

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
) Docket No. 52-047-ESP
Tennessee Valley Authority)
)
(Clinch River Nuclear Site))
_____)

**DECLARATION OF DR. EDWIN S. LYMAN IN SUPPORT OF
INTERVENORS' CONTENTION 4 (INADEQUATE
DISCUSSION OF ENVIRONMENTAL IMPACTS OF POOL FIRES)**

Under penalty of perjury, Edwin S. Lyman declares as follows:

1. My name is Edwin S. Lyman. I am a Senior Staff Scientist at the Union of Concerned Scientists.

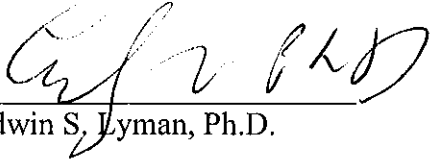
2. I am a qualified expert on matters relating to nuclear power plant safety and security. I earned a doctorate in physics from Cornell University in 1992. From 1992 to 1995, I was a postdoctoral research associate at Princeton University's Center for Energy and Environmental Studies (now the Science and Global Security Program), where my research focused on the prevention of nuclear proliferation, nuclear and radiological terrorism, and nuclear accidents. I have published articles and letters regarding those issues in journals and magazines including *Science*, *Nature*, *The Bulletin of the Atomic Scientists*, *Science and Global Security*, *Arms Control Today*, *Nuclear Engineering International*, *New Scientist* and *Energy and Environmental Science*. I am a co-author (with David Lochbaum and Susan Q. Stranahan) of the book *Fukushima: The Story of a Nuclear Disaster* (The New Press, 2014).

3. I have considerable experience and expertise with respect to the issue of spent fuel pool fire risks, and have briefed both the NRC and the National Academy of Sciences on issues related to pool fire risks. In addition, I am a co-author of the article "Nuclear Safety Regulation in the Post-Fukushima Era," which was published in *Science* magazine on May 26th, 2017 and focuses on spent fuel pool fire risks. A copy of my curriculum vitae is attached.

4. I am familiar with the licensing-related filings and correspondence that have been submitted by Tennessee Valley Authority ("TVA") in support of its application for an Early Site Permit ("ESP") for a Small Modular Reactor ("SMR") on the Clinch River Nuclear Site. I am also familiar with the Draft Environmental Impact Statement prepared by the U.S. Nuclear Regulatory Commission ("NRC") for the proposed ESP. NUREG-2226, Draft Environmental Impact Statement for an Early Site Permit (ESP) at the Clinch River Nuclear Site (April 2018) ("Draft EIS"). And I am familiar with applicable NRC

regulations, policies, and guidance documents.

5. I assisted Intervenors with the preparation of their Contention 4, which challenges the adequacy of the Draft EIS' discussion of spent fuel pool fire risks to satisfy the National Environmental Policy Act ("NEPA"). The factual assertions in the contention are true and correct to the best of my knowledge, and the opinions expressed therein are based on my best professional judgment.

A handwritten signature in black ink, appearing to read 'Edwin S. Lyman', written over a horizontal line.

Edwin S. Lyman, Ph.D.

May 21, 2018

Edwin Stuart Lyman
Curriculum Vitæ

Education

Ph.D, Cornell University, Theoretical Physics, August 1992.

M.S., Cornell University, Physics, January 1990.

A.B., *summa cum laude*, New York University, Physics, June 1986; Phi Beta Kappa.

Professional Experience

May 1, 2003 – Present: Senior Scientist, Union of Concerned Scientists.

Spring 2015: Adjunct Professor, Elliott School of International Affairs, The George Washington University, Washington, DC. Taught Master's level course on nuclear energy.

June 2002 – April 2003: President, Nuclear Control Institute, Washington, D.C.

July 1995 – May 2002: Scientific Director, Nuclear Control Institute, Washington, D.C.

August 1992 – June 1995: Postdoctoral research associate, Center for Energy and Environmental Studies, Princeton University, Princeton, NJ.

Spring 1995: Preceptor for Environmental Studies 302, "Perspectives on Environmental Issues: Values and Policies."

Spring 1994: Lecturer, Woodrow Wilson School. Preceptor for WWS 304, "Science, Technology and Public Policy."

