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The Hanford Nuclear Waste Site: A Legacy of Risk, Cost, and Inefficiency

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ABSTRACT

Since the cessation of plutonium production in 1987, the Hanford Nuclear Waste facility has been the site of the largest and most expensive environmental cleanup project in history. Without prior knowledge of the dangers associated with chemical and radiological wastes, the Department of Energy disposed of millions of gallons of these wastes directly into the soil and the nearby Columbia River. Faced with this enormous burden, the federal government has adopted a new cleanup strategy to accelerate the remediation process and reduce excess spending. However, critics argue that these efforts jeopardized both personal and environmental safety, and the federal and local governments have often been locked in dispute over the proper course of cleanup action to pursue. The result of these conflicting interests has been the most expensive and arguably most inefficient cleanup project in environmental history.

I. INTRODUCTION

In 2004, the U.S. Department of Energy (DOE) will spend over $2 billion[1] to remediate the Hanford nuclear reservation—the nation's largest existing federal nuclear waste storage site.[2] Located in southeastern Washington State, the Hanford site served as one of the nation's dumpsters for radioactive materials produced during the Manhattan Project and throughout the nuclear arms race that accompanied the ensuing Cold War.[3] With limited knowledge of the dangers associated with radioactive waste, DOE officials at Hanford disposed of millions of gallons of highly radioactive materials directly into the soil.[4] Today, large quantities of these radioactive substances

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1. U.S. DEP'T OF ENERGY, PUB. NO. RL-2002-47 REV. D, PERFORMANCE MANAGEMENT PLAN FOR THE ACCELERATED CLEANUP OF THE HANFORD SITE, B-2 (Aug. 2002), *available at* http://www.hanford.gov/docs/hpmp/index.html (last visited Apr. 24, 2004).
2. See C. Wu, *Radiation Helps Break Down Toxic Waste*, 155 SCI. NEWS 229 (1999).
3. *Id.* at 3.
4. *Id.* at 4.

have been detected in the ground water beneath the site, contaminating the water that feeds the Columbia River.[5] Faced with this enormous threat to personal and environmental safety, the federal government is now struggling with financing and implementing the estimated 50-year, $60 billion remediation plan—the largest and most expensive environmental cleanup project in history.[6]

Amidst a myriad of political, economic, and environmental challenges that accompany the cleanup effort, the federal government is struggling to appropriate funds in a manner that both provides a reasonable reduction of personal and environmental risk and remains economically feasible. This article provides a history of the Hanford legacy, an analysis of the DOE's accelerated cleanup and long-term stewardship initiatives, and the specific risks and costs associated with remediation. I will argue that external oversight of DOE practices is necessary to ensure a safe and effective cleanup, and that the primary causes for the project's high degree of inefficiency are DOE mismanagement and the existence of a conflict in cleanup incentives between the local and federal government.

II. BACKGROUND

The Department of Energy's (DOE) Hanford site is a 560-square-mile nuclear reservation located in southeastern Washington state, 35 miles north of the Oregon border. The Columbia River flows through the northern portion of the site and forms much of its eastern boundary (see Appendix, Figure 1). Approximately 175,000 people live directly downstream, centered in and around the cities of Kennewick, Pasco, and Richland, and the site is located 215 miles upstream from Portland, Oregon. Chosen in 1943 by the U.S. Army Corps of Engineers for the Manhattan Project, the Hanford site was used to produce plutonium for the world's first nuclear weapons.[7] Between 1944 and 1987, Hanford continually expanded its operations and came to play a pivotal role in the nation's defense, accounting for approximately 74 tons of plutonium for the U.S. nuclear weapons arsenal (which is almost two-thirds of the total plutonium production for use by the federal government).[8] Furthermore, the DOE estimates that past practices at Hanford are

5. *Id.* at 3.

6. *Id.* at B-2.

7. U.S. GEN. ACCT. OFF., PUB. NO. RCED-98-80, NUCLEAR WASTE: UNDERSTANDING OF WASTE MIGRATION AT HANFORD IS INADEQUATE FOR KEY DECISIONS 4 (Mar. 1998), *available at* http://www.gpoaccess.gov/gaoreports/advanced.html (last visited Apr. 24, 2004).

8. U.S. DEP'T OF ENERGY, *supra* note 1, at 3.

responsible for approximately 40 percent of the total human-made radioactivity across the entire former defense nuclear weapons complex in the United States, or 400 million of the total one billion curies[9] of radioactivity produced.[10]

During its years of production, the Hanford site was divided into several areas of operation (see Appendix, Figure 2). The four operational districts that are most relevant to this analysis are the 100 Areas, 200 East and 200 West, the 1100 Areas, and the 300 Area, as they are the four distinct regions of Hanford listed on the U.S. Environmental Protection Agency's (EPA) National Priorities List (NPL) of Superfund sites.[11] The 100 Areas, which are located immediately adjacent to the Columbia River, contain Hanford's nine decommissioned (though yet to be decontaminated) reactors, while the 200 East and 200 West sites house Hanford's chemical separations facilities and the underground tank farms[12] used to store waste.[13] The 1100 Area was the center of Hanford's support services, including maintenance facilities and vehicle service stations, and the 300 Area was primarily used to conduct fuel fabrication operations and other research and development activities.[14]

III. CLEANUP CHALLENGES

During the course of the Hanford site's nearly 50 years of production, separation, and purification of plutonium for the nation's nuclear weapons, the DOE estimates that the Hanford site produced approximately 450 billion gallons of liquid waste.[15] The vast majority of this waste—estimated to be as much as 350 billion gallons—was released directly into the ground (in the 200 Areas) through about 300 cribs,[16]

9. The curie is a unit of radioactivity that corresponds to 3.7×10^{10} disintegrations per second. By comparison, approximately 20 curies of radioactivity were released during the 1979 Three Mile Island incident. Chet Raymo, *Can We Make Amends?*, BOSTON GLOBE, Nov. 23, 1998, at E2, *available at* http://www.boston.com/globe/search/stories/health/science_musings/112398.htm (last visited Nov. 16, 2004).

10. U.S. DEP'T OF ENERGY, *supra* note 1, at 3.

11. U.S. ENVTL. PROT. AGENCY, NATIONAL PRIORITIES LIST SITES IN WASHINGTON, *available at* http://www.epa.gov/superfund/sites/npl/wa.htm (last visited Apr. 24, 2004).

12. The DOE uses the term "tank farm" in reference to the physical grouping of storage tanks at Hanford into clusters. *See* FED'N OF AM. SCIENTISTS, HANFORD SITE TANK FARM, *at* http://www.fas.org/irp/imint/doe_hanford_tank_01.htm (last visited Apr. 24, 2004).

13. *Id.*

14. U.S. DEP'T OF ENERGY, HANFORD SITE TOURS, *at* http://www.hanford.gov/tours/virtual.cfm (last visited Apr. 24, 2004).

15. U.S. GEN. ACCT. OFF., *supra* note 7.

16. A crib is an underground structure designed to allow liquid wastes to percolate to the soil.

ponds, and unlined trenches, while liquid wastes of varying levels of contamination were often pumped directly into the Columbia River.[17] Undoubtedly, the single greatest environmental risk posed by the Hanford site is the contamination of the Columbia River, which, as outlined in part II, runs through 51 miles of the site and forms much of its eastern border. With an estimated 500,000 people locally relying on clean water from the Columbia for drinking, fishing, agriculture, and recreation, and with Oregon residents downstream also dependent on the river for power generation, irrigation, and transport, preventing contamination of the river is paramount.[18] Studies show that these waste releases, though having met then-existing disposal standards, have led to the chemical and radiological contamination, exceeding current standards, of about 270 billion gallons of ground water spread over 80 square miles beneath the site.[19] Additionally, millions of tons of soil adjacent to the Columbia River have also been contaminated by these waste releases.[20]

In addition to these releases directly into the soil and ground water, the DOE is currently storing approximately 54 million gallons of the most radioactive and hazardous waste[21] in 177 underground tanks (see Appendix, Figure 3), which have been arranged into 18 farms, located in the 200 Areas.[22] Many of these storage tanks were built in the 1940s to 1960s and have far exceeded their design life of 10 to 40 years.[23] Hanford's inventory of tanks includes 149 single-shell and 28 double-shell containers,[24] and, according to DOE reports, 67 single-shell tanks

17. U.S. DEP'T OF ENERGY, *supra* note 1, at 3.

18. Press Release, U.S. Dep't of Energy, Radioactive Waste Tank Expert Panel to Meet Late June; Hanford Site Panel Will Review and Analyze Draft Contamination Report (June 8, 1998), *available at* http://www.hanford.gov/press/1998/98-059.htm (last visited Apr. 24, 2004).

