WAVE 2014
Life Chiropractic College West

FAIREWINDS
ENERGY EDUCATION

501(c)3 Non-profit Organization

Arnie and Maggie Gundersen

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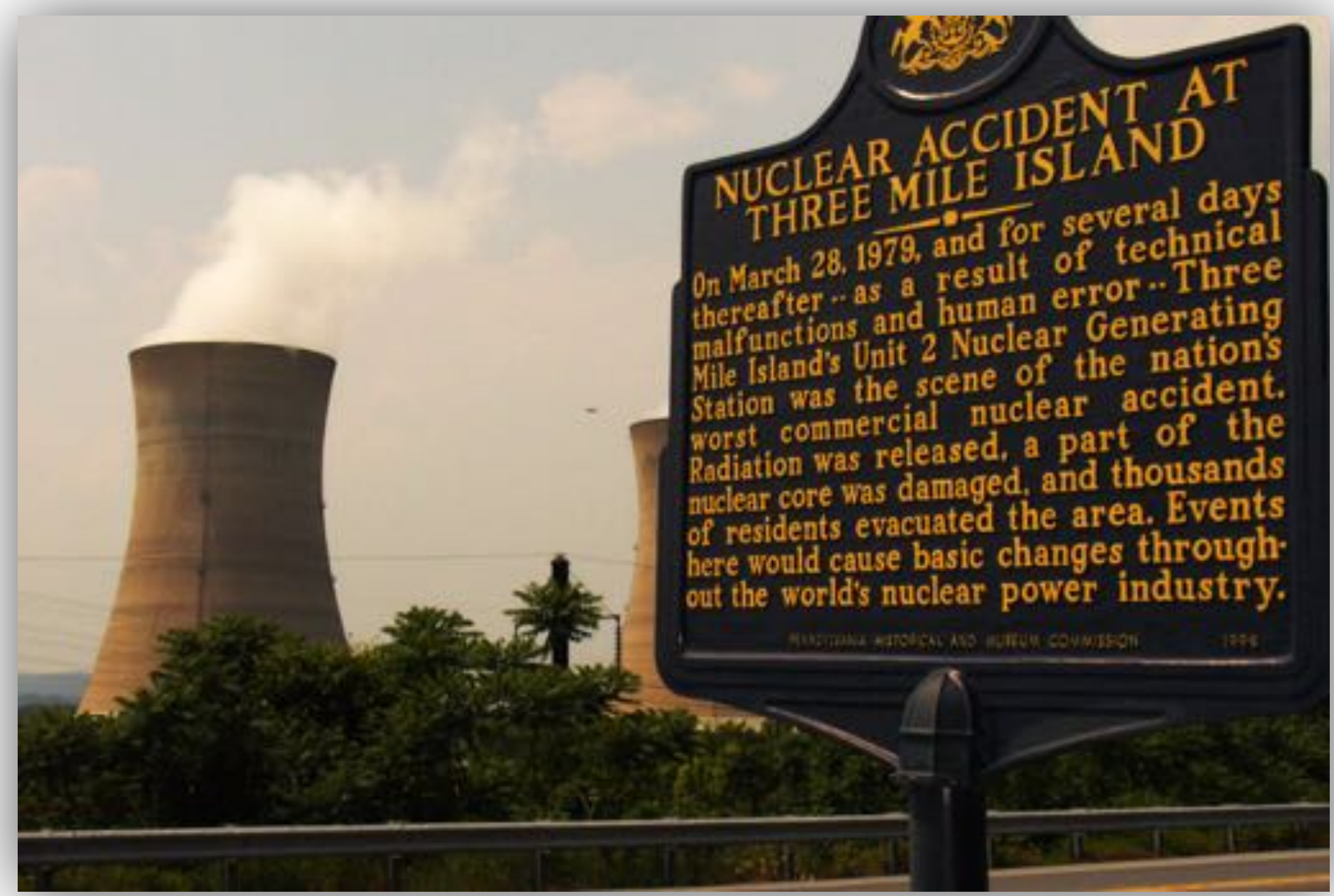
RADIATION KNOWS NO BORDERS

Four Main Themes

- Nuclear accidents happen frequently.
- As time goes on, accidents have become increasingly more severe
- As bad as it continues to be, Fukushima could have been much worse.
- Radiation knows no borders.


NUCLEAR ACCIDENT AT THREE MILE ISLAND
On March 28, 1979, and for several days thereafter -- as a result of technical malfunctions and human error -- Three Mile Island's Unit 2 Nuclear Generating Station was the scene of the nation's worst commercial nuclear accident. Radiation was released, a part of the nuclear core was damaged, and thousands of residents evacuated the area. Events here would cause basic changes throughout the world's nuclear power industry.

