered "low-level" in the U.S.

Despite existing at-reactor and onsite storage options for nuclear wastes, and repeated failures of its repository program, the nuclear industry is anxious for the government to take long-lived waste off its hands. As one nuclear utility executive recently put it, the government should take charge of spent fuel waste by 1998 (a target date in the 1982 Nuclear Waste Policy Act), and, he said, "I don't care where you put it."

Economics

On the high-level waste side (including DOE wastes), where $3 billion has already been spent on a program for geologic disposal, expected real disposal costs have increased by more than 80 percent since 1983, to about $325,000 per metric ton.

The Waste Isolation Pilot Plant (WIPP) repository program is doing even worse. In two years, DOE's cost estimates for the five-year period, including the first years of WIPP operation, have more than doubled, from $531 million in 1989, to about $1.1 billion in 1991.

Additional billions are being spent to fix the problems from past shallow burial of low-level wastes at commercial and military sites. Disposal costs at some LLW sites in the 1990's are projected to be 600-700 times those of 1975. A large proportion of the 100-plus billion dollar estimated cost of cleaning up Complex sites is due to environmental threats created by dumping radioactive and mixed wastes into the soil (more than two million cubic feet of TRU wastes at the Idaho National Engineering Laboratory – INEL), and the high-level wastes in 228 large tanks at Hanford and Savannah River. Wastes with the highest concentrations of Radium-226 and Thorium-230 are stored in two deteriorating silos at the Fernald, Ohio site. DOE has no plans for disposing of these isotopes, which will last for thousands of years.

Billions of dollars have been or are slated to be spent stabilizing uranium mill tailings and preventing Radium-226 and Thorium-230 from getting into groundwater. Yet such programs are limited to 1,000 years of environmental protection, while the thorium will persist several hundred times longer.

Environmental Protection

DOE's high-level waste (HLW) program has become unnecessarily risky because repository study has been restricted to just one site, at Yucca Mountain, Nevada. Emissions from vitrified military HLW alone, a small fraction of the total radioactivity proposed for disposal, could expose people to far higher doses than present standards allow from nuclear fuel cycles.

The huge inventories of transuranic wastes in the form of contaminated soil that will be left unaddressed by WIPP mean that this program will not succeed in preventing human exposure to TRU. And the small proportion that may be disposed of in WIPP is by no means assured of staying out of the human environment for even a few millennia, much less the thousands of centuries it will remain hazardous.

DOE's present disposal program

In the late 1950s, a National Academy of Sciences report advocated burying high-level nuclear wastes more than 1,000 feet underground, preferably in salt formations. Geologic repositories, it was thought, would contain the wastes for thousands of years and would not require monitoring. Despite that recommendation, DOE continued to dump TRU wastes into the soil at INEL, Hanford, Los Alamos, Oak Ridge, and Savannah River for more than a decade.

Two significant decisions made by the late 1960s still largely define the high-level and transuranic waste storage and disposal program:

1. The repository would not be at a weapons production facility, thus separating disposal from production;

A large proportion of the 100-plus billion dollar estimated cost of cleaning up Complex sites is due to environmental threats created by dumping radioactive and mixed wastes into the soil.

RADIOACTIVE WASTES AT DOE SITES (As of December 31, 1990)

VOLUME IN CUBIC METERS							RADIOACTIVITY IN CURIES					
		Stored	Buried	Disposed	Contam.	Total		Stored	Buried	Disposed	Contam.	Total
Site	HLW	TRU	TRU	LLW	Soil*	Volume	HLW	TRU***	TRU##	LLW	Soil***	Radioactivity
Fernald, OH				298,500		298,500				1,811		1,811
Hanford, WA	254,000	7,866	109,000	573,800	31,960	976,626	393,000,000	55,340	29,200	8,951,289	16,706	402,052,535
INEL, ID++	12,000	37,472	57,100	144,100	56,000	306,672	63,500,000	207,512	73,267	11,501,706	unknown	75,282,485
Los Alamos, NM		7,579	14,000	209,900	1,140	232,619		191,313	9,230	1,100,981	unknown	1,301,524
Mound, OH		222			106	328		1,352			40	1,392
Nevada Test Site		587		408,600		409,187		806		9,774,896		9,775,702
Oak Ridge, TN		1,974	6,200	439,100	13,000	460,274		20,967	270	1,261,178	unknown	1,282,415
Rocky Flats, CO		915				915		4,760				4,760
Savannah River, SC	132,000	3,992	4,534	612,800	38,000	791,326	562,000,000	666,338	9,831	9,603,426	unknown	572,279,595
West Valley, NY	1,230					1,230	27,300,000					27,300,000
Others			3	32,880		32,883				29,552		29,552
TOTAL	399,230	60,607	190,837	2,719,680	140,206	3,510,560	1,045,800,000	1,148,388	121,798	42,224,839	16,746	1,089,311,771

Source: Integrated Data Base for 1991 (DOE/RW-0006, Rev. 7), October 1991
Figures 2.1, 2.2, 4.4; Tables 3.2, 3.3, 3.4, 3.5, 4.8
*DOE'S "low" estimate; "High" estimates at INEL are 156,000; and 1,601,000 at Oak Ridge
***Includes only alpha radioactivity
##Includes only alpha radioactivity estimates, except at Oak Ridge
++Does not include spent fuel stored at ICPP
Compiled by: Don Hancock, Southwest Research and Information Center

2. Until the repository is open, nuclear waste from smaller facilities would be consolidated at the Idaho National Engineering Lab (INEL) and the Nevada Test Site (NTS), while the major waste generating sites – Hanford, Los Alamos, Oak Ridge, and Savannah River – would keep their wastes on-site.

Later DOE included Hanford on its list of repository sites for consideration, but dropped it after legislation favoring Nevada passed in 1987.

DOE storage and disposal plans

The only site developed for TRU waste disposal is WIPP in southeastern New Mexico. The site was chosen in the mid-1970s because it is in a region of thousand-foot-thick salt formations; New Mexico is a politically weak state heavily dependent on federal government funding; and local government and business officials asked for the facility, thinking it would boost the local economy.

By the late 1970s, public protests in New Mexico made WIPP's future uncertain, and President Carter (who wanted to cancel it) clashed with Congress. DOE promised that the site would be licensed by the Nuclear Regulatory Commission (NRC) and be subject to a state veto. In late 1979, Congress rushed through a law that authorized WIPP as a "research and development facility to demonstrate the safe disposal" of TRU defense wastes, and blocked the state veto and NRC licensing.

In January 1981, the Reagan administration decided to proceed with WIPP, expecting it to receive wastes from Idaho by 1988, although those large volumes of buried wastes and contaminated soils have never been part of WIPP's mission. But since 1987 the project has been stalemated by the site's technical difficulties and public and congressional opposition to opening the site before it meets established health and safety standards. In October 1991, DOE Secretary Watkins announced that he would start shipping wastes from Idaho to WIPP even though Congress had not passed a land withdrawal bill to transfer the site to DOE, and WIPP had no hazardous waste permit from New Mexico. Lawsuits were then filed by New Mexico,

Texas, national and regional environmental groups, and members of Congress. Federal court decisions in January 1992 prohibited waste transportation or disposal at WIPP pending land withdrawal legislation and a permit from New Mexico.

In 1983, President Reagan announced that DOE high-level waste would be placed in commercial spent fuel repositories. HLW at Savannah River, Hanford, and Idaho would remain at those sites, and solidification facilities would be constructed. Once the HLW repository was constructed, solidified wastes would be transported to it. In 1987, Congress decided that the only site to be considered would be Yucca Mountain.