19. U.S. DEP'T OF ENERGY, *supra* note 1, at 3.

20. *Id.*

21. The waste in these tanks contributes about 215 million curies to Hanford's inventory of high-level waste. *See* RICHLAND OPERATIONS OFFICE, U.S. DEP'T OF ENERGY, PUB. NO. RL/REG-99-20 REV. 1, *Preface to* REVIEW GUIDANCE FOR THE REVISED STANDARDS APPROVAL PACKAGE FOR CONSTRUCTION AUTHORIZATION (Jan. 2000), *available at* http://www.hanford.gov/osr/documents/reg-99-20.html (last visited Apr. 24, 2004).

22. CH2MHILL—Hanford Group, Inc., PUB. NO. HNF-EP-0182, Rev. 186, Waste Tank Summary Report for Month Ending September 30, 2003 (Oct. 2003) [hereinafter Waste Tank Summary Report].

23. U.S. GEN. ACCT. OFF., PUB. NO. GAO-03-593, NUCLEAR WASTE: CHALLENGES TO ACHIEVING POTENTIAL SAVINGS IN DOE'S HIGH-LEVEL WASTE CLEANUP PROGRAM 6 (June 2003), *available at* http://www.gao.gov/new.items/d03593.pdf (last visited Apr. 24, 2004).

24. The terms "single-shell" and "double-shell" refer to the number of layers of carbon steel encased inside a concrete outer wall.

have leaked over one million gallons of highly radioactive wastes.[25] The DOE acknowledges that these wastes have migrated through the vadose zone, [26] contaminating the ground water that feeds into the Columbia River. These wastes include chromium, nitrates, trichloroethylene, carbon tetrachloride, tritium, technetium-99, uranium, and strontium-90, some of which can remain radioactive for hundreds of thousands of years.[27]

Another primary challenge for the DOE is the approximately 12 tons of plutonium in various separated forms contained in spent nuclear fuel at the K-Reactor Basins (K-Basins). The K-Basins are huge indoor pools that currently house approximately 2300 tons of spent nuclear fuel—80 percent of the remaining irradiated uranium fuel in the DOE's inventory—that was abandoned when fuel reprocessing was halted in 1987.[28] Aside from simply housing some of the most hazardous wastes at Hanford, the K-Basins present a particularly difficult challenge, as they are located adjacent to the Columbia River. The proximity of the K-Basins to the Columbia is particularly unsafe, as an earthquake or other such disaster could potentially crack the pools open, spilling radioactive materials into the water.[29] The effects of a major contamination release into the Columbia River would be devastating; if the waters were to become contaminated, it would be extremely difficult, if not impossible, to retrieve or intercept the contaminants.

IV. REMEDIATION AND THE ACCELERATED CLEANUP

Since the cessation of plutonium production in 1987, the Hanford site has become engaged in the world's largest environmental cleanup program,[30] aimed to rectify the DOE's past mistakes. However, with the completion of the cleanup mission slated for 2070, and with projected costs spiraling to $90 billion, on March 5, 2002, the DOE signed a "Letter of Intent" with the Washington State Department of Ecology

25. U.S. GEN. ACCT. OFF., *supra* note 23; *see also* Waste Tank Summary Report, *supra* note 22.

26. The vadose zone is the area above the water table, comprised of soil and rocks, that DOE incorrectly assumed would be a sufficient barrier to hazardous wastes reaching the ground water.

27. U.S. DEP'T OF ENERGY, *supra* note 1.

28. *Id.*

29. While it is unclear whether or not the K-Basins were specifically designed to withstand such a catastrophe, the general trend at Hanford has shown that long-term planning was not adequately considered in the construction of other facilities, such as with the deterioration of storage tanks.

30. BECHTEL CORP., HANFORD'S ENVIRONMENTAL RESTORATION PROGRAM, *available at* http://www.bechtel.com/ppHanford.htm (last visited Oct. 5, 2004).

(Ecology) and the EPA to cooperatively develop approaches to accelerate cleanup of the Hanford site. As a result of this agreement, in August 2002 the DOE submitted to the Office of Management and Budget (OMB) a comprehensive *Performance Management Plan for the Accelerated Cleanup of the Hanford Site* (*Performance Management Plan*),[31] endorsed by Ecology and the EPA to expedite the slow-moving, high-priced remediation. Targeting specific areas in need of improvement, the DOE's *Performance Management Plan* states, "We believe we can accelerate the completion of the...cleanup mission from 2070 to 2035, and possibly to 2025, by reducing excess conservatism, substantively changing our technical strategy and management approach, and making new front-end investments."[32] By pursuing these objectives, the DOE believes that it can eliminate at least 35 years and $30 billion and restore over 500 square miles more of the active portions of the site.[33]

According to its *Performance Management Plan*, the DOE's current cleanup efforts are now focused on three primary outcomes: (1) restoring the Columbia River corridor for other uses, (2) transitioning the Central Plateau—a raised section of the 200 Areas—to long-term waste treatment and storage, and (3) preparing for the future.[34] In order to attain these goals—and to combat the cleanup challenges discussed in section III—the DOE has developed six strategic initiatives that "accelerate cleanup, reduce risk, and put [the DOE] on the path to completion by 2035."[35] The following is a brief summary of the DOE's Strategic Initiatives:

> 1. Restoring the Columbia River Corridor by reducing risk to the river and shrinking Hanford site operations.
>
> 2. Taking near-term actions to ensure that the tank waste program ends by 2033 with closure of the double-shell tank farms.
>
> 3. Accelerating the cleanup of the K-Basins, stabilization of remaining plutonium, and demolition of the Plutonium Finishing Plant. Also, evaluating the benefits of moving high-radiation-level cesium and strontium capsules to secure dry storage.

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31. U.S. DEP'T OF ENERGY, *supra* note 1.

32. *Id.* at 1.

33. These savings estimates have since been amended. One 2003 DOE estimate lists savings at $14.5 billion. *See* U.S. GEN. ACCT. OFF., *supra* note 23.

34. U.S. DEP'T OF ENERGY, *supra* note 1.

35. *Id.* at ii.

4. Accelerating treatment and disposal of mixed low-level waste and retrieval and shipment of transuranic waste offsite ahead of current plans.

5. Using grouping strategies to clean up the Central Plateau's excess waste facilities and non-tank-farm waste sites.

6. Protecting groundwater by removing or isolating important contaminant sources on the Central Plateau, remediating the contamination sources exterior to the Central Plateau core zone, reducing the conditions that have the potential to drive contaminants into the groundwater, treating the ground water, and integrating all site monitoring requirements.[36]

The DOE believes that by moving all low-level wastes to be stored at Hanford to the Central Plateau in the 200 Areas, it can reopen over 85 percent of the site to unrestricted uses in the long run. Some of these uses include restoration of Native American ceremonial sites,[37] the development of a regional transportation and industrial center in the 1100 Area, and the utilization of Hanford's natural resources such as minerals, natural gas, and prehistoric archeological sites.[38]

V. LONG-TERM STEWARDSHIP

In accordance with its acceleration of the Hanford cleanup, the DOE is currently developing guidelines that will define the future landscape of the Hanford site after the remediation process is complete. The DOE developed the Hanford Long-Term Stewardship Program (LTS) with the stated purpose, as defined in its mission statement, of "[providing] for continuous human and environmental protection, and the conservation and consideration of use of the biological, natural, and cultural resources, both during and following the completion of the cleanup mission."[39] In particular, "long-term stewardship" at Hanford consists of three elements: management of risk, management of site

36. *Id.*

37. Telephone Interview with Mike Wilson, Washington Dep't of Ecology (Dec. 29, 2003).

38. U.S. DEP'T OF ENERGY, HANFORD LONG-TERM STEWARDSHIP PROGRAM: INTEGRATING ACCELERATED SITE CLEANUP COMPLETION WITH LONG-RANGE POST-CLEANUP PLANNING, Doc. No. HNF-12254 REV A WORKING DRAFT (Sept. 2002), *available at* www.hanford.gov/docs/hnf-12254/HNF-12254.pdf (last visited Apr. 25, 2004).