Second Meltdown: Chernobyl

Third Meltdown: Fukushima Daiichi Unit 1

Fourth Meltdown: Fukushima Daiichi Unit 2

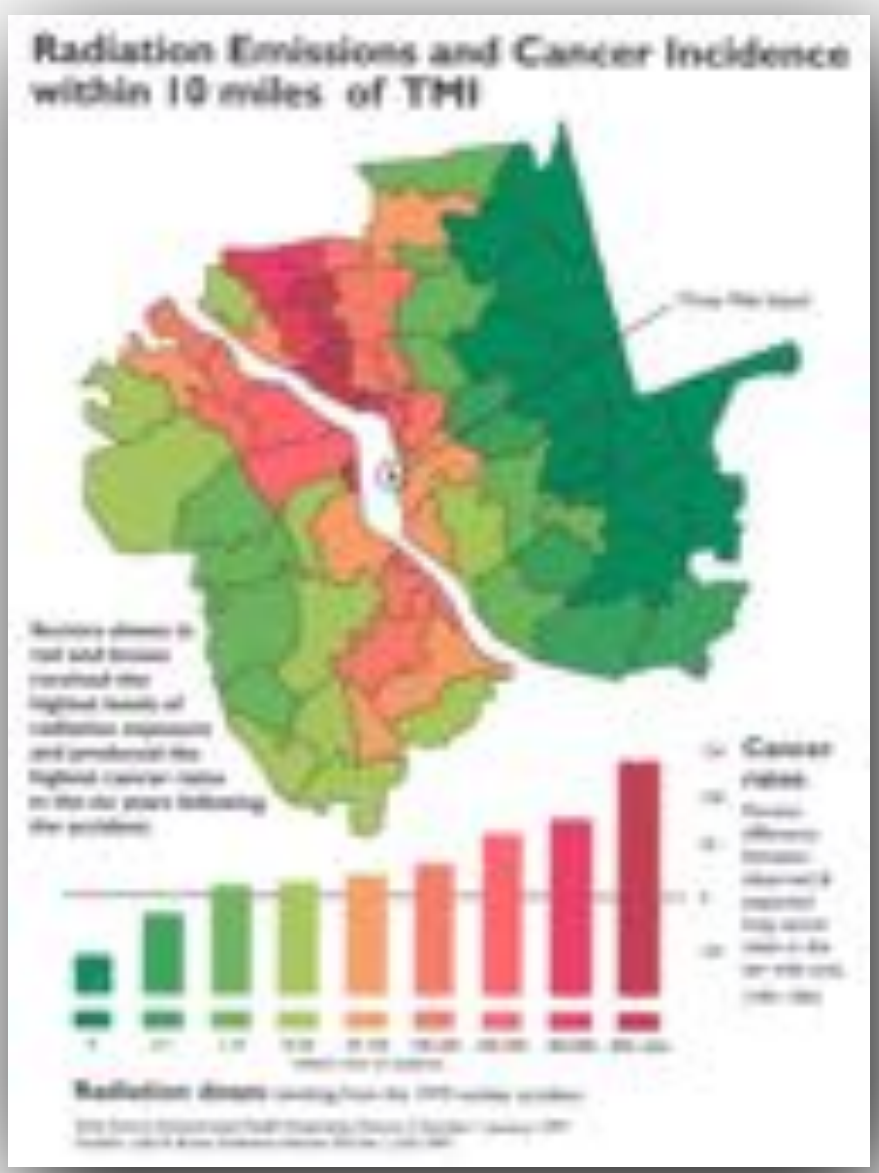
Fifth Meltdown: Fukushima Daiichi Unit 3

Conclusion 1: Accident Frequency

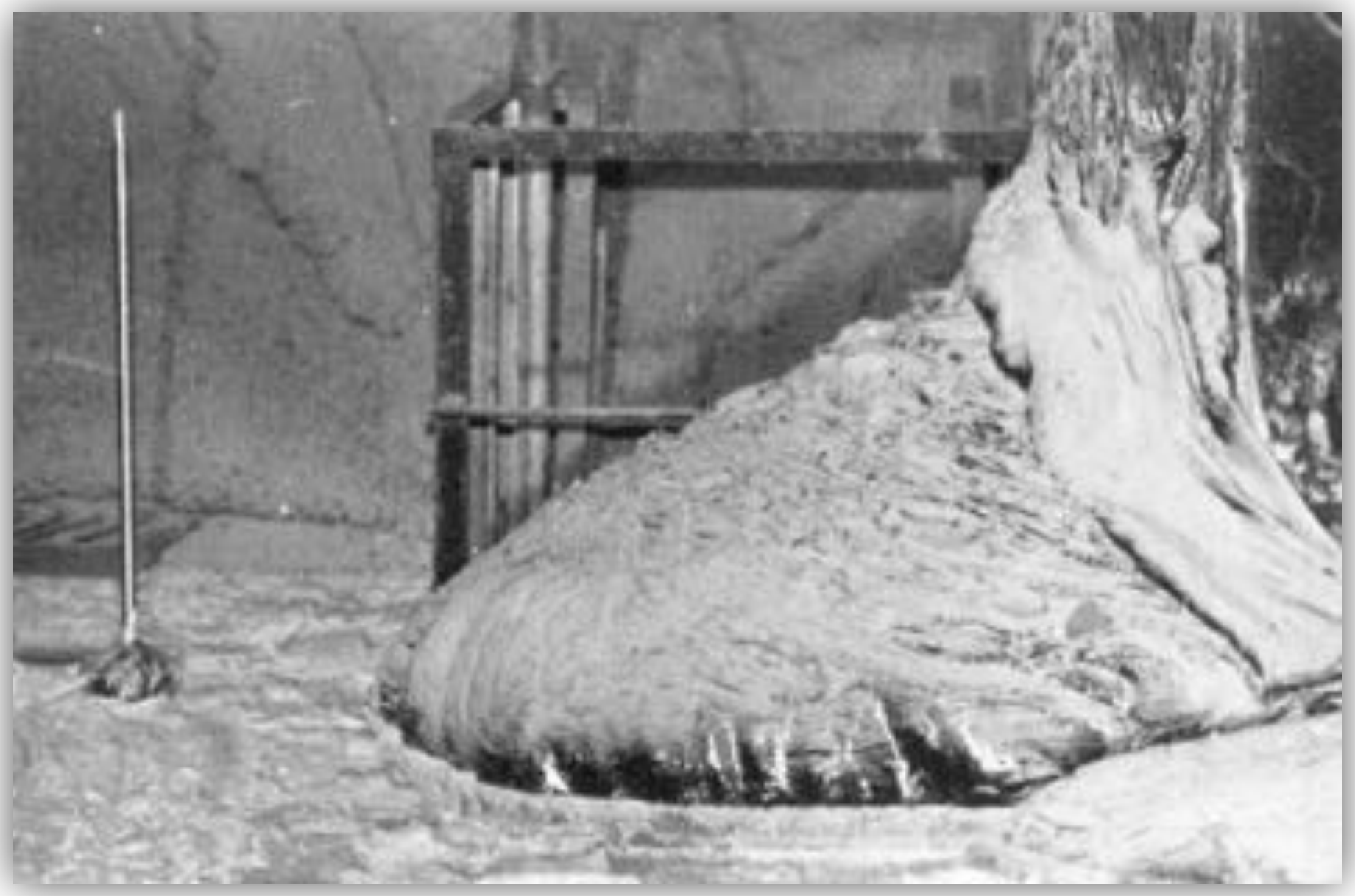
- 35 years divided by 5 accidents = 1 accident every 7 years.
- 1 million years divided by 400 nuclear reactors = 1 every 2,500 years.
- Policymakers and the public should expect 1 accident every decade.

