U.S. Nuclear Waste Technical Review Board

Fiscal Year (FY) 2011 Congressional Budget Request and Justification

Including Revised Board Performance Goals for FY 2010-2011 and Supplementary Information on the Board

February 1, 2010

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Introduction

In 2009, Secretary of Energy Steven Chu said: *I believe that nuclear waste policy should be guided by several criteria. For example, it certainly should reflect sound science and meet the highest feasible technical standards. It must also be safe and secure, and ensure the protection of public health and the environment. Finally, it should reinforce public trust and confidence, and search for workable solutions that take economic and other factors into consideration.*[1]

The U.S. Nuclear Waste Technical Review Board's independent peer review directly supports the technical validity of work undertaken by the Secretary of Energy to manage and provide for the ultimate disposition of spent nuclear fuel and high-level radioactive waste (HLW). ***To fulfill its statutory mandate to review the technical and scientific validity of activities undertaken by the Secretary of Energy related to nuclear waste management and to provide independent technical information and advice to Congress and the Secretary, the Board requests $2,490,000 for fiscal year (FY) 2011.***

The Board's Mission

The Board was established as an independent agency in the executive branch in the 1987 amendments to the Nuclear Waste Policy Act. As set forth in the legislative history, the purpose of the Board is to provide independent expert advice to Congress and the Secretary of Energy on technical issues and to review the U.S. Department of Energy's (DOE) implementation of the nuclear waste program. Several elements of the Board's congressional mandate combine to make the Board unique among federal agencies: (1) the Board is independent; (2) the Board advises both Congress and the Secretary of Energy on technical issues; and (3) the Board performs an ongoing and integrated technical peer review of all DOE activities related to managing spent nuclear fuel and high-level radioactive waste, including waste acceptance, transportation, packaging and handling, facility operation and design, and waste storage and disposal.

The Board's Continuing Role

For the last 20 years, DOE has focused on developing a permanent geologic repository at Yucca Mountain in Nevada. During that time, the Board has reported on the technical validity of DOE's efforts to Congress and the Secretary of Energy in twice yearly reports, in testimony, and in correspondence. During 2009, the Administration indicated its intention to terminate funding for the Yucca Mountain repository program and to appoint a Blue Ribbon Commission to consider alternatives for nuclear waste management. As Secretary Steven Chu has observed, even as new options for managing nuclear waste are evaluated, DOE continues to have responsibility under existing law for the long-term management and disposition of DOE-owned spent nuclear fuel and HLW and for the disposition of spent nuclear fuel from commercial reactors. Similarly, the Board's statutory responsibility for conducting ongoing technical peer review of DOE's waste management activities and for advising Congress and the Secretary on related issues is unchanged.

[1] Answer to a question from Senator James DeMint of South Carolina following Dr. Chu's January 13, 2009, confirmation hearing before the Senate Committee on Energy and Natural Resources.

Refocusing the Board's Priority Goals

In accordance with its continuing peer review responsibilities, the Board has refocused its priority goals to reflect anticipated and ongoing DOE activities related to nuclear waste management and to provide technical findings and information that also can be used by Congress, the Secretary of Energy, and a Blue Ribbon Commission in evaluating alternatives for managing nuclear waste. Issues on which the Board will focus include the technical implications of very long-term dry storage of commercial spent nuclear fuel, the characteristics and inventories of DOE-owned spent nuclear fuel and HLW, and the characteristics and quantities of waste associated with alternatives for managing spent nuclear fuel that include reprocessing and recycling.

Based on the activities described above and on others planned for the future, the Board will create information products that facilitate communication of the results of its review of DOE activities to inform, from a technical perspective, the discussion of waste management alternatives. In addition, the Board will update its recent report to Congress and the Secretary that is a survey of the nuclear waste management approaches used by 13 countries, including the United States.

Following is a list of the Board's priority goals for FY 2010-2011 and a number of associated tasks.