39. *Id.*

resources, and reuse. The first element—the management of risks—refers to human health, ecological, and cultural risks associated with any remaining contamination that will exist after remediation is complete. The second element—management of site resources—refers to Hanford's cultural, biological, and natural resources, many of which have been set aside and protected for nearly 60 years as a result of the site's existence. Finally, the third element—reuse—refers to the reuse of the site's assets, as land, facilities, technologies, and skilled personnel are no longer necessary to support Hanford missions.[40]

While the LTS Program focuses on reuse and the management of risks and site resources as described above, one purpose of developing the LTS Program now is that it allows the DOE to define and implement a program that will enable it to prepare for and satisfy (or transfer, as appropriate) its post-cleanup obligations when they arise. These obligations include the management of residual contamination that will remain below soil covers, disposal sites covered by engineered caps,[41] and the significant amount of contaminated ground water that will persist after remediation is complete.[42] Though the surface footprint of Hanford will shrink considerably, at the conclusion of the cleanup program, residual contamination will undoubtedly remain. It is in these areas that the success of the LTS Program is critical to ensure that the goals established in its mission statement are achieved.

VI. CLEANUP AUTHORITIES AND THE TRI-PARTY AGREEMENT

While the DOE is responsible for administering the closure of Hanford, multiple federal and state authorities govern the cleanup of environmental contamination and the management of radioactive and hazardous wastes at the site. The authority that applies to a specific action determines whether the federal government or the state is responsible for overseeing the action to ensure compliance.[43]

The primary statute that applies to the cleanup of past contamination at Hanford—and especially those areas placed on the EPA's National Priorities List—is the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA,

40. *Id.*

41. Caps are engineered ecological structures that cover contaminated areas and prevent contaminants from reaching the surface.

42. U.S. DEP'T OF ENERGY, *supra* note 38.

43. Memorandum to Sen. Ron Wyden, Environmental Cleanup at the Hanford Nuclear Facility (Nov. 25, 2003).

commonly referred to as Superfund).[44] While the EPA typically leads the oversight of response actions taken under CERCLA, the DOE implements the actions itself through use of private contractors.[45] In addition to CERCLA, the Resource Conservation and Recovery Act of 1976 (RCRA)[46] also applies to cleanup of past contamination. However, the RCRA specifically applies to areas in which waste disposal facilities have been operated, or are operating, with permits issued under that statute. As is common in many other states, the EPA has delegated its oversight of RCRA cleanup actions—including those taken at Hanford—to the State of Washington, to be administered by the Washington Department of Ecology. Furthermore, this Department oversees compliance at Hanford with other applicable state regulations,[47] such as the Washington Hazardous Waste Management Act.[48] Lastly, while the DOE is in charge of implementing the cleanup under the regulatory regime described above, it is also subject to requirements for the management of radioactive materials under the Atomic Energy Act of 1954.[49]

In order to specify the requirements that the DOE must satisfy in order to achieve compliance with the applicable regulatory regime, the DOE, the EPA, and the Washington State Department of Ecology signed the *Hanford Federal Facility Agreement and Consent Order*[50] on May 15, 1989, commonly referred to as the Tri-Party Agreement (TPA). The primary objectives of the TPA are achieving compliance with CERCLA's remedial action provisions, and with RCRA's treatment, storage, and disposal unit regulations, and corrective action provisions.[51] Furthermore, the TPA establishes legally binding deadlines for the completion of specific actions, defines and ranks cleanup commitments, and provides the basis for aggressively achieving full regulatory compliance and remediation.[52]

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44. 42 U.S.C. §§ 9601-9675 (2000). *See especially* 42 U.S.C. § 9620 (2000) (making federal agencies subject to CERCLA to the same degree as private entities).

45. For a list of the major contractors and the actions they perform, refer to DOE's Hanford website at http://www.hanford.gov/top/whowho.html (last visited Apr. 24, 2004).

46. 42 U.S.C. §§ 6901-6992 (1994). *See especially* 42 U.S.C. 6961 (1994) (making federal agencies subject to RCRA to the same degree as private entities).

47. Telephone Interview with Mike Wilson, *supra* note 37.

48. WASH. REV. CODE ANN. § 70.105 (West 2004).

49. 42 U.S.C. §§ 2011-2097 (1996).

50. U.S. DEP'T OF ENERGY, U.S. EPA & WASH. STATE DEP'T OF ECOLOGY, HANFORD FEDERAL FACILITY AGREEMENT AND CONSENT ORDER 89-10 (as amended through Sept. 2003), *available at* http://www.hanford.gov/tpa/coverpg.htm (last visited Apr. 24, 2004).

51. *Id.*

52. *Id.*

Because it is a legally binding agreement, any alterations to the TPA allowing different response actions to be taken, or that would alter the time frame for the completion of remediation, must be negotiated among all three parties. However, given the complexity of the cleanup effort, the TPA is revised periodically in response to improved remediation technologies or threats of exposure. As a result, the TPA is a "living" document.

In order to accomplish its stated objectives, the TPA uses its power to delegate remediation responsibilities at the Hanford site. The assignment of cleanup tasks is primarily divided among three organizations within the DOE's Richland Operations Office: (1) the Tank Waste Remediation System (TWRS) project office is responsible for managing and cleaning up the single- and double-shell tanks; (2) the Environmental Restoration unit is responsible for cleaning up closed facilities and the vadose zone, which is under the hundreds of inactive liquid waste facilities such as ponds, trenches, and cribs; and (3) the Waste Management unit is responsible for stored and newly generated wastes, along with related operational facilities. In charge of directing and implementing policy for these three organizations is the DOE's Assistant Secretary for Environmental Management.[53]

VII. MILESTONES

While the DOE has remediation efforts slated for completion by 2035, several key milestones are scheduled to occur much sooner. These benchmarks include the TWRS's first tank waste retrieval and closure demonstration in 2004 (and the closing of all remaining tanks by 2033); the complete removal of K-Basin spent nuclear fuel, sludge, debris, and water by 2006; and the completion of the Columbia River Corridor cleanup by 2012.[54] However, while the purpose of these new milestones is to expedite the cleanup process, the TPA has repeatedly been hampered in past remediation efforts due to technically flawed, impractical, and mistaken original provisions that led to frequent amendment and renegotiation. As a result, the TPA has failed to fulfill a number of its legally binding commitments.

For example, one of the TPA's most important milestones—the commencement of waste retrieval from single-shell tanks by 1997—was plagued by criticism of its planned waste transfer methods (the local government felt the practice was unsafe for workers and presented an unacceptable environmental risk). These criticisms halted the waste

53. *See generally* U.S. GEN. ACCT. OFF., *supra* note 23.

54. For a more comprehensive list of DOE milestones, see Appendix, Table 1 *infra*.

transfer process, prompted the conducting of numerous new safety studies, added to the total cost of remediation, and set off a spiral of delays and missed TPA milestones.[55] As a result of such conflicts, many of these "enforceable milestones" have proven not to be as enforceable as the TPA suggests.

VIII. LEGAL AND TECHNICAL CHALLENGES TO ACCELERATED REMEDIATION

While the purpose of the accelerated cleanup plan for Hanford is to reduce costs and shorten the length of the remediation process, many of the methods used by the DOE to attain these goals raise a host of legal and technical challenges. The most controversial aspect of the accelerated plan involves the DOE's belief that it has the regulatory authority to reclassify high-level wastes at Hanford as "low-level" or "incidental" waste. In 1999, the DOE issued an internal policy on the reclassification of high-level wastes at Hanford—Order 435.1—calling for the separation of the existing wastes into two main streams.[56] One stream, the high-level portion, will contain 90 percent of the radioactivity, but only a small portion of the waste volume; the other stream, the low-level portion, will contain less than ten percent of the total radioactivity, but the vast majority of the waste volume.

