

U.S. Nuclear Regulatory Commission  
38<sup>th</sup> Annual Regulatory Information Conference

# RIC2026

Regulation, Innovation and  
Collaboration for a Safer Tomorrow

March 10-12, 2026

Bethesda North Marriott Hotel  
and Conference Center  
Rockville, MD

#NRCRIC2026

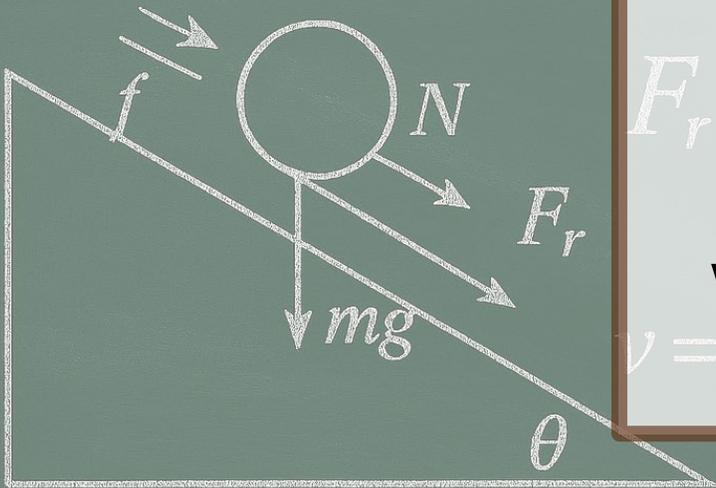
NRC.gov



$$F = ma$$

$$v = u + at$$

$$v = \sqrt{2as}$$



## COROLLARY ON NEWTON'S LAW OF MOTION

A regulator at rest  
will tend to stay at rest.

A regulator in motion  
will tend to stay in motion.