Like WIPP, Yucca Mountain is plagued by technical problems. In 1990 the Nevada legislature and governor, responding to overwhelming public opposition, passed legislation prohibiting HLW disposal in that state. The 1998 target date for Yucca Mountain's opening has been officially pushed back to 2010.

Recommendations:

The messy, costly problem of managing long-lived highly radioactive waste has no perfect solution. Society must minimize further generation of this material. Almost all of it, in terms of radioactivity and physical volume, comes from nuclear power and nuclear weapons production. Long-lived wastes from medical and research facilities should also be minimized by use of shorter-lived isotopes and substitute processes when practicable. Meanwhile, three major changes in the system for dealing with radioactive waste can be made:

1. Change how radioactive wastes are defined, and reclassify wastes and their disposal according to longevity and hazard level. For example, a new "long-lived" category should include wastes containing significant quantities of isotopes with half-lives longer than 20 to 25 years.[34] The exact definition should be chosen after public discussion.

2. Restructure long-lived waste management and disposal. An alternative to the present programs at WIPP and Yucca Mountain should reconsider the laws that govern waste disposal and include:

- *Spent Fuel, High-Level Reprocessing and Transuranic Wastes:* The program should begin with new EPA disposal standards and consideration of specific sites should be deferred until health standards and basic scientific procedures are generally agreed upon. Alternative approaches such as sub-seabed disposal and – for already reprocessed wastes – transmutation should be studied.
- *Low-Level Wastes:* Cancel new LLW sites, with provision for monitored storage. Study separating long-lived components from LLW, and storing hospital, pharmaceutical, and research wastes at interim locations. No siting, construction or operation of LLW disposal facilities should be allowed without comprehensive EPA standards, and shallow burial should be banned.
- *Uranium Mill Tailings:* Assess the feasibility of extracting Radium-226 and Thorium-230.
- *Remove DOE from radioactive waste management:* Establish a separate agency that does not have conflicts between nuclear power and weapon production, and health and environmental protection.
- *Create incentives for minimizing long-lived waste:* Realistic estimates of eventual disposal costs should be included at the "front end" of every nuclear waste generating process, rather than being passed on to taxpayers and future generations.
- *Establish consistent health-based standards:* These should apply to all waste, regardless of the process that produced it.

3. Provide for extended onsite storage. A better approach to handling long-lived wastes would:

- *Plan for up to 100 years of at-reactor storage:* Reactor waste handling should reflect the likelihood that long-term waste isolation will not be available for decades. Funds for extended onsite storage should come from the Nuclear Waste Fund (from a nominal fee paid by consumers of nuclear-generated electricity).
- *Delay dismantling shut-down nuclear reactors:* Plants should be left intact for up to 100 years to reduce disposal requirements and risk, and anticipate delays in longer term disposal.
- *Stabilize military, high-level, long-lived low-level, and transuranic wastes:* These wastes should be stored on-site in ways that minimize risk to workers and nearby residents.

Combined with on-site storage and deferred reactor decommissioning, a restructured long-lived waste disposal program will allow time to gain a sound understanding of geology and climate, development of more easily isolated waste forms, and research on new technologies.

Realistic estimates of eventual disposal costs should be included at the "front end" of every nuclear waste generating process, rather than being passed on to taxpayers and future generations.

11

CLEANUP

by Arjun Makhijani, PhD, Don Hancock, and Gerald Pollet

Since the current emphasis is on short-term "cleanup," there is insufficient attention to long-term problems.

Cleanup is a misleading term for management of the waste and pollution from nearly half a century of nuclear weapons production. The task is better described as the attempted containment of the Cold War legacy. At a particular site, radioactive soil may be scraped up and put into drums, but unless the containers can last for a number of decay half-lives (often centuries, and sometimes tens of thousands of years) the threat of contamination remains.

The primary goals of cleanup are:

- **minimize the immediate risk** of catastrophes and the irreversible spread of contamination;
- **site restoration** at weapons plants so that land and water may be used more freely in the future;
- **long term management** of toxic, radioactive, and mixed wastes including wastes from decontaminating and decommissioning the Complex.

Consideration of cleanup has generally been restricted to the second category. For instance, DOE has not even included waste from site cleanup and dismantlement in the Programmatic Environmental Impact Statement (PEIS) for "Environmental Restoration" of the Complex.

Setting Priorities

Site restoration is inextricably related to the other two categories. Short-term actions to minimize the spread of radioactivity may increase or decrease long-term contamination problems of the site. For instance, capping seepage basins with clay decreases surface runoff of radioactive materials, but may make future unrestricted land use difficult or impossible unless waste in and under the basin is uncapped and treated. Similarly, solidification of wastes in place (by glassification of soil, for instance) could create long-term risks from unrestricted land use. The cleaner one makes a site, the larger will be the volume of waste needing long-term management and disposal.

By categorizing "cleanup" this way, it is easy to see that reduced risk to present generations can be at the expense of future generations – or vice versa. DOE has usually taken the former approach. Many of the costly problems arising from the high-level radioactive waste tanks and the hundreds of thousands of corroding drums scattered across the Complex follow from this method.

DOE has created its own priorities for cleanup, usually with little or no input from state officials and citizens, and without considering all the long-term safety implications. In fact, DOE has tried to create its own cleanup prioritization process for budget purposes – in direct conflict with the schedules and standards of federal and state environmental laws and the "cleanup" agreements the department has signed with states.

Cleanup priorities must be set so as to minimize the risk of catastrophic accidents – as well as controlling risk to future generations – such as high-level waste tank explosions. DOE has not yet developed a coherent approach that would integrate these considerations into an overall cleanup plan. Needed changes include:

- Taking production activities out of the cleanup budget;
- Creating a "dedicated cleanup account" used only for Environmental Restoration and Waste Management activities as defined by relevant laws and cleanup agreements;
- Setting budget requests based upon publicly determined cleanup needs for each site as specified by the FY92 Defense Authorization Act;
- Ensuring enough funding to meet short-term and long-term requirements of environmental law and cleanup agreements.

Technologies

The technologies used for any cleanup plan must be compatible with risk minimization and the broadest possible resource use for future generations. Since the current emphasis is on short-term "cleanup," there is insufficient attention to long-term problems. There are, for example, no clear solutions to processing high-level radioactive wastes in tanks at Hanford. Ideally, the tanks should be emptied and the

wastes put in a solid form that will minimize environmental damage for hundreds of thousands of years.

A balance between short- and long-term risks will require abandoning the current emphasis on capping seepage basins, leaving contaminated soil in place, and grouting large quantities of waste for disposal on site. The following principles need to be integral parts of cleanup and waste management:

- separation of long-lived radionuclides from wastes where possible, and development of technologies to do this where they do not exist;
- concentration and processing into solid form of long-lived radionuclides;
- monitored retrievable storage of short-lived wastes until they have decayed to very low levels;
- restoration of groundwater quality where possible, and research into new treatment methods.

The existing legal framework for cleanup

The Atomic Energy Act of 1946 and 1954 established a legal framework over nuclear materials that prevented regulatory control of and public information about nuclear weapons. That law still restricts regulation of and public participation in DOE activities, especially regarding radioactive materials.