Once separated, the DOE plans to treat each waste stream according to its level of radioactivity, whereas previously all wastes at Hanford were subject to "high-level" waste regulations.[57] After separation, the DOE plans to permanently dispose of the high-level portion of the separated waste in a geologic repository developed pursuant to requirements of the Nuclear Waste Policy Act of 1982.[58] The remaining low-level portion would be immobilized and permanently stored on site.[59]

The primary legal challenge to the DOE's accelerated plan has been centered on the DOE's authority to make these waste reclassification determinations. In March 2002, the Natural Resources

55. Further analysis of poor project management and planning practices will be provided in Part VIII *infra*.

56. *See generally* U.S. DOE, RADIOACTIVE WASTE MANAGEMENT MANUAL, M 435.1-1 (July 9, 1999), *available at* http://www.directives.doe.gov/pdfs/doe/doetext/neword/435/m4351-1c1.pdf (last visited Apr. 24, 2004); U.S. DOE, IMPLEMENTATION GUIDE FOR DOE M 435.1-1, G 435.1-1 (July 9, 1999), *available at* http://www.directives.doe.gov/cgi-bin/explhcgi?qry1850731058;doe-184 (last visited Apr. 24, 2004).

57. *See generally* U.S. GEN. ACCT. OFF., *supra* note 23.

58. 42 U.S.C. §§ 10,101-10,270 (2000).

59. U.S. GEN. ACCT. OFF., *supra* note 23.

Defense Council (NRDC) filed a lawsuit challenging the DOE's authority to manage its wastes through the incidental waste process, and claimed that the DOE violated the Nuclear Waste Policy Act by promulgating Order 435.1. In *NRDC v. Abraham*,[60] the NRDC argued that the Nuclear Waste Policy Act defines all wastes originating from the reprocessing of spent nuclear fuel as high-level waste and requires that such wastes be managed in accordance with high-level waste regulations.[61] The U.S. District Court for Idaho ruled that the DOE violated the Nuclear Waste Policy Act by differentiating its wastes according to level of radioactivity. This decision dealt a major setback to the DOE's accelerated remediation plan.[62] Following the recommendations of the General Accounting Office (GAO), the Secretary of Energy has since requested that Congress enact legislation clarifying DOE authority in determinations on waste incidental to reprocessing at the Hanford and other DOE sites.[63]

The DOE's acceleration initiative also faces key technical challenges regarding the physical process used to separate the various components of the waste. Waste separation is an extremely complex process to begin with, involving a sequential procedure of filtering and extracting each major high-level waste contaminant from the tank waste. Furthermore, the waste separation process involves designing, building, and operating one-of-a-kind separations processes and facilities at Hanford.[64] Currently, the DOE is approximately five years from completion of its comprehensive waste treatment plant, which will contain a pre-treatment waste separations component and both low-level and high-level vitrification facilities.[65]

However, of greater concern than the complexity of the process itself is the fact that officials at Hanford are basing their accelerated cleanup initiative on separation technologies that will be untested prior to implementation. In order to save time and to avoid the expenses associated with building testing facilities, DOE managers at Hanford decided to forego these preliminary steps and invest millions of dollars in untested and unproven waste-separating technologies.[66] Developers and contractors of the new Hanford facilities have identified numerous technical uncertainties and have requested that the DOE take

60. *Id.*
61. Natural Res. Def. Council v. Abraham, 271 F. Supp. 2d. 1260 (D. Idaho 2003).
62. *Id.*
63. Shawn Terry, *DOE Seeks Nuclear Waste Clarification to Reaffirm HLW Disposal Strategy*, 28 NUCLEAR FUEL 14 (2003).
64. U.S. GEN. ACCT. OFF., *supra* note 23.
65. Telephone Interview with Mike Wilson, *supra* note 37.
66. U.S. GEN. ACCT. OFF., *supra* note 23.

appropriate measures to address these issues. For example, in response to concerns about potential operational problems with the waste separation process, in April 2002, Hanford's construction contractor proposed building a pilot facility to perform integrated tests prior to completion of the full-scale facilities.[67] The estimated cost of the pilot test facility was $6-$12 million.[68] Furthermore, experts from the National Research Council and a variety of research organizations, universities, and private institutions uniformly held that performing integrated testing specific to Hanford was an essential preliminary step for the DOE. However, the DOE's Office of River Protection ignored these recommendations and instead opted to accept the higher-risk approach. In fact, the DOE does not plan to fully test the process until the new, fully-operational facilities are constructed. A June 2003 GAO report on the DOE warned of the potential consequences of such action, noting, "if separation processes at Hanford do not work as planned, facilities will have to be retrofitted, and potential cost increases and schedule delays can be much greater than those associated with integrated process testing in a pilot facility."[69]

The decision to forego testing is especially ironic when considering that the DOE's *Performance Management Plan* explicitly states that the DOE aims to achieve accelerated remediation in part through "making new front-end investments."[70] However, when presented with the opportunity to make a relatively small front-end investment—small in comparison with the costs of retroactively fixing a flawed operations process—the DOE declined.

The DOE's lack of concern for the risks associated with its waste treatment program is particularly alarming considering that the DOE has had to significantly alter, and in some cases abandon, past projects based on unproven technologies. For example, the DOE invested $500 million over nearly 15 years to develop a similar waste separations process for its Savannah River site, located in South Carolina.[71] However, due to inadequate testing, unforeseen complications arose, leading to significant cost increases, schedule delays, a full-scale facility that did not work, and a sub-par waste treatment operation with no viable separation process.[72] Savannah River is currently taking steps to correct these errors and implement new waste separation technologies at an additional cost of

67. *Id.*
68. *Id.*
69. *Id.*
70. U.S. DEP'T OF ENERGY, *supra* note 1, at 1.
71. U.S. GEN. ACCT. OFF., *supra* note 23.
72. *Id.*

$1.8 billion and a delay of nearly seven years.[73] Despite such examples, DOE officials at Hanford are currently following the same risk-plagued path taken at Savannah River.

IX. CLEANUP RISKS

Due to the nature of the Hanford cleanup, there are undoubtedly numerous risks to worker health associated with remediation. However, these risks have been exacerbated by new safety standards adopted in conjunction with the DOE's accelerated cleanup initiative. According to the Government Accountability Project (GAP), which advocates on behalf of many Hanford employees, since the implementation of the accelerated cleanup initiative, GAP has represented over 100 cases of worker safety complaints.[74] Thus, while the cleanup of environmental contamination is inherently a "dirty job," the past six to eight months have seen worker health-related incidents skyrocket at an alarming rate.[75]

Since remediation practices began in 1987, there have been a variety of reports of personal safety risks to Hanford workers. Over the years, one of the greatest and most publicized risks to worker safety has been the possibility of explosion resulting from the buildup of highly flammable hydrogen gas within the underground storage tanks.[76] Although none of the 177 tanks has technically exploded, there have been a series of reports describing fluctuations in tank size, gas releases of severe intensity, and compromising of the structural integrity of several containers.[77] In an attempt to reduce risk associated with tank wastes, the DOE has implemented several strategies to help improve both worker and environmental safety, such as the installation of a mixing pump in one of the storage tanks in 1993 and the installation of ventilation systems to prevent the buildup of hydrogen and other gases in the tanks.[78] In addition, between Fiscal Year 1999 and Fiscal Year 2001,

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73. U.S. GEN. ACCT. OFF., NUCLEAR WASTE: PROCESS TO REMOVE RADIOACTIVE WASTE FROM SAVANNAH RIVER TANKS FAILS TO WORK, GAO/RCED-99-69 (Apr. 30, 1999).

74. Telephone Interview with Clare Gilbert, Policy Associate, Gov't Accountability Project (Dec. 29, 2003).

75. Gov't Accountability Project, Knowing Endangerment: Worker Exposure to Toxic Vapors at the Hanford Tank Farms (Sept. 2003).

76. *Id.*

77. Press Release, U.S. Dep't of Energy, DOE to Investigate Rise in Surface Level of Hanford Waste Tank (Mar. 24, 1998), *available at* http://www.hanford.gov/press/1998/98-017.htm (last visited Apr. 30, 2004); Waste Tank Summary Report, *supra* note 22.