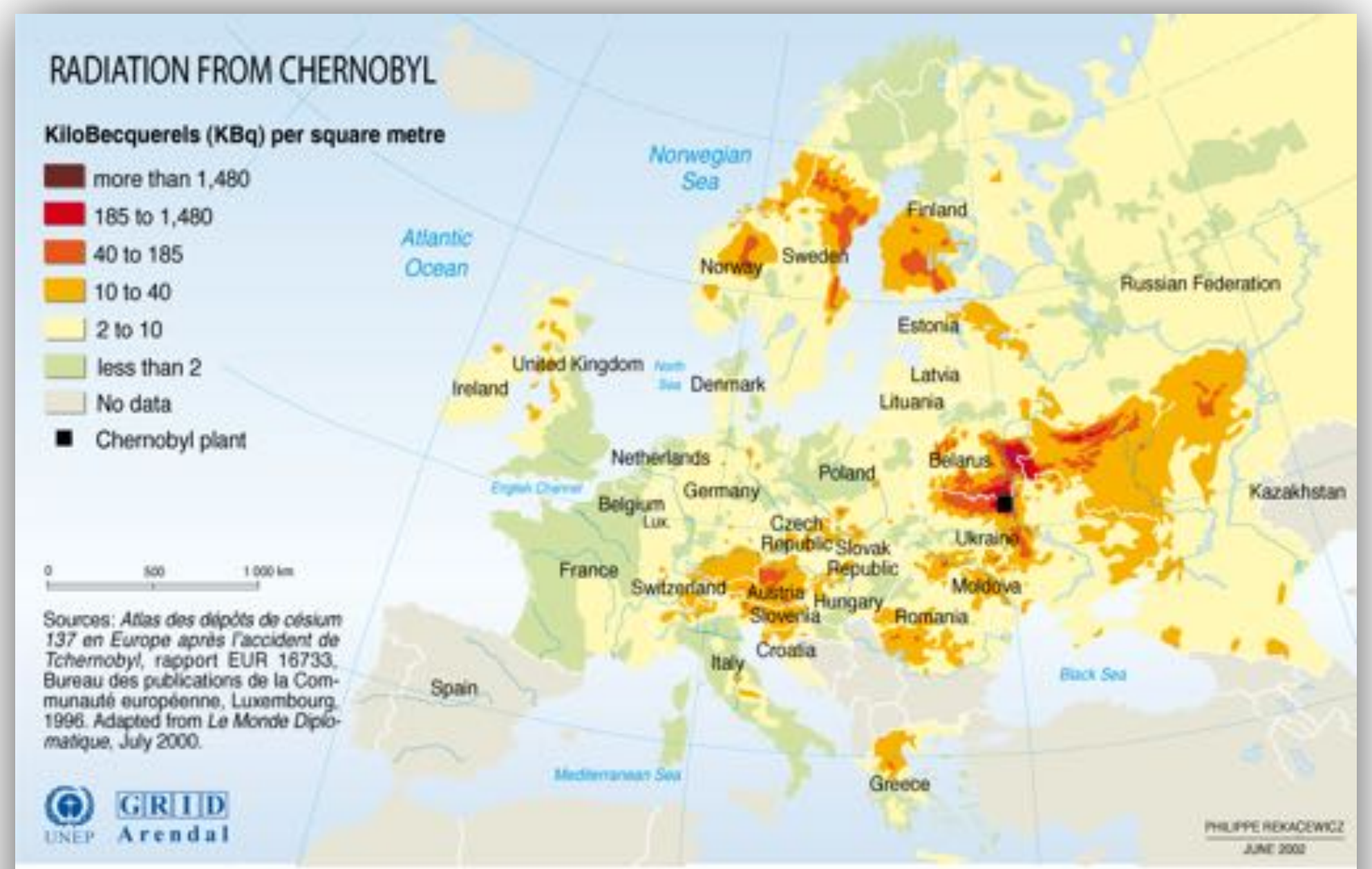
TMI Partial Core Meltdown

Dr. Steve Wing
New York Academy of Medicine
March 2013



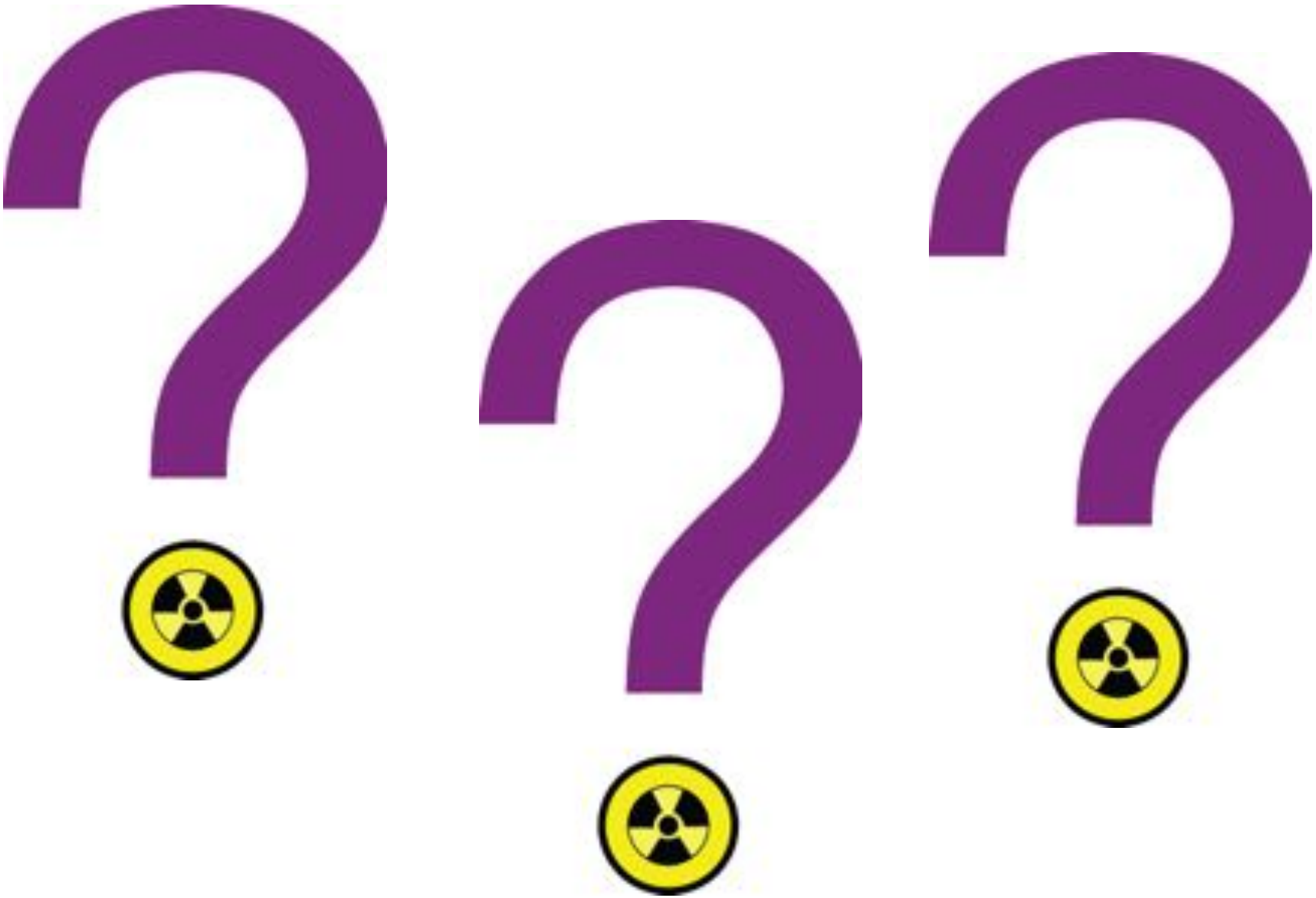
Chernobyl Elephant's Foot

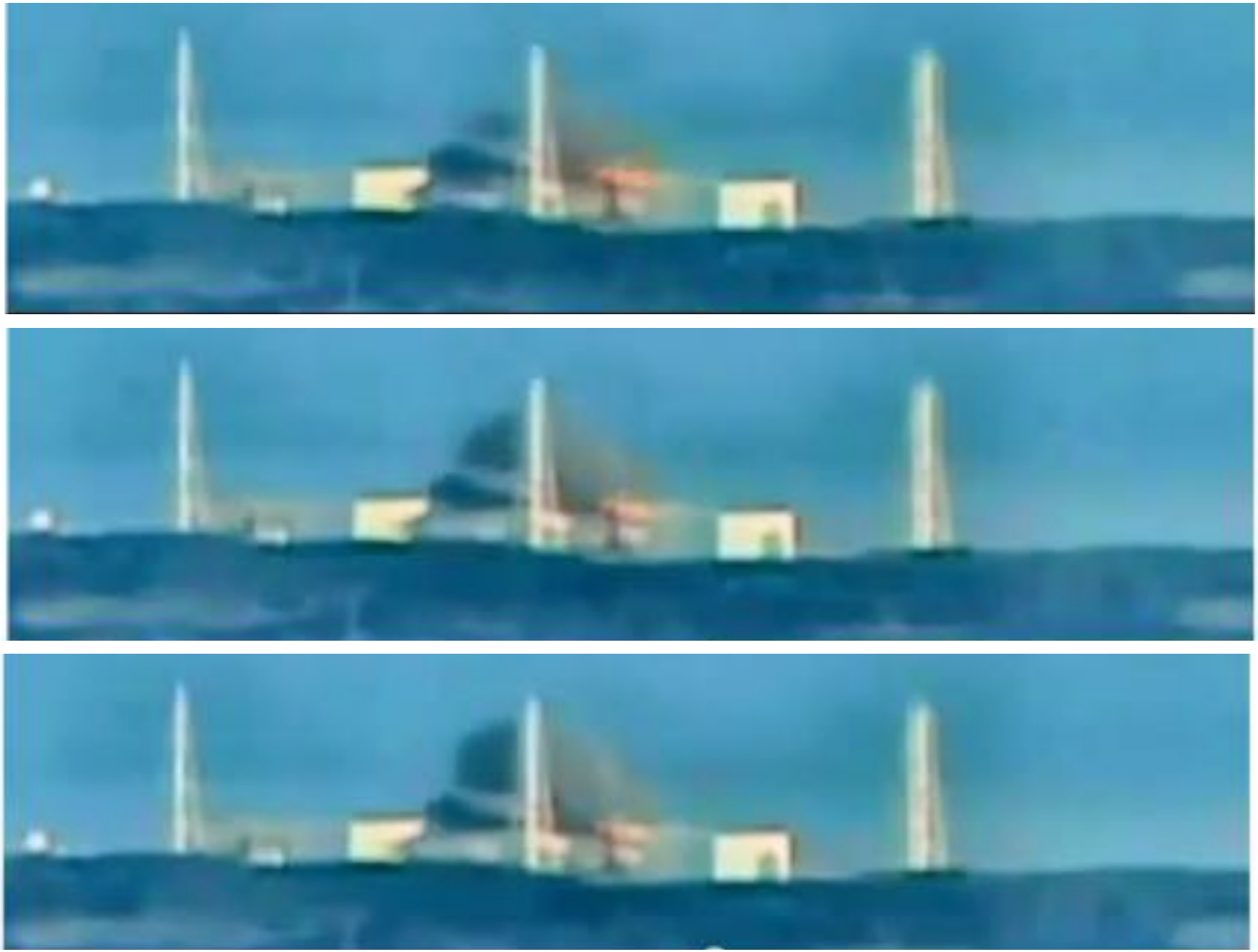