Various environmental laws apply to many DOE activities. The Resource Conservation and Recovery Act (RCRA) regulates solid wastes and toxic chemicals from generation through disposal. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) establishes standards and procedures for cleaning up sites contaminated with hazardous materials. While the Clean Water, Clean Air and Safe Drinking Water Acts establish standards and procedures for releases of contaminants into water and air, RCRA and CERCLA are the two laws that most affect Complex cleanup.

RCRA and CERCLA give regulatory authority to the Environmental Protection Agency (EPA) or a state agency with equivalent standards and legal authority. During the past three years, DOE, EPA, and 14 state governments have negotiated agreements that help define how environmental laws apply to the DOE facilities in those states. DOE has not fully complied with provisions of these agreements, and has not used the agreements to determine funding levels for cleanup.

Cleanup costs

The 1991 revision of the Five-Year Plan estimates cleanup costs for the seven years from 1991 to 1997 to be between $36.8 billion and $38.8 billion. Overall costs to complete restoration by 2019 are unknown, but many estimates exceed $100 billion. Since the standards that cleanup must ultimately meet are not certain and in some cases the necessary technologies do not exist, these cost estimates are highly speculative.

In addition to the uncertainty regarding costs, DOE's annual budget requests submitted to Congress have always been lower than levels specified in the 5-Year Plans. For example, The FY 1993 budget requests $5.3 billion for cleanup, including technology development, compared to the Department's projected need of $6.7 billion.

DOE has misused cleanup money to subsidize weapons production activities.

Cleanup funds are diverted to weapons production

DOE has misused cleanup money to subsidize weapons production activities. For example, a 1991 study by Heart of America Northwest disclosed that a half-billion dollars in the FY 1992 budget request for environmental restoration and waste management was intended for production work.

The cleanup budget should be reorganized to:

- eliminate production activities;
- set budget requests based on publicly determined cleanup needs for each site;
- ensure enough funding to meet short- and long-term requirements;
- change the Five-Year Plan process to include genuine state and citizen involvement.

Overwhelming evidence shows that DOE cannot now produce an adequate cleanup plan, much less implement one. DOE has also failed to make good use of public participation, or take outside advice seriously unless forced to by political pressure.

Some examples are instructive:

- A display about radiation and waste management during the PEIS hearing in Cincinnati falsely claimed that "low-level" waste contains only short-lived radioactive materials. DOE's inability to assemble an accurate display from well known facts suggests that it will have real trouble with a $100 billion cleanup plan.
- Numerous statements that health, safety and the environment come first in the "new DOE culture" appear to be just rhetoric. The determination to operate the K reactor, and the

haste to open WIPP show that other concerns still take a back seat to production.

As an institution, DOE lacks a serious commitment to sound environmental science, despite the many competent people within it. Many of the basic problems stem from two kinds of conflict of interest: one within the department, and one having to do with its contractors.

As an institution, DOE lacks a serious commitment to sound environmental science, despite the many competent people within it.

Conflict of interest within DOE

The Department is charged with both nuclear weapons production and nuclear power promotion. These functions are not conducive to complete and accurate disclosure of the risks of operation or of the harm from past operations. The country needs institutional arrangements that would eliminate conflict of interest from the agency doing cleanup. Proposed approaches include:

- Divesting DOE of all functions except cleanup;
- Putting all cleanup functions in the EPA;
- Creating a new cleanup agency.

All of these proposals would require on strong independent oversight to prevent an agency from doing the same old things under a new name.

Conflict of Interest at the Contractor Level

Many DOE contractors, such as Westinghouse, have a vested interest in promoting nuclear power, or, like Martin Marietta, in selling military hardware. This conflict of interest could be addressed by awarding cleanup work only to corporations that do not have military production contracts, or by having the government itself run the plants. In any case, the institution doing cleanup should be subject to all civilian laws and regulations.

Establishing Oversight

For cleanup to succeed, DOE's environmental restoration activities must be open to public scrutiny.

Regulators have had to settle for promises that crucial compliance actions will be included in DOE's budget, but the budget is closed to outside scrutiny until presented to Congress. Even then, most states cannot determine whether DOE has lived up to its promises.

Facility-specific Cleanup Oversight Boards and a National Oversight Board

The mechanism most likely to provide accountability is an array of facility oversight boards. A national coordinating entity drawn from those boards is also needed to create a consistent national cleanup program.

Each site should have an oversight board funded through charges imposed on DOE by state and EPA regulators. Site boards should reflect the diversity of interests affected by the sites, including those of Native Americans (although tribes could continue to negotiate separate agreements with DOE).

The oversight boards would ensure compliance by DOE and its regulators with the agreed standards, priorities and schedules. A national oversight board made up of representatives from facility boards would review cleanup standards and priorities.

It is impossible to intelligently choose among remediation technologies and storage or disposal options without a public determination of potential future uses for the site.

DOE has flaunted environmental spending levels at all its facilities, while failing to request enough money to meet its own cost estimates. Public oversight boards can hold DOE accountable for the expenditure necessary to carry out an extremely costly 30-year cleanup. A panel with continuity and independent staffing could evaluate cleanup actions, standards used, and the scientific basis for cleanup decisions. ☢

12

OFFICIAL OVERSIGHT

by James D. Werner

Cleanup of the Nuclear Weapons Complex rivals the Apollo space program and the interstate highway system as a long term national commitment. To ensure that resources are spent well, and that human health and the environment are protected, effective oversight of DOE will be crucial. The failure of state and federal regulatory agencies to oversee DOE is a primary cause of the massive environmental problems created by half a century of nuclear weapons research and production.

The Environmental Protection Agency (EPA), Nuclear Regulatory Commission (NRC), Occupational Safety and Health Administration (OSHA), and state regulatory agencies are currently barred from complete oversight of Complex operations. For example, unless the Federal Facilities Compliance Act is enacted, EPA and state agencies will continue to be unable to impose unilateral administrative orders, fines, or penalties on noncompliant DOE activities. And except for one special case, DOE is exempt from NRC oversight, including construction and operation of nuclear reactors. Similarly, DOE enjoys an exemption from OSHA oversight. Radioactive materials, unless mixed with hazardous chemicals, are also exempt from outside oversight and permitting, including discharges of "source, special nuclear materials and byproduct materials."

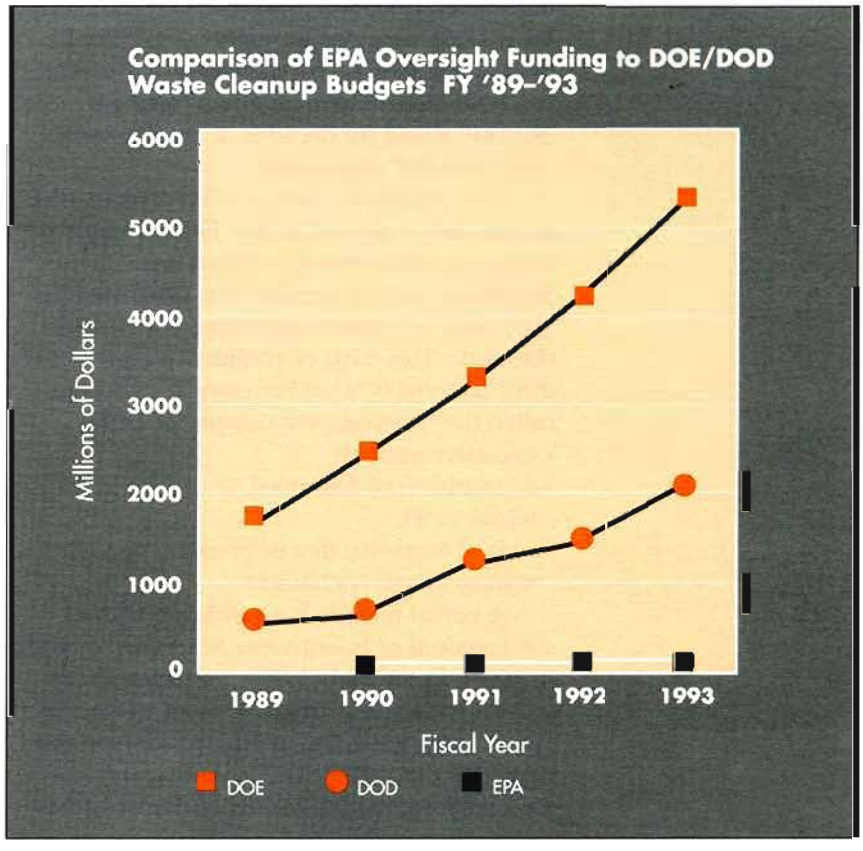
In 1991 the Congressional Office of Technology Assessment recommended that DOE be regulated by EPA or NRC for radioactive substances. Unfortunately, there has been no legislative response. Without sufficient authority, the historic problems caused by DOE regulating itself will continue.