78. Press Release, *supra* note 77.

the DOE's Office of River Protection reported the deployment of 22 separate technologies relevant to tank waste management.[79]

Although officials at Hanford believe that the risk of tank explosion has been adequately addressed, officials at GAP report that current DOE practices and oversight deficiencies have in fact allowed this threat to persist.[80] For example, one tank containing wastes in the BY Tank Farm[81] was recently classified as inactive and placed on standby with its vents closed, despite the fact that the vents work to prevent buildup of gases such as hydrogen.[82] Workers were sent to open the tank two to three weeks later and were overcome by severe gas releases that had built up in the unventilated tank, causing the hospitalization of several workers.[83] According to officials at GAP, such instances at Hanford are becoming the norm, not the exception.[84]

While the threat of tank explosion was one of the most prominent threats to worker safety in the early 1990s, currently the biggest threat to worker safety at Hanford is exposure to toxic vapors. According to GAP's September 2003 report, *Knowing Endangerment: Worker Exposure to Toxic Vapors at the Hanford Tank Farms*, between January 2002 and August 2003 there were at least 45 documented chemical vapor exposure incidents involving over 67 workers requiring medical attention (as well as an additional 75 complaints caused by tank vapors).[85] This is in sharp contrast with the 16 exposure events requiring medical attention that occurred in the first 55 months of remediation (from July 1987 to January 1992), and amounts to a 750 percent increase in the rate of significant chemical exposures.[86]

The health effects resulting from exposure to these tank vapors include nosebleeds, persistent headaches, tearing eyes, burning skin and lungs, coughing, difficulty breathing, sore throats, dizziness, nausea, and increased heart rate.[87] However, the most serious health impacts are more long term in nature. A 1997 draft report conducted by the DOE's Pacific Northwest National Laboratory (PNNL) assessed the risk of

79. OFFICE OF RIVER PROTECTION, U.S. DEP'T OF ENERGY, FY 2002 INTEGRATED TECHNOLOGY PLAN FOR THE RIVER PROTECTION PROJECT (Feb. 1, 2002).
80. Telephone Interview with Claire Gilbert, *supra* note 74.
81. One of Hanford's 18 tank farms.
82. Telephone Interview with Claire Gilbert, *supra* note 74.
83. *Id.*
84. Gov't Accountability Project, *supra* note 75.
85. *Id.* at 7.
86. *Id.* at 9.
87. *Id.* at 7.

contracting cancer from exposure to these chemical vapors to be as high as 1.6 in ten.[88]

The positive correlation between this drastic increase in worker exposure to tank vapors and the implementation of the DOE's accelerated remediation plan is particularly alarming, considering that the most important objective to the DOE, as stated in its *Performance Management Plan*, is the protection of human health.[89] However, according to officials at GAP, the problem of increased worker exposures is not simply the result of a series of isolated events; it is the result of a larger, institutional problem, beginning with how the DOE addresses its cleanup requirements.[90] With the adoption of its new accelerated cleanup initiative emphasizing a faster, cheaper cleanup, the DOE has adopted the de facto policy of expediency over worker safety. Furthermore, by providing financial incentives for contractors to meet deadlines, the DOE is prioritizing project completion over both worker and environmental safety. For example, recently GAP has received numerous complaints regarding safety risks to workers for Washington Group International (WGI)—a subcontractor of Bechtel National, Inc.—involved in the design and construction of Hanford's new Waste Treatment Plant.[91] Employees at Hanford have reported that WGI's construction workers are digging and building within the highly contaminated Tank Farm regions, without proper protective gear required for workers in these areas.[92] Due to a lack of effective safety protocols and enforcement mechanisms, there is nothing to ensure that a contractor will not place unqualified and unprotected workers in dangerous situations in order to meet its deadlines.

Such safety risks are able to occur because of actions the DOE has taken to ease its safety standards in favor of speed and cost reduction under its accelerated plan. While this increase in worker injuries and chemical exposures should lead the DOE to implement more stringent safety standards, it appears to have had the opposite effect. On October 27, 2003, the DOE removed its existing oversight and safety procedures and replaced them with a new Documented Safety Analysis (DSA) protocol.[93] While the DOE claims its new protocol promotes worker safety, in practice, DSA further reduces the number of administrative controls and safety regulations in place, effectively removing the "red

88. *Id.*
89. U.S. DEP'T OF ENERGY, *supra* note 1.
90. Gov't Accountability Project, *supra* note 75.
91. Telephone Interview with Claire Gilbert, *supra* note 74.
92. *Id.*
93. *Id.*

tape" (safety regulations) that make it more difficult for contractors to meet deadlines and receive their bonuses.[94]

A second complaint regarding the DOE's employment practices at Hanford is that there is no effective external oversight of worker safety. While most companies are subject to the oversight and enforcement of the Occupational Safety and Health Administration (OSHA), this agency has no jurisdiction at Hanford (or at any other DOE sites).[95] The DOE is in charge of overseeing its own practices, ensuring the safety of workers at its own sites, and self-reporting its on-site worker injuries.[96] Periodically the DOE invites OSHA to inspect parts of its operations at Hanford as part of OSHA's Voluntary Protection Program; however, the DOE and its contractors are not subject to OSHA's enforcement authority.[97]

One particularly unfortunate consequence of the DOE's self-regulation is that it produces misleading worker injury statistics. In spite of the 45 documented exposures causing 67 workers to seek medical attention, the DOE's official worker injury rates remain far below the national average, with only 1.6 cases per 100 full-time-equivalent work years in 2002,[98] in comparison with a rate of 5.3 for private industry.[99] According to officials at GAP, however, these statistics are misleading, as they do not account for workers whose sicknesses may not surface for many years (*e.g.*, cancer).[100] Furthermore, the statistics only account for cases reported by the DOE itself and evaluated by the on-site Hanford Environmental Health Foundation (HEHF). GAP officials argue that HEHF management has contributed to skewing the statistics through such practices as:

- Dismissing chemical vapor related symptoms as imagined or the result of allergies;
- Designing policies of automatic referral to a mental health counselor for a host of questionable reasons;
- Shredding and altering patients' progress notes;

94. *Id.*
95. Gov't Accountability Project, *supra* note 75.
96. *Id.*
97. Memorandum, *supra* note 43.
98. *Id.*
99. U.S. DEP'T OF LABOR, BUREAU OF LABOR STATISTICS, INCIDENCE RATES OF NON-FATAL OCCUPATIONAL INJURIES AND ILLNESSES BY INDUSTRY AND CASE TYPES, 2002 (Dec. 18, 2003), *available at* http://www.bls.gov/iif/oshwc/osh/os/ostb1244.pdf (last visited Apr. 23, 2004).
100. Gov't Accountability Project, *supra* note 75.

- Pressuring HEHF health care providers to not write "recordable medical restrictions" for workers;

- Prohibiting patients from having a union steward, friend, or family member accompany them during medical visits.[101]

Additionally, GAP has received complaints that workers who raise concerns and insist on protecting themselves from chemical vapors are denied overtime work, which can comprise over 30 percent of a tank farm worker's annual income.[102] GAP has received reports that these workers have been subject to retaliation, harassment, and taunting by their peers and supervisors, creating an atmosphere that discourages other workers from raising concerns.[103]

As a result of such instances, and the overall failure of the DOE to address safety concerns internally, a movement is currently underway to bring DOE contractors under the direct authority of OSHA. By establishing external oversight and enforcement, workers at DOE sites would at the very least be afforded the same level of safety standards as private sector workers. Studies have been conducted examining how OSHA oversight could be expanded,[104] pilot projects have been tested,[105] and bills have been introduced in Congress to address the oversight issue.[106] Most recently, in the first session of the 108th Congress, Representative Costello of Illinois introduced House Report 1961, providing for the external regulation of nuclear safety and occupational safety and health at the Department of Energy.[107] This bill calls for the elimination of DOE regulatory and enforcement authority at nonmilitary sites such Hanford and grants the Nuclear Regulatory Commission and OSHA safety and health regulatory enforcement.

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101. *Id.* at 2. This list is nearly identical but is not quoted verbatim.

102. *Id.*

103. *Id.*

104. U.S. GEN. ACCT. OFF., UNCERTAIN FUTURE FOR EXTERNAL REGULATION OF WORKER AND NUCLEAR FACILITY SAFETY, GAO/T-RCED-99-269 (July 22, 1999); ALFRED ZUCK ET AL., NAT'L ACAD. OF PUB. ADMIN, ENSURING WORKER SAFETY AND HEALTH ACROSS THE DOE COMPLEX (Jan. 1997).

105. Memorandum, *supra* note 43.

106. *Id.*

107. An act to provide for the external regulation of nuclear safety and occupational safety and health at the Department of Energy, H.R. REP. 1961, 108th Cong. (1st Sess. 2003) (introduced by Rep. Jerry Costello (D-Ill.)).