Board Performance Goals for FY 2010-2011

At its June 2009 public meeting in Las Vegas, Nevada, the Board articulated the following three priority performance goals, which already have begun to be implemented. The tasks under the goals have been developed to help advance and support the Board's technical review of DOE activities and focus the Board's work in FY 2010 and FY 2011.

Goal 1. The Board will compile objective technical information required to perform its technical peer review of DOE activities. That information and the results of the Board's technical reviews will be useful to Congress, the Secretary of Energy, and a Blue Ribbon Commission in evaluating waste management alternatives. The Board will examine the technical implications of potential waste-management alternatives from the perspective of an integrated waste management system.

Goal 1 Tasks

A. Systems Analysis. The Board recently began developing and compiling technical information it will need to evaluate future DOE activities related to managing spent nuclear fuel and HLW. This information will provide the basis for Board reports to Congress, the Secretary of Energy, and a Blue Ribbon Commission on the technical implications of waste management alternatives and the implications for waste management of potential fuel-cycle initiatives.

B. "Stranded" DOE Spent Nuclear Fuel and High-Level Radioactive Waste. Termination of the Yucca Mountain repository program will leave thousands of tons of government-owned spent nuclear fuel and high-level radioactive waste with no place to go—at least temporarily. These wastes are stored primarily at Hanford in Washington, at

Idaho National Laboratory in Idaho, and at the Savannah River Site in South Carolina. Much of the waste is subject to legal agreements between the federal government and the respective states. The agreements include timely transportation off the site to a final disposal location. After visiting the sites, the Board expects to issue a report that summarizes the amounts and characteristics of the waste, the alternatives under consideration for their management and disposition, and technical issues that need to be resolved.

C. Very-Long-Term Dry Storage. Whatever alternative is selected for final disposition of nuclear waste, commercial spent nuclear fuel will most likely remain in storage much longer than previously anticipated. To support its evaluation of DOE technical activities related to long-term dry storage, the Board convened a panel of experts in late September 2009 to identify the data needs for very-long-term dry storage of commercial spent nuclear fuel. On the basis of those discussions and its own study of the technical literature and government reports, the Board is preparing a "white paper" on technical needs for very-long-term dry storage that will serve as a framework for evaluating DOE's activities and advising Congress, the Secretary, and a Blue Ribbon Commission on these issues.

Goal 2. The Board will compile information gained from its extensive experience with the U.S. nuclear waste program and from observing waste management efforts in other countries.

Goal 2 Tasks

A. Survey of National Programs. Over the years, the Board has visited several countries whose long-term waste management programs are relatively mature. In November 2009, the Board issued a report entitled, *Survey of National Programs for Managing High-Level Radioactive Waste and Spent Nuclear Fuel.* The report can be accessed on the Board's website at www.nwtrb.gov. In the document, the Board provides up-to-date factual information to Congress and the Secretary of Energy about the wide range of institutional arrangements and technical approaches that have been adopted in the United States and 12 other countries. The Board plans to update the report in FY 2011.

B. Study of "Lessons Learned." On the basis of its experience and understanding of waste management programs in other countries, its in-depth technical reviews of the Yucca Mountain Project, and the *Survey of National Programs for Managing High-Level Radioactive Waste and Spent Nuclear Fuel*, the Board expects to prepare an analysis of lessons learned related to these programs. This effort will explore the technical and scientific aspects of nuclear waste management and disposal, including the generic and specific issues associated with the various media that have been considered worldwide for developing deep geologic disposal facilities for spent nuclear fuel and high-level radioactive waste. The Board's technical expertise and its 20-year history of performing objective technical analysis will enable it to make a unique contribution to the national discussion of alternative strategies for waste management and to provide technical advice to DOE on implementing whatever strategies are subsequently adopted.

C. Risk-Based Performance Assessment. As part of its examination of lessons that can be applied to any potential future geologic repository, the Board is preparing a paper that describes a risk-based method of assessing repository performance based on the source term (the amount and type of radioactive material that could be released from waste packages).

Goal 3. The Board will continue to monitor and evaluate DOE activities related to nuclear waste management and to report on the technical validity of the work to Congress and the Secretary.

