

Green Cross

Study Tour Fukushima

October 2nd – 8th 2014

Green Cross is an international humanitarian assistance organisation, founded by Mikhail Gorbachev in 1993, specialising in overcoming the consequences of industrial, chemical or military disasters.

www.greencross.ch

The 34 people on the study tour included people from Brazil, Canada, England, France, Italy, Japan, Scotland, South Korea, Sweden, Switzerland, USA, and Wales.

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Amongst the delegation were a Brazilian Mayor, a Canadian MP, an English MEP (Labour), a Swiss National Councillor, and six journalists.



HOKKAIDO

• **Epicenter**
8.9 magnitude

• **Fukushima**
(Nuclear plant accident)

HONSHU

SHIKOKU

KYUSHU

300 km

The earthquake and tsunami

11th March 2010

Earthquake magnitude 8.9 on Richter scale,
epicentre approx 43 km off-shore,
approx 180 km from Fukushima Dai-ichi

Fifth most powerful earthquake in the world
ever recorded; most powerful earthquake
ever to hit Japan

Tsunami waves up to 40 m tall, travelled up to
10 km inland

The earthquake and tsunami

11th March 2010

Moved Honshu Island 2.4 m east

Shifted the earth on its axis by 10 – 25 cm

Approx 16,000 deaths, 6,000 injured, 3,000 missing

Approx 130,000 buildings totally destroyed, 1,000,000 buildings damaged



Fukushima City
90 km away

Koriyama
58 km away

Tomioka
10 km away

Fukushima Dai-ichi
6 nuclear reactors

Fukushima Dai-ni
4 nuclear reactors
12 km away

Fukushima Dai-ni

All 4 nuclear reactors started an automatic shut down when the earthquake struck

13 m tsunami wave goes over the sea wall;
damages the cooling systems, high voltage
power cable damaged but soon repaired

10 km evacuation zone imposed 12th March
2010

Fukushima Dai-ni

Level 3 “serious incident” on the International Nuclear Event Scale

All 4 nuclear reactors closed down by 15th March 2010

Main remaining problem: 7,000 tons of radioactive seawater, which is corroding the water storage tanks

Permitted Radiation levels pre-disaster
Permitted Radiation levels post-disaster

Nuclear workers – 20 mSv / year, with at
maximum lifetime exposure of 400 mSv

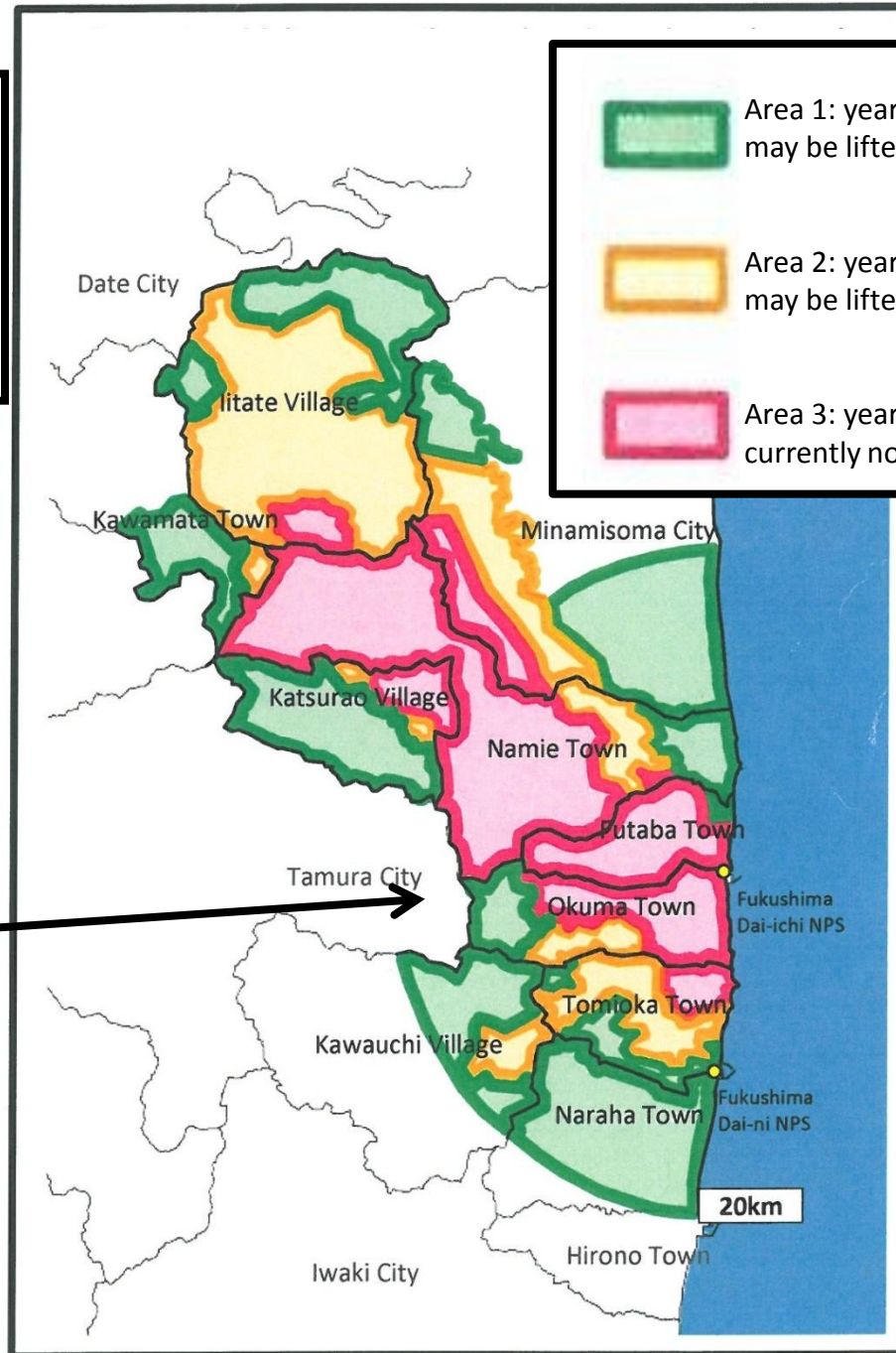
Nuclear workers – level raised to **250** mSv /
year (no lifetime limit)