July 1988 – June 1992: Graduate research assistant, Newman Laboratory of Nuclear Studies, Cornell University, Ithaca, NY. Conducted thesis research on high-energy physics under the supervision of Prof. S.H.-H. Tye.

August 1986–June 1988: Andrew D. White Graduate Fellow, Physics, Cornell University.

Other

Active Nuclear Regulatory Commission "L" clearance

Books and Book Chapters

D. Lochbaum, E. Lyman and S.Q. Stranahan, *Fukushima: The Story of a Nuclear Disaster*. The New Press, New York, 2014.

E. Lyman, "Nuclear Energy and Human Health," *Encyclopedia of Environmental Health*, Elsevier Science, 2011.

E. Lyman, "Can Nuclear Fuel Production in Iran and Elsewhere be Safeguarded Against Diversion?" in *Falling Behind: International Scrutiny of the Peaceful Atom* (H.D. Sokolski, ed.), Strategic Studies Institute, U.S. Army War College, 2008, 101-120.

E. Lyman and D. Lochbaum, "Protecting Vital Targets: Nuclear Power Plants," in *Homeland Security: Protecting America's Targets, Vol. III* (J. Forest, ed.), Praeger, Westport, CT, 2006, 157-173.

E. Lyman, "The Limits of Technical Fixes," in *Nuclear Power and The Spread of Nuclear Weapons: Can We Have One Without the Other?* (P. Leventhal, S. Tanzer and S. Dolley, eds.), Brassey's, Washington, DC, 2002, 167-182.

Journal Articles and Letters

E. Lyman, M. Schoeppner and F. von Hippel, "Nuclear Safety Regulation in the Post-Fukushima Era," *Science* **356** (2017), 808-809.

E. Lyman and F. von Hippel, "Nuclear Waste: Weapons Plutonium Riskier Above Ground" (letter), *Nature* **530** (2016), 281.

T. Clements, E. Lyman and F. von Hippel, "The Future of Plutonium Disposition," *Arms Control Today*, June/July 2013.

J. Beyea, E. Lyman and F. von Hippel, "Accounting for Long-Term Doses in 'Worldwide Health Effects of the Fukushima Daiichi Nuclear Accident'," *Energy and Environmental Science* **6** (2013), 1042-1045.

E. Lyman, "Rotblat's Pursuit of Nuclear Peace," *New Scientist*, January 25, 2012.

E. Lyman, Surviving the One-Two Nuclear Punch. *Bulletin of the Atomic Scientists online*, September 2011.

E. Lyman, "Security Since September 11th," *Nuclear Engineering International*, May 20, 2010.

E. Lyman, "Thirty Years after TMI: Five Continuing Vulnerabilities," *Bulletin of the Atomic Scientists*, March 23, 2009.

E. Lyman, "Making Domestically Produced Medical Isotopes a National Priority," *Bulletin of the Atomic Scientists*, December 18, 2008.

E. Lyman, "Can Nuclear Plants be Safer?" *Bulletin of the Atomic Scientists*, September/October 2008, 34-37.

E. Lyman and F. von Hippel, "Reprocessing Revisited: The International Dimensions of the Global Nuclear Energy Partnership," *Arms Control Today*, April 2008, 6-14.

J. Beyea, E. Lyman and F. von Hippel, "Damages from a Major Release of ^{137}Cs Into the Atmosphere of the United States," *Science and Global Security* **12** (2004) 125-136.

G. Bunn, C. Braun, A. Glaser, E. Lyman and F. Steinhausler, "Research Reactor Vulnerability to Sabotage by Terrorists," *Science and Global Security* **11** (2003) 85-107.

D. Hirsch, D. Lochbaum and E. Lyman, "The NRC's Dirty Little Secret," *Bulletin of the Atomic Scientists* (May/June 2003).

R. Alvarez, J. Beyea, K. Janberg, J. Kang, E. Lyman, A. Macfarlane, G. Thompson and F. von Hippel, "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States," *Science and Global Security* **11** (2003) 1-51.

E. Lyman, "Revisiting Nuclear Power Plant Safety" (letter), *Science* 299 (2003), 202.

E. Lyman, "The Pebble-Bed Modular Reactor: Safety Issues," *Physics and Society*, American Physical Society, October 2001.

E. Lyman, "Public Health Risks of Substituting Mixed-Oxide for Uranium Fuel in Pressurized Water Reactors," *Science and Global Security* **9** (2001), 1.

