

Peter S. Winokur, Chairman  
Jessie H. Roberson, Vice Chairman  
John E. Mansfield  
Joseph F. Bader  
Larry W. Brown

**DEFENSE NUCLEAR FACILITIES  
SAFETY BOARD**

Washington, DC 20004-2901



September 10, 2010

The Honorable Steven Chu  
Secretary of Energy  
U. S. Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585

Dear Secretary Chu,

The Defense Nuclear Facilities Safety Board (Board) is pleased to enclose a copy of our first periodic Report to Congress on Infrastructure Needs in the Department of Energy's Aging Defense Nuclear Facilities. The Board has fashioned this report after its Quarterly Report to Congress on the Status of Significant Unresolved Issues with the Department of Energy's Design and Construction Projects. The Board believes this report provides an appropriate means to keep all parties apprised of the Board's concerns regarding aging DOE defense nuclear facilities. As such, the Board intends to issue this report to Congress and DOE on a periodic basis—once per year or more frequently, if warranted.

Sincerely,

Peter S. Winokur, Ph.D.  
Chairman

Enclosure: as stated

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To the Congress of the United States:

The Department of Energy (DOE) continues to rely on aging facilities to carry out hazardous production missions. Examples of this persistent problem include the 9212 Complex at the Y-12 National Security Complex (portions of which are more than 60 years old), the Chemistry and Metallurgy Research (CMR) Facility at Los Alamos (55 years old), and the first high-level waste tanks built at the Hanford and Savannah River Sites (up to 56 years old). There are other examples of degrading and aging facilities that will require significant capital expenditures for replacement or for repair and upgrade of key systems. The Defense Nuclear Facilities Safety Board (Board) understands that, in several instances, replacement facilities have been authorized by the Congress to address this aging infrastructure. However, these new facilities may not be available for another decade. The Board expects to issue this report to Congress and DOE annually or more frequently if circumstances demand, to provide the status of significant safety issues concerning the infrastructure of DOE's defense nuclear facilities. This report reflects the status of the issues identified by the Board through May 2010. Future reports will build on this initial report to update the status of issues previously raised and describe new issues.

The most acute issues are presented by the 9212 Complex and the CMR Facility. The 9212 Complex cannot meet existing design requirements for Hazard Category 2 nuclear facilities, while the CMR Facility remains seismically fragile and poses a continuing risk to the public and workers. DOE has taken actions to reduce the quantities of radioactive material in these facilities and has taken other steps to reduce the risks to the public and workers. However, these are stop-gap measures. These two facilities are structurally unsound and are unsuitable for protracted use. The Board is especially concerned as schedules for replacement facilities (Uranium Processing Facility and the Chemistry and Metallurgy Research Replacement Facility) continue to slip, requiring the 9212 Complex to operate until at least 2021 and CMR to operate until some future date, yet to be defined.

Other facilities cited in this report, such as the H-Canyon facility at the Savannah River Site, do not present such acute issues and continue to meet valuable mission requirements. However, facilities such as H-Canyon require continued attention and resources from DOE to maintain safe operations.

The Board continues to drive safety improvements at the existing facilities while at the same time urging DOE to build replacement facilities quickly, invest in infrastructure improvements and upgrades, or find alternative means of accomplishing mission-related work.

## **MOST SIGNIFICANT SAFETY-RELATED INFRASTRUCTURE ISSUES**

The most significant safety-related infrastructure issues are listed below and summarized in the enclosure to this report.

**Los Alamos National Laboratory, Chemistry and Metallurgy Research Facility**  
Building End of Life

**Los Alamos National Laboratory, Plutonium Facility (PF-4), Technical Area-55**  
Safety System Reliability (Ventilation and Fire Suppression Systems)

**Los Alamos National Laboratory, Radioactive Liquid Waste Treatment Facility**  
Building and Equipment End of Life

**Nevada Test Site, Device Assembly Facility**  
Fire Suppression Water Tank Degradation  
Fire Suppression System Lead-In Degradation

**Pantex Plant, Site-Wide Fire Suppression System**  
Fire Suppression System Lead-In Degradation

**Y-12 National Security Complex, 9212 Complex**  
Building and Equipment End of Life

**Hanford Site, Tank Farms**  
Aging Tanks and Systems

**Hanford Site, T Plant (Waste Treatment and Packaging Operations)**  
Weak Structure

**Savannah River Site, H-Canyon**  
Aging Systems and Structures

**Savannah River Site, Concentration, Storage, and Transfer Facility (Tank Farms)**  
Aging Tanks and Systems

## **NEW ISSUES IDENTIFIED DURING THE PERIOD**

None for this first report

## **ISSUES RESOLVED DURING THE PERIOD**

None for this first report

As directed by Congress, the Board will continue to exercise its existing statutory authority.

