Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 21-H4.22B

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Supplementary Information

Renseignements supplémentaires

Presentation from Jerry Cuttler

Présentation de Jerry Cuttler

In the Matter of the

À l'égard de

Darlington New Nuclear Project

Projet de nouvelle centrale nucléaire de Darlington

Application to renew the nuclear power reactor site preparation licence for the Darlington New Nuclear Project

Demande de renouvellement du permis de préparation de l'emplacement d'une centrale nucléaire pour le projet de nouvelle centrale nucléaire de Darlington

Commission Public Hearing

Audience publique de la Commission

June 10-11, 2021

10 et 11 juin 2021

Canada

CNSC Public Hearing on Ontario Power Generation's Application for renewal of site preparation licence for the Darlington New Nuclear Project

Intervenor Presentation by
Dr. Jerry M. Cuttler, D.Sc., P.Eng.
Vaughan, Ontario
June 10-11, 2021

Part A: Review of the licence renewal documents

Part B: Evidence of health effects of radiation

Part A: Review of documents and comments

1. OPG Application for Licence (June 29, 2020)
2. OPG Aggregate Assessment and Commitments Report
3. OPG submission CMD 21-H4.1
4. CNSC Staff submission CMD 21-H4
5. Nuclear energy is important
6. Fear of radiation impedes nuclear energy
7. Concerns about nuclear energy and responses
8. Canadians need the facts and changes to the laws
9. Conclusions
10. Recommendations

Part A: Intervenor conclusions & recommendations

- OPG application and CMDs are high quality, detailed and accurate
- OPG is qualified and capable, and it complies with requirements
- Intervenor endorses CNSC Staff recommendation to renew OPG's licence
- Nuclear energy is concentrated and abundant
  - Fuel and waste is easily stored on site
  - Technologies are coming soon for better fuel utilization and recycling of used CANDU fuel
  - Waste is sealed inside robust containers---no credible risk

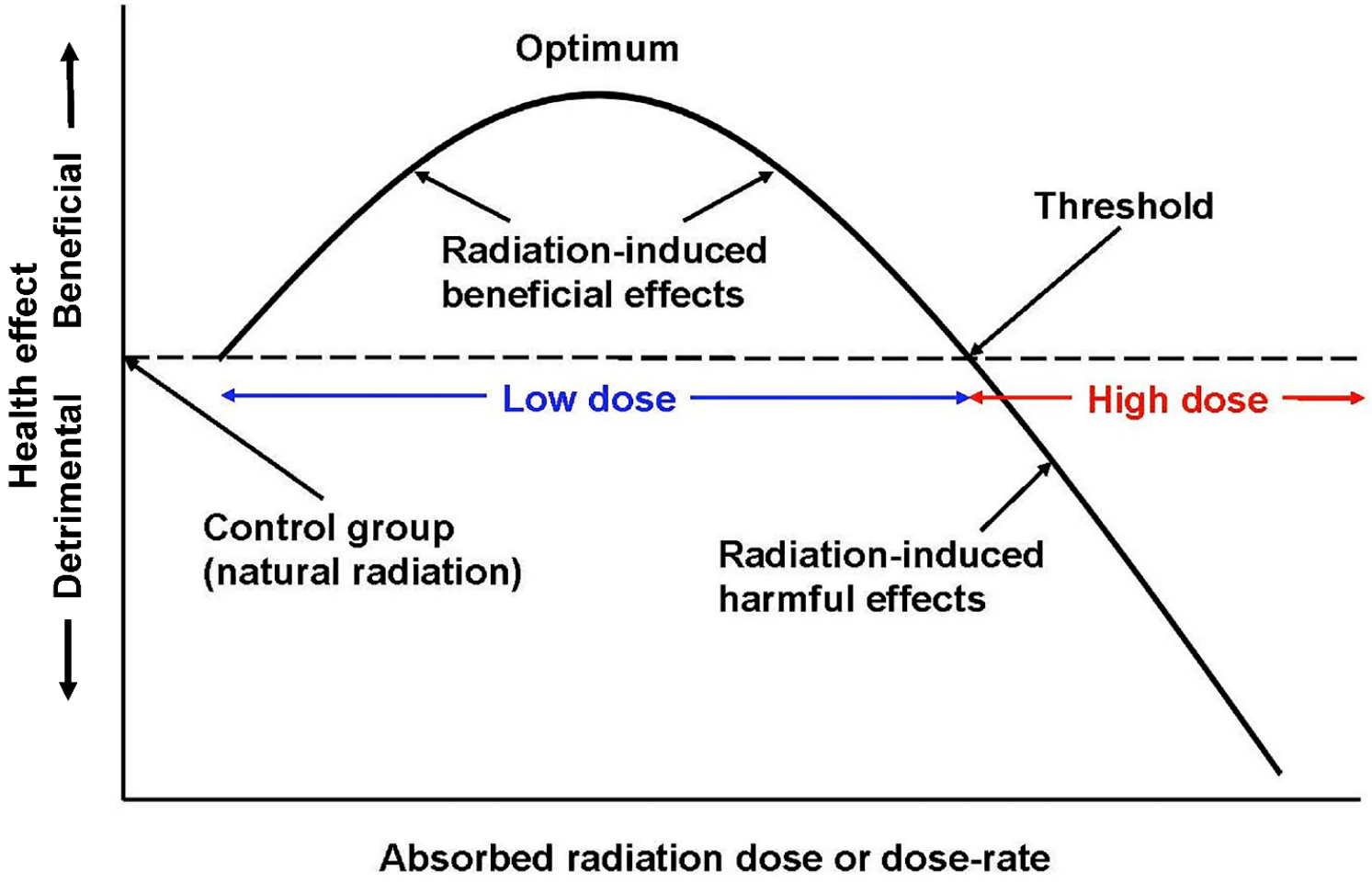
Part A: Intervenor conclusions & recommendations (cont'd)