E. Lyman and S. Dolley, "Accident Prone," *Bulletin of the Atomic Scientists*, March/April 2000, 42.

E. Lyman and H. Feiveson, "The Proliferation Risks of Plutonium Mines," *Science and Global Security* **7** (1998), 119.

E. Lyman and P. Leventhal, "Bury the Stuff [Weapons Plutonium]," *Bulletin of the Atomic Scientists*, March/April 1997, 45.

E. Lyman, "Weapons Plutonium: Just Can It," *Bulletin of the Atomic Scientists*, November/December 1996, 48.

F. von Hippel and E. Lyman, "Appendix: Probabilities of Different Yields," addendum to J. Mark, "Explosive Properties of Reactor-Grade Plutonium," *Science and Global Security* **4** (1993), 125.

F. Berkhout, A. Diakov, H. Feiveson, H. Hunt, E. Lyman, M. Miller, and F. von Hippel, "Disposition of Separated Plutonium," *Science and Global Security* **3** (1993), 161

E. Lyman, F. Berkhout and H. Feiveson, "Disposing of Weapons-Grade Plutonium," *Science* **261** (1993) 813.

P. Argyres, E. Lyman and S.H.-H. Tye, "Low-Lying States of the Six-Dimensional Fractional Superstring," *Phys. Rev. D* **46** (1992) 4533.

S.-w. Chung, E. Lyman and S.H.-H. Tye, "Fractional Supersymmetry and Minimal Coset Models in Conformal Field Theory," *Int. J. Mod. Phys A* **7** (1992) 3337.

Selected Reports

E. Lyman, "Preventing an American Fukushima," Union of Concerned Scientists, March 2016.

E. Lyman, "Excess Plutonium Disposition: The Failure of MOX and the Promise of Its Alternatives," Union of Concerned Scientists, December 2014.

E. Lyman, "Small Isn't Always Beautiful: Safety, Security and Cost Concerns About Small Modular Reactors," Union of Concerned Scientists, September 2013.

D. Lochbaum and E. Lyman, "U.S. Nuclear Power Safety One Year After Fukushima," Union of Concerned Scientists, March 2012.

L. Gronlund, D. Lochbaum and E. Lyman, "Nuclear Power in a Warming World," Union of Concerned Scientists, December 2007.

E. Lyman (with M. Schneider et al.), "Residual Risk: An Account of Events in Nuclear Power Plants Since the Chernobyl Accident in 2006," commissioned by the Greens of the European Parliament, May 2007.

E. Lyman, "Chernobyl on the Hudson? The Health and Environmental Impacts of a Terrorist Attack at the Indian Point Nuclear Power Plant," commissioned by Riverkeeper, Inc., September 2004.

E. Lyman, "Safety Issues in the Sea Shipment of Vitrified High-Level Radioactive Wastes to Japan," report sponsored by the Nuclear Control Institute, Greenpeace International and Citizens' Nuclear Information Center Tokyo, December 1994.

E. Lyman, "Interim Storage Matrices for Excess Plutonium: Approaching the 'Spent Fuel Standard' Without the Use of Reactors," PU/CEES Report No. 286, Center for Energy and Environmental Studies, Princeton University, August 1994.

E. Lyman, "The Solubility of Plutonium in Glass," PU/CEES Report No. 275, Center for Energy and Environmental Studies, Princeton University, April 1993.

Selected Invited Talks and Testimony

"Perspectives on Security Issues," presentation at NRC Commission closed briefing, June 23, 2016.

Testimony on advanced nuclear reactors before the Senate Committee on Environment and Public Works, Subcommittee on Clean Air and Nuclear Safety, April 21, 2016.

"Alternatives to MOX," presentation to the Savannah River Site Citizens' Advisory Board, Augusta, GA, March 29, 2016 (with Frank von Hippel)

"NRC's Fukushima Response: Lessons Learned and Lessons Unheeded," presentation at the NRC Regulatory Information Conference, March 10, 2016.

"Fixing the NRC's Broken Framework for Reducing Severe Accident Risk," presentation to the NRC Advisory Committee on Reactor Safeguards, December 1, 2015.

"UCS Perspectives on NRC and Industry Actions in Response to Fukushima," presentation at NRC Commission briefing, April 30, 2015.