$$s = ut + \frac{1}{2} at^2$$

$$a = \frac{g \sin \theta}{1 + kmR_2}$$

$$v = \sqrt{2as}$$

$$\omega = \frac{v}{R}$$

$$a = v \frac{v}{R}$$

## Emergency preparedness (EP) and incident response are in motion

*Prescriptive EP Framework*

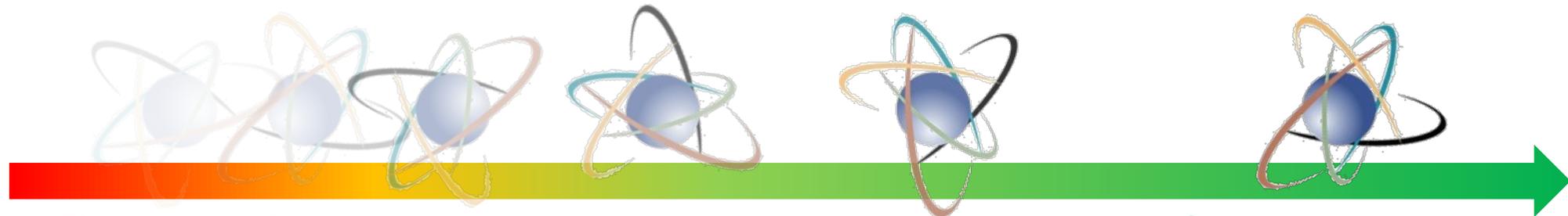
*Risk-Informed, Performance-Based EP*

*Reactor Oversight*

*10 CFR Part 57 Rulemaking*

*Public Protective Actions During a General Emergency Rulemaking*

*Executive Order 14300*



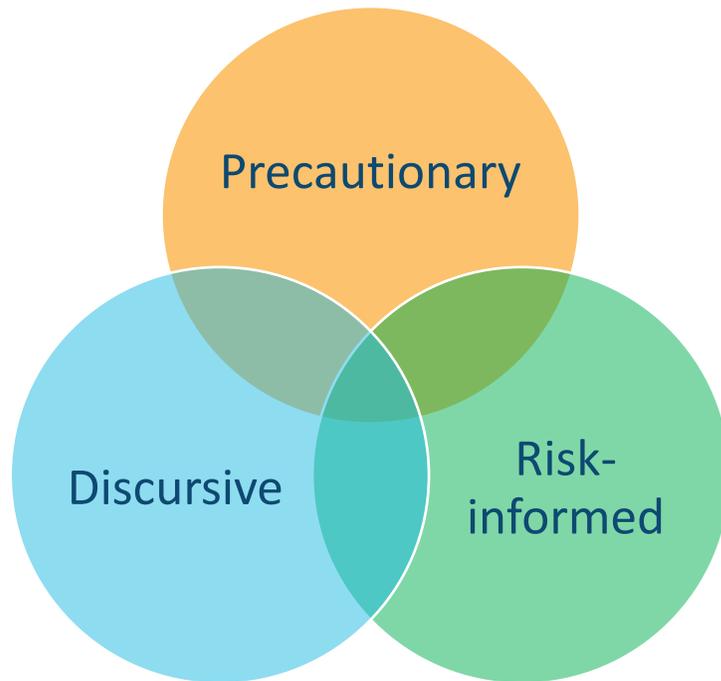
### ***Responsive***

Provides adequate protection of public health and safety  
Prescriptive requirements often set in response to actual events  
Focus on compliance

### ***Risk-informed***

Provides adequate protection of public health and safety  
Requirements are set commensurate to the risks and hazards of the facility  
Focus on capabilities and performance

## *Innovative risk management moves beyond reactive measures*

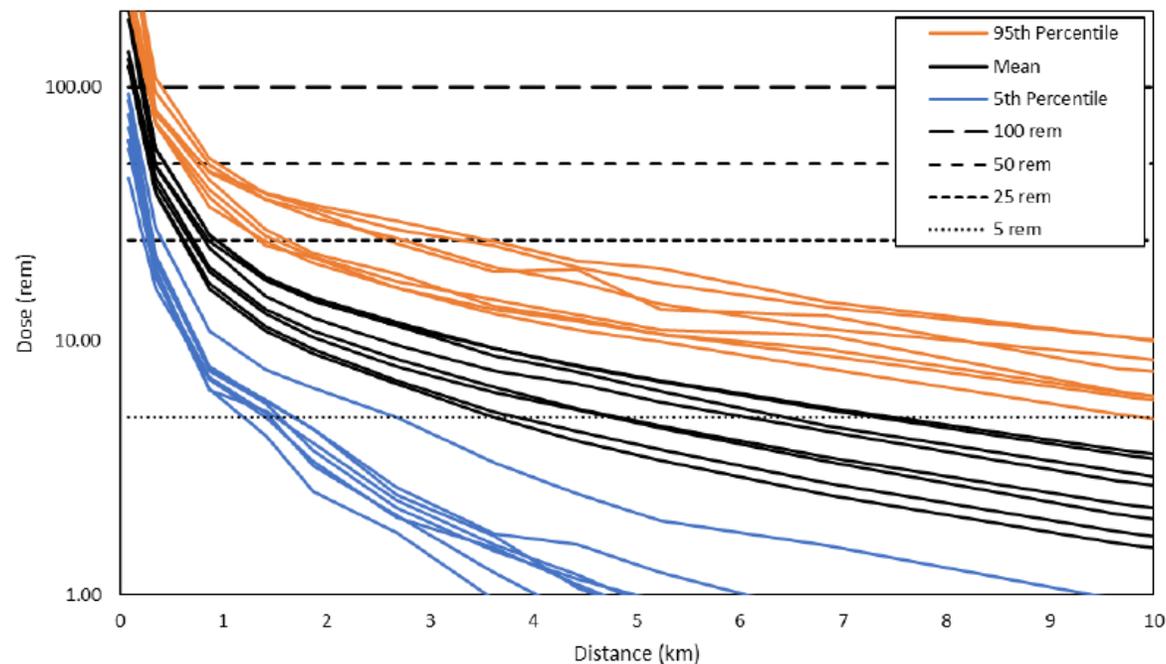
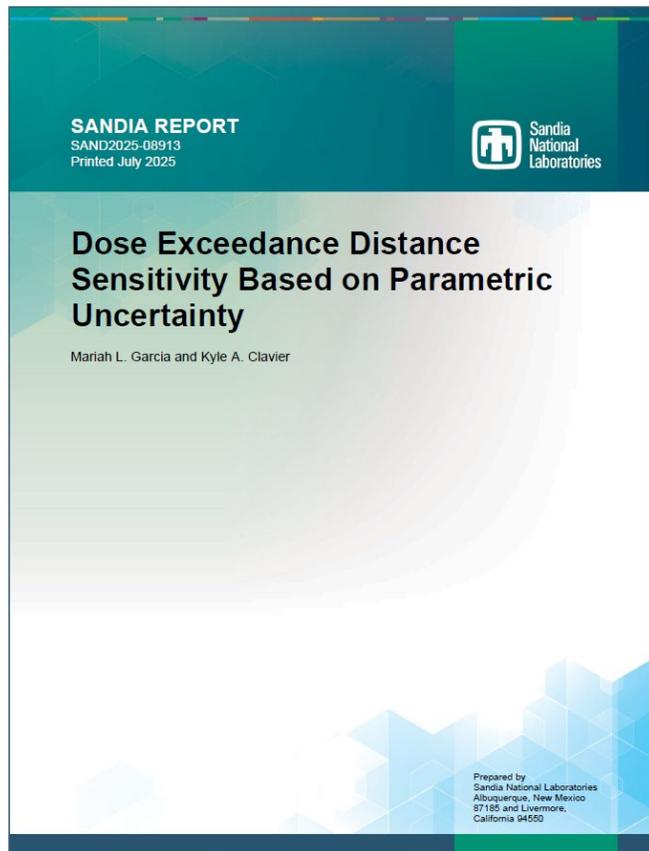