Goal 3 Tasks

A. Office of Nuclear Energy. An advanced fuel-cycle research and development program, which explores alternative fuel cycles and associated waste management strategies, is underway at DOE's Office of Nuclear Energy. The Board will evaluate the technical activities related to nuclear waste management that are being conducted under the auspices of this program. In particular, the Board will review the consistency of the results of development work being performed in laboratories and pilot plants with other independent analyses and theoretical projections.

Most of the Board's September 2009 public meeting focused on presentations by fuel-cycle companies on alternative recycling concepts that they had developed for DOE's Office of Nuclear Energy as part of the former Global Nuclear Energy Partnership program. On the basis of information presented at the meeting, the Board is identifying technical issues that need to be addressed concerning alternative waste management options being considered by DOE. (See Goal 1, Task A)

B. Corrosion. The Board has long been interested in deliquescence-induced localized corrosion, which can occur when salts on waste package surfaces absorb moisture from the air forming concentrated brines. The Board also believes that rates of general corrosion of waste package materials are important. These issues are important in the context of both geologic disposal and long-term dry storage of spent nuclear fuel and high-level radioactive waste. Board members and staff visited Sandia National Laboratory in 2009 to observe and discuss work that has been undertaken on those issues. The Board will report on its findings and recommendations related to corrosion in an upcoming report to Congress and the Secretary. These issues also will be part of the Board's examination of lessons that can be learned about the engineered system from the experience of the U.S. program.

C. Office of Environmental Management. In contrast to the HLW at Hanford and Savannah River, which is mostly in liquid or sludge form in tanks, most of the high-level waste at Idaho National Laboratory is in a solid, granular form in bins. There is a question about how much additional treatment this waste needs, if any, prior to being stored for prolonged periods and in preparation for eventual disposal in a geologic repository. Options include: (1) no additional treatment, (2) grouting in cement, (3) hot isostatic pressing, and (4) vitrification. In the coming year, the Board intends to examine the technical basis for selecting the best option as well as the appropriate timing for making such a selection.

Most DOE-owned spent nuclear fuel is in dry storage or soon will be moved to dry storage. All vitrified high-level radioactive waste is in dry storage. The Board plans to evaluate the design bases for dry-storage facilities, beginning with the facilities at Savannah River. The objective of the evaluation will be to determine whether the design bases are suitable for supporting longer facility lifetimes and what additional data or analyses are needed.

Strategy for Accomplishing Board Performance Goals

The Board accomplishes its goals by organizing working groups of Board members and staff that reflect the technical disciplines involved in achieving the performance goals. Board members direct the activities of staff members, who are responsible for the accomplishment of assigned goals. As authorized by statute, expert consultants may be retained and used to supplement the work of the Board and staff when necessary.

The Board's program for FY 2010-2011 includes:

- Holding public meetings in Idaho Falls, Idaho, and visiting DOE facilities at Savannah River and Idaho Falls. Additional meetings and site visits may be scheduled as needed.
- Applying the Board's scientific and engineering expertise to the identification of technical challenges that have been encountered both in the U.S. waste management program and in programs overseas. The Board will analyze how those challenges were addressed, and why actions to address the challenges were successful or deficient.
- Conducting fact-finding sessions involving small groups of Board members and/or staff who will focus in depth on specific technical topics, including corrosion, DOE spent nuclear fuel and high-level radioactive waste inventories and characteristics, alternative waste management technologies, waste forms, and the behavior of waste forms in various geologic media (source term).
- Reviewing and analyzing documents on work under way by DOE related to nuclear waste management, evaluating the implications of alternative waste management scenarios and activities, and conducting evaluations of analogous work in other countries. The results of such reviews and analyses will inform the Board's findings and recommendations, which will be presented in reports and correspondence to Congress and the Secretary of Energy.