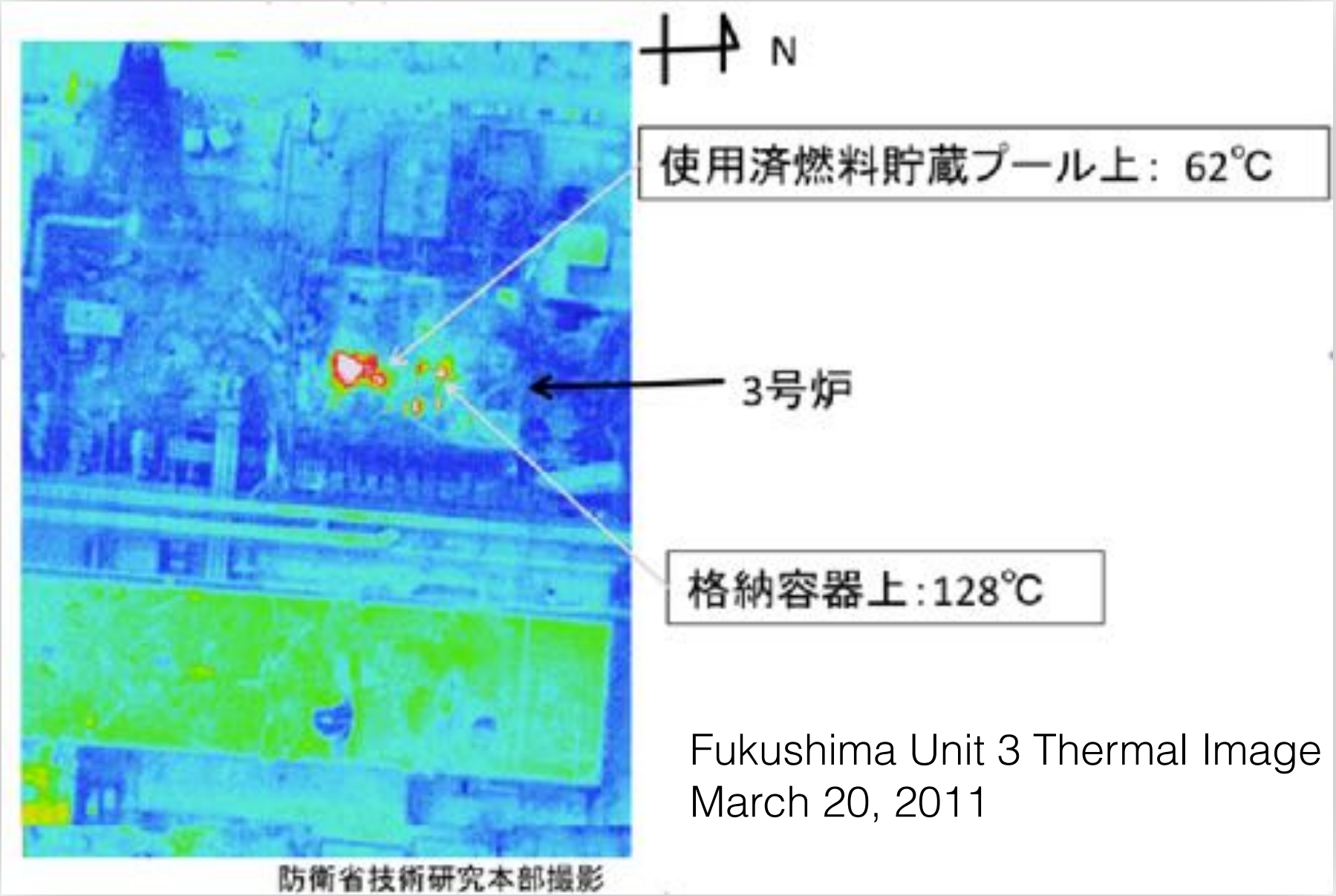
Sources: UNEP/GRID-Arendal, European Environment Agency; *AMAP Assessment Report : Arctic Pollution Issues*, Arctic Monitoring and Assessment Programme (AMAP), 1998, Oslo; European Monitoring and Evaluation Programme (EMEP); Co-operative programme for monitoring and evaluation of the long range transmission of air pollutants in Europe, 1999. Adapted from *Le Monde Diplomatique, July 2000*.

