

REBUILDING SOCIAL TRUST IN THE MANAGEMENT OF RADIOACTIVE WASTE

**Written testimony submitted to the House Committee on
Science, Space, and Technology
October 27, 2011**

**Roger E. Kasperson
Research Professor and Distinguished Scientist
Clark University**

**Written testimony based upon the technical paper for the Blue Ribbon Commission entitled,
“Social Distrust and High Level Radioactive Waste Management: Looking into the Future”**

by

Seth P. Tuler¹, Ph.D. and Roger E. Kasperson², Ph.D.

¹ Social and Environmental Research Institute, Greenfield, MA 01301

² George Perkins Marsh Institute, Clark University, Worcester, MA 01610

The management of spent nuclear fuel (SNF) and defense high level waste (HLW) is a complex socio-technical systems challenge. Coordinated, reliable, and safe performance will be required over very long periods of time within evolving and changing social and technical contexts. To accomplish these goals, a waste management system will involve a host of facilities for interim storage and long-term disposal, a transportation infrastructure, and research and development centers. The complexity of SNF and HLW management will also require an array of robust institutions and procedures. Waste management is multi-institutional, comprising multiple private companies and sectors (e.g., commercial nuclear utilities, trucking and railway companies), multiple government agencies at different levels (local, state, national), non-governmental organizations (NGOs) and other institutional stakeholders, as well as citizens. At the moment, experience of how this will work is limited.

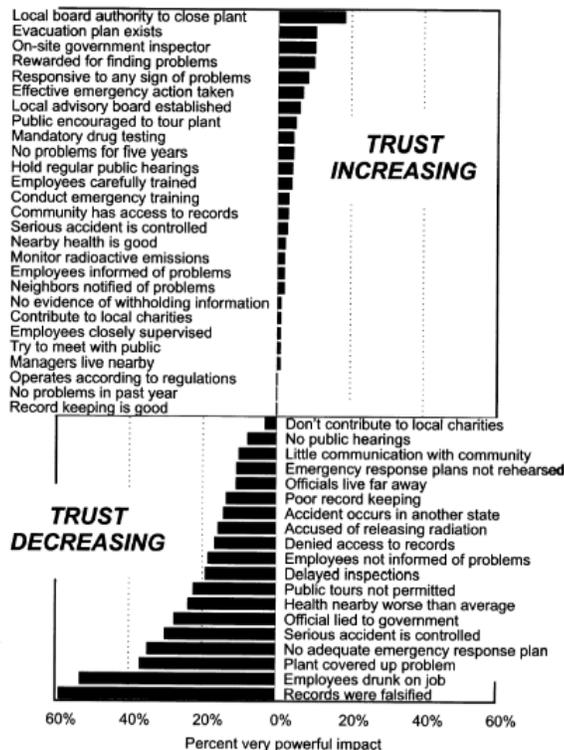
No matter how many checks and balances are put into place, no matter how much information is disclosed, no matter how many instruments for monitoring, evaluation, and oversight are implemented there will ultimately be individuals and groups entrusted to make sure “it all works.” Trust and confidence are necessary for stable arrangements in contexts of unequal power, whether in terms of access to information, economic resources, or ability to implement desired actions (Kuhn and Ballard 1999). Stable arrangements, in turn, are essential for the institutional continuity necessary for long-term projects such as the disposal of SNF and HLW.