Interactions with Other Agencies and Interested Parties

The Board sponsors meetings and technical exchanges with program participants and interested parties, including representatives of DOE and its contractors, the U.S. Nuclear Regulatory Commission, the U.S. Environmental Protection Agency, the U.S. Geological Survey, the U.S. Department of Transportation, affected states, regional groups, affected units of local governments, Native American tribes, nuclear utilities, environmental groups, state utility regulators, and members of the public. Board members and staff attend relevant technical conferences, meetings, symposia, and workshops; participate in field trips; and

occasionally visit foreign countries to gain insights from observing their programs and learning about their experience in repository development.

In developing its performance goals, the Board and Board staff met with key members of Congress; the Administration, including DOE and the Office of Management and Budget; the interested public; stakeholders; and representatives of local, regional, and state governments. The Board will use the evaluation of its performance in FY 2010-2011 to set priorities in its FY 2012 budget. The Board's organizational structure may be recalibrated and funding will be reallocated if necessary to ensure accomplishment of the goals.

To enhance access to the Board's deliberations and recommendations and make them more transparent, the Board holds open public meetings, and all Board reports, correspondence, testimony, and meeting transcripts are available on the Board's Web site at www.nwtrb.gov.

Nuclear Waste Technical Review Board

Salaries and Expenses

(Including Transfer of Funds)

For necessary expenses of the Nuclear Waste Technical Review Board, as authorized by public law 100-203, section 5051, $2,490,000 to be derived from the Nuclear Waste fund and to remain available until expended.

(Energy and Water Development and Related Agencies Appropriations Act, 2010)

Budget Details

To fulfill its statutory mandate to review the technical and scientific validity of activities undertaken by the Secretary of Energy related to nuclear waste management and to provide independent technical information and advice to Congress and the Secretary, the Board requests $2,490,000 for fiscal year (FY) 2011. A detailed explanation of the Board's request by Object Class follows.

Object Class 11.1, Full-Time Permanent Staff: $1,194,000

The estimate in this object class includes funding for Executive Schedule senior professional staff and General Schedule support staff. The senior professional staff members support the Board members' technical and scientific evaluation of DOE activities. The General Schedule staff members are engaged in administrative activities, including budget and financial management, dissemination of Board publications, information technology, and meeting logistics. The amount requested for full-time permanent staff is based on the requirement to fund senior professional staff and administrative staff positions. The estimate assumes a 2.1 per cent increase in January 2011 for both Executive Schedule and General Schedule employees.

Object Class 11.3, Base Pay - Intermittent: $285,000

This estimate includes compensation costs for Board members, all of whom are Special Government Employees. In accordance with the Board's enabling statute, each Board member is compensated at the rate of pay of Executive Schedule Level III for every day that the member is engaged in work for the Board. The estimate assumes a 2.1 percent increase in Executive Schedule compensation for employees in this category for FY 2011 (effective January 2011).

Object Class 11.5, Other Personnel Compensation: $12,000

The estimated amount is for funding of performance awards under the Performance Management System.

Object Class 12.0, Civilian Personnel Benefits: $301,000

The estimate represents the government's contribution for employee benefits at the average rate of 25.0 percent for staff and 7.65 percent for Board members.

Object Class 21.1, Travel and Transportation: $110,000

The estimate in this object class includes travel costs for Board members, staff, and consultants who will travel to Board meetings, professional meetings, conferences, orientation activities, analogue sites, national laboratories, and other events and venues related to accomplishing the Board's mission. The estimate assumes that each of the 11 Board members will attend 1 Board meeting and an average of 4 miscellaneous meetings for approximately 3 days each. It also assumes that the professional staff members will travel an average of 3 times for similar activities for approximately 3 days per trip.

Object Class 23.1, Rental Payments to the General Services Administration (GSA): $205,000

The estimate represents the amount the Board will pay to the General Services Administration for 5,216 square feet of office space.

Object Class 23.3, Communication, Utilities, Miscellaneous: $27,000

The estimate represents costs for telephone service, postage costs, local courier services, video teleconferencing, long-distance telephone service, and internet and mailing services related to management and use of the Board's mailing list.