- A false radiation scare was broadcast in 1960 by NCRP
  - Impedes acceptance of nuclear energy and low-radiation medical treatments
  - Safety regulations keep expanding to address perceptions of health risks
  - Cost of nuclear energy keeps rising
- Intervenor urges Canada to examine the science and the facts
  - Radiation effects on humans and organisms are known
  - Low-dose benefits and high-dose detriments. These are separated by thresholds
  - Discard the 1956 Linear No Threshold dose-response model because it is wrong
  - Adopt the biphasic dose-response model because it fits the medical evidence
  - Stop the radiation scare
- Change radiation laws and regulations
  - Discard precautionary principle and ALARA because radiation effects are known
  - Protect against exposures that exceed thresholds for detrimental effects

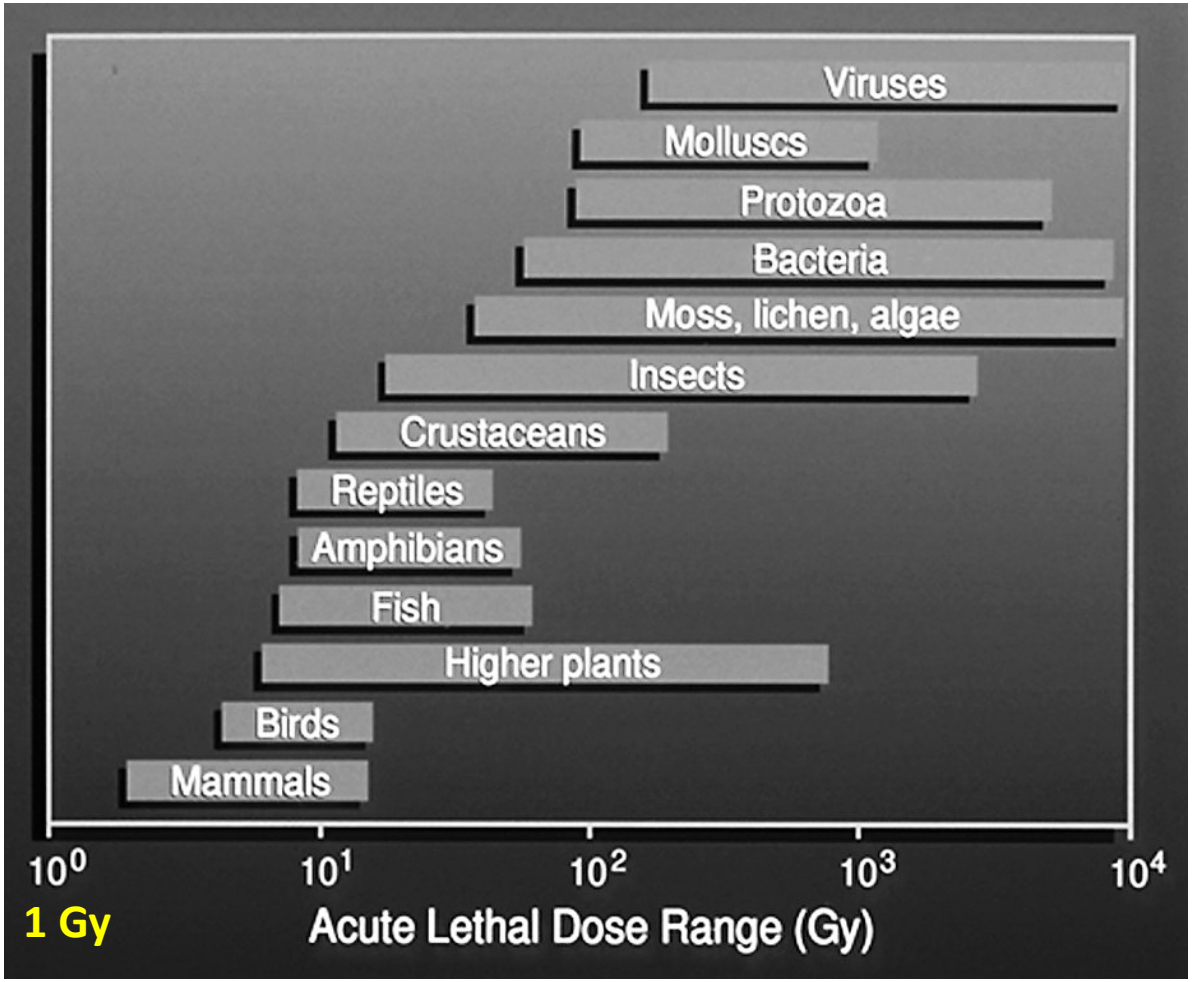
Part B: Health effects of radiation

- X-rays & nuclear radiation were used in medicine since 1896 (>120 years)
- *Low doses* treated many illnesses: cancers, infections, wounds, asthma, arthritis, pneumonia and other inflammations
- *Tolerance dose limit* 2 roentgen/day (700 mGy/y) avoids neoplasms in 1924
- U.S. National Academy of Sciences started *radiation scare* in 1956
  - for the political purpose of stopping atomic bomb testing
  - NAS recommended LNT model to assess risk of radiation-induced genetic mutations
  - NAS disregarded: *no evidence of mutations* in 70,000 children of atomic bomb survivors
- U.S. NCRPM recommended *Precautionary Principle* and ALARA in 1960
  - Widespread public concern over possible effects of fallout on population
  - Possibility that there might be somatic effects of chronic low-level radiation
  - "NCRP was *not aware* of any new basic information on somatic effects of radiation"
- All government regulators accepted this in 1960 without reviewing the facts
- Governments still accept ALARA in 2021, despite 120 years of facts

