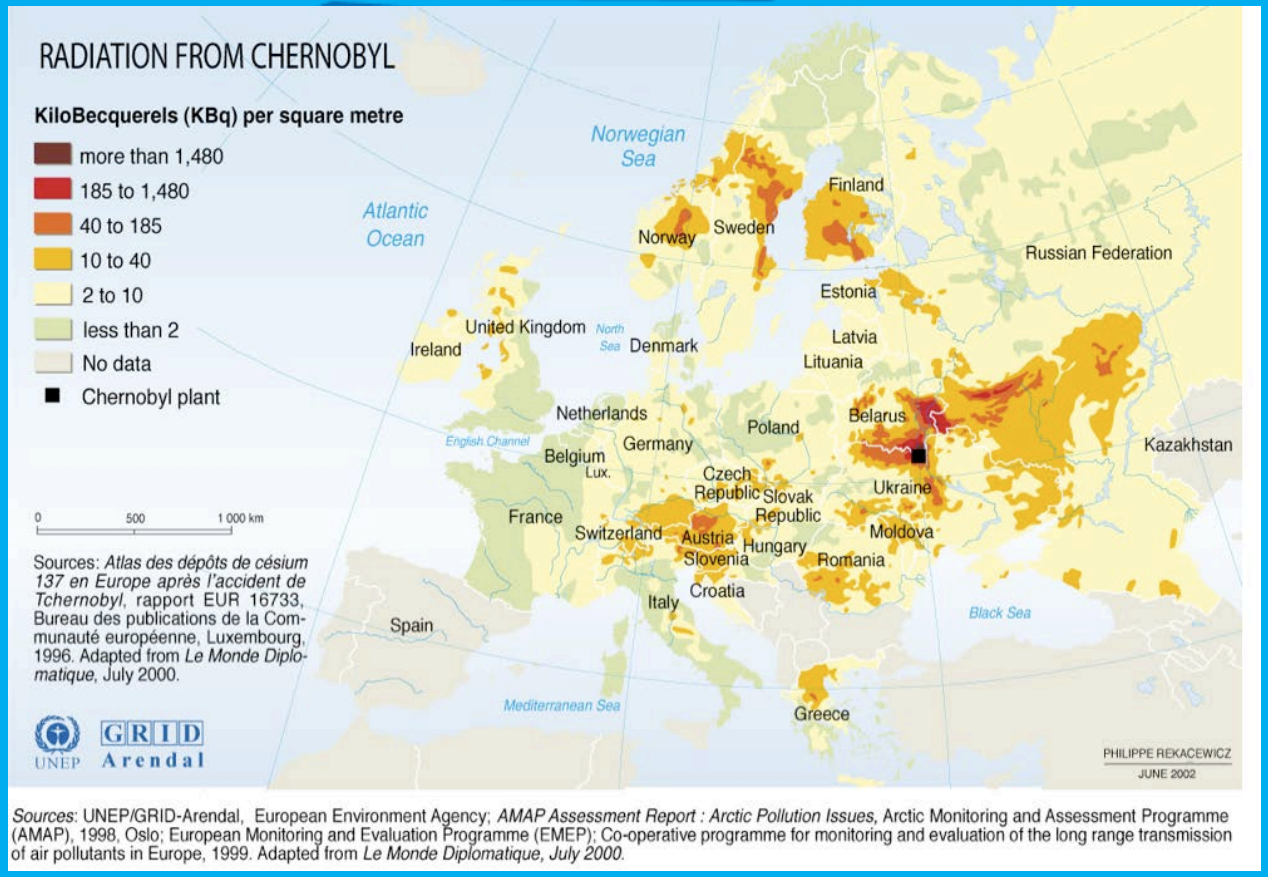
European Fallout from Chernobyl



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 Reactors: before & after earthquake and tsunami