Respectfully submitted,



Peter S. Winokur, Ph.D.  
Chairman



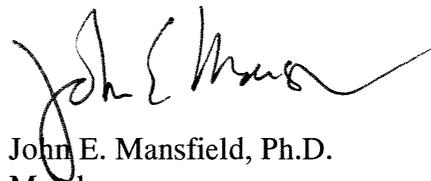
Jessie H. Roberson  
Vice Chairman



Larry W. Brown  
Member



Joseph F. Bader  
Member



John E. Mansfield, Ph.D.  
Member

Enclosure

ENCLOSURE

**SUMMARY OF SIGNIFICANT INFRASTRUCTURE ISSUES AT  
OPERATING DEFENSE NUCLEAR FACILITIES**

NATIONAL NUCLEAR SECURITY ADMINISTRATION SITES					
SITE	FACILITY	BEGAN SERVICE	REMAINING SERVICE	INFRASTRUCTURE WEAKNESS	COMMENTS
<b>Los Alamos National Laboratory</b>	<b>Chemistry and Metallurgy Research (CMR) Facility</b>	<b>1952</b>	<b>Until replaced by the Chemistry and Metallurgy Research Replacement Facility— Date to be determined (TBD)</b>	<b>Building End of Life.</b> Los Alamos National Laboratory estimates a 1 in 50 chance of seismic collapse during a 10-year time frame, which would result in a release of nuclear material.  Reference: October 23, 2007 Board letter	The Defense Nuclear Facilities Safety Board (Board) is concerned that prolonging operations in the 55-year-old CMR Facility represents a most serious safety risk; the National Nuclear Security Administration (NNSA) initiated a plan to reduce the material-at-risk by relocating some activities to a more robust facility; however, funding and prioritization decisions by NNSA and its contractor have caused significant delays in these efforts. Construction of the CMR Replacement Facility is the long-term corrective action.
	<b>Plutonium Facility, Technical Area-55</b>	<b>1977</b>	<b>At least 2040</b>	<b>Safety System Reliability.</b> The facility does not have a set of safety controls that would adequately protect the public and workers from the consequences of potential seismic accidents.  Reference: Board Recommendation 2009-2 dated October 26, 2009	The Board issued Recommendation 2009-2, <i>Los Alamos National Laboratory Plutonium Facility Seismic Safety</i> , on October 26, 2009, to communicate clearly its concern regarding the limited progress made to date in reducing the risk to the public and workers following a seismic event. Safety system upgrades will be required to address this issue. The Department of Energy (DOE) is currently developing the Implementation Plan for Recommendation 2009-2.
	<b>Radioactive Liquid Waste Treatment Facility (RLWTF)</b>	<b>1963</b>	<b>Until replaced by the Radioactive Liquid Waste Treatment Upgrade Facility (now on hold)</b>	<b>Building and Equipment End of Life.</b> The RLWTF has reached its end of life and despite ongoing life extension efforts, requires replacement to support future laboratory missions reliably.  Reference: March 5, 2008 Board letter	The cost growth of the Radioactive Liquid Waste Treatment Upgrade Facility project has resulted in NNSA looking for an alternative approach to building a new facility. The risk associated with the status quo is unacceptable for the long term.

**NATIONAL NUCLEAR SECURITY ADMINISTRATION SITES**

<b>SITE</b>	<b>FACILITY</b>	<b>BEGAN SERVICE</b>	<b>REMAINING SERVICE</b>	<b>INFRASTRUCTURE WEAKNESS</b>	<b>COMMENTS</b>
<b>Nevada Test Site</b>	<b>Device Assembly Facility (DAF)</b>	<b>1986</b>	<b>Until replaced— Date TBD</b>	<p><b>Fire Suppression Water Tank Degradation.</b> The water tank cannot be relied upon to provide fire suppression water in the event of a fire in DAF.</p> <p>Reference: January 18, 2008 Board letter</p>	The water tank has corrosion on interior and exterior surfaces. The tank is also in violation of standards of the Occupational Safety and Health Administration and noncompliant with standards of the American Water Works Association. The tank does not meet seismic requirements. NNSA is planning to make interim repairs, but has not yet submitted a line-item budget request to replace the tank.
			<b>Until replaced— Date TBD</b>	<p><b>Fire Suppression System Lead-In Degradation.</b> The water lead-ins are susceptible to corrosion failure and cannot be relied upon to provide fire suppression water in the event of a fire in DAF.</p> <p>Reference: January 18, 2008 Board letter</p>	Fire suppression lead-ins are susceptible to failure due to potential corrosion throughout the entire fire suppression system. Pipe internal coatings failed almost immediately after installation due to improper welding, which has led to corrosion problems. Nondestructive evaluation of two lead-in pipes showed wall thinning of 20 to 30 percent in some places, with a maximum of 80 percent in one place. The site has submitted a line-item budget request to make repairs, but NNSA has not approved it.
<b>Pantex Plant</b>	<b>Site-Wide Fire Suppression System</b>	<b>1950s</b>	<b>Until replaced— Date TBD</b>	<p><b>Fire Suppression System Lead-In Degradation.</b> The lead-ins are susceptible to corrosion failure and cannot be relied upon to provide fire suppression water to the bays and cells in the event of a fire. There have been 24 corrosion-induced leaks since 1995.</p> <p>Reference: September 23, 2002 Board letter</p>	The fire suppression system piping lead-ins to nuclear explosive bays and cells are susceptible to failure. NNSA has not funded this project. Lead-in pipes continue to fail periodically.

