



**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

Updating the Scientific Basis for Low Dose Radiation Protection Standards

Commemorating the 75th Anniversary of the Creation of the Manhattan Project



Technical Program

Sunday September 30, 2018

B Reactor Concert Sponsored by Bruce Power



Innovation at work

2:30-3:00 pm	Board Buses and Safety Briefing	Pasco Red Lion
3:00-4:00 pm	Travel to B Reactor	Hanford Site
4:00-5:30 pm	Reactor Tour	B Reactor
5:30-6:45 pm	Dinner	B Reactor
6:45-7:15 pm	Seating for Concert, Welcome, and Pre-Concert Presentation	B Reactor
7:15-8:30 pm	Concert	B Reactor
8:30-8:45 pm	Use Restrooms and Board Buses.	B Reactor
8:45-9:45 pm	Travel to Hotel	Hanford Site, Pasco Red Lion

B Reactor was the world’s first full-scale nuclear production reactor. It is now part of the Manhattan Project National Historical Park with the mission of telling stories surrounding the Manhattan Project. Managed in partnership by the Department of Energy and the National Park Service, Manhattan Project National Historical Park preserves and interprets the nationally significant historic sites, stories, and legacies associated with the top-secret race to develop an atomic weapon during World War II, and provides access to these sites consistent with the mission of the Department of Energy.



Concert at the Front Face



Sunset at B Reactor

The concert will be a choral performance with the theme of “Democracy”. It will be performed by the [Mid-Columbia Mastersingers](#). Ethos Bakery will cater the meal.



Applicability of Radiation-Response Models to Low Dose Protection Standards



Monday October 1, 2018 Morning

- 8:00-8:15 Welcome and Introductions Alan Waltar
8:15-8:30 Goals of the Conference Mike Lawrence
8:30-8:40 Society Presidents' Welcome
HPS President Nolan Hertel, ANS Past President Andy Klein
- 8:40 PLENARY SESSION #1, Opening Session Chair: Nick Dainiak
- 8:40-9:10 Keynote Address:
David Brenner
The Strengths and Weaknesses for linearity in Radiation Risks at Very Low Doses
- 9:10-9:40 Historical Context:
Roger McClellan
Science and Judgment in Setting Radiation Protection Standards:
Over a Century of Experience
- 9:40-10:00 BREAK
- 10:00 PLENARY SESSION #2, Dose-Response Relationships in the Context of
Standards for Radiation Protection. Chair: Christopher Clement
- 10:00-10:20 NCRP - Report Commentary #27, Implications of Recent Epidemiological Studies
for the LNTH Model and Radiation Protection Roy Shore
- 10:20-10:40 ICRP - Status of ICRP Committee 1 on Low Dose and Low Dose Rate Effects
for Ionizing Radiation Werner Rühm
- 10:40-11:00 UNSCEAR - Protection Against Low-Dose Radiation: An Evolving International
Paradigm for Regulatory Decisions. Abel Gonzalez and Patricia Wieland
- 11:00-11:20 IAEA - Radiation Response Models and International Radiation Protection
Guidelines Oleg Belyakov
- 11:20-11:40 NRC - The U.S. Nuclear Regulatory Commission's Radiation Protection Policy:
What Does it Take for Change?. Cynthia Jones
- 11:40-12:00 EPA - Environmental Protection Agency Perspectives on Risk Projections
for Exposures to Low Dose Rate Radiation. David Pawel
- 12:00 Noon - Luncheon Speaker: Michael Shellenberger
The Making of the Radiation Panic

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Applicability of Radiation-Response Models to Low Dose Protection Standards



Monday October 1, 2018 Afternoon

1:00-2:00 PANEL #1

Can Regulators Accommodate an Alternative
Dose-Response Paradigm?
Moderator: William Magwood

William Sacks Radiation Harm vs Hormesis (3 Minutes)
Peter Colgan IAEA Safety Standards (3 Minutes)
Antony Hooker South Australian Experience (3 Minutes)
Julian Preston
David Pawel

2:00 PLENARY SESSION #3, Epidemiology Chair: Barrett Fountos

2:00-2:25 Russian Health Studies Barrett Fountos

2:25-2:50 Dosimetry for Mayak and Techa River Populations Bruce Napier

2:50-3:15 Epidemiology of the Mayak and Techa River Populations Dan Stram

3:15-3:40 Comparing High and Low Dose Radiation Rates Dale Preston

3:40-4:10 BREAK

4:10-5:10 PANEL #2

Epidemiology and Basis for Current Radiation
Protection Standards
Moderator: Roger O. McClellan