Biphasic dose-response model



Acute dose ranges for 100% lethality



Acute radiation dose threshold is ~ 3 Gy

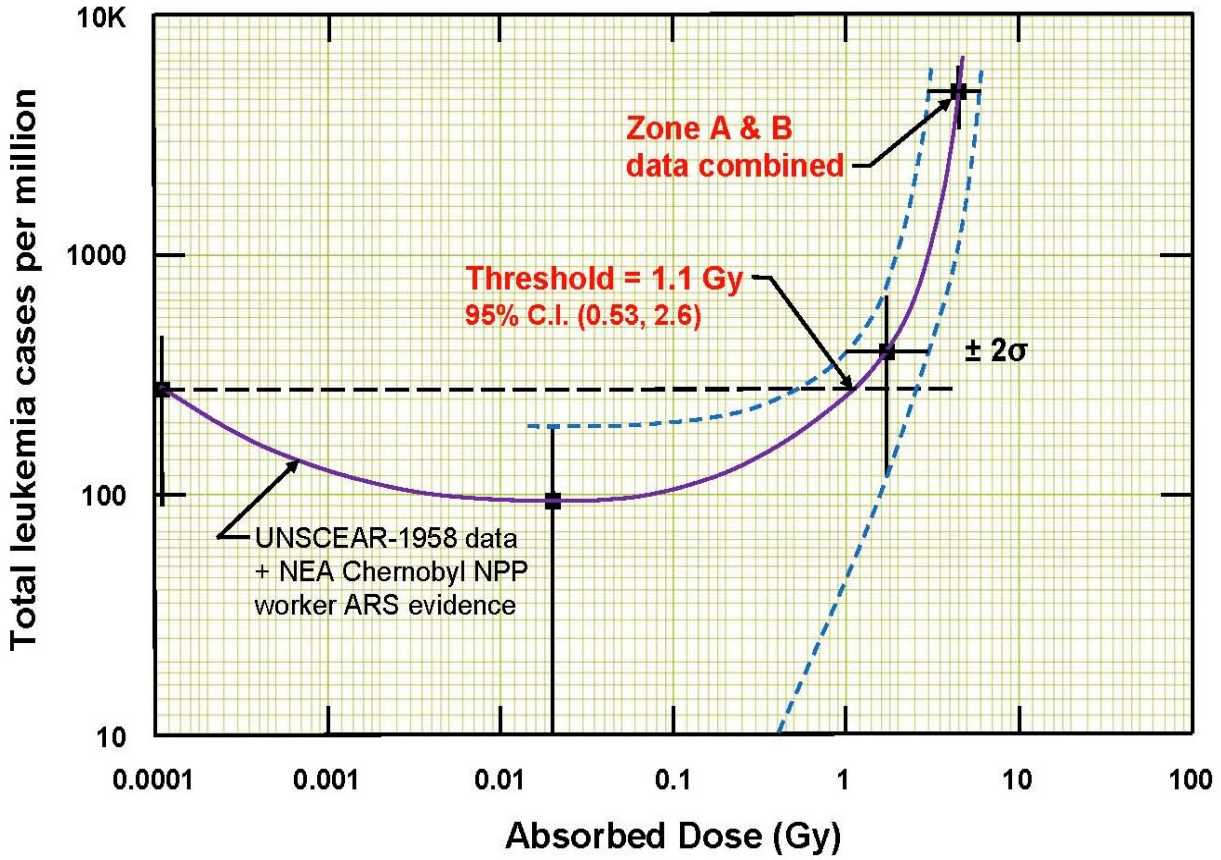
Hospitalized Chernobyl NPP workers exposed on April 26th, 1986

Number of patients		Estimated Dose (Gy)	Deaths
21		6 - 16	20
21		4 - 6	7
55		2 - 4	1
140		less than 2	0
Total	**237**		**28**

- 134 workers were heavily irradiated acutely
- 28 of them died after several weeks
- 106 recovered
- 22 of the 106 died during 19 years after exposure. Mortality = 1.09% per year, which is lower than the 1.4% average mortality rate in Russia in 2000.
- 26 of the 106 died during 30 years after exposure. Mortality = 0.82% per year.
- There were 7 cancer deaths, which is 27% of the 26 deaths. This is about the same fraction of cancer deaths among all mortality causes for Central Europe.
- These facts contradict the health scare of radiation-induced delayed effects.