General public – 1 mSv / year

General public – level raised to **20** mSv / year

**Areas to which
evacuation orders
have been issued
(1st April 2014)**

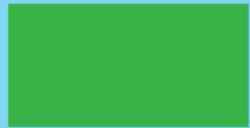
The evacuation
order for this area
was lifted on 1st
April 2014:
27 out of 353
former residents
have returned .



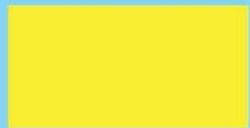
20 km

Fukushima evacuation areas applied to Wylfa nuclear power station, Anglesey

Wylfa



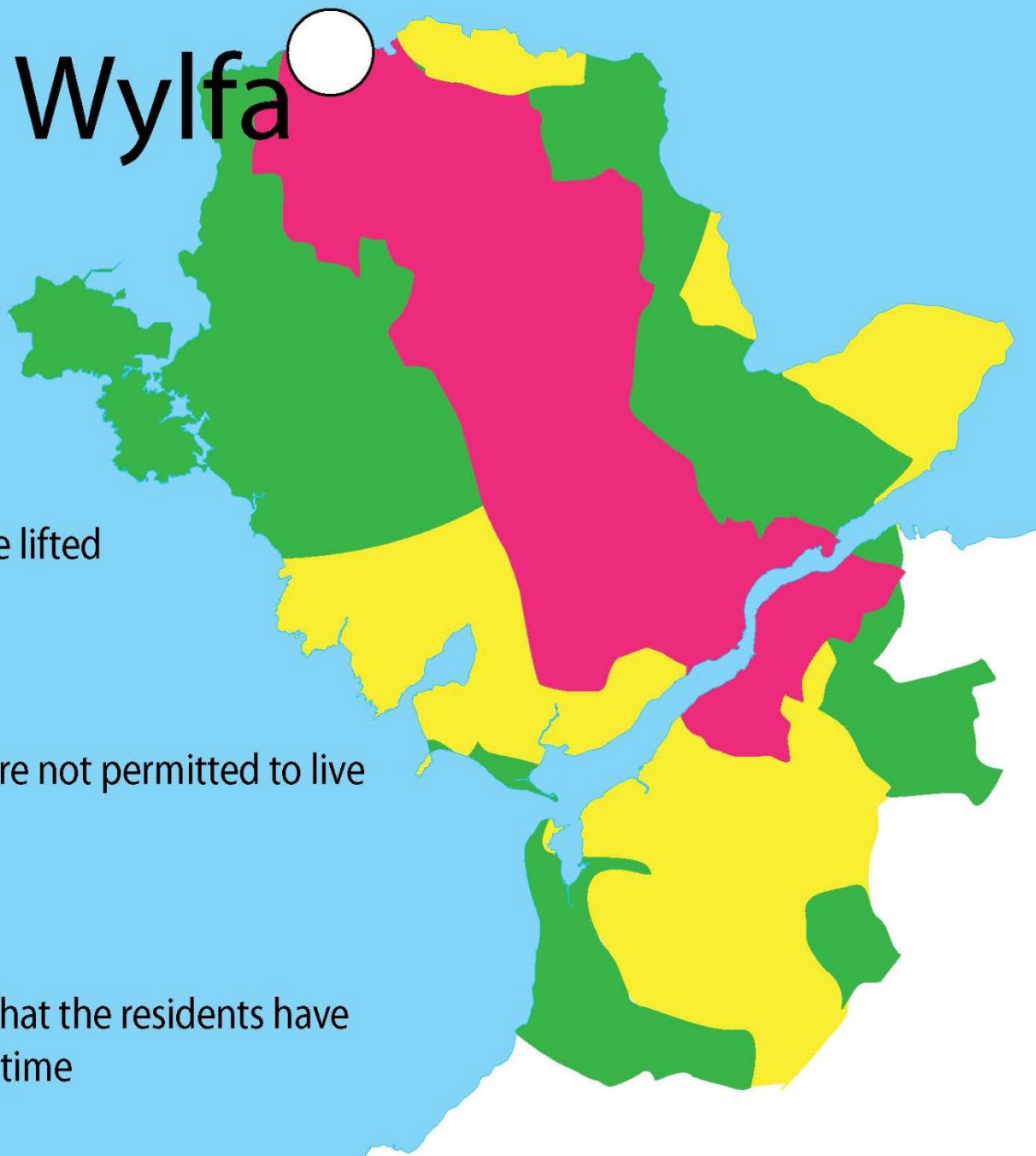
Area 1 Areas to which evacuation orders are ready to be lifted