Richard Bull Internal Dosimetry (3 Minutes)
Yutaka Hamaoka Analysis of Worker Data (3 Minutes)
Bruce Napier
Dan Stram
Dale Preston

5:10-5:30 The Strategic Low Dose Program of the Canadian Nuclear Utilities - Addressing
the Worries and Concerns of the Public Nick Priest

5:30 Poster Session and "Walk-Around Dinner/Reception"





Applicability of Radiation-Response Models to Low Dose Protection Standards



Tuesday October 2, 2018 Morning

- 8:00 PLENARY SESSION #4, Mechanistic Biology and
Radiation Standards Chair : Doug Boreham
- 8:00-8:25 Keynote Address
Paradigm Shifts in Radiation Biology
Antone Brooks
- 8:25-8:45 Molecular Biology and Mechanisms of Action. Sujeenthar Tharmalingam
- 8:45-9:05 Radiation Induced Epigenetic Changes. Randy Jirtle
- 9:05-9:25 Using Mechanism of Action to
Reduce Uncertainty in Risk Estimates. Julian Preston
- 9:25-9:45 Molecular, Cellular and Animal Data Alia Zander, Stephanie Puukila
- 9:45-10:20 BREAK
- 10:20-10:40 Understanding Paracrine Signaling and Stem Cell Function through
Computational Modeling. Nick Dainiak
- 10:40-11:00 Low Dose Radiation Biology in Canada Dmitry Klovov
- 11:00-12:00 PANEL #3
Can We use Mechanistic Data in Risk Assessment?
Moderator: Ludwig Feinendegen
Ludwig Feinendegen Protective Adaptation (3 minutes)
Janet Baulch Epigenetics in Brain (3 minutes)
Noy Rithidech Delayed Effects Radiation (3 minutes)
Helmut Sies Redox Biology (3 minutes)
Tony Brooks

12:00 "Walk-Around" Lunch Visiting Posters



Applicability of Radiation-Response Models to Low Dose Protection Standards



Tuesday October 2, 2018 Afternoon

- 1:00 PLENARY SESSION #5, The Role of Modeling in
Radiation Protection Chair: Kathy Higley
- 1:00-1:20 Keynote Address
Basis for Updating the Limits on Radiation Dose to the Public
Darrell Fisher
- 1:20-1:40 Arguments Against Linearity at Low Doses John Dunn
- 1:40-2:00 Information Needed to Alter Standards..... Kathy Higley
- 2:00-2:20 GAO Report: Interagency Collaboration to Improve
Health Effects Research Allen Chan
- 2:20-2:40 Radiation Hormesis and Radiation Protection..... Mohan Doss
- 2:40-3:00 The Case for a Threshold Bennett Greenspan
- 3:00-3:30 BREAK
- 3:30-4:30 PANEL #4
Models of Dose Response Relationships
Moderator: David Brenner
Jerry Cuttler Hormesis and Disease (3 minutes)
Mark Miller SARI and its Goals (3 minutes)
Darrell Fisher
Kathy Higley
- 4:30 PLENARY SESSION #6, Needs in Low Dose Radiation Biology for
Medicine and Industry Chair: Michael O'Connor
- 4:30-5:00 Keynote Address
Benefits of the Low Doses of Radiation Delivered in Medical Imaging
Cynthia McCollough
- 5:00-5:20 The Value of a Human Life Jim Conca
- 5:20-5:40 Public Support for Nuclear Power Wade Allison
- 6:00 BANQUET and POSTERS
Banquet Speaker: William D. Magwood, IV
Science and Values in Radiological Protection

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Applicability of Radiation-Response Models to Low Dose Protection Standards