**NATIONAL NUCLEAR SECURITY ADMINISTRATION SITES**

<b>SITE</b>	<b>FACILITY</b>	<b>BEGAN SERVICE</b>	<b>REMAINING SERVICE</b>	<b>INFRASTRUCTURE WEAKNESS</b>	<b>COMMENTS</b>
<b>Y-12 National Security Complex</b>	<b>9212 Complex</b>	<b>1951</b>	<b>Until replaced by the Uranium Processing Facility (UPF) in 2018</b>	<p><b>Building and Equipment End of Life.</b> The 9212 Complex has reached its end of life and cannot be relied upon to provide a safe operating environment indefinitely.</p> <p>Reference: March 13, 2007 Board letter</p>	<p>The 9212 Complex cannot meet existing requirements for Hazard Category 2 nuclear facilities; NNSA has taken actions to reduce the radioactive material in the facilities. NNSA initiated a line-item project to upgrade certain facility systems in the 9212 Complex based on a facility risk review; however, the facility still has a sizable maintenance backlog. Construction of the new Uranium Processing Facility is the long-term solution to this issue. Even if there is no further schedule slippage at UPF, 9212 must function at least until 2021.</p>

**ENVIRONMENTAL MANAGEMENT SITES**

<b>SITE</b>	<b>FACILITY</b>	<b>BEGAN SERVICE</b>	<b>REMAINING SERVICE</b>	<b>INFRASTRUCTURE WEAKNESS</b>	<b>COMMENTS</b>
<b>Hanford Site</b>	<b>Tank Farms</b>	<b>1943–1964</b>	<b>Until cleaned and closed: 2019–2048</b>	<p><b>Aging Tanks and Systems.</b> The older single-shell tanks containing high-level radioactive waste are beyond their design lives, and some have leaked.</p> <p>Reference: January 6, 2010 Board letter</p>	DOE is transferring radioactive waste from 149 older, single-shell tanks to 28 newer, double-shell tanks to reduce the environmental risk. DOE plans to use the single-shell tanks until at least 2041. DOE is evaluating options to extend the lives of the single-shell tanks. The Board issued a letter dated January 6, 2010, encouraging DOE to develop more efficient tank inspection techniques.
	<b>T Plant— Waste Treatment and Packaging Operations</b>	<b>1944</b>	<b>Until storage mission is complete— TBD</b>	<p><b>Weak Structure.</b> Portions of the T Plant structure do not meet minimum reinforcement requirements of the American Concrete Institute (ACI) code, ACI 318.</p> <p>Reference: April 4, 2003 Board letter</p>	T Plant is more than 50 years old, and the Board is concerned about the structure’s suitability for new missions that may involve significant quantities of radioactive materials.
<b>Savannah River Site</b>	<b>H-Canyon</b>	<b>1955</b>	<b>Until processing mission is complete (no sooner than 2019)</b>	<p><b>Aging Systems and Structures.</b> H-Canyon is exhibiting degradation of systems and structures that, if not addressed, could challenge safe operations.</p> <p>Reference: April 29, 2010 Board letter</p>	The Board encouraged DOE to continue aging management evaluations of H-Canyon and adopt a strategy to address age-related degradation. Components showing localized degradation include canyon wall concrete, the sand filter ceiling, electrical wiring, and the canyon roof liner.
	<b>Concentration, Storage, and Transfer Facility (Tank Farms)</b>	<b>1951–1962</b>	<b>Until cleaned and closed: 2012–2022</b>	<p><b>Aging Tanks and Systems.</b> The older Type-I, -II, and -IV tanks containing high-level radioactive waste are beyond their design lives, and some have leaked.</p> <p>Reference: January 6, 2010 Board letter</p>	DOE continues to store liquid wastes in some of the old noncompliant tanks. DOE expects these old tanks will contain waste through 2018. Support systems require increased attention for monitoring and repair. The Board issued a letter dated January 6, 2010, encouraging DOE to develop more efficient tank inspection techniques.