X. COSTS OF REMEDIATION

From the outset, the institution and operation of the Hanford site was a national project, aimed at providing collective benefits to the entire country through the establishment of a nuclear defense arsenal. Throughout its construction and nearly 50 years of operation, the Hanford site received complete federal funding and was overseen by the DOE.[108] Today, with the focus of the facility having switched from plutonium production to extensive cleanup and remediation, the federal government is still responsible for bearing the entirety of the monetary burden.

Although the figures continue to fluctuate from year to year, complete remediation costs are currently estimated at $50 to $60 billion,[109] with the Tank Waste Remediation System (TWRS) project accounting for $30 billion alone.[110] Over the past several years, the costs of remediation for the Hanford site have steadily increased; in 1998, the DOE received $1.07 billion for cleanup programs at Hanford, compared with $1.78 billion in 2002 and $1.95 billion in 2003.[111] With such soaring costs, the annual process of allocating funds for the site's cleanup is naturally a very complex and hotly contested issue. While the DOE submits a budget in accordance with what it deems as necessary for the fulfillment of its cleanup requirements under the TPA, the amount of money allocated to the DOE by Congress is often much less than requested. This disparity in funding has widespread implications, often making it difficult, if not impossible, for the DOE to meet its established milestones. For example, while the $1.78 billion allotment for 2002 was an increase of $320 million over the previous year, it still fell $56 million short of what DOE calculations indicate was necessary to meet its legal cleanup obligations.[112] As a result, each of the DOE's divisions responsible for specific cleanup procedures was expected to achieve the same level of remediation with less funding than was reportedly needed.

While the costs of the Hanford cleanup continue to increase, President Bush has repeatedly pushed to reduce federal funding for the project. Faced with growing public dissatisfaction with project inefficiency and spiraling costs, Bush's 2002 budget proposal called for a

108. Telephone Interview with Robert Budnitz, Chairman, Nat'l Academy of Sci. Comm. on Buried & Tank Waste (1993–1997) (May 15, 2002).
109. U.S. DEP'T OF ENERGY, *supra* note 1.
110. *Id.*
111. Memorandum, *supra* note 43.
112. *Id.*

$435 million cut for Hanford spending.[113] This attack on Hanford funding met with harsh criticism from numerous members of Congress, especially Washington Senator, and member of the Senate Appropriations Committee, Patty Murray. Senator Murray immediately organized a bi-partisan nuclear cleanup caucus (comprised primarily of other states housing nuclear storage facilities) and was able to counter President Bush's cuts and force a reinstitution of the $435 million into the federal budget.[114] Nevertheless, in the face of continued criticism and project delays, President Bush's 2003 budget proposal again cut Hanford funding (this time calling for a $300 million reduction), in hopes of encouraging the TPA to accelerate and increase the efficiency of the Hanford cleanup process.[115] However, with Senator Murray's help, the Senate rejected the proposed cut and added an additional $433 million to the Hanford budget.[116]

Following this series of intense budget wrangling from 2000 to 2003, in Fiscal Year 2004 the funding arrangement for Hanford underwent significant changes. Beginning in Fiscal Year 2004, the Bush Administration requested an entirely new account structure to support the DOE's accelerated cleanup initiative. This proposal called for the creation of a new Defense Site Acceleration Completion Account from which Hanford funding would be provided, replacing the existing Defense Environmental Restoration and Waste Management Account.[117] As passed by the House and Senate, the conference agreement on the Energy and Water Development Appropriations Act for Fiscal Year 2004 would provide $5.65 billion for this new account, which is nearly $164 million less than the requested $5.81 billion. While the administration requested over $2.0 billion for Hanford in Fiscal Year 2004, the conference report language does not specify whether or not Hanford's funding will be cut as a result of the overall reduced appropriations for the Defense Site Acceleration Completion Account.[118]

113. Telephone Interview with Todd Webster, Press Secretary for Sen. Patty Murray (May 24, 2002).
114. *Id.*
115. *Id.*
116. *Id.*
117. Memorandum, *supra* note 43.
118. *Id.*

XI. ANALYSIS OF THE PROBLEMS ASSOCIATED WITH THE HANFORD CLEANUP

One of the most frustrating realities for policy makers involved in the Hanford cleanup is that it is the most expensive,[119] and arguably the least efficient, project ever conducted by the DOE. At a current cost of over $2 billion a year, and likely to take at least another 20 years to complete, the Hanford remediation has been and, barring a miracle, will continue to be, an excessive drain on Congress's checkbook. While a number of factors contribute to this problem, the principal cause is a conflict of motivation between those who bear the costs and those who bear the risks associated with remediation.

The primary bearers of risk in the Hanford cleanup are the members of the local population in and around the cities of Kennewick, Pasco, and Richland. It is the workers from these communities that are employed at the Hanford site and who have the greatest potential exposure to chemicals and radiation. Additionally, if the Columbia River were to become contaminated, the local citizenry would be forced to suffer both the health and environmental consequences that would ensue. However, though the local populace is clearly at the greatest risk, the community has a distinct lack of desire to expedite the cleanup process. A potential explanation of this apparent divergence from rational thought has been posited by Robert Budnitz, the chairman of the National Academy of Sciences (NAS) former Committee on Buried and Tank Waste (1993–1998). According to Dr. Budnitz, because the dangers accompanying the site are not clear and present, the local citizens feel little pressure to push for immediate cleanup; since nobody can see the direct effects of contamination on the community, the citizens feel little pressure to combat the problem quickly.[120] In other words, if not enough people are getting sick *today* as a result of contamination, the local community sees little reason why it matters if the site is cleaned up in three years or thirty years.[121]

While the people living near Hanford undoubtedly want to see site remediation, the lack of an immediate tangible threat assigns the risk of contamination a lower priority than that of other issues concerning the community. Thus, the decision of whether to expedite or to prolong the cleanup effort flows from a simple evaluation of individual costs and benefits. Prior to the cessation of plutonium production in 1987, Hanford

119. U.S. DEP'T OF ENERGY, *supra* note 1, at 10.

120. Telephone Interview with Robert Budnitz, *supra* note 108.

121. The problems associated with DOE's worker injury reports (discussed in Part IX *supra*) likely contribute to the local citizenry's lack of a sense of urgency.

employed approximately 8000 workers; in contrast, there are currently over 11,000 employees working on the cleanup effort.[122] In an area that has grown alongside Hanford, and has been economically dependent upon it since the beginning of World War II, the shutdown of the facility and completion of the cleanup will certainly bring economic downfall for the surrounding communities. While the remediation efforts are taking place, not only have local communities survived, but they have actually thrived with the cleanup project's creation of over 3000 new jobs. Without any clear and present danger posed by the site, the finite costs associated with the completion of Hanford's cleanup far outweigh the seemingly intangible benefits of remediation.[123]

Though the local communities' incentives for prolonging the cleanup efforts are understandable, they stand in direct conflict with the remediation goals of the federal government. Distinct from the objectives of the local citizenry, Congress's primary aim is to complete the remediation of the Hanford site in both an expedient and cost-effective manner. While safety is publicly stated to be the most important aspect of the Hanford cleanup, Congress also has a strong incentive to reduce the number of yearly billion dollar checks it hands out to the DOE. Thus, from a congressional standpoint, the goal of the federal government is to strike an appropriate balance between the reduction of risk at Hanford and the most economically reasonable remediation plan. However, because of the local economic benefits that accompany a prolonged remediation, coupled with the federal government's bearing of the entire monetary burden for the project, the local government has the incentive to manipulate the availability of federal funding. Thus, while Congress is working with limited resources, making its decisions based on cost-benefit analysis, local governments make their decisions under the assumption of infinite resources. With remediation efforts being paid for with federal funds, the policies that the local government considers to be cost-effective for the community—essentially everything—are often inconsistent with the balance Congress is attempting to strike.