Effective oversight requires funding as well as a statutory commitment. EPA is routinely reimbursed by private parties for the cost of overseeing commercial waste site restoration. Private corporations are typically required to pay two to four percent of total cleanup costs for oversight. Based on a combined Energy and Defense Department Environmental Restoration and Waste Management budget of more than 7.3 billion dollars (75 percent of it for DOE), funding for oversight should be 150 to 300 million dollars.

However, the Administration's EPA federal facilities oversight budget request – $46.4 million – is only 0.63 percent of the DOE/DOD cleanup budget. While cleanup funding requests increased by 26 (DOE) and 44 (DOD) percent from FY92 to FY93, EPA's oversight budget declined by one percent. And tens of millions of additional dollars are needed to oversee other federal facility cleanups such as Bureau of Land Management sites and federal prison landfills.

The Office of Management and Budget (OMB) has opposed transferring Energy Department funds to EPA for oversight expenses. OMB's opposition appears inconsistent with the "Superfund" law that allows EPA to recover its costs,[35] especially in light of 1986 amendments that specifically establish that liability provisions apply to government agencies.[36]

The failure of state and federal regulatory agencies to oversee DOE is a primary cause of massive environmental problems.



Opponents of reimbursing EPA oversight costs from DOE and DOD accounts have argued that it is inappropriate for one part of the federal government to pay another. But there are numerous examples to the contrary. For instance, the Army is reimbursing EPA for oversight costs at the Twin Cities Ammunition Depot in Minnesota and the Rocky Mountain Arsenal in Colorado. Also, nearly forty Federal Agencies have been identified as "potentially responsible parties" at scores of non-federal Superfund sites. These agencies may be found liable for cleanup and EPA oversight costs at these sites. The Administration's opposition is also inconsistent with DOE's transfer to EPA of $700,000 plus two full-time employee equivalent for oversight of the Waste Isolation Pilot Plant.(WIPP).[37]

To avoid more environmental damage and wasted cleanup dollars, regulatory agencies such as EPA must have oversight authority and enough funding to back it. ☢

Government information should be presumed to be public information, unless disclosure could cause identifiable damage to national security.

13

THE FIGHT FOR INFORMATION

by Tom Carpenter

The battle has only begun for complete, accurate information about the health, safety, and environmental damage caused by the Nuclear Weapons Complex. Both the Atomic Energy Commission and DOE have tried, since 1943, to ensure that every aspect of the nuclear weapons business takes place behind closed doors. For managers and contractors who have hidden behind a "national security" shield for decades, accepting oversight does not come easily.

The continuous stream of scandalous revelations that began in the late 1980s brought weapons production to a virtual halt. Skepticism among citizens near DOE sites has given way to intense opposition and outright disbelief. This crisis of confidence grew out of three features of what Secretary Watkins has called the "management culture" of DOE:

- excessive secrecy;
- suppression of dissenting or controversial internal views;
- lack of accountability or penalties applied to managers and contractors.

A partial remedy for inordinate secrecy is the Freedom of Information Act (FOIA) enacted in 1966. In the early 1970s, investigators, journalists, and citizens began to learn to use the law to bring government information into the open. In the 1980s, FOIA requests, and associated lawsuits, exposed some of the worst travesties of the Complex that are now known.

Yet this approach has been inadequate and slow. Even when there is no excuse for keeping a document secret, unless citizens somehow know of its existence, they cannot ask for it. And the government is far better armed with funds and legal tricks than are the local or even national citizens' groups that have tried to break the secrecy barriers. Worse yet, DOE is charged with administering its own FOIA program. Some requesters have had to wait more than three years before receiving information.

Openness is also hindered by rules that encourage excessive classification and create a temptation for officials to hide activities for the sake of their programs, budgets, and careers. Information with no strategic implications, such as worker health data and gross budget numbers, is still kept secret. Government information should be presumed to be public information, unless disclosure could cause identifiable damage to national security.

Although FOIA is still widely used by public interest groups, cheaper and less time-consuming methods of gaining crucial information about present and former bomb factories are sometimes available. Many public interest groups have begun to cooperate with workers – known as whistleblowers – who expose health, safety, and environmental scandals at nuclear facilities.

The nuclear weapons industry goes to great lengths to silence whistleblowers and suppress unclassified but embarrassing information about its activities. Workers at the Knolls Atomic Power Laboratories near Albany, New York, contacted the Government Accountability Project (GAP) to ask for help in revealing contamination, a radioactive parking lot, and an abandoned spent fuel reprocessing laboratory that had been converted into a food storage warehouse. In response, General Electric, the site contractor, issued a "security newsletter" to all employees, warning them not to speak out on Knolls operations. The gag order spelled out the possible consequences of making even casual comments about Knolls: termination, a $100,000 fine, or life imprisonment for any "deviation" from the policy.

At Hanford, numerous whistleblowers have helped bring to light a flood of environmental abuses with their testimony to Congress, press conferences, and leaks of information to activists and outside regulatory bodies. Subjected to forced psychological referrals, surveillance, termination, and enforced ostracism, Hanford whistleblowers have had a tough time. Yet in many well-publicized cases, people have risked their careers to speak out.

Hanford engineer Sonja Anderson provided information that led to a lawsuit under the Clean Water Act and the Solid Waste Disposal Act. Casey Ruud and Ed Bricker gave testimony to Congress that contributed to the shutdown of the Plutonium Finishing Plant. Jim Simpkin's testimony helped idle the N-Reactor. Inez Austin's courage helped block potentially disastrous pumping of high-level waste tanks containing unstable chemicals. She was awarded the Scientific Freedom and Responsibility Award for 1991 by the American Academy for the Advancement of Science.

Workers who expose illegal or dangerous activities perform a valuable public service – rarely with any prospect of personal gain. They must be consistently and reliably protected from retribution. ☢

Workers who expose illegal or dangerous activities perform a valuable public service.

14

SEEKING HUMAN JUSTICE

by Gerald Pollet

The Department of Energy is waging an all-out legal battle against the civilian victims of its radioactive and toxic emissions. On March 6, 1992, the Seattle Times reported that DOE had already spent $39 million in legal fees to oppose the claims of Hanford "downwinders" for compensation and medical assistance for the health effects of Hanford's emissions. The case was filed in July 1990, and is expected to take until 1996 to reach a decision at the trial level.