Unfortunately, the principal agencies responsible for nuclear wastes, the Department of Energy (DOE) and the Nuclear Regulatory Commission, are not trusted by majorities of the public in recent public opinion polls (e.g., Whitfield et al. 2009) and other earlier assessments (e.g., DOE 1993, DOE 2000). Social perceptions of mis-steps and failures in government and private parties’ management of nuclear wastes have contributed to long term erosion of trust and confidence (DOE 1993, DOE 2000, Hewlett 1978, Kraft 1996, NRC 2001, OTA 1985, Pijawka and Mushkatel 1992, Rosa and Clark 1999, Rosa et.al. 2010). Reasons include Congressional scrapping of a site selection in the Eastern half of the US, Congressional scrapping of technical integrity and equity provisions in the Nuclear Waste Policy Amendments, attempts to coerce Nevada rather than negotiate, failure to clearly define regulatory criteria in advance and then adapt them to fit existing conditions, attempts to re-negotiate or circumvent compliance with cleanup agreements related to HLW at DOE sites, and treating the public as if its concerns are irrational. In short, social *distrust* is multi-lateral and “widespread in the nuclear waste domain, is deeply seated, reflects broader trends in society, and has a continuing history of events to maintain it” (NRC 2001, pg. 74).

Two reasons for the difficulty of regaining social trust in the context of SNF and HLW management stand out for special attention. First, nuclear waste is thought of in largely negative terms. Changing negative views can be hard. The “affect heuristic” explored in the work of Slovic and colleagues (Finucane et al. 2000, Slovic et al. 2007) suggests that when people like an activity or technology they tend to view it as having high benefit and low risk. On the other hand, if they dislike it, they see benefits as low and risk as high. Furthermore, recent work on “cultural cognition” reinforces findings that people tend to select and interpret information to support preexisting views, protect values and worldviews (e.g., anti-nuclear or pro-nuclear), or preserve identity with an ideological group (Braman et al. 2005, Kahan et al. 2007). Thus, information intended to educate or persuade is all too often impotent.

Second, evidence suggests that events and activities that erode social trust have a stronger impact on overall levels of trust than do those thought to strengthen social trust (Figure 1). This is often referred to as the “asymmetry of trust” (Slovic 1993). Slovic (1993) found that of the many trust-building actions investigated only one had a moderate effect: “An advisory board of local citizens and environmentalists is established to monitor the plant and is given legal authority to shut it down if they believe it to be unsafe.”

Figure 1. Differential impact of trust-increasing and trust-decreasing events on levels of trust among respondents. Respondents were asked about each event whether it would increase or decrease their trust in the management of a nuclear power plant. They, then, rated how strongly their trust would be affected (1 = very small impact on trust; 7 = very powerful impact on trust). **Source: Slovic, 1993.**



Note: Only the percentage of respondents giving category 7 ratings (very powerful impact) are shown here.

REBUILDING SOCIAL TRUST

Based upon the sizable literature on social distrust, we offer six recommendations for how nuclear waste management should move forward.

- 1) The planning process should commission a set of focus papers by leading experts on the major social and ethical problems that must be addressed in the evolving approach. These should include options for solutions and their pluses and minuses.
- 2) Social science and policy expertise will be essential (Rosa et al. 2010). We suggest convening a standing advisory committee of leading social scientists and policy analysts with whom nuclear waste planner regularly consult.
- 3) A dual strategy should be adopted. First, planning, including the design of institutional architecture and procedures, should proceed in a way that recognizes the need to perform and be effective in a context of social distrust. It may be that proceeding on the recognition of a deficit in social trust will lay the foundation for transparent, participatory procedures that can rebuild functional, critical social trust over the long term. Second, while working in a context of distrust there must also be consistent efforts at all levels and in all aspects of nuclear waste policy-making - planning, implementation, and operations - to support the (re)development of critical social trust.
- 4) Given the long, apparently obdurate distrust of the DOE it is time to think of putting waste management in the hands of alternative institutions. We argue that responsibility should be placed in a public corporation, as many countries have done.
- 5) A premium should be placed on openness, inclusive stakeholder involvement, and truly independent peer review (including impacted communities and knowledgeable, demanding critics) during the planning, decision, and monitoring process for all stages of program development and operation. The role of public involvement and peer review should be clear and meaningful. Independent review by critics.
- 6) Contingent on geological suitability, the approach to siting should emphasize voluntary consent rather than coercion as much as possible.