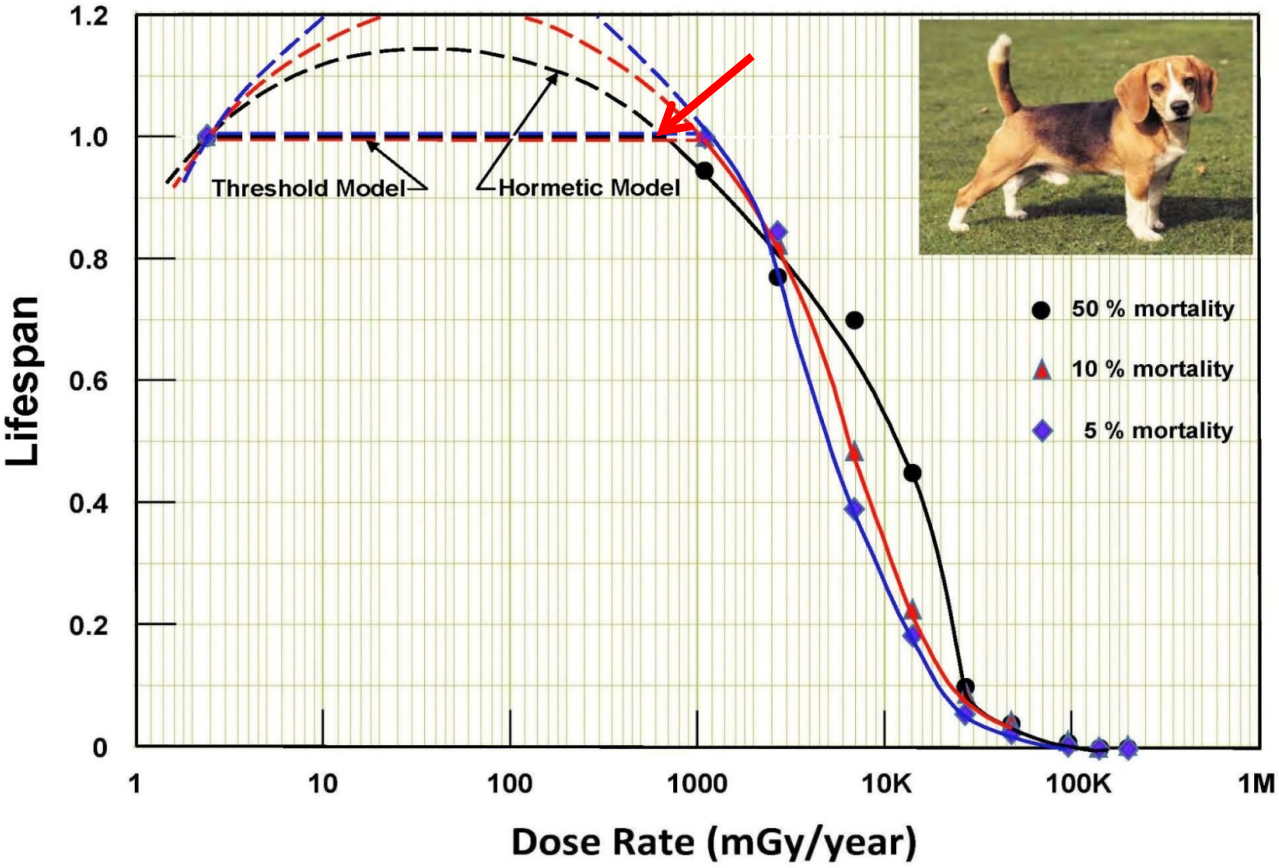
Threshold dose for onset of leukemia is 1.1 Gy