Instead of going to the law firms of Hanford contractors, those millions could help alleviate real suffering. But it is the precedent of admitting that there are real, rather than hypothetical victims that DOE seeks to avoid. This refusal to acknowledge or compensate for injury is, to say the least, an insult to people who believed in contributing to their country, and expected to be treated fairly in return.

Unjustified Immunity

The communities and workers exposed to hazardous DOE emissions are calling for the same justice that citizens would expect if private companies had exposed the public or workforce to danger. But DOE is essentially immune from the damage claims of citizens. Congress has sanctioned this injustice, and only Congress can reverse it.

The concept of "sovereign immunity" protects DOE from the claims of victims, unless specifically waived by Congress. In 1984, DOE and its contractors won a change in the Defense Authorization Act for 1985 that retroactively invoked a form of immunity called "discretionary function" to dodge claims for damages due to radiation from atmospheric nuclear tests in Nevada. Senator John Warner,

DOE's refusal to acknowledge or compensate for injury is an insult to people who believed in contributing to their country, and expected to be treated fairly in return.

If managed properly, a Worker Superfund might ease economic conversion of the Complex.

who sponsored the amendment, did not anticipate its effects, and he has since called for its repeal several times.

Health monitoring and medical assistance are the basic demands of DOE downwinders. To date, compensation at Hanford has been limited to a five million dollar appropriation for a health information network to get information to doctors and to assess the possibility of tracking downwind victims' health.

Attempting to find alternative routes to justice, victims have sued contractors on various theories of liability and have lobbied for direct compensation from Congress. As a result of a 1991 law, downwinders and former workers of the Nevada Test Site are eligible for payments of up to $75,000 per person if they have certain types of cancer and were likely to have received high doses of radiation. In 1992, 30 million dollars were finally appropriated to begin compensating workers, downwinders, and uranium miners for 40 years of health damage.

Justice for Nuclear Workers

Medical assistance and health insurance are the primary demands of both injured and healthy workers at DOE facilities. The ill have found themselves with no recourse against a government that knowingly exposed them to unhealthy working conditions without adequate warnings or protection. Many healthy workers have faced drastic cuts in the DOE workforce, while civilian employers and health insurance companies reject them because of their past exposure at DOE facilities.

Several legislative proposals are aimed at helping nuclear weapons workers obtain justice from the government they served. Rep. David Skaggs has introduced a "Defense Nuclear Workers Bill of Rights Act" (HR 3908), that would cover health insurance and radiation exposure compensation. Current workers would be entitled to early notification of plant closures or layoffs as well as retraining for the new cleanup missions at the sites.

The Oil, Chemical, and Atomic Workers Union (OCAW) has proposed a more comprehensive effort aimed at fulfilling a broad range of social justice goals for current and former veterans of the DOE weapons complex. Dubbed the "Worker Superfund," the proposal is modeled after the GI Bill of Rights.

If managed properly, a Worker Superfund might ease economic conversion of the Complex by offering employees the choice between: a) retraining and preference for cleanup and environmental restoration work; b) re-education with enrollment at a higher educational or job retraining school; or c) dislocated worker assistance benefits for one year.

Hundreds of millions of cleanup dollars are being spent to "warehouse" former defense production workers in facilities that no longer have missions and that are not actively being decommissioned or decontaminated.[38] Legislation to guarantee nuclear workers' rights, and finance their economic conversion, could provide the U.S. with committed, dedicated cleanup workers and a retrained, well-educated workforce for other endeavors, and might also result in long-run reductions in the cost of cleanup.

U.S. Department of Energy

Dangerous radioactive materials are stored in barrels at Hanford.

15

REDUCING THE DOE NUCLEAR WEAPONS BUDGET

by Tom A. Zamora and Peter Gray

"The threat to the United States of deliberate attack from [the former Soviet Union] has all but disappeared for the foreseeable future." – *CIA Director Robert M. Gates* [39]

"We want to get rid of the nuclear complex to the extent we can and do it safely and as inexpensively as possible." – *Energy Secretary James D. Watkins* [40]

The U.S. nuclear arsenal of some 20,000 weapons is shrinking by two-thirds to 6,000 weapons or fewer, and the arms race has shifted into reverse. However, the Administration's proposed Fiscal Year 1993 (FY93) nuclear weapons budget demonstrates that DOE is responding slowly and inadequately to a new fiscal and international reality. Despite the fact that all new nuclear weapons production has been suspended, the FY93 budget is still geared for a high level of nuclear weapons activity. Congress must play a leading role in scrutinizing DOE activities and reshaping the Complex.

This analysis recommends reducing the overall DOE nuclear weapons budget request of $7.5 billion by more than $1.5 billion. The program outlined in the rest of this report implies larger cuts, but DOE's request gives too little detail to identify every reasonable reduction. Our figures should be seen as minimal. Although DOE's request for FY93 is down nine percent from FY92, the dramatic decline in the need for its military products makes further reductions imperative. Recommended reductions include:

- $466 million from weapons Research, Development, and Testing, including a 50% cut in Weapons Development activities and a 25% reduction in the Technology Base.
- $357 million from Weapons Production, including a 50% reduction in the Weapons Production and Support budget and the curtailment of certain facilities to be restarted at the Rocky Flats Plant.
- $597 million from Nuclear Materials Production, including a 50% cut in the reactor operations budget of the Savannah River K-reactor.
- $254 million from the New Production Reactor program.

Since the Berlin Wall began to crumble in 1989, DOE has scaled back or canceled many of its programs. Production of plutonium and highly-enriched uranium (HEU) for weapons has stopped for the foreseeable future. The New Production Reactor program for making tritium was reduced from two plants to one. One tritium reactor at the Savannah River Site is now slated for restart, instead of three. And most recently, plutonium manufacturing operations at the Rocky Flats plant were canceled, after termination of a new Trident II warhead. The U.S. now has no new nuclear weapons planned for production.

DOE's proposed FY93 nuclear weapons budget fails to reflect these new realities. For example, although DOE has stopped making plutonium and HEU, the nuclear materials production budget is $1.8 billion – only six percent less than in FY92. Much of this is for restarting the K-reactor at Savannah River for tritium production, although Secretary Watkins has said no new supply will be needed until 2005-2010. And although there are no new warheads being built, the request for weapons development, testing, and production is nearly $5 billion.

It is difficult to make deep cuts in any Federal agency within one year – this is especially true of DOE with its high overhead costs and bureaucratic momentum. That momentum perpetuates entire programs, year after year, and DOE doesn't know how to cut its obsolete activities or change its way of operating. A financial audit of DOE's nuclear weapons programs would allow Congress to identify budget cuts that reflect the end of the Cold War.

Meanwhile, specific reductions can be made in unnecessary or low-priority nuclear weapons activities in four major accounts – Nuclear Weapons Research, Development, and Testing; Weapons Production; Materials Production; and the New Production Reactor. These changes would result in a budget reduction of more than $1.6 billion for FY93. The results are summarized on page 35.

Bureaucratic momentum perpetuates entire programs, year after year, and DOE doesn't know how to cut its obsolete activities or change its way of operating.

With the end of the Cold War, there is no longer a need to develop and test new weapon systems.

1. Weapons Research, Development, and Testing

The Administration has asked for $1.9 billion for Research, Development, and Testing in FY93, down $56 million from FY92 (but up $146 million from FY91). With the end of the Cold War, there is no longer a need to develop and test new weapon systems. The budget should be cut by $466 million.

