



APPLICABILITY OF RADIATION-RESPONSE MODELS TO LOW DOSE PROTECTION STANDARDS

AMERICAN NUCLEAR SOCIETY & HEALTH PHYSICS SOCIETY
JOINT TOPICAL - SEPTEMBER 30 - October 3, 2018
TRI-CITIES, WASHINGTON

*Mitigating the Harm Done by
Excessively Conservative Low Dose Radiation
Protection Standards*

An Ethical Imperative



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Current Radiation Protection Standards Were Developed Mid-Twentieth Century. Much Scientific Information is Available Now That Was Not Available When the Standards Were Developed. It Must be Evaluated Now.

Updating the Basis for Low Dose Protection Regulations



The Best of Intentions Can Have Disastrous Consequences

How Did an Ethical Concern Result From Conservative Safety Objectives?

- *The Evolution of Radiation Protection Standards*
- *Late 20th Century Data - Not Available When Standards Were Set*
- *How Did New Data Help Demonstrate an Ethical Concern?*
- *How Do We Address the Ethical Concern?*



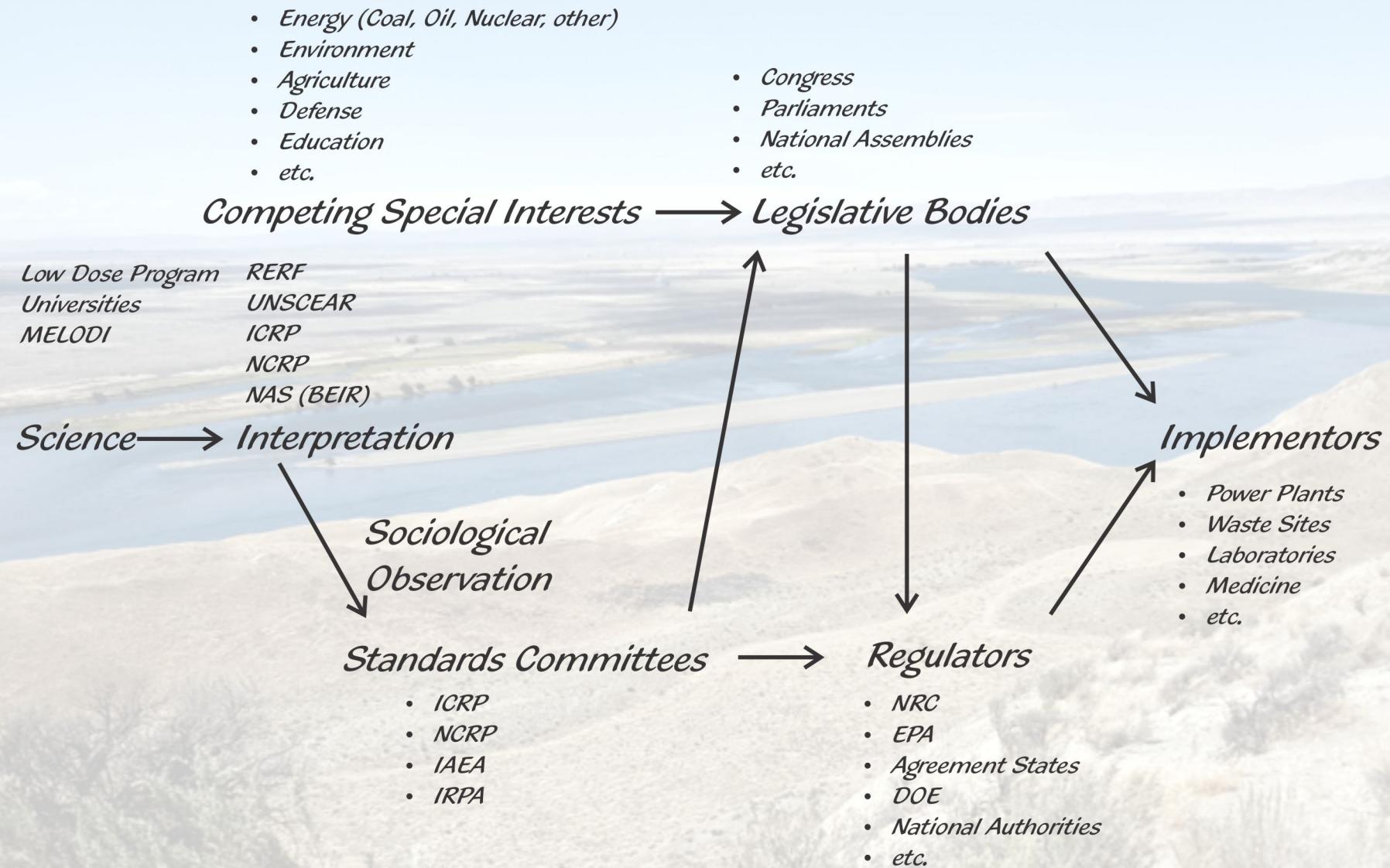
How Did Low Level Radiation Protection Get Here?