Evidence of 95,819 atomic bomb survivors in Hiroshima



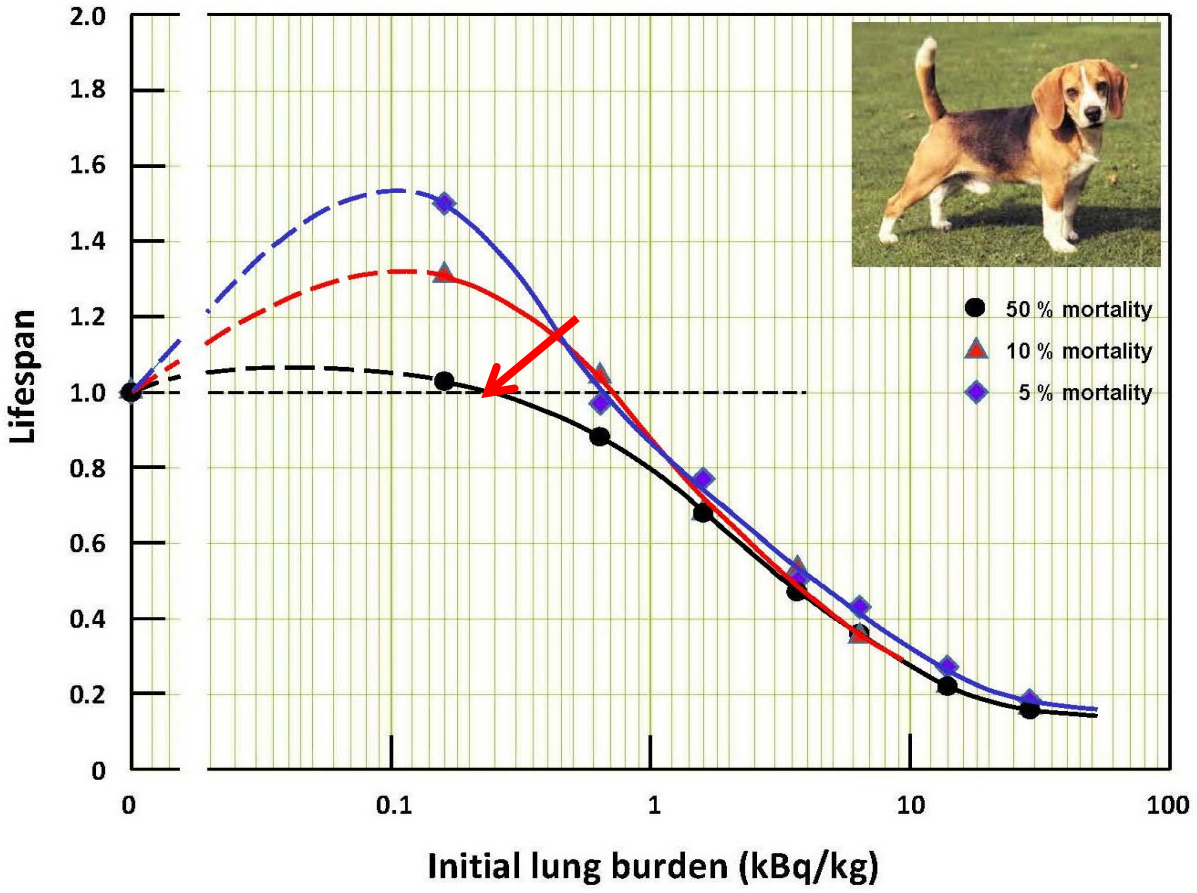
Dose-rate threshold is > 700 mGy/year

Cobalt-60 gamma radiation, lifelong



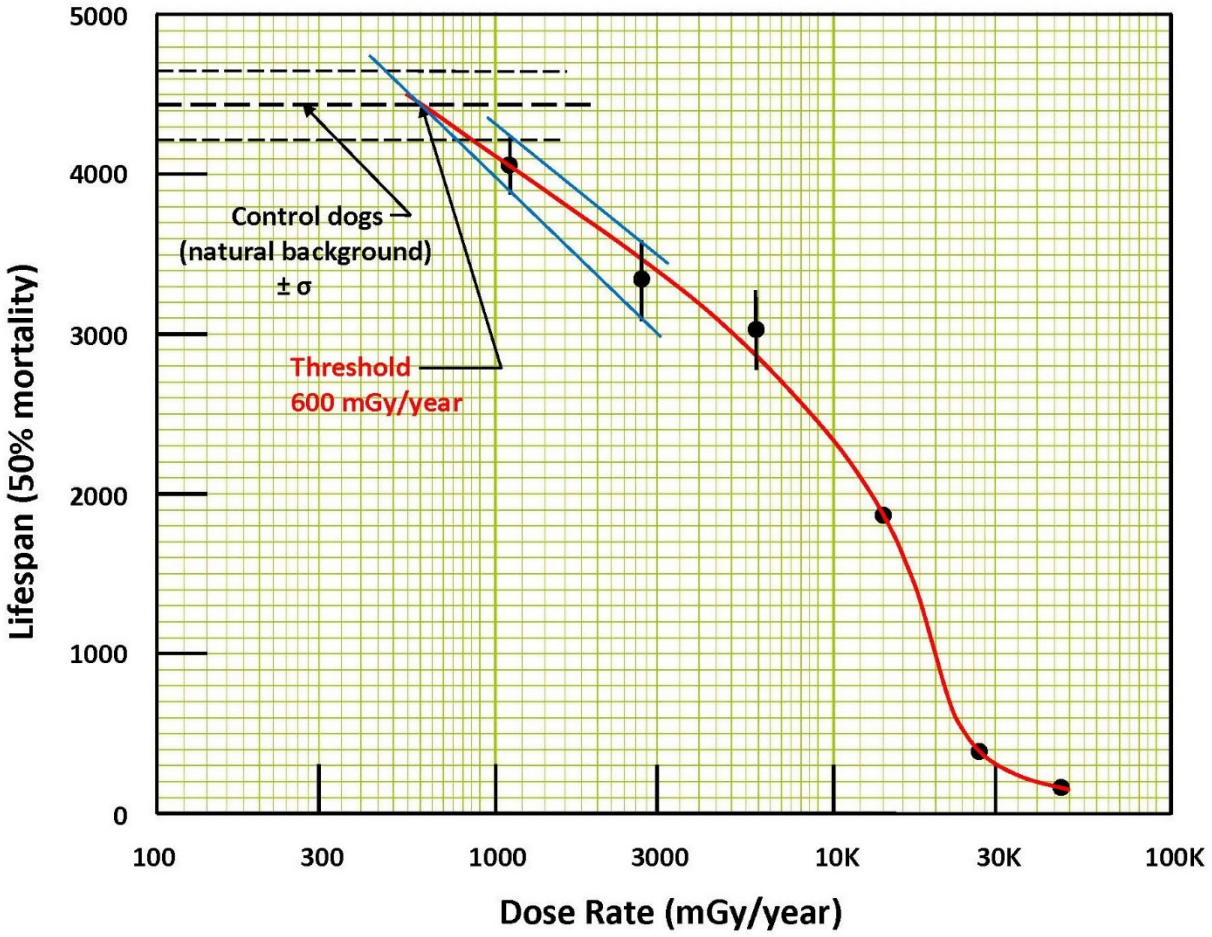
Dose-rate threshold is > 0.2 kBq/kg

Plutonium-239 alpha radiation in lungs, lifelong



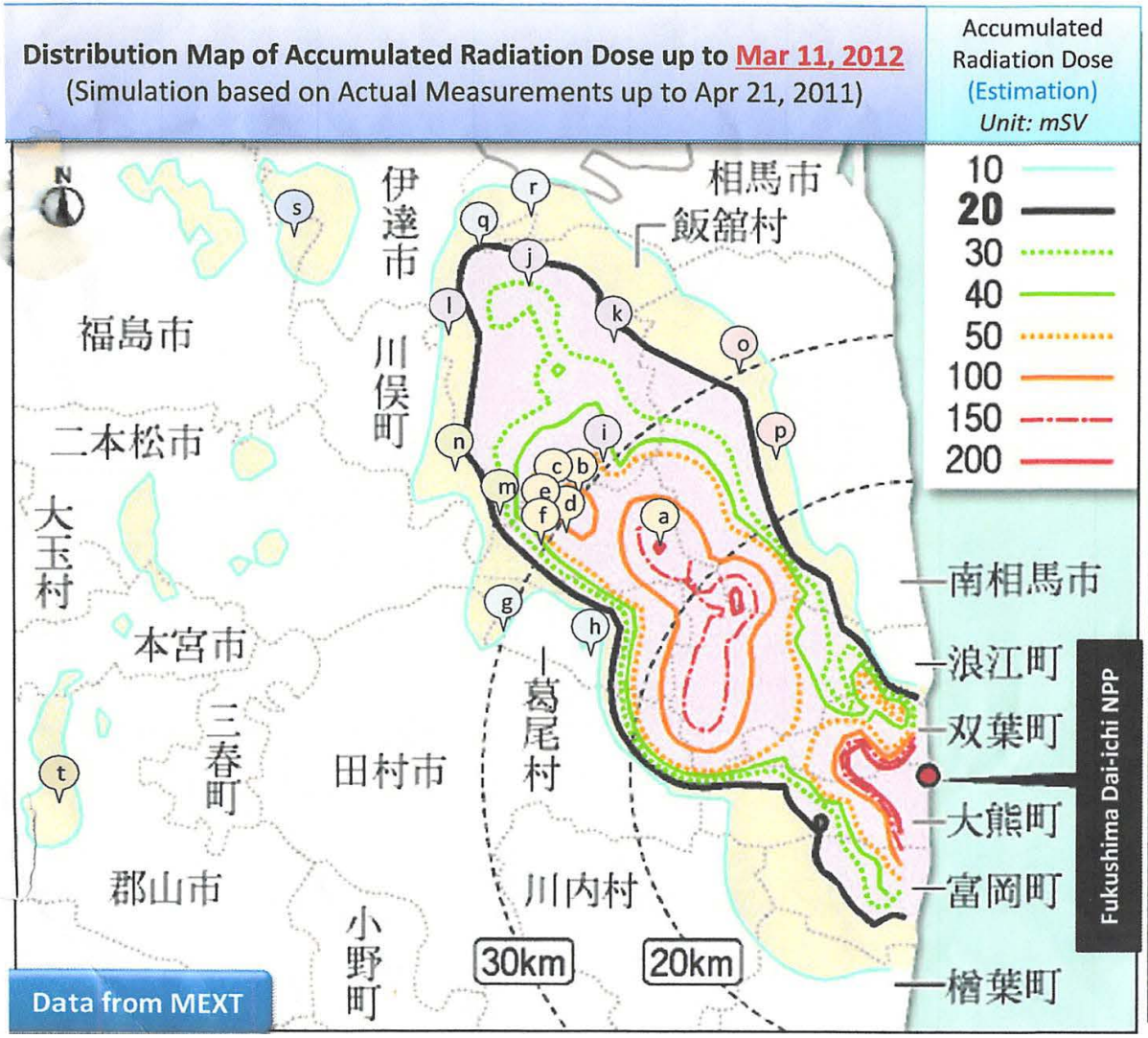
Dose-rate threshold is 0.5 to 1.1 Gy/year

Cobalt-60 gamma radiation, lifelong



Cumulative dose City of Ramsar, Iran up to 260 mSv/year

Accumulated Radiation Dose around Fukushima Dai-ichi — Estimation