Fukushima Daiichi: Units 1, 2, & 3

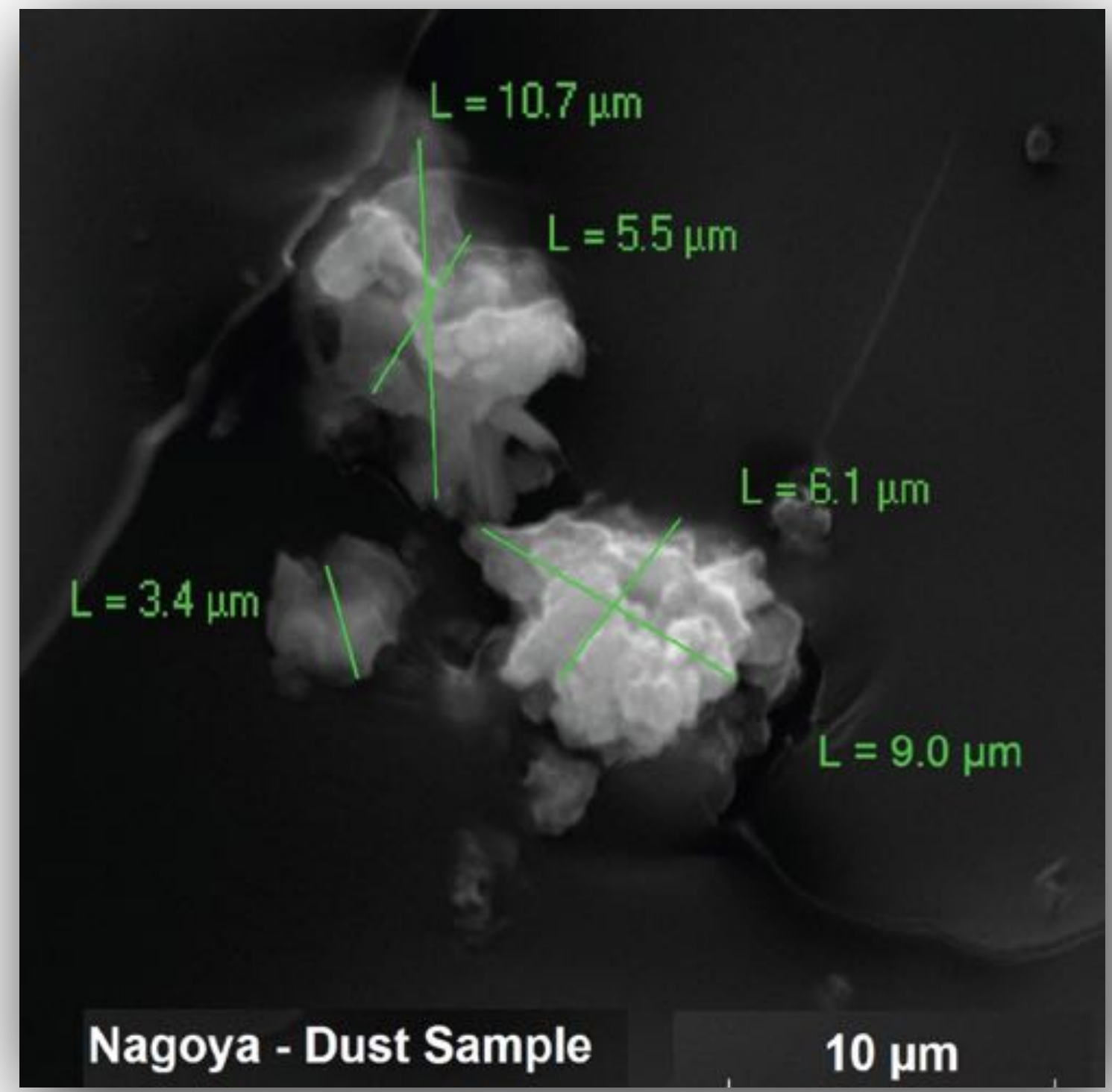




128°C Thermal Flare Proves Hot Radioactive Gases, Not Steam, Were Released



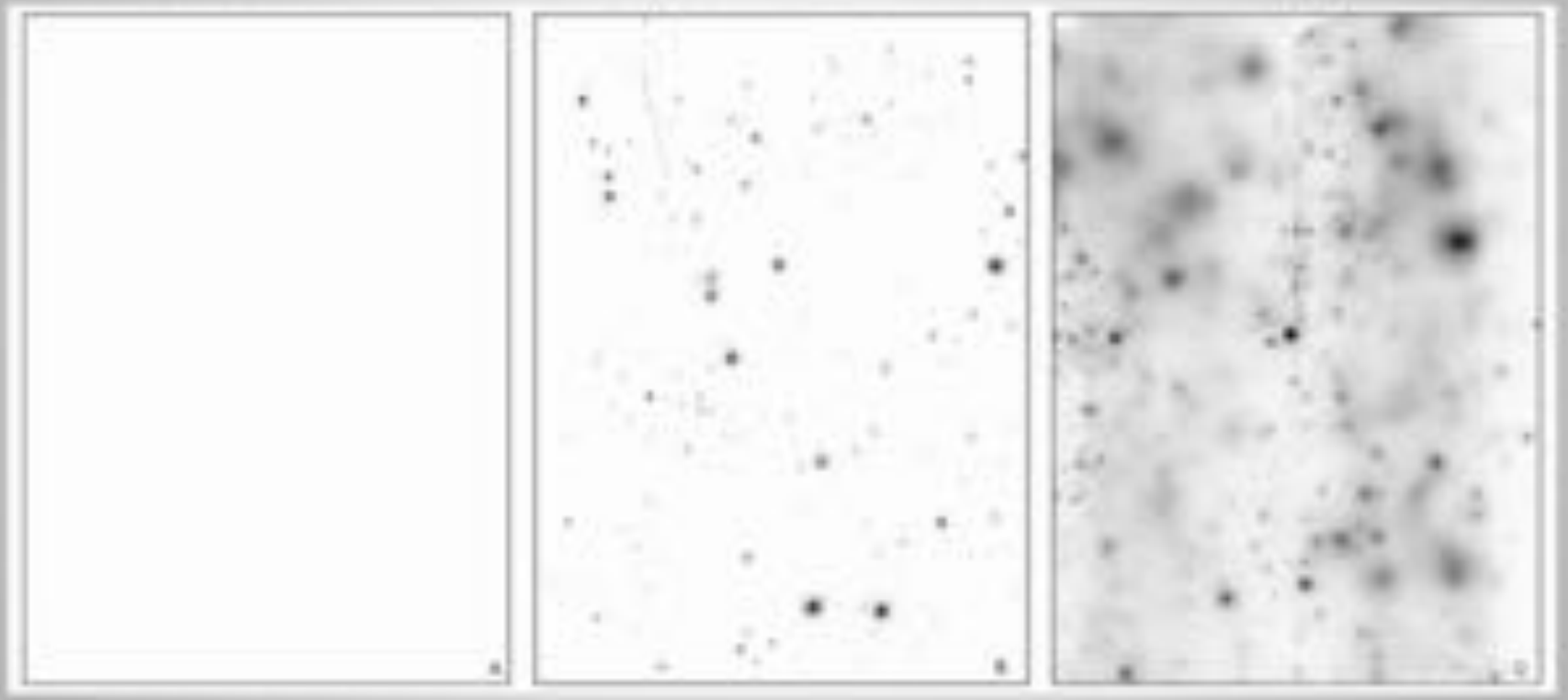
Fukushima Unit 3 Thermal Image
March 20, 2011


L = 10.7 µm
L = 5.5 µm
L = 6.1 µm
L = 3.4 µm
L = 9.0 µm
Nagoya - Dust Sample
10 µm