1A. Weapons Development, Engineering, and Certification – This $352.4 million budget for pre-production warhead research and development should be cut by $176 million (50 percent).[41] Development in FY93 will continue on two new warheads, the W89 for the SRAM-II missile (which was canceled by President Bush in September 1991), and a new warhead for submarine-launched missiles. All other weaponry is in the early development phase.[42] Those new weapons are unnecessary due to the lack of a strategic threat, and could stimulate a new round of the arms race.

1B. Technology Base – This $665.0 million budget category should be cut by 25 percent, or $166 million.[43] Although usually considered "off-limits" to cuts because it supports basic weapons research, this account includes a number of advanced weapons designs of dubious value.[44] It also includes the Nuclear Directed Energy Weapons (NDEWs) program and its X-ray laser effort. NDEWs would still receive $40 million for FY93 from this account.[45]

Congress must carefully consider the missions for these weapons before endorsing their development. Remaining funds could support weapons safety, pit reuse, warhead dismantlement and disposal, and non-proliferation research.

1C. Testing Capabilities – Fifty percent, or $94 million, should be cut from this $188.4 million category, which supports all FY93 nuclear testing activities at the Nevada Test Site. As the need for nuclear weapons with new military attributes has vanished, little or no testing will be necessary in FY93 and beyond.

1D. Defense Programs Research Facility and Site 300 Facilities Revitalization – This site construction request of $29.8 million for Livermore National Laboratory should be terminated. The Defense Programs Research Facility was designed to "meet the new and unique requirements of advanced nuclear weapons development" at Livermore.[46] This facility, however, was originally intended to be the "Nuclear Directed Energy Research Facility," but was renamed following cuts in the NDEW budget. Site 300 at Livermore is where high-explosive tests for the weapons program are conducted. Because it is no longer necessary to have two weapons research facilities, nuclear defense work should be discontinued at Livermore and both projects canceled.

2. Nuclear Weapons Production

The Production and Surveillance budget request for FY93 is $2.6 billion, up $51 million from FY92. There are no new nuclear weapons in production, due to the cancellation of the Trident II W88 warhead and the termination of warhead production activities at Rocky Flats, and no production is planned for FY93. This budget can be cut by 50 percent, or $357 million.

In the name of cleanup, DOE has argued for restarting production facilities such as Building 707 at the Rocky Flats Plant. Many of these plants have been rated unsafe to operate, and their suitability for cleanup is debatable. DOE should be required to explore alternatives and specify what "cleanup" entails – before receiving funds.

3. Nuclear Materials Production

The Nuclear Materials Production request – to manufacture plutonium, HEU, and tritium for weapons – is $1.8 billion, down six percent from FY92. DOE announced last year that new plutonium and HEU for weapons would not be needed in the foreseeable future, so funding would go toward tritium production only. This account should be cut by $597 million.

3A. Savannah River Reactor Operations – DOE wants $553.2 million to start and operate K reactor. Restart should be canceled and the reactor operations budget cut by 50 percent, or $277 million. With nuclear arsenals shrinking rapidly, the requirement date for new tritium of 2005-2010 expected by Secretary Watkins could be pushed back even further.[47] Given this wide "tritium requirement gap," plans to restart K reactor should be canceled and DOE's efforts focused on a long-term tritium source (see New Production Reactor section below).

3B. F and H Canyons at Savannah River – This $152.2 million account should be eliminated. F Canyon processes plutonium from various sources, including spent reactor fuel, for use in weapons. The facility was closed in January 1990 for lack of need and has not reopened. Since Rocky Flats, where the plutonium would be machined, is closed and there are no new warhead requirements, the products of this

facility are not needed. The Plutonium-238 (mainly for spacecraft power sources) processed in H Canyon could be purchased from Russia instead if it is needed.

3C. Uranium Recovery at the Idaho Chemical Processing Plant – This $168.5 million request is split between uranium processing operations and plant construction at Idaho National Engineering Laboratory. Uranium processing should be discontinued, and the budget eliminated. The Idaho Chemical Processing Plant (ICPP) has historically reprocessed spent highly enriched uranium (HEU) fuel from naval reactors, government-owned research reactors, and domestic and foreign civilian research reactors. The recovered HEU has not been reused in the naval reactor program, but as fuel in Savannah River reactors for tritium production.[48]

If DOE should need HEU, the large stocks from warhead retirements will be more than enough. Naval reactor fuel can be stored until a disposal method is developed for commercial power reactor fuel. The Navy has said it no longer wants its fuel reprocessed at the ICPP, and DOE has suggested it will put the ICPP on permanent standby in the near future.

4. New Production Reactor (NPR)

The New Production Reactor program budget request for FY93 is $153.8 million, plus $125 million in prior year balances, for a total budget of $278.8 million. This program's mission is to construct a new nuclear reactor and associated facilities for making tritium (and potentially plutonium). Funding is split between operating expenses and construction. The entire $153.8 million in new money should be eliminated, and only about $25 million from FY92 should be left for research into the alternatives.

The NPR is a carryover from Cold War planning for an arsenal of 20,000 warheads. NPR construction would require about 15 years and $5 to $6 billion, by DOE estimates. The General Accounting Office has found that "the smaller particle accelerator needed to meet the lower tritium requirements would use less power than the type previously reviewed by DOE. This feature could make its safety and environmental advantages more attractive."[49] Secretary Watkins announced in December 1991 that DOE would take a closer look at accelerators for tritium production, but they are not in the FY93 budget request. There is plenty of time to consider the alternatives for future tritium supply.

There is plenty of time to consider the alternatives for future tritium supply.

THE DOE'S FY 1993 NUCLEAR WEAPONS BUDGET: RECOMMENDED REDUCTIONS

(Millions of Dollars)

Budget Category	Bush Buget	Reduced Budget	Savings
Research, Development & Testing			
Weapons Development	352.4	176.2	
Technology Base	665	499	
Testing Capabilities	188.4	94.2	
Livermore Construction	29.8	0	
Remaining projects	652.5	652.5	
Subtotal	**1,888.1**	**1,421.9**	**466.2**
Weapons Production			
Production and Support	713.6	356.8	
Remaining projects	1,852.7	1,852.7	
Subtotal	**2,566.3**	**2,209.5**	**356.8**
Materials Production			
Savannah River			
Reactor Operations	553.2	276.6	
F and H Canyon Processing	152.2	0	
Uranium Recovery at Idaho			
Separation	128	0	
Construction	40.5	0	
Remaining projects	902.8	902.8	
Subtotal	**1,776.7**	**1,179.4**	**597.3**
New Production Reactor			
FY 1993 Funds	153.8	0	
FY 1992 Funds	125	25	
Subtotal	**153.8**	**0**	**253.8**
Other DOE Weapons Activities	1,124	1,124	
Total, DOE Weapons Activities	7,508.9	6,065	
Total Savings			**1,674.1**

16

GAINING PUBLIC TRUST

by Dan Reicher

DOE has communicated in a confusing, vague, and sometimes misleading manner.

Before the country can effectively carry out its post-Cold War missions such as cleaning up the Complex, it must clear a daunting hurdle – the profound lack of public confidence in the Department of Energy's nuclear programs. To earn the public's trust, DOE must:

1. Acknowledge Its Past Record

Frequently, DOE officials adopt a "that was then, this is now" attitude and are angered when members of the public point to the Department's record. But just as none of us can elude our past, DOE cannot escape decades-old public concern over nuclear testing; or the appalling environmental and safety legacy of nuclear weapons production; or controversy over the handling of high-level nuclear waste.