Fukushima reactors 3 & 4

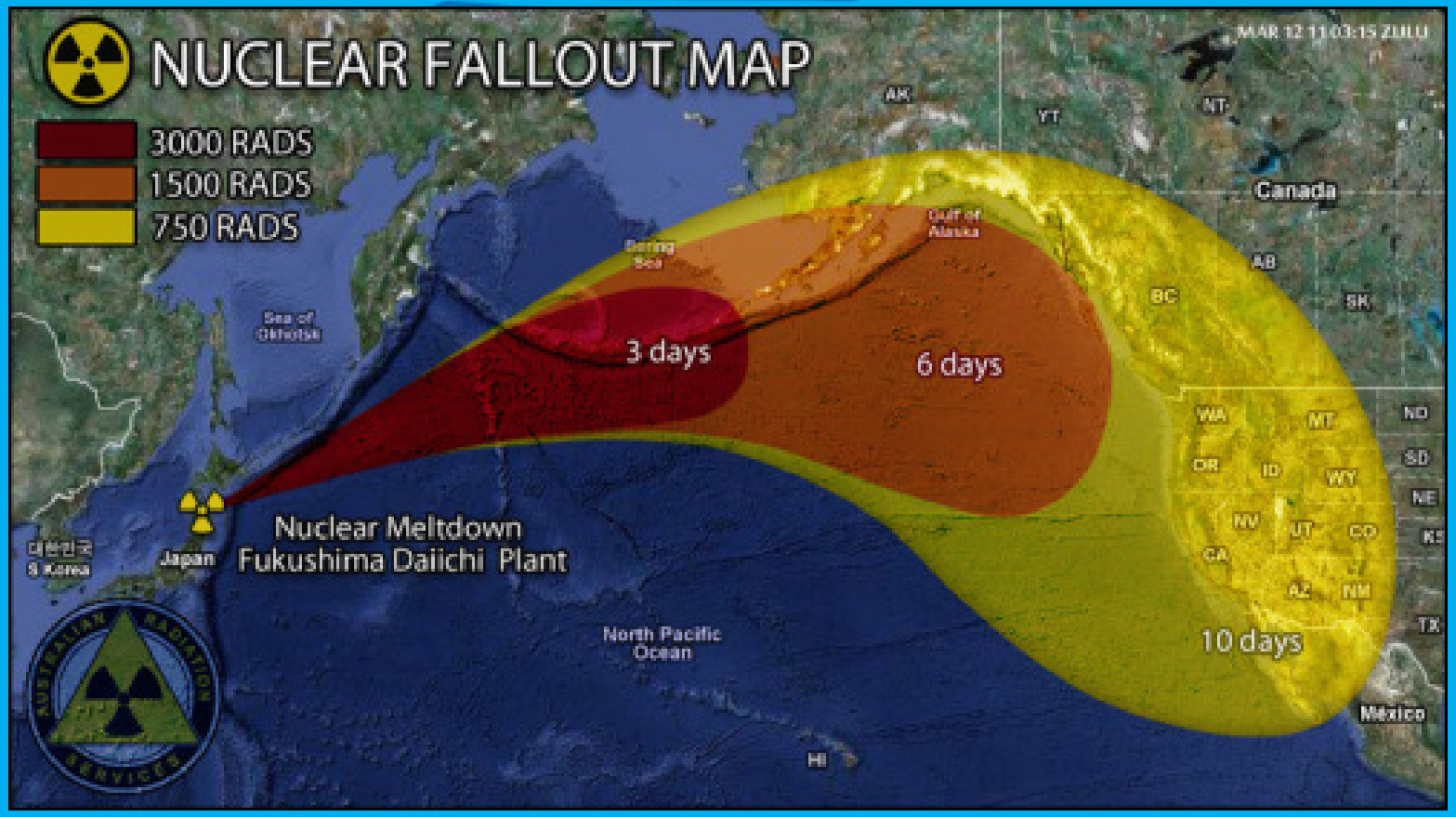
(picture released by Tokyo Electric Power Company)

Fukushima Reactor 1

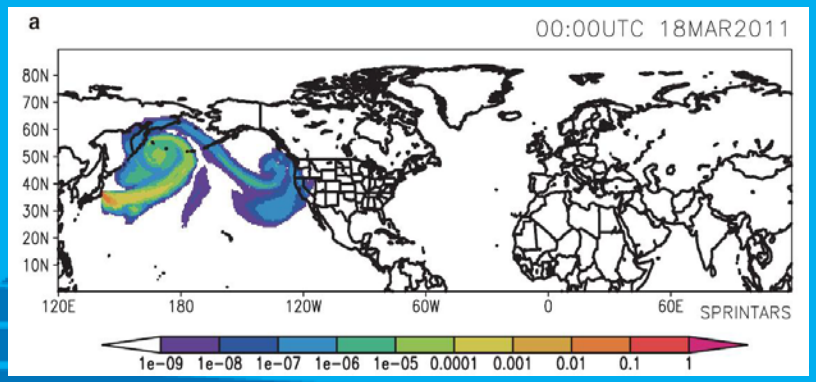
A view inside one of the damaged Fukushima reactors

