

LOW DOSE RISK, DECISIONS, & RISK COMMUNICATION:

YEAR 3

Annual Technical Progress Report for the Period June 2001-May 2002

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Research Objective: The objective of this project is to conduct basic research on how people receive, evaluate, and form positions on scientific information and its relationship to low-dose radiation exposure. There are three major areas of study in our research program. First is the development of theories, frameworks and concepts essential to guiding data collection and analysis. The second area is a program of experimental studies on risk perception, evaluation of science information, and the structure of individual positions regarding low-dose exposures. Third is the community-level studies to examine and record how the social conditions, under which science communications take place, influence the development of attitudes and opinions about: low-dose exposures, the available management options, control of radiation risks, and preferences for program and policy goals.

Research Progress and Implications: This report summarizes work performed during months 21-32 of a 36-month project (October 1999 to September 2002). The focus of this year's work has moved from data collection and analyses to reporting in each of the three study areas.

1. *Theory and Concept Development:* Theoretical work on The Social History of Radiation has focused on the concept of nuclear stigma, which functions as a composite evaluation of hazards inherent to nuclear science and technology combined with the public history of management, and the perceptions of potential risks. Work also continues on The Social Geography of Risk Communication, a spatial framework in which to understand risk communication messages, and the community context in which responses to risk communication are formed and acted out. A better understanding of the historical and community contexts is essential to the development of successful risk communication strategies concerning low dose radiation risk.
2. *Experimental Studies:* Experimental studies of radiation risk perception, emotional and affective responses to radiation, and the effects of education on radiation decisions were conducted among the university student population. Results from the risk perception studies show that nonscientists view low dose radiation exposure largely in terms of its potential for harm and the context in which the exposure occurs. Results from the emotional and affective response studies suggest that stigma responses towards radiation sources are constructed through an interaction of individuals feelings and thoughts about the stigmatized object; furthermore, some individuals are more susceptible than others to the generation of stigma responses. Recent inquiries into the effects of education on radiation decisions have centered around an educational booklet that presents basic information on radiation sources, exposure, and effects. This radiation tutorial, along with knowledge-assessment and risk-perception instruments, was presented to a small group of subjects in order to determine how people receive, evaluate, and form positions on scientific information and its relationship to low-dose radiation exposure. Results to date indicate that nonscientists can learn and appreciate the models used to infer low dose radiation risk, but prior attitudes and beliefs about radiation risk interact with their learning. Data analyses for a three-month follow-up study are currently underway. These studies reveal a rich dynamic of cognitive and emotional responses to messages of radiation risk that can inform future risk communication efforts based on the results of the Low Dose Radiation Research Program.
3. *Community and Small Group Studies:* Our community and small group studies have uncovered the importance of stakeholder involvement, social networks, scientific knowledge, tradeoffs, and public values in the communication and perception of low dose radiation risk. Three case studies of communities located adjacent to DOE facilities have been completed with analyses focused on how the community social context, including the underlying values of various stakeholders, serves to form public opinion about radiation exposure and related issues. Extensive historical reviews, key informant interviews, and random telephone surveys were conducted at Rocky Flats, Colorado, Fernald, Ohio, and Brookhaven, New York. Exploratory small group studies were also

conducted with a small sample of nonscientists, with results suggesting that a values-based approach may be more useful than one based on science when involving members of the lay public in decisions regarding the cleanup of sites contaminated with low levels of radiation. The combined analysis of historical and experimental data provides valuable guidance for future efforts at public involvement in decisions regarding low dose radiation risk.

Planned Activities: During the remaining four months of this project, all resources will be directed toward completing the draft reports listed below and compiling a final report for submission to DOE. Data analyses for the science education follow-up experiment will be completed shortly, with an additional report to follow. Following submission of final reports to the contractor, manuscripts based on the reports will be prepared and submitted for publication in major scientific journals such as *Risk Analysis* and *Risk—Health, Safety, and Environment*. Plans are also underway to compile and publish a book manuscript on the Social Geography of Risk Communication in 2003. We do not anticipate any unexpended funds at the completion of this project.