Where do we Need to Go?

- *Early Radiation Protection*
 - *Most Health Effects Data From Early Scientific Investigators*
 - *Protect Medical Practitioners and Patients*
 - *Radium Use*
 - *Early Protection Organizations (ICRP, AARS, US Advisory Committee on X-Ray and Radium Protection)*
 - *Standards Based on Prevention of Deterministic Effects*
- *Early Modern Radiation Protection*
 - *Manhattan Project Needed to Protect Workers - Largely a Programmatic Concern*
 - *Manhattan Project Was The Sole Authority*
 - *Herb Parker Led Radiation Protection Standards Development*
 - *Remarkably Successful in Spite of Los Alamos Fatalities*
 - *Public Exposure Was a Consideration*
- *Radiation Protection Evolution*
 - *Civilian Control*
 - *Atomic Energy Commission*
 - *Proliferation of Agencies and Departments with Regulatory Roles*
- *Latter Half 20th Century Radiation Protection*
 - *Confusing Web of Entities with Responsibilities and Authorities*
 - *Precautionary Principle*



How is Regulatory "Policy" Established? Current Status





New Scientific Data and Observation of Current Events Raise an Ethical Concern

- *Early Modern Radiation Protection*
 - *Limited Data With Respect To Health Effects at Various Exposure Levels*
 - *Most Information From Early Researcher and Medical Practitioner Exposures*
 - *Very Clear That High Level Exposure is Harmful, Even Fatal*
 - *Health Effects of Low Level Exposure Were Not Clear*
- *Radiation Protection Evolution*
 - *Extremely Conservative Approach*
 - *In Case of Doubt, Reduce Allowable Exposure*
 - *Mantra: As Low As Reasonably Achievable*
- *Current Status*
 - *Being Overly Conservative is Considered to Be Not Harmful*
 - *Precautionary Principle*
- *Current Understanding: Overly Conservative Can Be Harmful*
 - *New Data Show Robust Protective Biological Response to Low Level Radiation*
 - *Overreaction Driven by Irrational Fear Supported by Conservative Limits*
 - *Established Regulatory Limits for the Public are Well Below Background*
 - *Unnecessary Evacuations; Refusal of Medical Treatment Kills People*
 - *Conservatism Wastes Huge Amounts of Money, Terrible Resource Allocation*