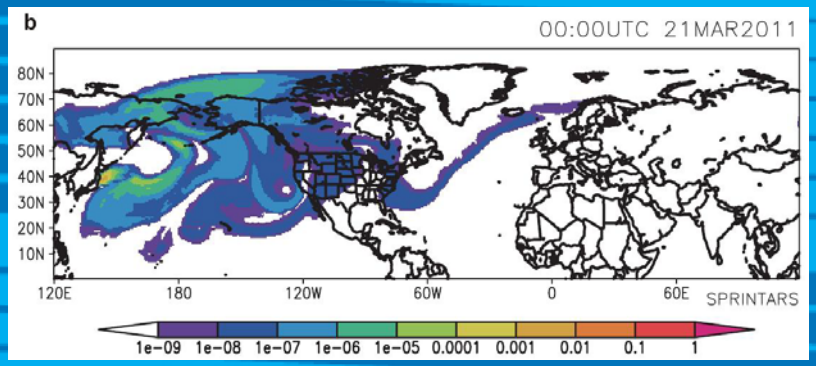
Potential Fallout from Fukushima Reactor

released by Australian Radiation Service, March 2011



Radioactive Materials Dispersion by Kyushu & Tokyo University Researchers





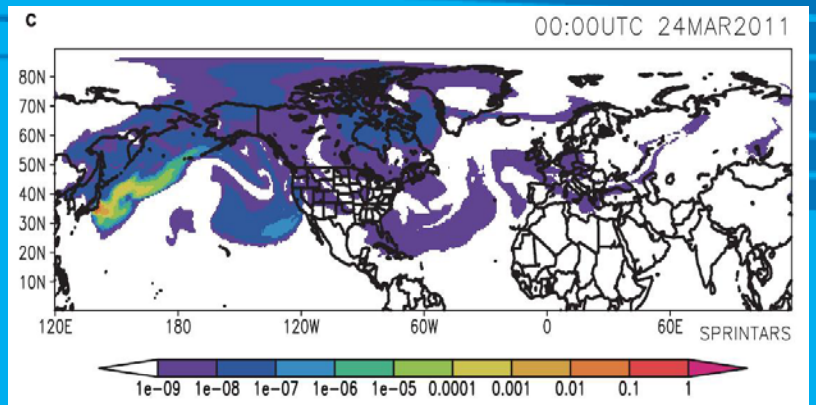
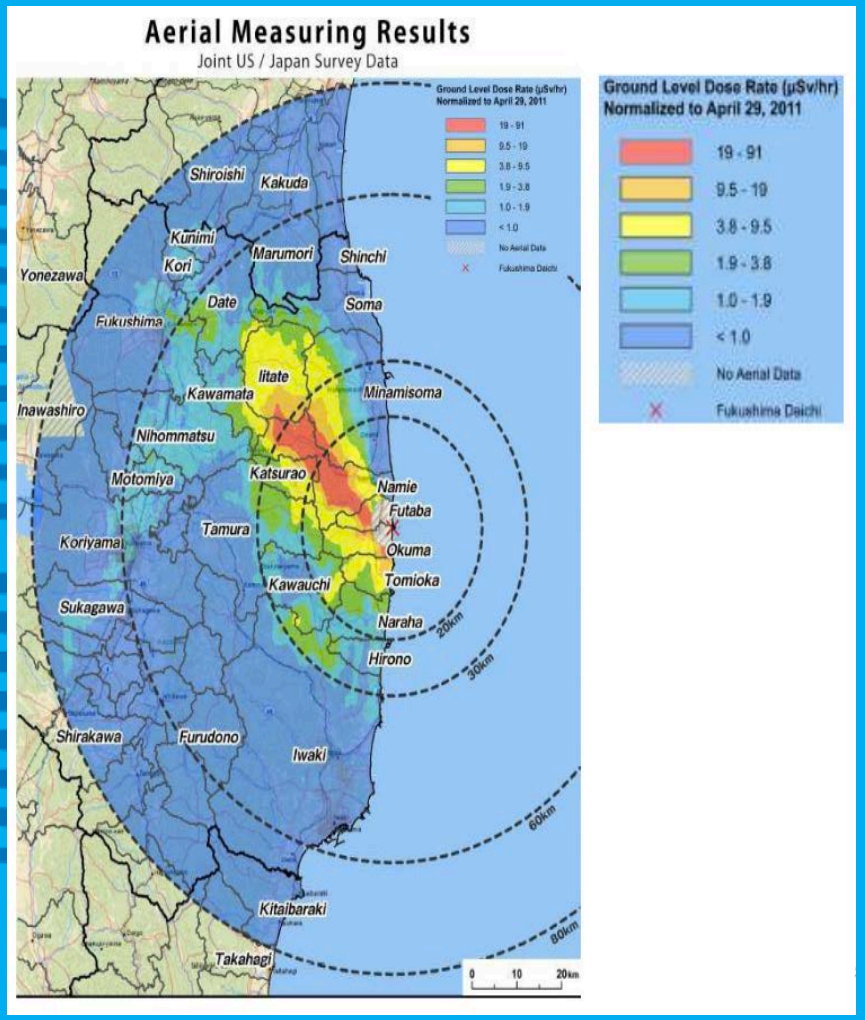