"Perception versus Reality: UCS Views on Nuclear and Radiological Terrorism Risks," presentation at the Institute of Nuclear Materials Management "Reducing the Risk" Workshop, Washington, DC, March 17, 2015.

"Fukushima and its Lessons for Nuclear Safety," seminar at The Library of Congress, February 19, 2015.

"Production of Mo-99 Without the Use of Highly Enriched Uranium: Perspectives of the Union of Concerned Scientists," presentation to the National Academy of Sciences Committee on Status of Mo-99 Production, February 12, 2015.

"Safety and Security of Spent Fuel Storage in the United States," presentation to the National Academy of Sciences Fukushima Lessons Learned Panel, January 29, 2015.

"UCS Views on the NRC's Human Reliability Program Activities and Analyses," presentation at NRC Commission briefing, May 29, 2014.

"Public Confidence and Force-on-Force Inspections," presentation at the NRC Regulatory Information Conference, March 13, 2014.

"Fukushima: The Story of a Nuclear Disaster," lecture at the Carter Presidential Library, Atlanta,

GA, February 10, 2014.

“UCS Views on NTF Recommendation 1 and the NRC Staff Proposal,” presentation at NRC Commission briefing, January 10, 2014.

“UCS Perspective on Expedited Transfer of Spent Fuel to Dry Casks,” presentation at NRC Commission briefing, January 6, 2014.

“Security Impacts of Emerging Nuclear Technologies,” MITRE STEP Technical Exchange, McLean, VA, December 3, 2013.

“UCS Perspective on Considering Economic Consequences in the NRC’s Regulatory Framework,” presentation at NRC Commission briefing, September 11, 2012.

“Lessons from Fukushima for Improving Nuclear Safety,” American Physical Society March Meeting, Boston, MA, March 1, 2012.

“Lessons from Fukushima for Improving Nuclear Safety,” Physics Department Colloquium, University of Central Florida, February 24, 2012.

Testimony on the Blue Ribbon Commission Report before the House Committee on Energy and Commerce, Subcommittee on Environment and the Economy, February 1, 2012.

“UCS Perspective on the Prioritization of NTF Recommendations,” presentation at NRC Commission briefing, October 11, 2011.

“UCS Perspective on the Japan Task Force Report Short-Term Actions,” presentation at NRC Commission briefing, September 14, 2011.

Testimony on small modular reactors before the Senate Committee on Appropriations, Energy and Water Subcommittee, July 14, 2011.

Testimony on nuclear power legislation before the Senate Energy and Natural Resources Committee, June 7, 2011.

Testimony on the U.S. government response to Fukushima before the House Energy and Commerce Committee, Subcommittee on Oversight and Investigations, April 6, 2011.

Testimony on nuclear safety and Fukushima before the Senate Committee on Environment and Public Works, March 16, 2011.

“UCS Perspective on Maintaining Enhanced Safety for New Reactors,” presentation at NRC Commission briefing, October 14, 2010.

“Limiting Future Proliferation and Security Risks,” presentation to the Blue Ribbon Commission on America’s Nuclear Future, Reactor and Fuel Cycle Technology Subcommittee, October 12, 2010.

“Opportunities in Reactor and Fuel Cycle Technologies ,” presentation to the Blue Ribbon Commission on America’s Nuclear Future, Reactor and Fuel Cycle Technology Subcommittee, August 30, 2010.

“Proliferation and Terrorism Risks of the ‘Nuclear Renaissance,’” New York State American Physical Society meeting, April 24, 2010.

“Reprocessing in the U.S.: Just Say No,” presentation at the NRC Fuel Cycle Information Exchange, June 25, 2009.

“Nuclear Concerns: Safety, Security, Waste and Proliferation,” presentation at the Nuclear Nonoperating Owners’ Group Conference, Baltimore, MD, April 23, 2009.

“NRC Regulation of the Nuclear Fuel Cycle: Safety and Security Concerns,” presentation at the NRC Regulatory Information Conference, March 11, 2009.

“UCS Views on Risk-Informed Regulation,” presentation at NRC Commission briefing, February 4, 2009.

“Licensing Challenges for Fuel Cycle Facilities Under the Global Nuclear Energy Partnership,” U.S. Nuclear Regulatory Fuel Cycle Information Exchange, Rockville, MD, June 12, 2007.