Major strategies for managing risk

*“Risk management is not about avoiding risks, but about navigating through them with wisdom and preparedness.”*

<https://www.linkedin.com/pulse/navigating-risk-management-wisdom-preparedness-zane-edwards>

## The emergency planning zone is a risk-informed planning tool



**Figure 3-7 Meteorological Data Impact on Effective Dose (ISLOCA) [0-10km]**

**Note:** Each of the eight curves for the different quantiles represents one of the different meteorological datasets shown in Table 2-1.

# The NRC is leading research to inform protective action strategies

**SANDIA REPORT**  
SAND2022-3706  
Printed March 2022

 Sandia National Laboratories

## Scoping Analysis of MACCS Modeling Improvements for the Study of Protective Action Recommendations

Mariah Smith, Fotini Walton, Jennifer Leute, Joshua Dise

Prepared by  
Sandia National Laboratories  
Albuquerque, New Mexico  
87185 and Livermore,  
California 94550



## Status of Guidance and Scientific Knowledge on Using Heating, Ventilation, and Air Conditioning (HVAC) Systems for Protection During Radiological / Nuclear Emergencies

Department of Homeland Security, Lawrence Berkeley National Laboratory,  
U.S. Nuclear Regulatory Commission

September 2024

Approved for Public Release

 Science and Technology  U.S. NRC  
United States Nuclear Regulatory Commission  
Protecting People and the Environment  BERKELEY LAB  NUSTL

Literature Review:  
**Evaluation of Implementation Strategies for Potassium Iodide**

 U.S. NRC  
United States Nuclear Regulatory Commission  
Protecting People and the Environment

## Evaluation of MACCS KI Modeling Capability

Noah Etter  
Accident Analysis Branch  
Division of Systems Analysis

EFFECTIVE USE OF MASKING DURING RADIOLOGICAL EMERGENCIES AND EARLY RELEASES:  
DOSIMETRY ANALYSIS REPORT

 UNITED STATES NUCLEAR REGULATORY COMMISSION

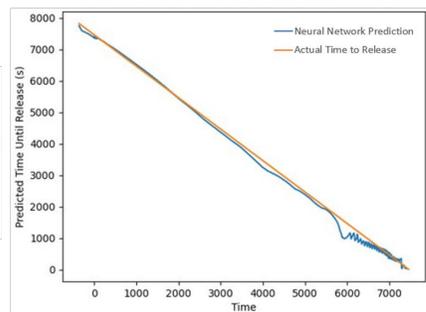
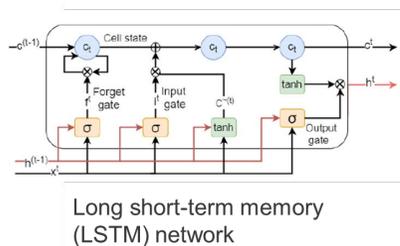
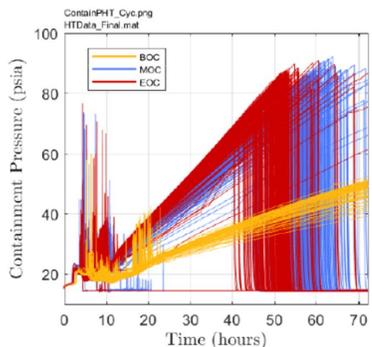
June 2025