2. Reveal Information

All of DOE's nuclear weapons activities have been characterized by secrecy – some of it legitimate, some of it not. For example, the public has been denied access to probabilistic risk assessments that are used to analyze the safety of military nuclear reactors. Parts of the hazardous waste permits that DOE submits to the EPA have also been kept secret. The Natural Resources Defense Council (NRDC) even had to file suit to try to obtain nuclear testing program data that DOE had readily provided to the Soviet Union.

3. Communicate With The Public

DOE has typically communicated in a confusing, vague, and sometimes misleading manner. Too often the benefits of a project are exaggerated and its costs minimized. Experts have been trotted out who are either incomprehensible to the public or are so involved in a program that they are not trusted. Hazards are often presented in an inappropriate context – as when involuntary risks are compared with voluntary ones.

For example, last year at waste cleanup hearings across the country, the Department presented a display that tried to put the risks of radiation into context by comparing them with the likelihood of being bitten by a tiger. This would not be taken seriously at a health physics conference, nor should it be by the public. Citizens sometimes have difficulty distinguishing between radioactive hazards worth worrying about and those that are less so – DOE's traditional approach has done little to improve the situation.

4. Provide Meaningful Public Participation

DOE should seek guidance before making decisions, and sometimes even change its approach to an issue based on public comments. For some officials this is a revolutionary idea.

Hearings are often one-way communications where members of the public are given a microphone and allowed to express their concerns – with no response from the Department. At one recent DOE hearing in New Mexico on cleanup, local citizens became so angered at this form of participation that they took over the meeting and, with the moderator's permission, began to answer questions from the audience.

When public participation is inadequate, the result, in the case of a large and controversial project or program, is not a public that doesn't participate, but one that participates in an angry, uncompromising, and sometimes misinformed way.

5. Deal Fairly With Independent Experts

Independent experts – people with nuclear expertise who are not professionally connected with the program in question – can bring valuable perspectives to difficult problems, and often have the public's confidence. DOE has frequently gone out of its way to ignore, reject, or discredit such experts. For instance, physicists, economists, and others testified at hearings in 1987 on DOE's proposal to build a new plutonium production plant in Idaho. They raised many crucial questions, especially about the need for the facility. Their arguments were summarily rejected by DOE and were barely considered in its Environmental Impact Statement (EIS). However, the very same points were made by the Secretary of Energy in 1990 when he canceled the plant.

6. Set Rigorous Standards

Studies of facility siting controversies have shown that members of the public are more comfortable about a controversial plant if they know that strict standards are in place and will be rigorously applied.[50] But this has not always been the case.

For example, in 1985 NRDC led a group of organizations and states in challenging the adequacy of EPA's regulations on high-level and transuranic nuclear waste, in the First Circuit Court of Appeals in Boston. The coalition prevailed in July 1987 after arguing, among other things, that the regulations allowed contamination of potential drinking water supplies at levels above those allowed by the Safe Drinking Water Act.

One would think that after litigation the interested parties would work together to strengthen the standards. Instead, DOE has pushed to weaken them. Of 18 DOE comments on EPA's second working draft of the new standards, 12 comments called for weakening the standards; the other six were neutral.

In legislation proposed by the Administration regarding the Waste Isolation Pilot Plant – a geologic repository for transuranic waste – the Administration resisted having EPA, rather than DOE, certify compliance with EPA standards.

DOE's consistent failure to support the strengthening of nuclear standards has only undermined public confidence.

7. Use The Environmental Impact Statement Process

The EIS process under the National Environmental Policy Act (NEPA) holds great potential for informed decisionmaking and meaningful public participation that can increase confidence in a controversial program. But in many instances DOE has avoided looking fully and fairly at impacts and alternatives, and has neither provided for genuine public participation in the EIS process nor adequately responded to public comments. EIS's have often been post hoc rationalizations of decisions already made.

In January 1990, after litigation was brought by 21 citizen organizations, DOE agreed to prepare two programmatic EIS's – one on cleanup and one on Complex modernization. However, DOE decided that the proposed Yucca Mountain nuclear waste repository is not within the scope of either study. This is at odds with NEPA and its implementing regulations, and is illogical given the pivotal nature of geologic disposal to military high-level waste.

8. Recognize Legitimate Litigation

DOE Secretary Watkins has bemoaned the "litigious mischief" of states and citizen groups regarding DOE nuclear programs. However, litigation surrounding a program with serious compliance problems is almost inevitable. It is often the only way the public can influence DOE decisions.

In 1984, for example, NRDC and a Tennessee citizens' group won a major case which established that the Energy Department was subject to the Resource Conservation and Recovery Act. This outcome expanded both EPA and State oversight of the massive waste problems in the Complex, and helped prod DOE into finally confronting them.

9. Stop Pushing Misguided Legislation

DOE has recently promoted legislation to advance the Yucca Mountain repository and Monitored Retrievable Storage (MRS) proposal. This includes removing Nevada's authority over site characterization, allowing co-location of an MRS site with a repository, and removing the limit on waste quantities that may be placed in the repository. While these sorts of fixes might advance the Department's short term interests, they can only hurt public confidence in the long run. By trying to limit Nevada's authority over Yucca Mountain, DOE has poisoned relations with the state and its citizens and further strengthened their resolve to block the repository.

Adoption of such legislative provisions would also set a tragic precedent for the difficult task DOE will face during the next decade in siting many other controversial waste treatment and disposal facilities to handle huge amounts of waste. If Congress and the nation are serious about siting these crucial plants, they should not sanction legislation that withdraws a state's authority in a short-sighted attempt to grease the skids for proposed facilities. If Congress casts aside a state's regulatory authority, the public will become even less inclined than it is today to consider the siting of a treatment or disposal facility. ☢

DOE Secretary Watkins has bemoaned the "litigious mischief" of states and citizen groups. However, litigation is often the only way the public can influence DOE decisions.

ENDNOTES

1. New York Times, Dec. 17, 1991

2. Among the most persuasive studies of U.S. and former Soviet nuclear arsenal overkill: Desmond Ball and Robert C. Toth, "Revising the SIOP," *International Security*, Spring 1990. The INF and START treaties, along with recent unilateral reductions, demonstrate that deterrence could be preserved with a small fraction of previously deployed forces.

3. For example, DOE officials predicted in 1988 that rehabilitating three tritium production reactors at Savannah River--and restarting at least one of them that year--would cost $250 million. As of early 1992, 10 times that amount had been spent, not one reactor had started, two have been essentially abandoned, and the third is plagued by management and safety problems.

4. According to the Office of Technology Assessment, "air, groundwater, surface water, sediments, and soil, as well as vegetation and wildlife, have been contaminated at most, if not all, nuclear weapons sites." *Complex Cleanup: The Environmental Legacy of Nuclear Weapons Production*, OTA, U.S. Congress, February 1991. The General Accounting Office has estimated that the immense 30-year task of cleaning up the weapons complex, and rebuilding it to DOE's specifications, could cost more than $150 billion.

5. Radioactive emissions from the Hanford Reservation in Washington state exposed nearby residents to thousands of times the "maximum safe level" set for atomic workers in the late 1940s. Fallout from U.S. atmospheric testing, based on dose/response estimates from the National Academy of Sciences, will cause several hundred thousand excess cancer deaths worldwide.