Autoradiographs – car air filters

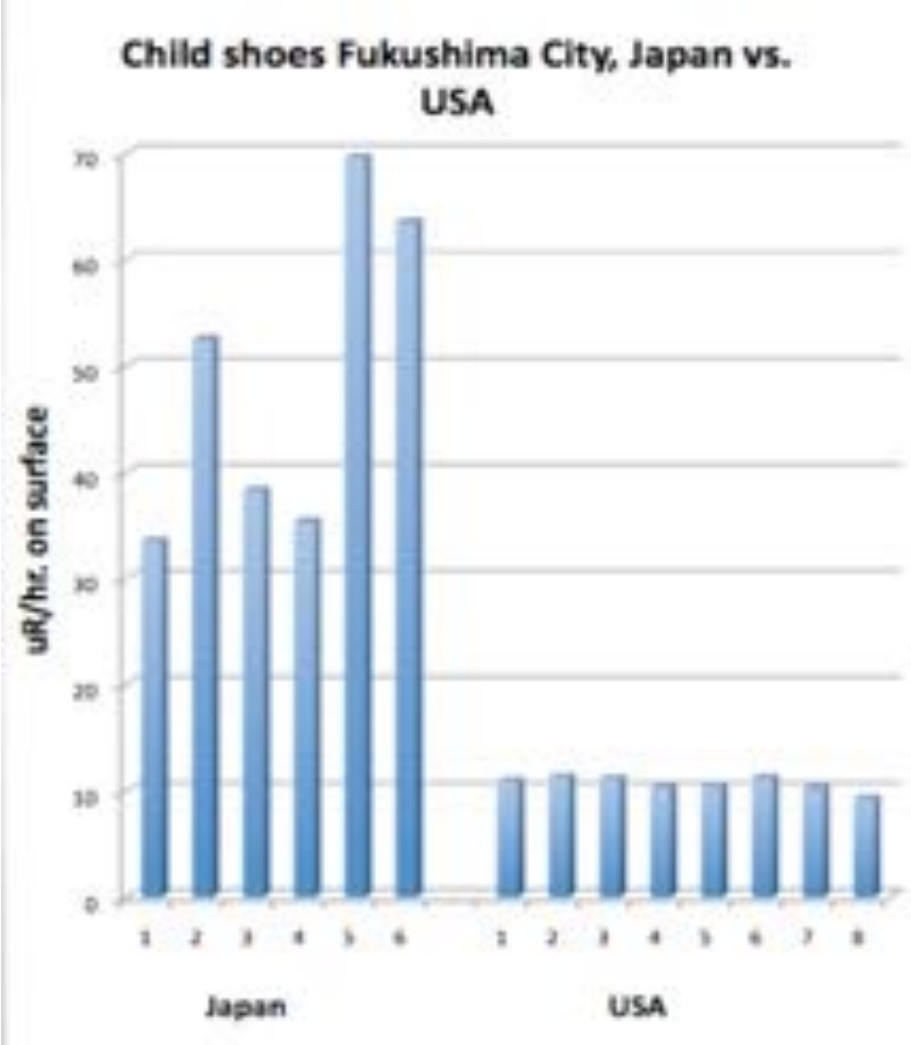
April 2011, X-ray film image and uR/hr.

Seattle m=11.7 Tokyo m=18.9 Fukushima City m=199

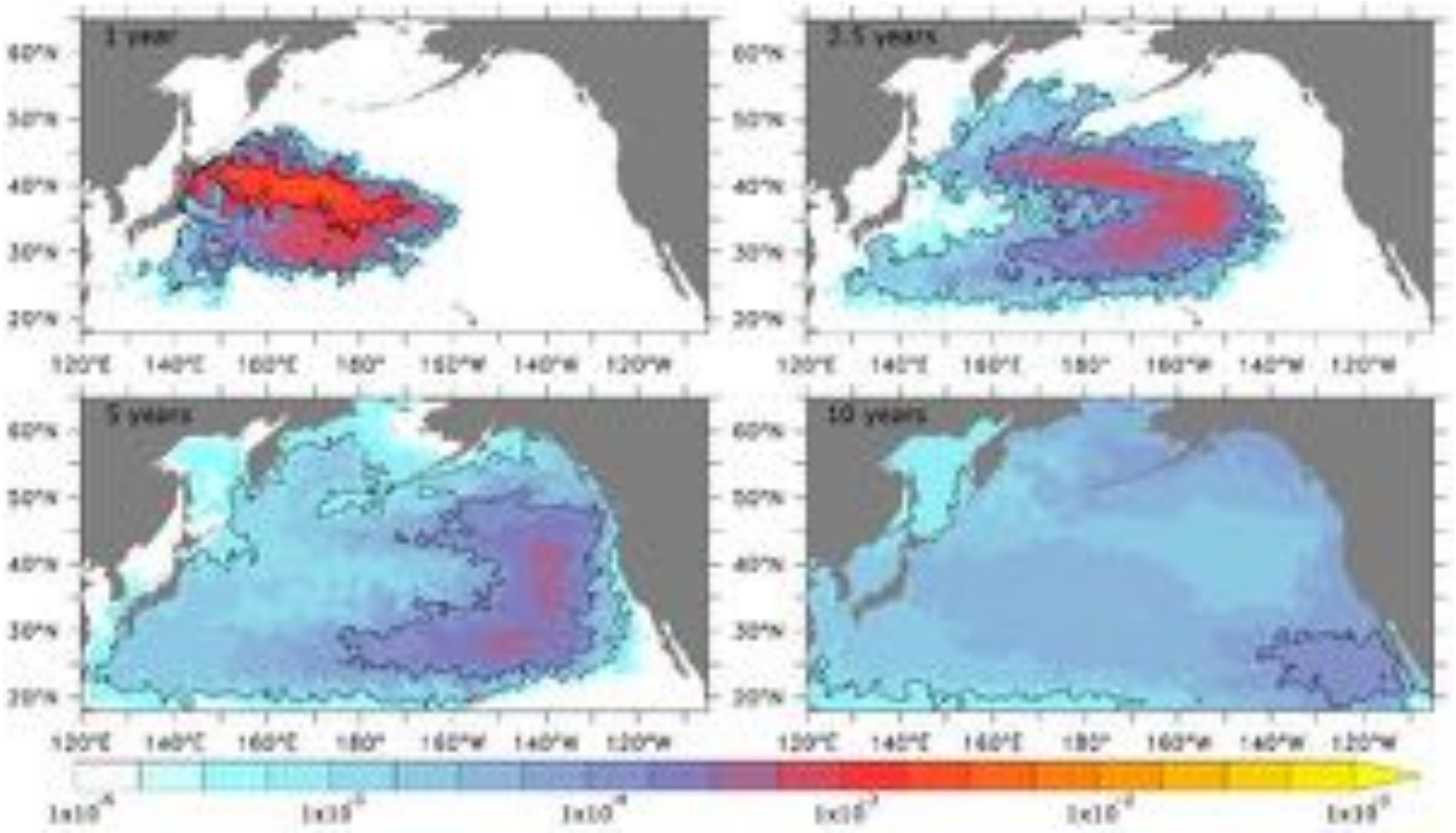


Radiation Exposure To The Population In Japan After The Earthquake,
Marco Kaltofen, MS, PE (Civil, MA)