Figure 1. SPRINTARS simulation for March (a) 18, (b) 21 and (c) 24 of near-surface mass concentration of particles emitted continuously from the Fukushima Daiichi Nuclear Power Plant since 1200 UTC, March 14. The concentration indicated is relative to that within a few tens kilometers around the power plant. Each range of color contours corresponds to one order of magnitude.

U.S.-Japan joint survey reveals high radiation beyond evacuation zone

(map released by the US Department of Energy, May 6, 2011)

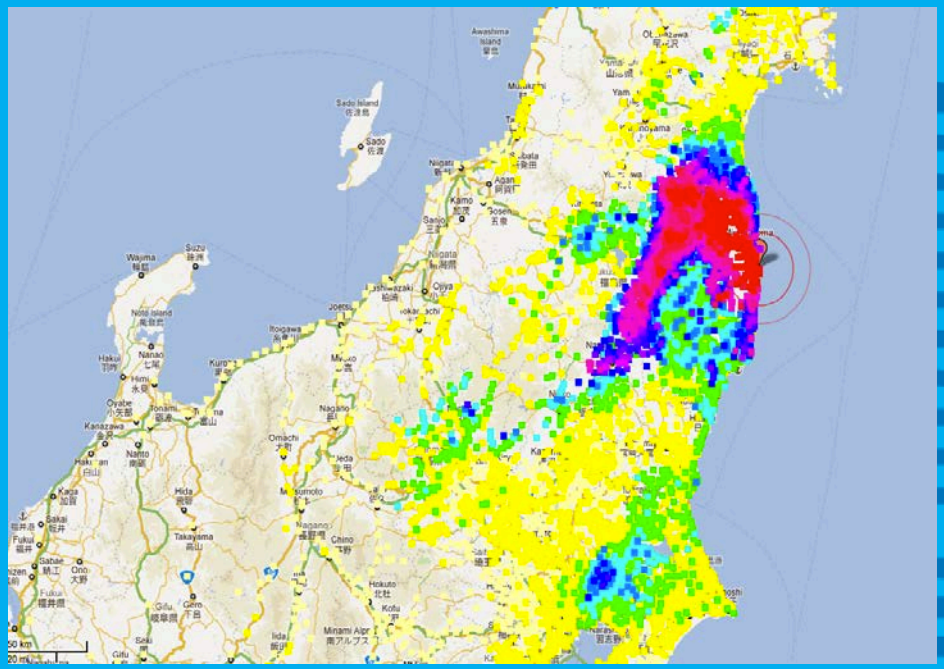


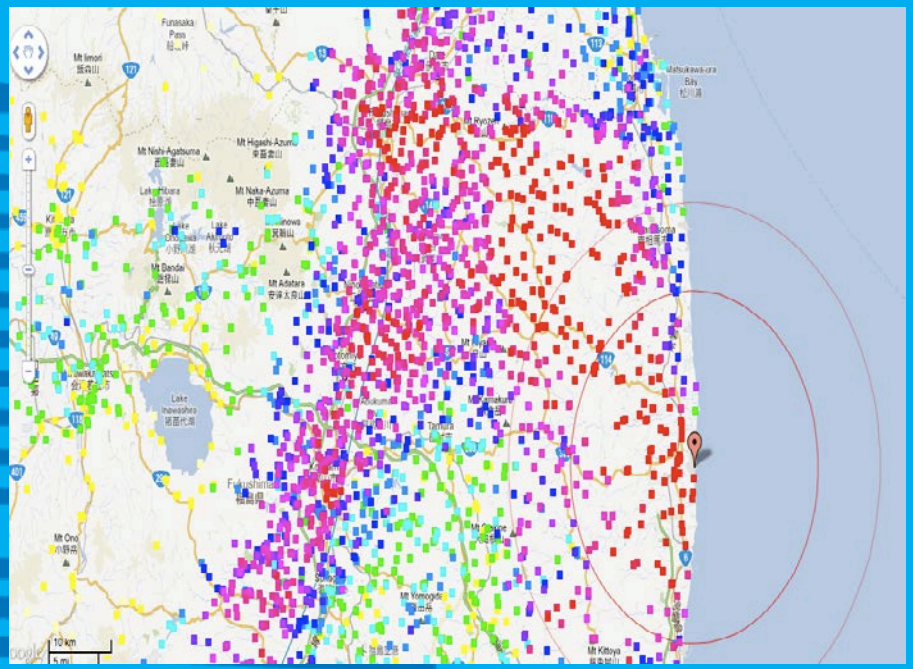
- Map measurements were taken between April 6 and April 29

- Ground surface contamination within 80 kilometers of the crippled Fukushima No. 1 nuclear power plant shows radiation levels higher than those in the mandatory relocation zone around the Chernobyl plant.

.

Radioactive plume over Japan from Fukushima





- The highest-dose zone from the Fukushima Daiichi nuclear plant was caused when radioactive plume discharged in the afternoon of 15 March, and flowed toward the west to northwest direction from the plant.
- It was washed out by a rain band moving from the northwest direction and deposited on the ground over the northwest area of the plant during the period from the evening to midnight of 15 March.

(Source: www.nnistar.com)