In accordance with this logic, much of the inefficiency that shrouds the Hanford cleanup is a result of the local community's attempt to take advantage of the available federal remediation funds. For example, Congress's primary goal for the Hanford site cleanup is to reduce risks to both people and the environment. However, the local community ideally would like to see the site completely uncontaminated, free of Hanford's footprint (an economically enormous, if not

122. Telephone Interview with Robert Budnitz, *supra* note 108.
123. *Id.*

impossible, task). In the absence of economic responsibility, the only choice the local government has to make is, "Would we prefer to have the site restored to prior greenfield status,[124] or have large portions of the reservation fenced-off and unusable?" In contrast, Congress, working with limited resources, has to decide what degree of remediation provides the correct balance between reducing risks to human health and the environment and the economic costs of these reductions. From a congressional standpoint, clearly the economic burden of returning Hanford to greenfield status far outweighs the overall benefits.[125]

In addition to its attempts to restore Hanford to prior greenfield status, the local population has employed the issue of worker safety as a means for prolonging the cleanup efforts.[126] While the local government idealistically pushes for a zero marker in worker exposure,[127] Congress again turns to cost-benefit analysis to find the level of policy implementation that adequately balances worker protection with economic feasibility. However, because the issue at hand deals with personal health risk, as opposed to land use, the local community has achieved a greater level of success in receiving sympathy in the form of federal funds. While the reasoning behind conducting these studies is valid—the local community is worried about its citizens' exposure to risk—in practice, they have added to the overall inefficiency of the Hanford cleanup. In order to ensure the highest degree of personal safety, the local community has insisted that the federal government conduct repeated studies of all cleanup procedures used and has questioned all aspects of DOE decisions.[128] In doing so, the local government is ensuring that cleanup measures will come as close to the desired zero standard policy as possible, while at the same time adding a hitch to the remediation process, resulting in long delays and higher costs.[129] For example, while certain aspects of the DOE's waste separations plan[130] justly deserve further scrutiny and deliberation, the local citizenry has worked to impede the DOE's progress at nearly every step. In its desire to restore Hanford to prior greenfield status, the local citizenry is ignoring the billions of dollars saved and years of remediation reduced by the DOE's plan to store some low-level wastes

124. Greenfield status refers to land not previously developed beyond that of agriculture or forestry use.

125. DOE currently plans to restore approximately 511 acres, or over 85 percent of the Hanford site.

126. Telephone Interview with Robert Budnitz, *supra* note 108.

127. *Id.*

128. *Id.*

129. *Id.*

130. See Part VIII *supra*.

on site.[131] Concern about unsafe storage practices is valid, but a blanket refusal to accept any on-site storage of low-level wastes simply contributes to the overall inefficiency of the cleanup project.

Working with limited resources, and with annual cleanup costs for Hanford now exceeding $2 billion, it seems logical that Congress would be very concerned with the current level of project inefficiency. However, due to internal politicking and congressional logrolling, Congress has, for the most part, failed to address the issue. Although Congress is in charge of appropriating funds, the process of allocating money for the Hanford cleanup is extremely complex, with every dollar down to the $500,000 mark specifically assigned. To add to the complexity of the issue, each of these specific allocation decisions is, in turn, influenced by the individual special interests of each congressional member. For example, when voting on whether Congress should appropriate funds for the DOE to transport low-level hazardous wastes from Hanford to an out-of-state facility for treatment, Members from Idaho might ask themselves, "Why should we support this proposal? What's in it for us?" Thus, in order to benefit from the proposal, the representatives from Idaho might try to negotiate, promising to vote favorably on this issue on the condition that the waste is shipped to an Idaho treatment facility (an action that would benefit the economy and please their constituents).[132] Unfortunately, accompanying this system of trade-offs is often a great deal of economic inefficiency. While Idaho might only support the proposal if the waste is shipped to its treatment plants, perhaps sending the waste to another state would save the government millions of dollars.[133]

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131. There is no one source that specifically shows that the local citizenry is directly disregarding the costs. This is part of the Budnitz argument and is based on how the local government and local citizenry have reacted to various DOE proposals and actions. One source is *Natural Resources Defense Council v. Abraham*, 271 F. Supp. 2d. 1260 (D. Idaho 2003), in which the plaintiffs include a number of local groups such as the Snake River Alliance, The Confederated Tribes and Bands of the Yakima Nation, and the Shoshone Bannock Tribes. Also, in this case the states of Oregon, Washington, Idaho, and South Carolina participated as amicus curiae. A second source is from a leading Hanford citizen's action group, Heart of America Northwest. This group drafted a response to the DOE's Performance Management Plan, *supra* note 1, explicitly opposing the DOE's plan to permanently store wastes on-site at Hanford, *available at* http://www.heartofamerica northwest.org/reportspubs/hanfordreview.html (last visited Apr. 24, 2004). While none of these sources explicitly states that the local citizenry is disregarding the costs, their actions suggest that these other concerns consistently take precedent over cost-saving measures.

132. Telephone Interview with Robert Budnitz, *supra* note 108.

133. Coincidentally, instead of transporting all of its low-level wastes to existing treatment sites, DOE is constructing a new on-site facility specifically tailored for wastes at Hanford. *See* U.S. GEN. ACCT. OFF., *supra* note 23.

Additionally, Congress is also under enormous pressure to find the proper balance between risk prevention and remediation cost—if Congress errs in either direction, the consequences can be severe. The nature of the threat posed by Hanford is of great concern to the general public. If a member of Congress is portrayed as being in support of reducing cleanup funds, the effects of such negative exposure could be politically devastating—thus, few politicians want to take this risk. At the other end of the spectrum, Congress is expected to allocate funds efficiently and eliminate wasteful spending. If the public becomes disenchanted with the Hanford cleanup effort and believes that there is a great imbalance between the risks involved and the remediation costs, then policy-makers risk alienating their constituents. This age-old quandary is commonly referred to in environmental circles as the "man from Maine" dilemma.[134] The question raised in this scenario is "Why would the man from Maine—who has no direct personal risk of contamination—appropriate his tax dollars to fix something at Hanford?" The simple answer to this question is that the man from Maine benefited from the Hanford site (in the sense that the nation collectively benefited), and, as a result, he feels a sense of financial responsibility for remediation. However, the man from Maine—the skeptical appropriator of funds—ceases to feel a sense of responsibility when the remedy being sought costs far more than the real objective risk. As a result, members of Congress must find an acceptable balance and make appropriations decisions that avoid the risk of being portrayed as tight-fisted or an excessive spender.

XII. CONCLUSION

After nearly a half century of waste management procedures that threatened both personal and environmental safety, the federal government is now faced with a cleanup task more complex than any other remediation project in environmental history. Not only are wastes that were dumped directly into the soil permeating the ground water, but also over one-third of Hanford's storage tanks are leaking, adding to the flow of radioactive substances into the ground water. The risks associated with exposure to these wastes are substantial; the effects of the Columbia River's contamination would not only be devastating to the local community, but would also impact all who live downstream and who depend on the Columbia for their livelihood.

134. Consequently, DOE has no sites in Maine.

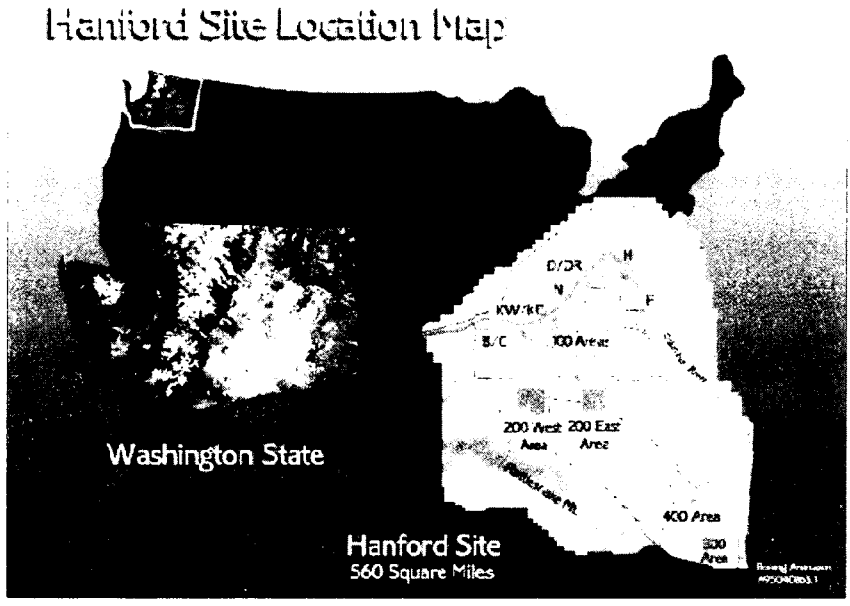
The DOE has taken steps to address these risks in an accelerated fashion but has done so at the expense of the environment and worker health. Improved safety protocols are necessary for the DOE to achieve a safe and effective remediation, and DOE practices over the past six to eight months have made it clear that external oversight and enforcement is needed. Furthermore, to avoid costly mistakes in the future, the DOE needs to place more emphasis on the planning and testing of its waste separations processes prior to construction of treatment facilities.