Wednesday October 3, 2018 Morning

- 8:00 PLENARY SESSION #7, Continuing Needs in Low Dose Radiation Biology
for Medicine and Industry Chair, Isaf Al-Nabulsi
- 8:00-8:20 Low Dose Radiation in Space Robin Elgart
- 8:20-8:40 Low Dose Radiation in the Airline industry Edward Bramlitt
- 8:40 PLENARY SESSION #8, Risk Communication,
Fear and Regulations Chair, Tony Hooker
- 8:40-9:00 Lessons Learned in Communication from the Fukushima Accident Jacques Lochard
- 9:00-9:20 Connecting Science and Life with Trust Ryoko Ando
- 9:20-9:40 Public Communication after Accidents. Yuliya Lyamzina
- 9:40-10:00 Science Must develop Trust and Empathy in the Public Ohtsra Niwa
- 10:00-10:30 BREAK
- 10:30-11:00 Risk Tradeoffs in Policy Making Thomas Hansen
- 11:00-12:00 PANEL #5
Communication and Policy
Moderator, Paul Locke
Bonne Posma An Economics Perspective on Nuclear Reactor Safety (3 minutes)
Ryoko Ando
Thomas Hansen
Ohtsra Niwa
John Dunn
- 12:00 Noon - Luncheon Speaker: Paul Lorenzini
Radiation, Fear, and Public Policy



Applicability of Radiation-Response Models to Low Dose Protection Standards



Wednesday October 3, 2018 Afternoon

- 1:00 PLENARY SESSION #9, Scientific Needs to Move Forward in
Low Dose Biology and Risk Chair, Gayle Woloschak
- 1:00-1:20 Incorporating Low Dose Information into US Laws,
Regulations and Policy Paul Locke
- 1:20-1:40 Research Needs in Low Dose Biology Dmitry Klokov
- 1:40-2:00 Needs in Communication. Nick Priest
- 2:00-2:20 ICRP Views on Radiation Risk at Low Doses through the Lens
of Fukushima. Christopher Clement
- 2:20-3:20 PANEL #6
Requirements to update regulations
Moderator: Christopher Clement
- Nick Priest
Dmitry Klokov
Mohan Doss
Doug Boreham
Dan Stram
Barrett Fountos
Paul Locke
- 3:20-3:40 BREAK
- 3:40-4:40 PANEL #7
Path Forward-- How? and Who Will Have the Action?
Facilitator, Larry Oates
- Roger O. McClellan
Werner Rühm
David Pawel
Gayle Woloschak
David Brenner
Antone Brooks
Alan Waltar
Christopher Clement
Ludwig Feinendegen
- 4:40 Open Discussion to Focus on the Future Chair, Alan Waltar
- 5:00 Summarize Meeting Ludwig Feinendegen



Applicability of Radiation-Response Models to Low Dose Protection Standards Posters



Name, Abstract Title	Poster Location
Steve Baker Radiation Protection: Finding the Right Balance	4
Masako Bando Proposal of WAM model - Is LNT suitable to describe low-dose/dose late biological effects caused by radiation?	16
Janet Baulch Effect of Whole Body Radiation Exposures on DNA Methylation in the Brain of the Irradiated Mouse	1
Gerald Braley Considering Risk in Radiological Evacuation and Reoccupation Decision Making	40
Elena Buglova Putting Radiological Health Hazards in Perspective in Emergency Preparedness and Response	32
Richard Bull Internal Dosimetry for the Mayak Worker Cohort and its impact on Radiation Protection	24
Peter Colgan The Safety Standards of the International Atomic Energy Agency: Development and Application	8
Jerry Cuttler Major change to radiation protection policy is urgently needed to improve health care: the cases of Alzheimers dementia and Parkinson disease	7
Jack DeVanney The Case for a Sigmoid No Threshold Dose Response Model	31
Nicolas Foray Theory of the radiation-induced nucleo-shuttling of the ATM protein: applications at low dose	33
Stephane Grison Multi-Omics Approaches Reveal Multigenerational Effects of Chronic Low Dose Contamination with Uranium in Rat	38
Yutaka Hamaoka ReAnalysis of Nuclear Worker Data Hanford, Gilbert data	13
William Hannum Living With Radiation	34
Howard Hayden Overcoming the Direct-Proportion Prejudice	14
Alexandre Klementiev Lifetime Risk of Radiation-Induced Thyroid Disease Estimated for Hanford Litigation Clients	22
Shigeru Kumazawa On a Hybrid Scale Model of Dose-response Relationships Universally Applied to Various Data of Ionizing Radiation Exposure	6
Edward Lazo Science and Values in Radiological Protection	26



Applicability of Radiation-Response Models to Low Dose Protection Standards Posters