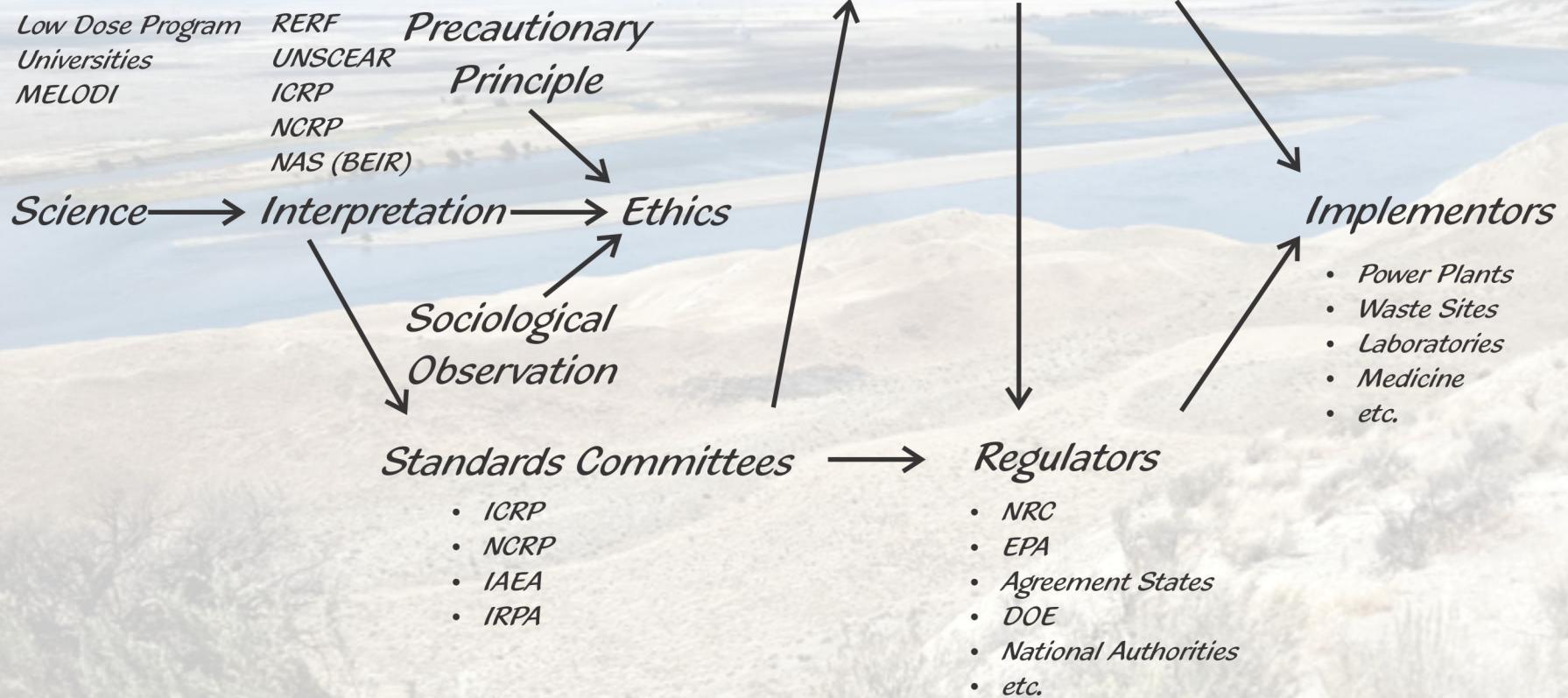
What is the Ethical Concern?

- Irrational fear of radiation
- Resistance to Mixing Science and Politics
- Regulations Driven by Narrow Precautionary Principle Perspective

- Energy (Coal, Oil, Nuclear, other)
- Environment
- Agriculture
- Defense
- Education
- etc.

- Congress
- Parliaments
- National Assemblies
- etc.

Competing Special Interests → Legislative Bodies





How Can we Change Regulatory Requirements? Special Interest

The Key to Low Dose Rad Topical Conference Success

- *Radiation Risk Scientists Want to be "Pure", Avoid Politics*
 - *Scientific Input Has Been Limited to Standards Institutions*
 - *Disagreements About Details Exist*
 - *Significant Agreement: Exposures Below Background are Not Harmful Enough for Concern*
- *Scientific Forums*
 - *Generally Restricted to Specific Areas of Science*
 - *Lots of Technical Jargon, Difficult to Explain Outside of the Discipline*
 - *Little Public Trust*
- *Powerful Special Interest Groups Dominate Public Policy*
- *Ethical Imperative:*

***Scientists Who Study Radiation Risk Have a Responsibility
For Assuring That Society Uses Their Results Ethically***

***You Are Ethically Responsible if a Bridge That You Designed Collapses
You Are Equally Responsible if You Know People are Dying to
Avoid a one mSv Exposure and You Don't Speak Up***



How Must Regulatory "Policy" be Changed to Address Ethics?

- Irrational fear of radiation
- Resistance to Mixing Science and Politics
- Regulations Driven by Narrow Precautionary Principle Perspective
- **Scientists Must Insist on Ethical Use of Their Science**

- Energy (Coal, Oil, Nuclear, other)
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