Reactor-borne isotopes & radioactive emissions

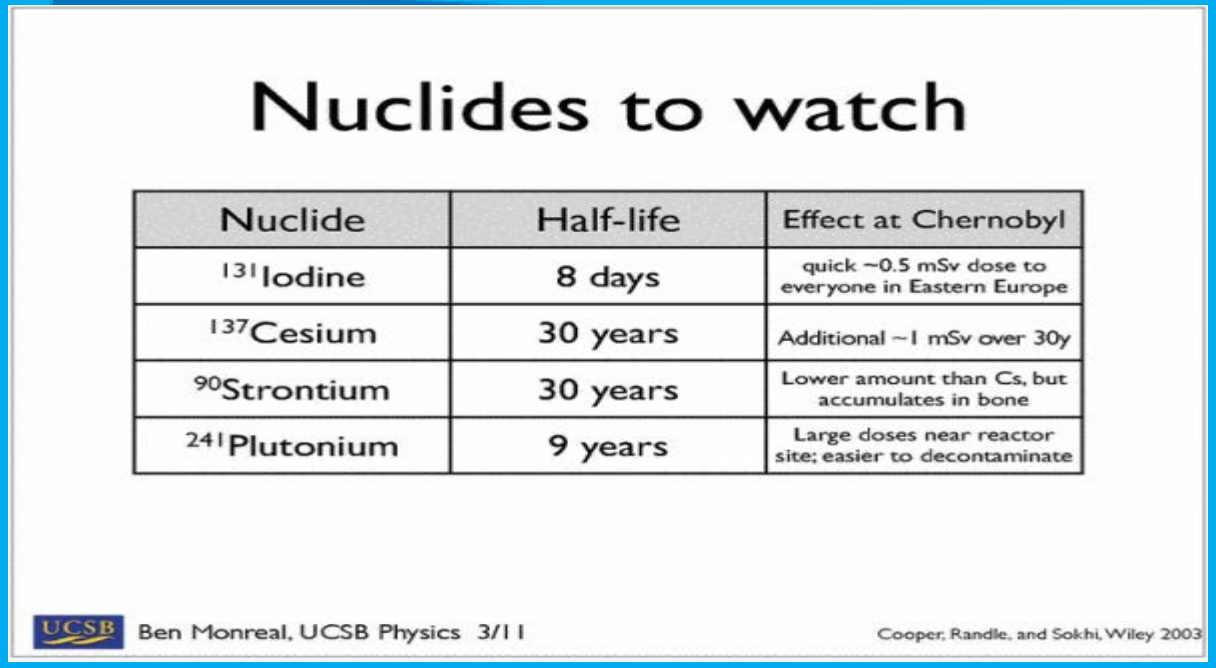
Isotope	Emits	Half-life	Used in/by
Uranium-238	alpha	4.5 billion years	used in new depleted uranium weapons and tank armor; contaminates 50 million tons of U.S. uranium mine wastes left in open piles
Uranium-235	alpha	700 million years	used in atomic weapons, poisoning fabrication factories
Uranium-234	alpha & gamma	245,000 years	left from uranium ore milling and enrichment
Plutonium-239	alpha	24,300 years	used in hydrogen bombs; seeks liver, lung, bone
Cesium-137	beta & gamma	30.2 years	left in large quantities from bomb production and in reactor wastes; contaminates whole body & muscle
Strontium-90	beta	28 years	spewed by accidents at Three Miles Island & Chernobyl--and vented in routine "allowable" releases by all operating nuclear power reactors; seeks bone
Cobalt-60	beta & gamma	5 years	left from H-bomb production & used in food irradiation; contaminates whole body
Iodine-125 & 131	beta & gamma	8.1 days	spewed in large quantities during reactor accidents and in fallout from above-ground bomb testing; contaminates the thyroid gland