Object Class 24.0, Printing and Reproduction: $13,000

The estimate is for funding publication of statutorily mandated reports sent to Congress and the Secretary of Energy at least two times per year, publication of meeting notices in the *Federal Register*, and production of press releases announcing meetings and other materials that are necessary to accomplish the Board's mission and inform the public. An effort will be made to make use of electronic publishing to the extent feasible. Members of the public who live in rural areas and who do not have Web access receive the Board's material on request.

Object Class 25.1 Consultants: $16,000

The estimate includes funding for consultants to support and supplement Board and staff analyses of specific technical and scientific issues as mandated by Congress.

Object Class 25.2, Contractual Services - Other: $190,000

The estimate for this object class includes court-reporting services for Board meetings; meeting-room rental and related services; and maintenance agreements for equipment rental, professional development, and services from commercial sources. In addition, the Board will contract with part-time technical consultants to supplement and support in-house operations including, in-systems management, Web site management, and report production and editing. The Board also is committed to supporting the Administration's initiatives such as financial auditing in accordance with the Accountability of Tax Dollars Act. The Board supports the goals set forth in Executive Order 13514, "Federal Leadership in Environmental, Energy, and Economic Performance," and is committed to reducing its greenhouse gas emissions where practicable. The Board has requested guidance from OMB on future funding of activities related to this initiative.

Object Class 25.3, Services from Other Government Agencies: $93,000

This estimate includes funding for GSA administrative support services (payroll, accounting, personnel, etc.), legal advice from GSA, security clearances through the Office of Personnel Management, and other miscellaneous interagency agreements.

Object Class 26.0, Supplies and Materials: $20,000

This estimate includes anticipated expenses for office supplies, subscriptions, library materials, and off-the-shelf technical reports and studies.

Object Class 31.0, Equipment: $25,000

This estimate relates to miscellaneous equipment costs, including computer hardware, and computer-network software maintenance. In addition, funds are included to support the Federal Information Security Act, which requires federal agencies to periodically test and evaluate the effectiveness of their information security policies, procedures, and practices. The category also includes continued upgrades to information technology security, continuity of operations (COOP), support of E-Gov telecommuting efforts, and technical support of the management of electronic records and e-mails.

Nuclear Waste Technical Review Board
Projected Fiscal Year 2011
Expenditures
Object Classifications
(In Thousands of Dollars)

Classification code 48-0500-0-271		Act FY 2009	Est FY 2010	Req FY 2011
	Expenditures			
11.1	Full-time Permanent Staff	$1,512	$1,879	$1,194
11.3	Base pay - Intermittent	406	315	285
11.5	Other Personnel Compensation	35	57	12
Total	Total Personnel Compensation	$1,953	$2,251	$1,491
12.0	Civilian Personnel Benefits	421	508	301
21.1	Travel and Transportation	376	272	110
23.1	Rental Payments to GSA	177	206	205
23.3	Communication, Utilities, Misc.	34	31	27
24.0	Printing and Reproduction	25	24	13
25.1	Consultants	78	86	16
25.2	Contractual Services - Other	329	311	190
25.3	Services from Other Govt. Agencies	112	98	93
26.0	Supplies and Materials	37	64	20
31.0	Equipment	45	39	25
	Total Obligations	***$3,587***	**$3,891**	**$2,490**

(Numbers may not add due to rounding.)

Identification Code 48-0500-0-1-271	2009 Act	2010 Est	2011 Req
Total Number of Full-Time Permanent Positions	15	17	10
Total Compensable Work-Years: Full-Time Equivalents	15	17	10

Supplementary Information on The U.S. Nuclear Waste Technical Review Board

The U.S. Nuclear Waste Technical Review Board was established on December 22, 1987, in the Nuclear Waste Policy Amendments Act (NWPAA) as an independent agency in the executive branch of the federal government. The Board is charged with evaluating the technical and scientific validity of activities undertaken by the Secretary of Energy related to the U.S. Department of Energy's obligation under law to manage and dispose of spent nuclear fuel and high-level radioactive waste.