6. As a rule, DOE and its contractors have been immune from oversight and penalties under a wide array of federal and state environmental, health, safety, and disclosure laws.

7. Congress has begun to address the problem, with legislation such as the Wirth Bill to create a Workers' Superfund, but these efforts have received little DOE or Administration support.

8. *Energy and Technology Review*, Lawrence Livermore National Lab, July/August 1991.

9. Testimony before Energy and Water Development Subcommittee, U.S. House of Representatives Committee on Appropriations, March 2, 1992.

10. *Environmental Surveillance at Los Alamos during 1990*, Los Alamos National Laboratory, LA-12271-MS, page v-4.

11. Abraham Szoke and Ralph W. Moir, "A Practical Route to Fusion Power," *Technology Review*, July 1991, p. 21, postulate exploding thousands of nuclear bombs per year in an underground chamber to produce the electrical equivalent of one 1,000 megawatt coal or nuclear powerplant.

12. Response to the Draft Final Report of the Secretary of Energy Advisory Board Task Force on the Department of Energy National Laboratories

13. Ray E. Kidder, *Report to Congress. Assessment of the Safety of U.S. Nuclear Weapons and Related Nuclear Test Requirements*, Lawrence Livermore National Laboratory UCRL-LR-107454, July 26, 1991, p. 1.

14. U.S. House of Representatives, Energy and Water Development Appropriations for 1992, Washington, DC: U.S. Government Printing Office, 1991, p. 627.

15. Oral testimony of John H. Nuckolls before the Senate Armed Services Committee, Subcommittee on Strategic Forces and Nuclear Deterrence, May 9, 1991.

16. Ray E. Kidder, *Maintaining the U.S. Stockpile of Nuclear Weapons During a Low-Threshold or Comprehensive Test Ban*, Lawrence Livermore National Laboratory, UCRL-53820, October 1987.

17. *Remanufacturing Study, Volume I, Unclassified Report*, Department of Energy, December 1990, p. 6.

18. *Radioactive Heaven and Earth*, International Physicians for the Prevention of Nuclear War and Institute for Energy and Environmental Research, Apex Press, 1991.

19. On the average, each test deposits the following amounts of the three most significant radioisotopes, in curies: 4,000 of Strontium-90, 6,000 of Cesium-137, and 150 of Plutonium-239. Further discussion in *Radioactive Heaven and Earth*.

20. *Safety Issues at the Defense Production Reactors*, Washington, DC: National Academy Press, 1987.

21. Plutonium-239 and Uranium-235, the primary isotopes used in weapons, have half-lives of 24 thousand and 704 million years.

22. David Albright, Peter Gray, and Tom Zamora, "A Smaller, Safer Weapons Complex Through Arms Reductions," *Arms Control Today*, July/August 1991, pp. 3-10. The START treaty alone will produce up to 20,000 kg of surplus plutonium.

23. *Nuclear Weapons Complex Reconfiguration Study* (Washington, DC: DOE, January 1991), DOE/DP-0083, pp. 65 & 159-62.

24. U.S. District Court Memorandum Opinion, Allen vs. USA, Civil No. C 79-0515-J, May 10, 1984.

25. Public Hearings before the Secretarial Panel for the Evaluation of Epidemiologic Research Activities, Chicago, IL, October, 1989.

26. Committee to Assess Safety and Technical Issues at DOE Reactors.

27. *Report to the Secretary*, Secretarial Panel for the Evaluation of Epidemiologic Research Activities for the U.S. Department of Energy, March 1990.

28. These agencies include DOE's offices of: Defense Programs; Nuclear Safety; Environment, Safety and Health; and Environmental Restoration and Waste Management. Under HHS: Centers for Disease Control; National Institute of Occupational Safety and Health; Center for Environmental Health and Injury Control; and Agency for Toxic Substances and Disease Registry.

29. For a more detailed description and critique of the CEDR program, see: Jay Olshansky and Gary Williams, "A Comprehensive Epidemiologic Data Resource," *The PSR Quarterly- a Journal of Medicine and Global Survival*, 1: 145-156, 1991.

30. General Colin Powell, Defense Department Budget Briefing, Jan. 29, 1992, Office of the Assistant Secretary of Defense (Public Affairs), p. 11. Russian President Boris Yeltsin has called for cuts to about 2500 weapons.

31. "Responses to Questions Regarding Dismantlement and Pantex," letter from Energy Secretary James Watkins to Senator Carl Levin, February 24, 1992.

32. *Complex Cleanup: The Environmental Legacy of Nuclear Weapons Production*, Office of Technology Assessment, Congress of the United States, OTA-O-484, February 1991, pp. 46-47.

33. Arjun Makhijani and Scott Saleska, *High-level Dollars, Low-level Sense*, Apex Press, New York, 1992.

34. An isotope with a 25-year half-life would retain 6.25 percent of its radioactivity after 100 years.

35. Comprehensive Environmental Response Compensation and Liability Act of 1980, 42 USC 9607(a): "...[T]he owner and operator of a...facility...shall be liable for...all costs of removal or remedial action incurred by the United States Government or a State not inconsistent with the national contingency plan [and] any other necessary costs of response...."

36. 42 USC 9620: "Each department ..of the United States...shall be subject to, and comply with, this Act in the same manner, and to the same extent, both procedurally and substantively, as any nongovernmental entity, including liability under section 107".

37. EPA/DOE, "Interagency Agreement," No. RW89934318-0, signed by Sylvia Lawrence (EPA) and E. Robinson (DOE), November 6, 1989

38. See "The Dirt in the U.S. DOE Cleanup Budget," Heart of America Northwest newsletter, July 1991.

39. Elaine Sciolino, "CIA Chief Says Threat by Ex-Soviets Is Small," *The New York Times*, Jan. 23, 1992, p. A4.

40. Department of Energy Press Conference, December 16, 1992.

41. The unclassified FY93 budget request is not specific enough to distinguish development costs for different weapons.

42. Including the Aircraft Delivered Precision Low-Yield Weapon, the Hypervelocity Aircraft Delivered Weapon, the Tactical High Radio Frequency Weapon, the Maneuvering Reentry Vehicle (MARV) Warhead, and the Strategic High Power Radio Frequency Weapon. DOE FY 1993 Congressional Budget Request, Vol. 1, p. 37.

43. The FY 1993 DOE budget request is not specific enough to distinguish development costs for different weapons.

44. New designs include "low yield advanced electromagnetic radiation (EMR) weapons to disable adversaries communication, intelligence, command and control functions with little or no collateral damage; stealthy weapons for use with stealth aircraft; highly accurate, smart, advanced earth penetrators for deeply buried command and control facilities or third world delivery systems." DOE FY 1993 Congressional Budget Request, Vol. 1, pp. 34-35.

45. Interview with Department of Energy budget staff, Feb. 26, 1992.

46. DOE FY 1993 Congressional Budget Request, Project Data Sheets, p. 120.

47. "U.S. Wants K Reactor to be Tested," *Atlanta Journal- Constitution*, Feb 29, 1992, p. A2.

48. DOE FY 1993 Congressional Budget Request, Project Data Sheets, p. 277.

49. *Nuclear Materials: Decreasing Tritium Requirements and Their Effect on DOE Programs*, U.S. General Accounting Office, February 1991, p. 2.

50. Kunreuther, H., et al, "Public Attitudes Toward Siting a High-level Nuclear Waste Repository in Nevada," *Risk Analysis*, vol 10, #4, 1990, p 469.

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