REFERENCES AND SUGGESTED READINGS

- Baxter, J. 2006. A case study of intra-community conflict as facility impact, *Journal of Environmental Planning and Management* 49(3):337-360.
- Bradbury, J., Branch, K., Malone, E. 2003. *An evaluation of DOE-EM public participation programs*. Report # PNNL-14200. Washington: Battelle Pacific Northwest National Laboratory.
- Braman, D., Kahan, D. M., & Grimmelmann, J. 2005. Modeling facts, culture, and cognition in the gun debate. *Social Justice Research*, 18(3), 283-304.

- Burger, J., Gochfeld, M., Kosson, D., Powers, C., Friedlander, B., Eichlberger, J., Barnes, D., Duffy, L., Jewett, S., Volz, C. 2005. Science, Policy, and Stakeholders: Developing a Consensus Science Plan for Amchitka Island, Aleutians, Alaska, *Environmental Management* 35(5): 557-568.
- Castle, G. & Munton, D. 1996. Voluntary siting of hazardous waste facilities in western Canada. In D. Munton (editor), *Hazardous waste siting and democratic choice*. Washington, DC: Georgetown University Press.
- Cvetkovich, G. and Lofstedt, R. (Eds.) 1999. *Social trust and the management of risk*. London: Earthscan.
- Dietz, T. and Stern, P. 1998. Science, values, and biodiversity, *Bioscience* 48(6):441-444.
- DOE 1993. *Recommendations from the Report of the Secretary of Energy Advisory Board Task Force on Radioactive Waste Management* (November 1993). Washington, DC: US Department of Energy.
- DOE 2000. *Relations between DOE Facilities and their Host Communities: A Pilot Review. Report of the Openness Advisory Panel (OAP) of the Secretary of Energy Advisory Board*. Washington, DC: US Department of Energy.
- Earle, T. 2010. Trust in Risk Management: A model-based review of empirical research, *Risk Analysis* 30(4):541-574
- Earle, T. C., Siegrist, M., & Gutscher, H. 2007. Trust, risk perception, and the TCC model of cooperation. In M. Siegrist, H. Gutscher, & T. C. Earle (Eds.), *Trust, technology, and society: Studies in cooperative risk management*. London: Earthscan.
- Elam, M., Soneryd, L., and Sundqvist, G. 2010. Demonstrating safety – validating new build: The enduring template of Swedish nuclear waste management, *Journal of Integrative Environmental Sciences* 7(3):197-210.
- Finucane, M., Alkhakami, A., Slovic, P., and Johnson, S. 2000. The affect heuristic in judgments of risks and benefits, *Journal of Behavioral Decision Making* 13:1-17.
- Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S., and Combs, B. 1978. How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits, *Policy Sciences* 9:127-152.
- Gallup 2008. Polling data on trust and confidence in government institutions. Available on the web at: www.gallup.com/poll/110458/trust-government-remains-low.aspx
- Hewlett, R. G. 1978. *Federal Policy for the Disposal of Highly Radioactive Wastes from Commercial Nuclear Power Plants*. DOE/MA-01530, Washington DC: US Department of Energy.
- Jenkins-Smith, H. and Silva, C. 1998. The role of risk perception and technical information in scientific debates over nuclear waste storage, *Reliability Engineering and System Safety* 59:107-122.
- Kahan, D., Slovic, P., Braman, D., Gastil, J., and Cohen, G. 2007. Affect, values, and nanotechnology risk perceptions: An experimental investigation. Yale Law School Public Law Working Paper No. 155. New Haven: Yale University. Available at: <http://ssrn.com/abstract=968652>
- Kasperson, R. 2005. Siting hazardous facilities: Searching for effective institutions and processes. In *Managing conflict in facility siting: An international comparison*, eds. S. H. Lesbirel & D. Shaw, 13-35. Northampton, MA: Elgar Publishing Inc.
- Kasperson, R. Kasperson, J., and Golding, D. 1999. Risk, trust, and democratic theory. In G. Cvetkovich and R. Lofstedt (eds.) *Social trust and the management of risk*. London: Earthscan.
- Kasperson, R. E., Golding, D., and Tuler, S. 1992. Siting hazardous facilities and communicating risks under conditions of high social distrust. *Journal of Social Issues* 48(4):161-187.
- Kasperson, R. E., Renn, O., Slovic, P., Brown, H., Emel, J., Goble, R., Kasperson, J., Samuel R. 1988. "The Social Amplification of Risk: A Conceptual Framework," *Risk Analysis* 8(2): 177-187.
- Kraft, M. 1996. Democratic dialogue and acceptable risks: The politics of high-level nuclear waste disposal in the United States. In D. Munton (editor), *Hazardous waste siting and democratic choice*. Washington, DC: Georgetown University Press.
- Kuhn, R. and Ballard, K. 1999. Canadian innovations in siting hazardous waste management facilities, *Environmental Management* 22(4):533-545.