Samuel Hanson,<sup>1</sup> John Tomon,<sup>1</sup>  
and Todd Smith<sup>2</sup>

Division of Systems Analysis  
Office of Nuclear Regulatory Research  
United States Nuclear Regulatory Commission

<sup>1</sup> Office of Nuclear Regulatory Research, Division of Systems Analysis, Radiation Protection Branch (RES/DSARPB)  
<sup>2</sup> Office of Nuclear Security and Incident Response, Division of Preparedness and Response (NSIR/DPR)

# AI will accelerate our ability to prepare, predict, and respond



## I. Machine learning can make actionable predictions

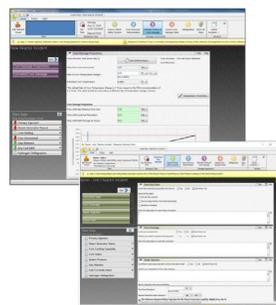
Message	Default	Model 1	Model 3	Model 6
<i>You cannot sense radiation</i>	negative	neutral	fear	1 star
<i>Radiation can only be detected using specialized instruments</i>	negative	neutral	anticipation	3 stars
<i>With the correct instruments, radiation is easily detected</i>	positive	neutral	optimism	4 stars
<i>We cannot eliminate radiation in our environment</i>	positive	negative	fear	1 star
<i>There is no known safe amount of radiation</i>	negative	negative	fear	2 stars
<i>There may be some risk from low levels of radiation</i>	negative	neutral	fear	3 stars
<i>It is reasonable to assume that less radiation exposure is better</i>	negative	neutral	optimism	3 stars
<i>Contamination occurs when radioactive material settles on a surface</i>	negative	neutral	fear	2 stars
<i>Go inside, get inside, stay tuned</i>	positive	neutral	anticipation	5 stars
<i>Radioactive fallout particles might be raining down in your area</i>	negative	neutral	fear	2 stars

## II. Fuzzy logic can inform our decisions

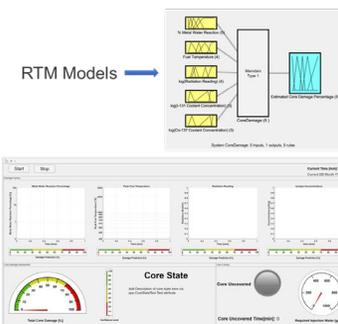
Response Technical Manual (RTM)



Response Technical Tool (RTT)



Response Digital Twin using Fuzzy Logic (RDT)



## III. Large language models can refine risk communication

## Collaboration keeps us moving forward, together



Trilateral Cooperation on  
Emergency Preparedness



U.S.-Japan Emergency  
Management Working Group

## *For more information*

- [Federal Register Notice for Rulemaking on Public Protective Actions During a General Emergency](#)
- [Evaluation of MACCS \[MELCOR Accident Consequence Code System\] KI \[Potassium Iodide\] Modeling Capability](#)
- [Literature Review: Evaluation of Implementation Strategies for Potassium Iodide](#)
- [Effective Use of Masking During Radiological Emergencies and Early Releases](#)
- [Dose Exceedance Distance Sensitivity Based on Parametric Uncertainty](#)
- [Status of Guidance and Scientific Knowledge on Using Heating, Ventilation, and Air Conditioning \(HVAC\) Systems for Protection During Radiological/Nuclear Emergencies](#)
- [Scoping Analysis of MACCS Modeling Improvements for the Study of Protective Action Recommendations](#)
- [NRC Presentations for International Atomic Energy Agency EPR2025 Conference Agencywide Documents Access and Management System \(ADAMS\) Package](#)

*The NRC is rolling into the future of  
emergency preparedness*

**#NRCForward**