“The ‘Nuclear Renaissance’ and the Spread of Nuclear Weapons,” American Physical Society Ohio Chapter Meeting, May 7, 2007.

“Recycling Nuclear Waste,” American Physical Society Annual April Meeting, Jacksonville, FL, April 15, 2007.

“The Security Imperative of Eliminating Commercial Use of HEU,” presentation to the Committee on Medical Isotope Production Without Highly Enriched Uranium, National Academy of Sciences, Washington, DC, February 15, 2007.

“Recycling Nuclear Waste,” Peace Studies Seminar, Cornell University, November 29, 2006.

“Nuclear Power and Nuclear Proliferation,” Citizens for Global Solutions conference, Washington, DC, November 13, 2006.

“Next-Generation Nuclear Plants: Safety and Security,” presented at “Is Nuclear Power a Solution to Global Warming and Rising Energy Prices?,” American Enterprise Institute conference, Washington, DC, October 6, 2006.

“Recycling Nuclear Waste: Technical Difficulties and Proliferation Concerns,” Physics Department Colloquium, Case Western Reserve University, Cleveland, OH, September 14, 2006.

“The Chernobyl Source Term: Implications for Nuclear Safety,” international conference

“Chornobyl +20: Remembrance for the Future,” Kiev, Ukraine, April 23-25, 2006.

“Public Health Consequences of a Severe Accident or Attack at a Nuclear Plant,” Nuclear Policy Research Institute Conference on Nuclear Power and Global Warming, Airlie House, Warrenton, VA, November 7, 2005.

Testimony before the Subcommittee on Clean Air, Climate Change on Nuclear Safety, Committee on Environment and Public Works, United States Senate, May 26, 2005.

“Safeguarding the U.S. Plutonium Disposition Program Against Nuclear Terrorism,” Science and Global Security Program seminar, Woodrow Wilson School of Public and International Affairs, Princeton University, December 9, 2004.

“Status of the Security Regime for the U.S. Mixed-Oxide Fuel Program,” Managing the Atom Project seminar, Belfer Center for Science and International Affairs, Kennedy School of Government, Harvard University, November 2, 2004.

"U.S. Nonproliferation Policy, Plutonium Disposition and the Threat of Nuclear Terrorism," seminar on "Recycling Plutonium: Risks and Alternatives," sponsored by the Green Group, European Parliament, Brussels, Belgium, January 9, 2003.

"Current Status of the U.S. Plutonium Disposition Program," seminar, Princeton University Program on Science and Global Security, Princeton University, Princeton, NJ, June 12, 2002.

"Controlling Fissile and Radioactive Material," Public Health Summit on Weapons of Mass Destruction, sponsored by Physicians for Social Responsibility and the UCLA School of Public Health, UCLA, Los Angeles, June 2, 2002.

"Assessing the U.S. Government Response to the Nuclear Terrorism Threat After 9/11," presentation to the Joint Atomic Energy Intelligence Committee, McLean, VA, May 9, 2002.

"Upgrading Physical Protection at Nuclear Facilities to Address New Threats," MIT Security Studies Seminar, MIT, Boston, MA, April 18, 2002.

"Perspectives on New Plant Licensing," presentation at the U.S. Nuclear Regulatory Commission Briefing on Readiness for New Plant Applications and Construction, Washington, DC, July 19, 2001.

"Regulatory Challenges for Future Nuclear Plant Licensing: A Public Interest Perspective," U.S. NRC Advisory Committee on Reactor Safeguards (ACRS) Workshop on New Nuclear Plant Licensing, Washington, DC, June 5, 2001.

"The Future of Nuclear Power: A Public Interest Perspective," 2001 Symposium of the Northeast Chapter of Public Utility Commissioners, Mystic, CT, May 21, 2001.

Statement at the U.S. Nuclear Regulatory Commission Briefing on Office of Nuclear Regulatory Research Programs and Performance, May 11, 2001.

"Barriers to Deployment of Micro-Nuclear Technology," presentation at the workshop on "New Energy Technologies: A Policy for Micro-Nuclear Technologies," James A. Baker III Institute for Public Policy, Rice University, Houston, TX, March 19-20, 2001.