- Lehtonen, M. 2010. Deliberative decision-making on radioactive waste management in Finland, France, and the UK: Influence of mixed forms of deliberation in the macro discursive context, *Journal of Integrative Environmental Sciences* 7(3):175-196.
- McLeod, C. 2008. Trust. In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy* (Fall 2008 Edition). Available at <http://plato.stanford.edu/archives/fall2008/entries/trust/>
- Metlay, D. 1999. Institutional trust and confidence: A journey into a conceptual quagmire. In *Social trust and the management of risk*, eds. C. G. & R. Lofstedt, 100-116. London: Earthscan.
- NEA 2004. Stepwise Approach to Decision Making for Long-term Radioactive Waste Management: Experience, Issues and Guiding Principles. Report No. 4429. Paris: Nuclear Energy Agency, OECD.
- National Research Council (NRC) 1996. *Understanding risk*. Washington, DC: National Academies Press.
- National Research Council (NRC) 2000. *Long-Term Institutional Management of U.S. Department of Energy Legacy Waste Sites*. Washington, DC: National Academies Press.
- National Research Council (NRC) 2001. *Disposition of high-level waste and spent nuclear fuel*. Washington, DC: National Academies Press.
- National Research Council (NRC) 2003. *One Step at a Time: The Staged Development of Geologic Repositories for High-Level Radioactive Waste*. Washington, DC: National Academies Press.
- National Research Council (NRC) 2008. *Public participation in environmental assessment and decision making*. Washington, DC: National Academies Press.
- National Research Council (NRC) 2009a. *Science and decisions: Advancing risk assessment*. Washington, DC: National Academies Press.
- National Research Council (NRC) 2009b. *Informing decisions in a changing climate*. Washington, DC: National Academies Press.
- NWMO 2005. Review of Factors Influencing 'Social Acceptability' In considering long term waste management approaches. NWMO Background Paper. Toronto: Nuclear Waste Management Organization.
- Office of Technology Assessment (OTA) 1985. *Managing the nations high-level commercial radioactive waste* (OTA-0-277). Washington, DC: Office of Technology Assessment.
- Petts, J. 2008. Public engagement to build trust: false hopes?, *Journal of Risk Research* 11(6):821-835.
- Pidgeon, N. F., Kasperson, R. E. and Slovic, P. (Eds) 2003. *The Social Amplification of Risk*. Cambridge: Cambridge University Press.
- Pijawka, K. D. and Mushkatel, A. H. 1991/1992. Public opposition to the siting of the high-level nuclear waste repository: The importance of trust, *Policy Studies Review* 10(4):180-194.
- Poortinga W, Pidgeon N. F. 2003. Exploring the dimensionality of trust in risk regulation, *Risk Analysis* 23:961-972.
- Poortinga W, Pidgeon N. F. 2006. Prior attitudes, salient value similarity, and dimensionality: Toward an integrative model of trust in risk regulation. *Journal of Applied Social Psychology* 36:1674-1700.
- Rabe, B., Gunderson, W., Harbage, P. 1996. Alternatives to NIMBY gridlock: Voluntary approaches to radioactive waste facility siting in Canada and the United States. In *Hazardous waste siting and democratic choice*, ed. D. Munton, 85-107. Washington, DC: Georgetown University Press.
- Rabe, B., Becker, J., and Levine, R. 2000. Beyond Siting: Implementing Voluntarism in Waste Facility Siting, *American Review of Canadian Studies* 30: 455-478.
- Renn, O. 2006. *Risk governance: Toward an integrative framework*. White Paper. Geneva, Switzerland: International Risk Governance Council.
- Renn, O. & D. Levine. 1991. Credibility and trust in risk communication. In *Communicating risks to the public: international perspectives*, eds. R. E. Kasperson & P. J. M. Stallen, 175-218. Dordrecht, Netherlands: Kluwer Academic Publishers.
- Richards, A. 1996. Using co-management to build community support for waste facilities. In *Hazardous waste siting and democratic choice*, ed. D. Munton, 321-337. Washington, DC: Georgetown University Press.