Department of Civil and Environmental Engineering
Worcester Polytechnic Institute, Worcester, MA.
Presented October 31, 2011 at the 139th Annual Meeting of the
American Public Health Association, Washington, DC



Ocean Contamination

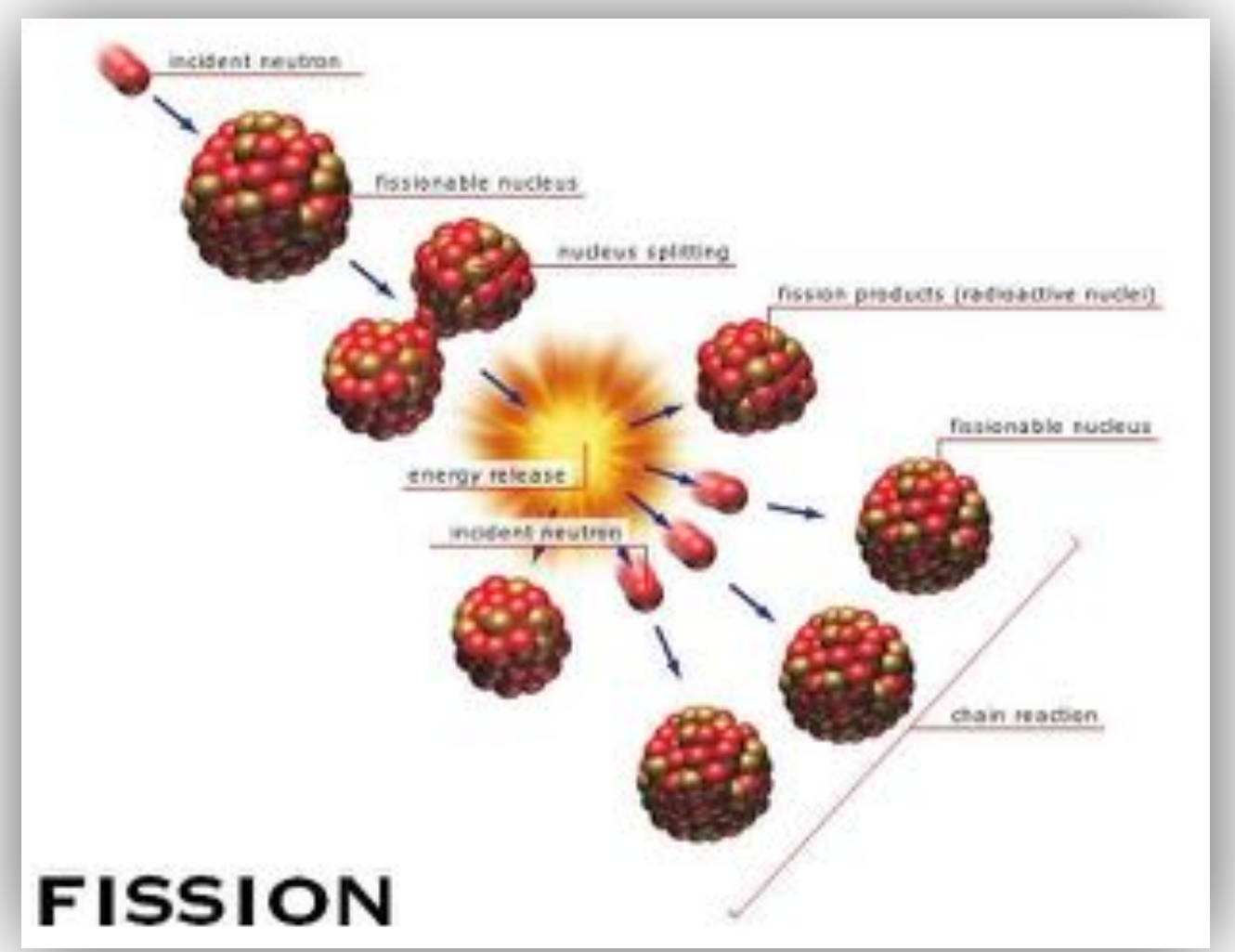


The Secret is in the Assumptions

Conclusion 2: Increased Accident Severity

- TMI: partial meltdown.
- Chernobyl: complete meltdown.
- Fukushima Daiichi: 3 complete meltdowns.

Nuclear Chain Reaction



LoUHS

Japan Map


Tomari (2)
Sapporo
Kashiwazaki-Kariwa (7)
Onagawa (2)
Shika (1)
Fukushima I (6)
Tsuruga (2)
Fugen (1)
Fukushima II (4)
Mihama (3)
Ohi (4)
Monju (1)
Tokai (2)
Takahama (4)
Tokyo
Shimane (2)
Kyoto
Kobe
Nagoya
Osaka
Hamaoka (4)
Genkai (4)
Ikata (3)
Sendai (2)

Conclusion 3:
It Could Have Been Worse

- Fukushima: Complete Technological Failure.
- Luck.
- Courage.


Tokyo City
Capital since 1603
Population: 35+ Million
GDP: US$ 1.479 Trillion
"Our existence as a sovereign nation was at stake"
Prime Minister, Kan Naoto
When do the risks of a technology become untenable?

TOO BIG TO FAIL?

Sooner or later, in any foolproof system, the fools are going to exceed the proofs!
- Arnie Gundersen

Conclusion 4: Radiation Has No Borders

When Do the Risks of a Technology Become Untenable?

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Fairewinds Associates, Inc

Nuclear Engineering, Safety, and Reliability Expert
42-years of nuclear industry experience and oversight

ME NE Master of Engineering Nuclear Engineering
Rensselaer Polytechnic Institute, 1972
U.S. Atomic Energy Commission Fellowship
Thesis: Cooling Tower Plume Rise

BS NE Bachelor of Science Nuclear Engineering
Rensselaer Polytechnic Institute, 1971,
Cum Laude
James J. Kerrigan Scholar

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U.S. Atomic Energy Commission
License # OP-3014

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