"Aging Research and Public Confidence," presentation at the U.S. Nuclear Regulatory Commission 2001 Regulatory Information Conference (RIC), Washington, DC, March 14, 2001.

"NRC Reactor Safeguards Activities," presentation at the U.S. Nuclear Regulatory Commission 2001 Regulatory Information Conference (RIC), Washington, DC, March 14, 2001.

"DOE's Nuclear Material Stabilization Approach: The Failure of Transparency," Embedded Topical Meeting on DOE Spent Nuclear Fuel and Fissile Material Management, American Nuclear Society Annual Meeting, San Diego, CA, June 2000.

"The Status of Reactor Safeguards Initiatives," presentation at the U.S. NRC 2000 Regulatory Information Conference, Washington, DC, March 29, 2000.

"Safety Questions Concerning MOX Fuel Use in Proposed U.S. Reactors," Sixth International Policy Forum on the Management and Disposition of Nuclear Weapons Materials, sponsored by Exchange/Monitor Publications, Washington, DC, June 1999.

"Transparency and Plutonium Disposition," ISIS Workshop on Comprehensive Controls on Plutonium and Highly Enriched Uranium: Long-Term Problems and Prospects for Solutions, sponsored by the Institute for Science and International Security, Washington, DC, June 1997.

"Ship Transportation of Radioactive Materials," presentation to the Marine Board of the National Research Council, U.S. National Academy of Sciences, Woods Hole, MA, June 20, 1996.

"The Importation and Storage of High-Level Radioactive Wastes at Rokkasho-Mura: Safety Concerns," presentation at the Public Forum on High-Level Nuclear Waste and Reprocessing," Aomori, Japan, April 16, 1996.

"Perspectives on U.S. Options for Disposition of Excess Plutonium," Third International Policy Forum on the Management and Disposition of Nuclear Weapons Materials, sponsored by Exchange/Monitor Publications, Landsdowne, VA, March 21, 1996.

"Addressing Safety Issues in the Sea Transport of Radioactive Materials," presentation to the Special

Consultative Meeting of Entities Involved in the Marine Transport of Nuclear Materials Covered by the INF Code," International Maritime Organization, London, March 4-6, 1996.

"Prospects and Unsolved Issues for Plutonium Immobilization," INESAP/IANUS/UNIDIR Fissile Cutoff Workshop, Palais des Nations, Geneva, June 1995.

"An Intermediate Solution for Plutonium from Dismantled Nuclear Warheads," Annual Meeting of the German Physical Society, Berlin, Germany, March 1995.

"The Sea Transport of High-Level Radioactive Waste: Environmental and Health Concerns," Channel Islands International Conference on Nuclear Waste, St. Helier, Jersey, United Kingdom, January 1995.

Conference Papers

E. Lyman, "Security and Nonproliferation Assessment of Breed-and-Burn Systems," GLOBAL 2015 Conference, Paris, France, September 2015.

E. Lyman, "Material Accounting Issues at the MOX Fuel Fabrication Facility," 2014 IAEA Safeguards Symposium, International Atomic Energy Agency, Vienna, Austria, October 2014.

E. Lyman, "Spent Nuclear Fuel Sabotage: An Unnecessary Risk?" 55th Annual Meeting of the Institute of Nuclear Materials Management, Atlanta GA, July 2014.

E. Lyman, "WIPP and Plutonium Disposition: End of the Spent Fuel Standard?" 54th Annual Meeting of the Institute of Nuclear Materials Management, Palm Desert, CA, July 2013.

E. Lyman, "MC&A Issues at the MOX Fuel Fabrication Facility," 53th Annual Meeting of the Institute of Nuclear Materials Management, Orlando, FL, July 2012.

E. Lyman, "A Comprehensive Approach to Protecting Nuclear Facilities and Materials from Terrorist Threats," 2012 Seoul Nuclear Security Symposium, Seoul, Republic of Korea, March 2012.

E. Lyman, "Is Dilution the Solution to the Plutonium Threat?" 52th Annual Meeting of the Institute of Nuclear Materials Management, Palm Desert, CA, July 2011.

E. Lyman, "Resolving a Safeguards Paradox," 2010 IAEA Safeguards Symposium, International Atomic Energy Agency, Vienna, Austria, November 2010.