Radiation is insidious, because it cannot be detected by the senses. We are not biologically equipped to feel its power, or see, hear, touch or smell it. Yet gamma radiation can penetrate our bodies if we are exposed to radioactive substances. Beta particles can pass through the skin to damage living cells, although, like alpha particles, which are unable to penetrate this barrier, their most serious and irreparable damage is done when we ingest food or water - or inhale air - contaminated with particles of radioactive matter.

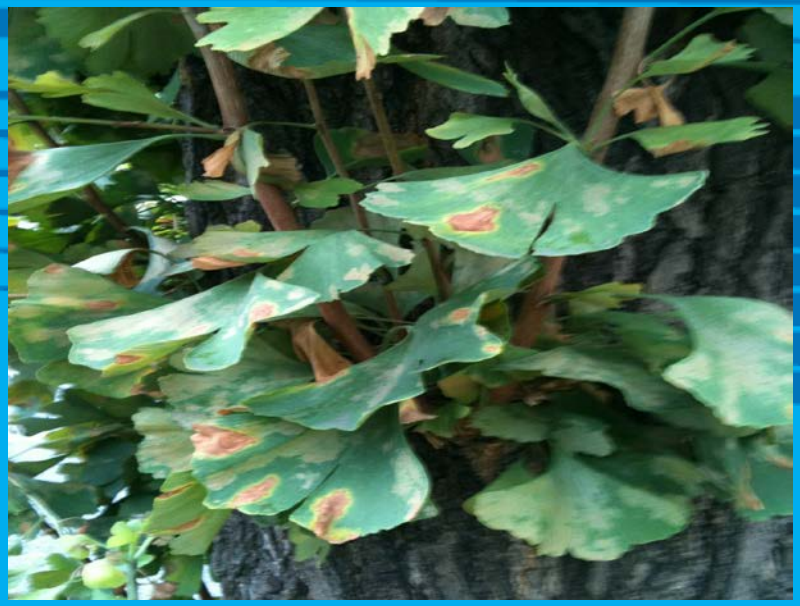
Radioactive nuclides released into the air from Fukushima

- As steam is vented during cooling efforts at Fukushima, radioactive nuclides are carried out with the steam.
- The Fukushima Daiichi plant has emitted radioactive iodine, cesium, and noble gases as aerosols via steam venting. These are present in the air, seawater, and soil in the area around the plant.
- Neptunium-239, which decays to plutonium-239, was estimated at 7.6 x 10^13 becquerels, or 76 terabequerels, adding to 3.2 x 10^9 becquerels of plutonium-239 that came out.