- Rosa, E. and Clark, Jr., D. 1999. Historical Routes to Technological Gridlock: Nuclear Technology as Prototypical Vehicle, *Research in Social Problems and Public Policy* 7:21-57.
- Rosa, E., Tuler, S., Fischhoff, B., Webler, T., Friedman, S., Sclove, R., Shrader-Frechette, K., English, M., Kasperson, R., Goble, R., Leschine, T., Freudenburg, W., Chess, C., Perrow, C., Erikson, K., Short, J. 2010. Nuclear waste: Knowledge waste? *Science* 329(5993):762 – 763.
- Siegrist, M. 2010. Trust and Confidence: The Difficulties in Distinguishing the Two Concepts in Research, *Risk Analysis* 30(7):1022–1024
- Seligman, A. 1997. *The problem of trust*. Princeton, NJ: Princeton University Press.
- Slovic, P. 1993. Perceived risk, trust, and democracy, *Risk Analysis* 13:675-682.
- Slovic, P., Layman, M., and Flynn, J. 1991. Risk perception, trust, and nuclear waste: Lessons from Yucca Mountain, *Environment* 33:6-11 and 28-30.
- Slovic, P., Finucane, M., Peters, E., and MacGregor, D. 2007. The affect heuristic, *European Journal of Operational Research* 177(3): 1333-1352.
- Spies, S., Murdock, S., White, S., Krannich, R., Wulfhorst, J., Wrigley, K., Leistriz, F. L., Sell, R., and Thompson, J. 1998. Support for waste facility siting: Differences between community leaders and residents, *Rural Sociology* 63(1):65-93.
- Strauss, H. 2010. Involving the Finnish public in nuclear facility licensing: Participatory democracy and industrial bias, *Journal of Integrative Environmental Sciences* 7(3):211-228.
- Terwell, B. et al. 2009. Competence-Based and Integrity-Based Trust as Predictors of Acceptance of Carbon Dioxide Capture and Storage (CCS), *Risk Analysis* 29(8):1129–1140
- Tuler, S. 2002. *Radiation Risk Perception and Communication: A Case Study of the Fernald Environmental Management Project*. SERI Report 02-001. Greenfield, MA: Social and Environmental Research Institute. Available at: www.seri-us.org/pubs/02-001.pdf
- Tuler, S. and Webler T. 2010. How preferences for public participation are linked to perceptions of the context, preferences for outcomes, and individual characteristics, *Environmental Management* 46(2):254-267.
- Vira, J. 2006. Winning citizen trust: The siting of a nuclear waste facility in Eurajoki, Finland, *Innovations* (fall): 67-82.
- Webler, T. 2002. *Radiation Risk Perception and Communication: A Case Study of the Tritium Controversy at Brookhaven National Laboratory*. SERI Report 02-002. Greenfield, MA: Social and Environmental Research Institute. Available at: www.seri-us.org/pubs/02-002.pdf
- Whitfield, S., Rosa, E., Dan, A., and Dietz, T. 2009. The future of nuclear power: Value orientations and risk perception, *Risk Analysis* 29(3):425:437.