

Consideration of Property Damage by External Organizations

The staff performed a limited review of how select external organizations address economic consequences arising from property damage (e.g. land contamination). Although the regulatory framework at the NRC is somewhat unique (e.g. existence of backfitting provisions and implementation of the adequate protection standard) the following were considered pertinent to this issue:

- **Federal agencies:** The Environmental Protection Agency (EPA) is a leader in developing and implementing cost-benefit guidance used in regulatory analyses. According to the National Center for Environmental Economics, EPA's *Guidelines for Preparing Economic Analyses* establish a sound scientific framework for performing economic analyses of environmental regulations and policies. They incorporate recent advances in theoretical and applied work in the field of environmental economics. The *Guidelines* provide guidance on analyzing the benefits, costs, and economic impacts of regulations and policies, including assessing the distribution of costs and benefits among various segments of the population.¹ Furthermore, In October 2011, the EPA published its *Handbook on the Benefits, Costs, and Impacts of Land Cleanup and Reuse*.

The Department of Transportation (DOT) is also an active leader in the area of regulatory analyses, but has no specific guidance or policy on the subject of economic consequences arising from property damage due to radiological contamination. The Department of Energy (DOE) also does not have a formal policy in this area. The staff notes, however, that the DOE uses the MACCS2 code when conducting NEPA analyses and formulating Environmental Impact Statements.

- **IAEA and NEA:** The International Atomic Energy Agency (IAEA) and the Organization for Economic Cooperation and Development (OECD) Nuclear Energy Agency (NEA) provide little direct guidance to consider economic consequences of the unintended release of licensed nuclear materials to the environment. However, the following documents and information are pertinent to the discussion:
 - “Fundamental Safety Principles,” Safety Fundamentals (SF) No. 1, 2006, describes IAEA’s safety principles:
 - States that the fundamental safety objective is “...to protect people and the environment from harmful effects of ionizing radiation.”
 - Provides a number of safety principles, one of which (Number 5) recognizes that in optimizing protection, economic, social, and environmental factors need to be considered.
 - “Safety of Nuclear Power Plants: Design,” Specific Safety Requirements No. SSR-2/1, 2012, describes IAEA’s specific safety requirements for nuclear power plant design:
 - Requires a comprehensive safety assessment that identifies all possible sources of radiation and evaluates possible doses to workers, members of the public, and possible effects on the environment.
 - Focuses on controlling/preventing release of radioactive materials (e.g., through defense-in-depth).

¹ <http://yosemite.epa.gov/ee/epa/eed/nsf/webpages/Guidelines.html>

- “Safety Assessment and Verification for Nuclear Power Plants,” Safety Guide NS-G-1.2, 2001, describes IAEA’s guide for nuclear power plant safety assessment:
 - States that Probabilistic Safety Assessment (PSA) results should be compared with probabilistic safety criteria defined for the plant, including (if defined) criteria for “off-site consequences such as land contamination and food bans” and that results should be provided to civil authorities to help them in their planning.
 - Does not say Level 3 PSA should be performed but does say that a Level 3 PSA should consider economic consequences. Does not mandate specific economic factors that should be included in the analysis.
 - Refers to IAEA guidance document 50-P-12 (see next) for details.
- “Procedures for Conducting Probabilistic Safety Assessments of Nuclear Power Plants (Level 3),” Document 50-P-12, 1996, describes IAEA’s technical guidance document for Level 3 PSA:
 - Provides high-level procedures for conducting a Level 3 PSA, including consideration of economic impacts. However, this discussion is limited and dated; participants at a recent (July 2-6, 2012) IAEA Technical Meeting on Level 3 PSA agreed: (1) the document needs to be updated, and (2) additional guidance documents are needed to provide more detail.
 - At the IAEA Technical Meeting on Level 3 PSA, participants also agreed that there was a need for risk criteria associated with environmental contamination.
- A 2011 report on risk-informed decision making by the IAEA International Nuclear Safety Group (INSAG) titled “A Framework for an Integrated Risk Informed Decision Making Process,” INSAG-25:
 - Acknowledges risks other than to public health and safety, but provides little discussion.
- “Improving Nuclear Regulation,” NEA/CNRA/R(2011)10, 2011 is NEA’s compilation of NEA Regulatory Guidance Booklets produced by the Committee on Nuclear Regulatory Activities (CNRA):
 - Contains considerable discussion on regulatory philosophy and approaches. The term “risk” appears to be generally used in relation to public health and safety (or surrogate notions like core damage).
- “Probabilistic Risk Criteria and Safety Goals,” NEA/CSNI/R(2009)16, 2009:²
 - Reports on a survey of nuclear regulators and utilities
 - Identifies individual and societal risk goals, but none that directly address environmental or economic criteria.
- “Use and Development of Probabilistic Safety Assessment,” NEA/CSNI/R(2007)12, 2007:³
 - Provides working group on risk (WGRISK) member survey information on probabilistic risk criteria and safety goals – some of this information was not included in the 2009 report mentioned above.
 - Does not seem to have any discussion on environmental or economic criteria.

² <http://www.oecd-nea.org/nsd/docs/2009/csni-r2009-16.pdf>

³ <http://www.oecd-nea.org/nsd/docs/2007/csni-r2007-12.pdf>

- Contains some extended discussions on regulatory approaches to risk criteria and safety goals
- **ASME:** The March 2011 Fukushima accident prompted the formation of the ASME Presidential Task Force on Response to Japan Nuclear Power Plant Events⁴, which reviewed the Fukushima events and contrasted it with previous nuclear accidents at Three Mile Island and Chernobyl. Following this review, the task force has called for a new "safety construct" or a "set of planned, coordinated, and implemented systems ensuring that nuclear plants are designed, constructed, operated, and managed to prevent extensive societal disruption caused by radioactive releases from accidents, using an all-risk approach." The term "all-risk" requires consideration of "all credible hazards in developing probabilistic risk assessments," including "rare but credible events" that threaten the safety of a nuclear generating station. According to the task force, this includes very low-probability events, such as extreme floods and other natural phenomena that are unprecedented but conceivable at a given site⁵.

⁴ During the March 2012 annual Regulatory Information Conference, the chair of the ASME Presidential Task Force, Nils J. Diaz, gave a speech entitled "Forging a New Nuclear Safety Construct."

⁵ June 2012, "After Fukushima, ASME Task Force Challenges Nuclear Industry." <http://www.asme.org/kb/news---articles/articles/nuclear/after-fukushima-asme-challenges-nuclear-industry>