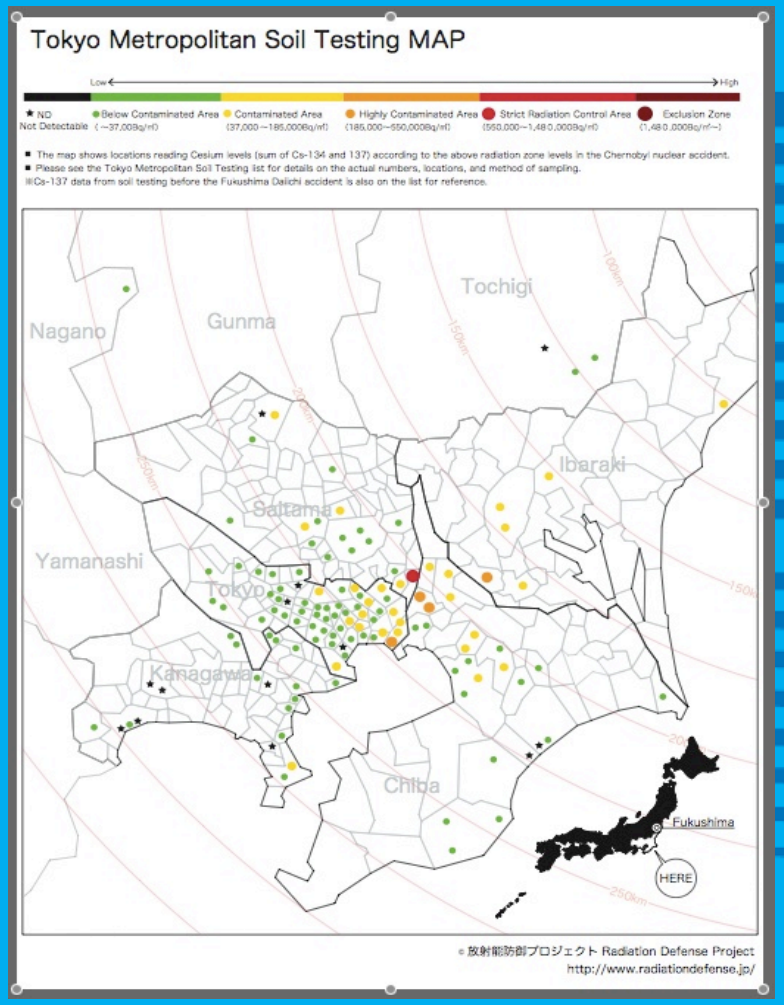
Source: Japan's Nuclear and Industrial Safety Agency (NISA) on June 6, 2011 / www.sciencemediacenter.ca



Dying Azaleas & Ginko leaves: central Tokyo, July 30, 2011



Radiation Defense Project begins soil testing - June/July 2011



- First unified investigation on the diffusion of radioactive particles in the metropolitan area including Tokyo, Chiba, Saitama, Kanagawa, and Ibaraki prefectures.
- Soil samples were sent to the same laboratory to test radioactive particles Iodine-131, Cesium-134, and Cesium-137.
- The results of the test show that both radioactive Cesium and Iodine radiation is being detected across Tokyo. The Iodine radiation, with the short 8 day half-life, indicates that fresh radiation produced by an ongoing nuclear meltdown from the Fukushima nuclear power plant is being transported into the city from over 200 kilometers away.
- The highest level detected was in the Tokyo Metropolitan area of Saitama with cesium radiation levels being detected at 919,000 becquerels per square meter - a level almost twice as high as the Chernobyl permanent dead zone evacuation limit of 500,000 becquerels per square meter.

Source: Radiation Defense Project

Japan to seek to reduce children's radiation dose by 60% in 2 yrs

•Japanese government releases a document on radiation decontamination policy.

•Government task force to lead decontamination activities to scale down areas where radiation exposure is expected to top 20 millisieverts a year, such as the 20-kilometer radius of the plant designated as a no-entry zone.