Information Access: Most of following research products are available on the Decision Research web site at http://www.decisionresearch.org/Projects/Low_Dose/.

Flynn, J. (in press). Nuclear stigma: Some notes on the social history of radiation. In N. Pidgeon, R. Kasperson, & P. Slovic (Eds.), *The social amplification of risk* (Forthcoming, Summer 2002). London: Cambridge University Press.

Flynn, J. (2002, March). *Low dose risk, decisions, and risk communication: Materials prepared for the U.S. DOE Low Dose Radiation Research Program Contractor's Workshop III* [CD-Rom]. Eugene, OR: Decision Research.

Flynn, J. (2002, March 25). *Overview: Low Dose, Risk, Decisions, and Risk Communication*. Presented at the DOE Low Dose Radiation Research Program Contractor's Workshop III, Rockville, MD.

Flynn, J., & MacGregor, D. G. (2002). *The social geography of risk communication* (Draft report). Eugene, OR: Decision Research.

Gregory, R., & Arvai, J. L. (2002). *A decision-focused approach to DOE cleanup priorities* (Draft report). Eugene, OR: Decision Research.

MacGregor, D. G. (2002, March 25). *Communicating about radiation exposure: Effects of science education on radiation decisions*. Paper presented at the DOE Low Dose Radiation Research Program Contractor's Workshop III, Rockville, MD.

MacGregor, D. G. (2002). *Ionizing radiation: A tutorial on sources and exposures*. (Version 2.0, Report No. 02-02). Eugene, OR: Decision Research.

MacGregor, D.G., & Flynn, J. (2002). *Public perception of nuclear materials in space research* (Draft report). Eugene, OR: Decision Research

MacGregor, D. G., Flynn, J., Mertz, C. K., & Slovic, P. (2002). *Perception of radiation exposure: Part II. Communicating about radiation exposure and health effects* (Draft report). Eugene, OR: Decision Research.

- MacGregor, D. G., Flynn, J., Slovic, P., & Mertz, C. K. (2002). *Perception of radiation exposure: Part I. Perception of risk and judgments of harm* (Report No. 02-01). Eugene, OR: Decision Research.
- MacGregor, D.G., Mertz, C.K. (2002). *Communicating models of radiation health effects: The role of knowledge and perceptions* (Draft report). Eugene, OR: Decision Research.
- Mertz, C. K., Flynn, J., MacGregor, D. G., Satterfield, T., Johnson, S. M., Tuler, S., & Webler, T. (2002). *Community surveys: Low dose radiation. Fernald, Ohio and Rocky Flats, Colorado* (Draft report). Eugene, OR: Decision Research.
- Peters, E., Flynn, J., & Slovic, P. (forthcoming). *A emotion-based model of stigma susceptibility: Worldviews, affective reactivity, and appraisals in the generation of stigma*. Eugene, OR: Decision Research.
- Satterfield, T., & Levin, J. (2002). *Public science, fugitive values, and the problems of tradeoffs at Rocky Flats* (Draft report). Eugene, OR: Decision Research.
- Slovic, P. *Public perceptions of low dose radiation risks*. Paper presented at the Session on Low dose radiation: Science, ethics and communication shaping public policy, Annual Meeting & Science Exposition of the American Association for the Advancement of Science, Boston, MA, February 15, 2002.
- Tuler, S. (2002). *Low dose risk perception and communication: A case study of on-site remediation and off-site community health studies at the Fernald nuclear weapons site* (Draft report). Leverett, MA: Social and Environmental Research Institute.
- Tuler, S. *Radiation-related decision making based on community participation and science*. Paper presented at the Session on Low dose radiation: Science, ethics and communication shaping public policy, Annual Meeting & Science Exposition of the American Association for the Advancement of Science, Boston, MA, February 15, 2002.
- Webler, T. (2002). *Low dose risk perception and communication: A case study of the tritium controversy at Brookhaven National Laboratory* (Draft report). Leverett, MA: Social and Environmental Research Institute.
- U.S. Department of Energy. (2002, March). *Low dose risk, decisions, and risk communication*. Poster session presented at the U.S. Department of Energy Low Dose Radiation Research Program Contractor's Workshop III, Washington, DC.