Board Members

The Board is apolitical and nonpartisan. The NWPAA authorized a Board of 11 members who serve on a part-time basis; are eminent in a field of science or engineering, including environmental sciences; and are selected solely on the basis of distinguished professional service. The law stipulates that the Board shall represent a broad range of scientific and engineering disciplines relevant to nuclear waste management. Board members are appointed by the President from a list of candidates submitted by the National Academy of Sciences. Board members whose terms have expired continue serving until they are reappointed or their replacements assume office. The terms of five current members will expire in April 2010.

The names and affiliations of the current 11 Board members are listed below.

B. John Garrick, Ph.D., P.E., is Chairman of the Board. A founder of PLG, Inc., he retired from the firm in 1997 and is a private consultant. His areas of expertise include nuclear science and engineering, specializing in probabilistic risk assessment and the application of the risk sciences to natural and engineered systems.

Mark D. Abkowitz, Ph.D., is professor of civil and environmental engineering at Vanderbilt University and director of the Vanderbilt Center for Environmental Management Studies. His areas of expertise include the strategic and operational deployment of intelligent transportation systems, enterprise risk management methods and practices, and assessing the impacts of energy choices and climate change.

William Howard Arnold, Ph.D., P.E., is a private consultant with long experience as a top executive in the nuclear industry. He retired from a 40-year career, first with Westinghouse and then with Louisiana Energy Services, in 1996. He holds a doctorate in physics and has special expertise in nuclear project management, organization, and operations.

Thure E. Cerling, Ph.D., is Distinguished Professor of Geology and Geophysics and Distinguished Professor of Biology at the University of Utah. His areas of expertise include field geology, isotope geology, and geochemical processes occurring near the Earth's surface.

David J. Duquette, Ph.D., is John Tod Horton '52 Professor of Engineering in the Department of Materials Science and Engineering at Rensselaer Polytechnic Institute. His areas of expertise include the physical, chemical, and mechanical properties of metals and alloys.

George M. Hornberger, Ph.D. is a Distinguished University Professor at Vanderbilt University where he is director of the Vanderbilt Institute for Energy and Environment. He also is the Craig E. Philip Professor of Engineering and a Professor of Earth and Environmental Sciences there. His areas of expertise include catchment hydrology and hydrochemistry and transport of solutes and colloids in geologic media.

Andrew C. Kadak, Ph.D., is Professor of the Practice in the Nuclear Science and Engineering Department at the Massachusetts Institute of Technology. His areas of expertise include fundamental nuclear engineering, reactor operations, and the development of advanced reactors.

Ronald M. Latanision, Ph.D., is emeritus professor of materials science and engineering and of nuclear engineering at the Massachusetts Institute of Technology and a Corporate Vice President of the engineering consulting firm, Exponent. His areas of expertise include materials processing and corrosion of metals and other materials in aqueous environments.

Ali Mosleh, Ph.D., is Nicole J. Kim Professor of Engineering, director of the Reliability Engineering Program, and director of the Center for Risk and Reliability at the University of Maryland. His areas of expertise include methods for probabilistic risk analysis and reliability of complex systems.

William M. Murphy, Ph.D., is professor of Geological and Environmental Sciences at California State University, Chico. His research focuses on geochemistry, including the interactions of nuclear wastes and geologic media. He also is a technical administrative judge on the Atomic Safety and Licensing Board Panel of the U.S. Nuclear Regulatory Commission.

Henry Petroski, Ph.D., P.E., is Aleksandar S. Vesic Professor of Civil Engineering and professor of history at Duke University. His areas of expertise include the interrelationship between success and failure in design, the nature of invention, and the history of technology.

Staff

The NWPAA limits the Board's professional staff to 10 positions and to administrative staff as determined by the Chairman.

Board Reporting Requirements

As required by the NWPAA, the Board reports its findings and recommendations to Congress and the Secretary of Energy at least two times each year. Board meetings are open to the public and are announced in the *Federal Register* four to six weeks before each meeting. Time is set aside for public comment at each meeting. Transcripts of Board meetings and all Board reports, correspondence, and congressional testimony are available from the Board's Web site, www.nwtrb.gov.

The Board offices are in Arlington, Virginia.