•The document also showed that the state will take responsibility for securing places to dispose of contaminated soil, while acknowledging the need to temporarily keep it in local areas for some time.

•.If there is a request, local governments can clean up the contamination based on the premise that safety is assured, receiving support from the state, according to the document.

Source: Mainichi Japan, August 25, 2011

Birth defects were the norm for years following the Chernobyl incident

Children in Belarus, Russia and Ukraine have been suffering from the effect of the radiation released in 1986. The Rechitsa orphanage in Belarus has been caring for the huge population of sick children.
Photo Credit: Julien Behal/Chernobyl Children's Project

The reactor disaster in Chernobyl took place on April 26, 1986. The reactor was encased as a temporary solution to secure the site for only 20-30 years.
Photo Credit: Julien Behal/Chernobyl Children's Project

Mentally handicapped children exposed to radiation
Photo Credit: Alex Emes/ Blacksmith Institute

Victims of Chernobyl radiation

Chernobyl

Consequences of the Catastrophe for People and the Environment

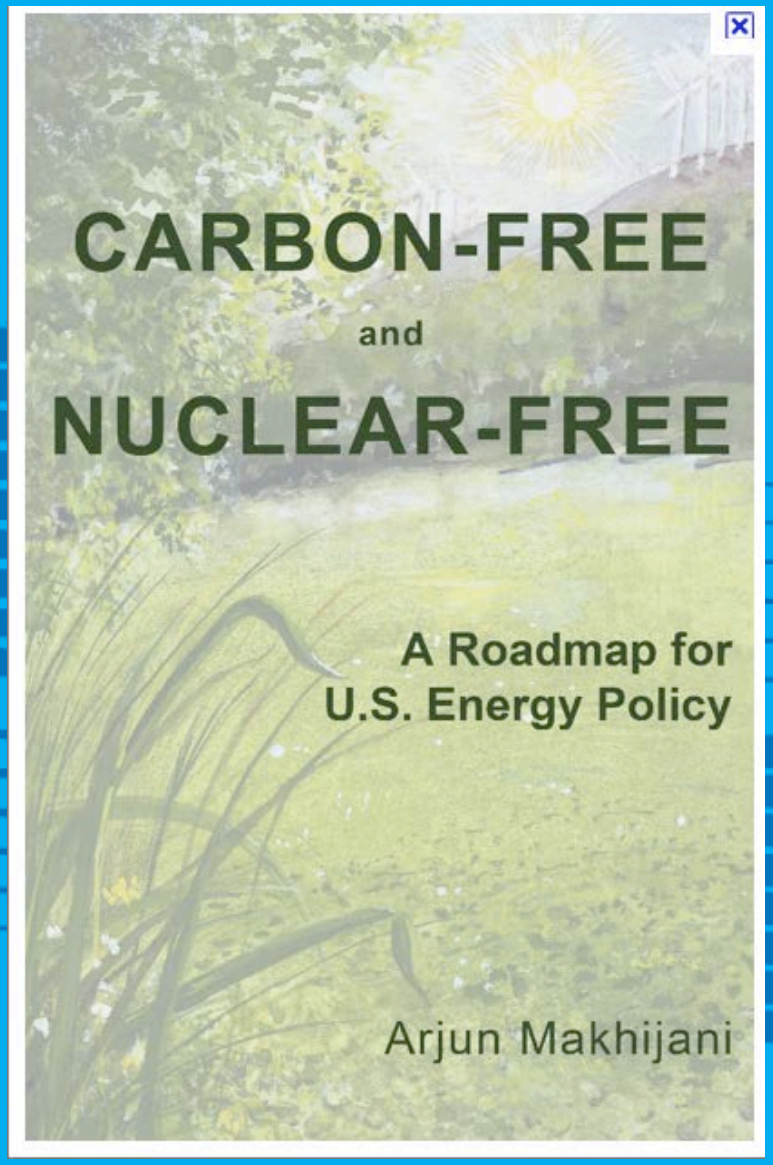
Alexey V. **YABLOKOV**

Vassily B. **NESTERENKO**

Alexey V. **NESTERENKO**

CONSULTING EDITOR Janette D. Sherman-Nevinger

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES VOLUME 1181


CARBON-FREE
and
NUCLEAR-FREE
A Roadmap for
U.S. Energy Policy
Arjun Makhijani