E. Lyman, "NRC: Taking Spent Fuel Security in the Wrong Direction," 51th Annual Meeting of the Institute of Nuclear Materials Management, Baltimore, MD, July 2010.

E. Lyman, "Severe Accident Consequence Assessment Regulatory Guidance: A Critique," American Nuclear Society Annual Meeting, San Diego, CA, June 2010.

E. Lyman, "Promoting Mediocrity: NRC's Policy for New Facility Security Design," 50th Annual Meeting of the Institute of Nuclear Materials Management, Tucson, AZ, July 2009.

E. Lyman, "Excess Plutonium Disposition: Requiem for a Dream," 49th Annual Meeting of the Institute of Nuclear Materials Management, Nashville, TN, July 2008.

E. Lyman, "Revising the Rules for Material Protection, Control and Accounting," 8th International Conference on Facility Operations – Safeguards Interface, Portland, OR, March 30 – April 4, 2008.

E. Lyman, "Regulatory Challenges Facing the Global Nuclear Energy Partnership," GLOBAL 2007 Conference, Boise, ID, September 2007.

E. Lyman, "Envisioning a World Without Uranium Enrichment," 48th Annual Meeting of the Institute of Nuclear Materials Management, Tucson, AZ, July 2007.

E. Lyman, "The Global Nuclear Energy Partnership: Will it Advance Nonproliferation or Undermine it?" 47th Annual Meeting of the Institute of Nuclear Materials Management, Nashville, TN, July 2006.

E. Lyman, "Can Nuclear Fuel Production in Iran and Elsewhere Be Protected Against Diversion?" paper presented at the Nonproliferation Policy Education Center/King's College-London Conference "After Iran: Safeguarding Peaceful Nuclear Energy," London, October 2-3, 2005.

E. Lyman, "The Erosion of Physical Protection Standards Under the MOX Fuel Program," 46th Annual Meeting of the Institute of Nuclear Materials Management, Phoenix, AZ, July 2005.

E. Lyman, "Extending the Foreign Spent Fuel Acceptance Program: Policy and Implementation Issues," 26th International Meeting on Reduced Enrichment for Research and Test Reactors, IAEA, Vienna, Austria, November 2004.

E. Lyman, "Using Bilateral Mechanisms to Strengthen Physical Protection Worldwide," 45th Annual Meeting of the Institute of Nuclear Materials Management, Orlando, FL, July 2004.

E. Lyman, "The Congressional Attack on RERTR," 25th International Meeting on Reduced Enrichment for Research and Test Reactors, RERTR-2003, Chicago, IL, October 2003.

E. Lyman, "Nuclear Plant Protection and the Homeland Security Mandate," 44th Annual Meeting of the Institute of Nuclear Materials Management, Phoenix, AZ, July 2003.

E. Lyman and A. Kuperman, "A Reevaluation of Physical Protection Standards for Irradiated HEU Fuel," 24th International Meeting on Reduced Enrichment for Research and Test Reactors, RERTR-2002, Bariloche, Argentina, November 2002.

E. Lyman, "Material Protection, Control and Accounting at the U.S. MOX Fuel Fabrication Plant: Merely an Afterthought?" 43rd Annual Meeting of the Institute of Nuclear Materials Management (INMM), Orlando, FL, June 2002.

E. Lyman, "Terrorism Threat and Nuclear Power: Recent Developments and Lessons to be Learned," Symposium on Rethinking Nuclear Energy and Democracy after 9/11, sponsored by PSR/IPPNW Switzerland, Basel, Switzerland, April 2002.

E. Lyman, remarks for Expert Panel on Advanced Reactors, Nuclear Safety Research Conference, U.S. Nuclear Regulatory Commission, Washington, DC, October 2001.

E. Lyman, "The Future of Immobilization Under the U.S.-Russian Plutonium Disposition Agreement," 42nd Annual Meeting of the Institute of Nuclear Materials Management (INMM), Indian Wells, CA, July 18, 2001.

E. Lyman, comments in *the Report of the Expert Panel on the Role and Direction of Nuclear Regulatory Research*, U.S. Nuclear Regulatory Commission, May 2001.

E. Lyman, "Can the Proliferation Risks of Nuclear Power be Made Acceptable?" Nuclear Control Institute 20th Anniversary Conference, Washington, DC, April 9, 2001.