Name, Abstract Title	Poster Location
Yevgeniya Le Effects of Low-Dose Radiation on Aging of Human Stem Cells In vitro	2
Dalila Lebsir Evaluation of the Potential Toxic Effect of Repeated Potassium Iodide Prophylaxis in Adult and in Utero Models	11
Audrey Legendre Male Reproductive Defects Evidenced in Rat Multigenerational Model Exposed to Low Concentration of Uranium	39
Charles Miller Geographical Comparison of Calculated Cumulative Radiological Dose from Exposure to Drinking Water Using Two Dose Estimation Bases	10
Mark Miller The Origins of Scientists for Accurate Radiation Information (SARI)	29
SMJ Mortazavi How Non-Linear Dose Response Models Help Astronauts Tolerate High Levels of Radiation During Deep Space Manned Mission	41
Delvan Neville Improving Methodology for Biota Radiation Transport	18
Michael O'Connor Radiation Risks in Low-dose Imaging: Real or Imaginary?	23
Ludivine Pascucci-Cahen Refining Reactor Accident Risk Cost Estimates	19
Jake Pirkkanen Investigating Molecular Level Differences in the CGL1 (HeLa x Normal Fibroblast) Human Hybrid Tissue Culture Model System	5
Bonne Posma An Economics Perspective on Nuclear Reactor Safety	12
Charles Potter The Linear Non-Threshold Model and Its Implications for Radiological Security	9
Joanna Reszczynska Hyper-radiosensitivity phenomenon and significance of human individual radiosensitivity in modeling of Biological Effects for Low Dose Radiation	35
Noy Rithidech Delayed Effects of a Whole-body Exposure to Low-dose Radiation on Somatic and Germinal Cells of mice	3
William Sacks The Linear No-Threshold Assumption of Radiation Harm vs Hormesis: Paradigms, Assumptions, and Mathematical Conventions that Bias the Conclusions	25



Applicability of Radiation-Response Models
to Low Dose Protection Standards
Posters



Name, Abstract Title	Poster Location
Charles Sanders There is No Need for Vitrification of Nuclear Wastes at Hanford	42
John Shanahan Public Perceptions Of Radiation Risk And Recommendations For Getting more of the Public To Support Nuclear Power	15
Helmut Sies Oxidative Eustress: the essential role of low-level (nanomolar) hydrogen peroxide in redox biology	20
Michael Stabin Low Dose Protection: Protection by Low Dose, Not Protection from Low Dose	27
Marilyne Stuart Health, Growth and Reproductive Success of Mice Exposed to Environmentally Relevant Levels of Ra-226 via Drinking Water Over Multiple Generations	36
Philip Thomas J-value Guidance on Radiation Risk for Government, Media and Public	21
Gerry Thomas The Chernobyl Tissue Bank – a biological resource for low dose radiation	30
Christopher Thome The role of dose-rate on cancer induction in the lung following inhalation of beta-gamma emitting radionuclides	28
Jacobus VanBlerk Revised Radon Dose Conversion Factors - Implications for Public and Worker Radiation Exposure at Mining and Mineral Processing Operations	37
Ruth Weiner Transportation Risk Assessment: What is Appropriate?	17



Applicability of Radiation-Response Models to Low Dose Protection Standards



Janet Baulch	1
Yevgeniya Le	2
K Rithidech	3
Steve Baker	4
Jake Pirkkanen	5
Shigeru Kumazawa	6
Jerry Cuttler	7
Peter Colgan	8
Charles Potter	9
Charles Miller	10
Dalila Lebsir	11
Bonne Posma	12
Yutaka Hamaoka	13
Howard Hayden	14
John Shanahan	15
Masako Bando	16
Ruth Weiner	17
Delvan Neville	18
Ludivine Pascucci-Cahen	19
Helmut Sies	20
Philip Thomas	21
Alexandre Klementiev	22
Michael O'Connor	23
Richard Bull	24
William Sacks	25
Edward Lazo	26
Michael Stabin	27
Christopher Thome	28
Mark Miller	29
Gerry Thomas	30
Jack DeVanne	31
Elena Buglova	32
Nicolas Foray	33
William Hannum	34
Joanna Reszczyńska	35
Marilyne Stuart	36
Jacobus VanBlerk	37
Stephane Grison	38
Audrey Legendre	39
Gerald Braley	40
SMJ Mortazavi	41
Charles Sanders	42



Applicability of Radiation-Response Models to Low Dose Protection Standards



Poster Layout