In the face of these risks, Congress and the local government have often been at odds in regard to goals for remediation. While the federal government wants to ensure the safety of workers and the local citizenry, it also has to counter the challenges and criticism made by those who have to help bear Hanford's cleanup costs. At the same time, the local government is pushing to increase the extent of remediation beyond what is economically feasible for Congress. With so much of the local economy tied up in the remediation effort, the local government has a strong incentive to prolong the cleanup procedure.

The Hanford cleanup project has become a platform for congressional logrolling. Even though the local government and Congress are locked in dispute, they must both counter the influence of special interest groups trying to benefit personally from the cleanup. Diminishing the influence of special interest groups will help to avoid increasing the difficulty of an already complex situation. In the upcoming year, with a new and increased budget from the federal government, the TPA stands ready to fulfill its end of the bargain. However, it remains to be seen whether this increase in funding will result in a safer and more efficient cleanup, or a more costly and prolonged remediation.

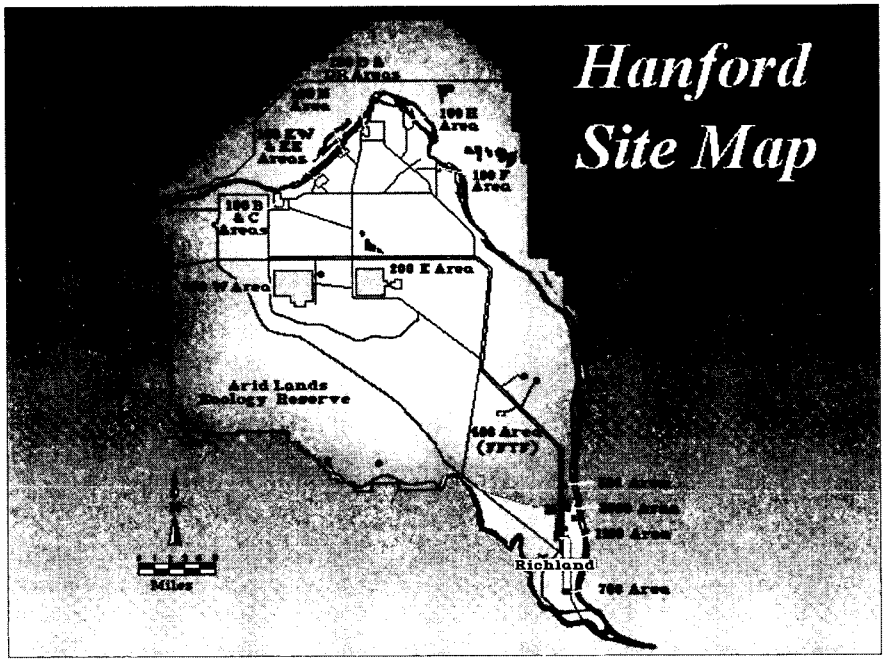
APPENDIX

Figure 1: Location of the Hanford Site



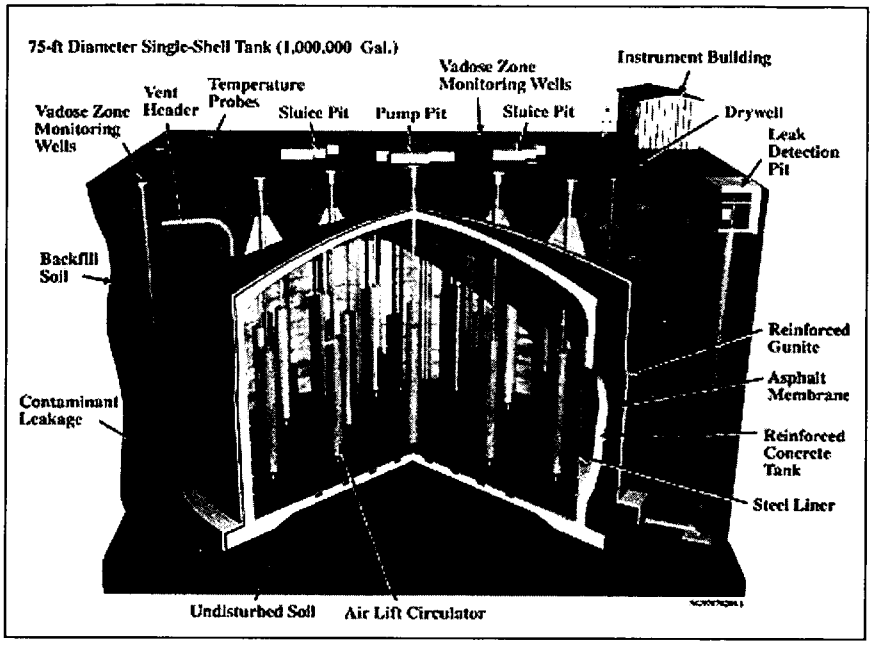
Source: U.S. Dep't of Energy: Hanford Site. Hanford Tours: *Get to Know Us, available at* http://www.hanford.gov/tours/index.cfm.

Figure 2: The Hanford Site



Source: U.S. Department of Energy: Hanford Site, Hanford Tours: *Get to Know Us, available at* http://www.hanford.gov/tours/index.cfm.

Figure 3: Diagram of a Typical Storage Tank



Source: *Hour One: Nuclear Waste*, SCI. FRIDAY (Apr. 3, 1998).

Table 1: Hanford Performance Management Plan Acceleration Goals*

Cleanup Activity	Current Plan	Acceleration Plan
Complete cleanup	2070	2035 (2025?)
Start tank closure	2012[a]	2002
Initiate Plutonium Finishing Plant (PFP) plutonium deinventory	2009	2003
Establish the site-wide Integrated Groundwater Protection Program	NA[b]	2003
Complete first tank waste retrieval and closure demonstration	2014	2004
Demonstrate supplemental tank waste technologies	NA	2004
Complete PFP plutonium deinventory	2014	2005
Retrieve, assay, and disposition 15,000 drums of buried suspect transonic waste	2010	2006
Complete removal of K Basin spent nuclear fuel, sludge, debris, and water	2007[g]	2006
Move cesium and strontium capsules into try storage	NA	2008[c]
Treat 14,000 cubic meters of mixed low-level waste	2012	2008
Demolish PFP	2016	2009
Achieve Waste Treatment Plant full performance	2018	2010
Complete U Plan regional closure	2025	2011
Initiate shipments of cesium/strontium capsules to national geologic repository	2040	2012
Complete River Corridor cleanup	2037	2012[e]
Complete remediation of high-risk waste sites[e]	2012	
Disposition all contact-handled legacy TRU[d]	2027	2015
Complete closure of 60 to 140 single-shelled tanks[h]	2024	2018
Complete tank waste treatment	2048[f]	2028
Active portion of site	586 sq. miles (1158 sq. km)	~75 sq. miles (194 sq. km) by 2012
Approximate Cost	$90 billion	$50–$60 billion

* U.S. DEP'T OF ENERGY, PUB. NO. RL-2002-47 REV. D, PERFORMANCE MANAGEMENT PLAN FOR THE ACCELERATED CLEANUP OF THE HANFORD SITE, B-2 (Aug. 2002), *available at* http://www.hanford.gov/docs/hpmp/index.html (last visited Apr. 24, 2004).

[a] Current Tri-Party Agreement target date.

[b] Agencies have recently agreed to establish a new site-wide Integrated Groundwater Protection Program.

[c] Benefits of dry storage and disposal options to be evaluated in FY 2003.

[d] Remote-handled and large-item TRU will require processing through the M-91 facility. This will occur after 2015.

[e] Several discrete projects in the river corridor will not be completed by 2012. The 618-10 and 618-11 burial grounds will be completed by 2018; several active facilities in the 300 Area related to the Pacific Northwest National Laboratory (PNNL) remain operational; the reactor cores in Interim Safe Storage are pending final disposition; ongoing groundwater remedies. The Fast Flux Test Facility is not yet part of the EM cleanup mission and is not included in this initiative.

[f] 2048 represents current DOE projection; the TPA date is 2048.

[g] Current TPA milestone is July 31, 2007.

[h] The number of tanks depicted here represents a DOE goal and does not represent agreement with the Washington State Department of Ecology.