E. Lyman and P. Leventhal, "Radiological Sabotage at Nuclear Power Plants: A Moving Target Set," 41st Annual Meeting of the INMM, New Orleans, LA, July 2000.

E. Lyman, "Comments on the Storage Criteria for the Storage and Disposal of Immobilized Plutonium," Proceedings of the Institute for Science and International Security Conference on "Civil Separated Plutonium Stocks --- Planning for the Future," March 14-15, 2000, Washington, DC, Isis Press, 135.

E. Lyman, "The Sea Shipment of Radioactive Materials: Safety and Environmental Concerns," Conference on Ultrahazardous Radioactive Cargo by Sea: Implications and Responses, sponsored by the Maritime Institute of Malaysia, Kuala Lumpur, Malaysia, October 1999.

E. Lyman, "A Critique of Physical Protection Standards for Irradiated Materials," 40th Annual Meeting of the INMM, Phoenix, AZ, July 1999.

E. Lyman, "DOE Reprocessing Policy and the Irreversibility of Plutonium Disposition," Proceedings of the 3rd Topical Meeting on DOE Spent Nuclear Fuel and Fissile Materials Management, American Nuclear Society, Charleston, SC, September 8-11, 1998, 149.

E. Lyman, "Japan's Plutonium Fuel Production Facility (PFPP): A Case Study of the Challenges of Nuclear Materials Management," 39th Annual Meeting of the INMM, Naples, FL, July 1998.

E. Lyman, "Safety Aspects of Unirradiated MOX Fuel Transport," Annex 2b of the *Comprehensive Social Impact Assessment of MOX Use in Light Water Reactors*, Citizens' Nuclear Information Center, Tokyo, November 1997.

E. Lyman, "Unresolved Safety Issues in the Storage and Transport of Vitrified High-Level Nuclear Waste," 38th Annual Meeting of the INMM, Phoenix, AZ, July 1997.

E. Lyman, "A Perspective on the Proliferation Risks of Plutonium Mines," proceedings of the Plutonium Stabilization and Immobilization Workshop, U.S. Department of Energy, Washington, DC, December 12-14, 1995, CONF-951259, p, 445.

E. Lyman, "Assessing the Proliferation and Environmental Risks of Partitioning-Transmutation," Fifth International Summer Symposium on Science and World Affairs, Cambridge, MA, USA, July 1993.

Letters to the Editor and Op-Eds

E. Lyman, "Nuclear Cybersecurity: Why We Should Worry," New York Times, January 26, 2016.

E. Lyman and F. von Hippel, "Direct Disposal is a Better Solution for South Carolina's Plutonium Problem" (op-ed), Augusta Chronicle, October 24, 2015.

E. Lyman, "The Value of a Life," New York Times, February 23, 2011.

E. Lyman, "The Downside of Nuclear Energy," Washington Post, April 21, 2006.

E. Lyman, "Reprocessing Nuclear Waste: Forget It," Topeka Capital-Journal, December 24, 2005.

E. Lyman, "The Wrong Way to Get Cheap Electricity," Chicago Sun-Times, December 16, 2005.

E. Lyman, "Uranium on Campus," New York Times, August 23, 2004

L. Gronlund and E. Lyman, "Halting the Spread of Nuclear Arms," New York Times, December 28, 2003.

E. Lyman, "Troubles at Indian Point," New York Times, January 25, 2003.

E. Lyman and P. Leventhal, "Nonessential Nukes" (op-ed), Washington Post, November 26, 2002.

P. Leventhal and E. Lyman, "Shipping Plutonium," New York Times, July 12, 2002.

- E. Lyman, "Indian Point Reactor," New York Times, January 27, 2002.
- E. Lyman, "Spent Nuclear Fuel," New York Times, June 3, 2001.
- E. Lyman and P. Leventhal, "Better Plutonium Plan," New York Times, February 5, 1998.
- E. Lyman, "A Safer Plutonium Plan," Washington Post, August 24, 1997.
- P. Leventhal and E. Lyman, "Who Says Iraq Isn't Making a Bomb?" International Herald Tribune, November 2, 1995.
- H. Feiveson and E. Lyman, "No Solution to the Plutonium Problem," Washington Post, July 29, 1994.
- E. Lyman, "Getting Rid of Weapon Plutonium," *Bulletin of the Atomic Scientists*, July/August 1994.