MEXT has released a map showing how much radiation will be accumulated around Fukushima Dai-ichi Nuclear Power Plant.

Place		Distance from Fukushima Daiichi	Accumulated Radiation (Estimation) unit:mSV
Namie-machi	a	NW 24km	235.4
	b	NW 31km	188.6
	c	NW 31km	110.2
	d	WNW 29km	56.2
	e	WNW 30km	48.2
	f	WNW 30km	24.2
Katsurao-mura	g	WNW 32km	18
	h	NW 25km	11
Iitate-mura	i	NW 33km	61.7
	j	NW 39km	34.8
	k	NW 36km	26.3
	l	NW 44km	10
Kawamata-machi	m	WNW 34km	24.2
	n	WNW 40km	19.6
Minamisoma-shi	o	NNW 30km	15.6
	p	NNW 25km	11.9
Date-shi	q	NW 48km	21.2
	r	NW 46km	16
Fukushima-shi	s	NW 56km	10.6
Koriyama-shi	t	W 60km	10.1

Fear of radiation deters medical treatments for:

- Cancer metastases by stimulation of immunity
- Infections by stimulation of immunity
- Pneumonia by inducing M2 anti-inflammatory phenotype
- Inflammatory diseases, such as rheumatoid arthritis
- Autoimmune diseases by curing immune system disorders
- Alzheimer's disease by reducing oxidative damage in brain
  https://eurekalert.org/pub_releases/2021-05/bcfg-ldo050321.php
- Neurodegenerative diseases: Parkinson's, glaucoma, etc.