Area 2 Areas in which residents are not permitted to live



Area 3 Areas where it expected that the residents have difficulties in returning for a long time



Fukushima Dai-ichi

Nuclear reactors 4, 5, 6 had been shut down for planned maintenance

Nuclear reactors 1, 2, 3 started an automatic shut down when the earthquake struck

14 m tsunami wave smashes through the 5.7 m sea wall; damages or destroys cooling systems and control systems, high voltage power cable, back-up generators, and radioactive water storage systems

Fukushima Dai-ichi

Explosions in nuclear reactors 1, 3 and 4,
suspected explosion in reactor 2

Loss of coolant results in exposure of spent fuel
rods to the air in nuclear reactors 1, 3, 4

Loss of coolant results in partial meltdowns in
nuclear reactors 1, 2, 3, each rated level 5
“accident with wider consequences”

Damage to reactor 4 rated level 3 “serious
incident”

Fukushima Dai-ichi

Overall disaster rated at Level 7 “major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures”

20 km evacuation zone imposed 12th March 2010 (later extended)

US recommends 80 km evacuation zone for its citizens

Fukushima Dai-ichi

Main problems

Removing the 1,500 “spent” fuel rods from the storage ponds in reactor 4 (90% completed)

Removing the 500 “spent” fuel rods from the storage ponds in reactors 1, 2, 3

Gaining information about what is happening in the primary containment vessels in reactors 1, 2, 3 (feasibility study using remote controlled robots “about to start”)

Radioactive water

Contaminated Water

On average 400 litres of radioactive water has been released into the sea every day since the accident three and a half years ago.

Contaminated Water

The tsunami seawater

The contaminated coolant water released by the tsunami damage to the coolant systems

The water that is continually needed to cool reactors 1, 2, 3, which then itself becomes contaminated

The 1,000+ tanks of 14,000,000 tons of water, some of which are leaking or corroding

400 tons of groundwater that drains through the site every day, becoming radioactive on its way through the site.

Contaminated Water

Proposed solutions

ALPS (advanced liquid processing system) treatment plant, removing 63 radioactive elements including caesium and strontium, finished March 2013, able to treat 2,000 tons of water a day – but which is only operating at 35 – 65 %, and has broken down twice

Contaminated Water

Proposed solutions

The “ice wall”, due to start operation next spring but already 4 months behind schedule: a 1,500 m long, 30 m deep, underground “wall” around the 4 reactors, kept at -30°C to prevent groundwater around the site, together with pumps so that the groundwater bye-passes the plant (currently diverting 170 tons per day).

Human and social effects

Thyroid cancer rates in children between 150 and 300 times the expected level

Too soon to see physical health effects on adults

Serious mental health problems – in Tomioka, 18 people were killed by the tsunami, but there have been over 300 “disaster related deaths” amongst former residents, due to several relocations, losing homes, jobs, family, friends and optimism

Evacuation

80,000 people were forced to evacuate their homes, another 80,000 evacuated voluntarily. Approx 25,000 of these will never be able to return to their homes.

We spoke to 6 of the 16,000 residents of Tomioka (10 km from the accident) were evacuated.

Of these, three and a half years later:

13.5% are in temporary housing,

54.5% are in locally rented housing,

32% no longer live in the Fukushima prefecture

Tomuko Endo, refugee from Tomioka

Tomuko Endo spent the first month in a school gymnasium, the second month in a concert hall, the third month in a sports centre, before being allocated a pre-fab in a 550-household temporary housing centre in Koriyama (58 km from Fukushima Dai-ichi).

Temporary housing for Tomioka refugees in Koriyama

Tomuko Endo's pre-fab. Folding dividers enable the room to be split into three smaller rooms. An alcove contains a toilet and shower. Her husband was hospitalised 3 months after being moved here.

Rumyko Kubayashi, refugee from Tomioka

Rumyko Kubayashi is a quietly spoken grandmother of nine. "Because the radiation is so high, I can't bring my grandchildren to my home and I do not want to live in a place where you can't see your grandchildren".

Tokiko Noguchi, “3A” Club

Tokiko Noguchi left Koriyama with her daughter, returning after a month to start the “3A” Club. The club

- sells radiation free vegetables, fruit and water;
- lends out radiation monitors;
- runs voluntary medical checkups and consultations;

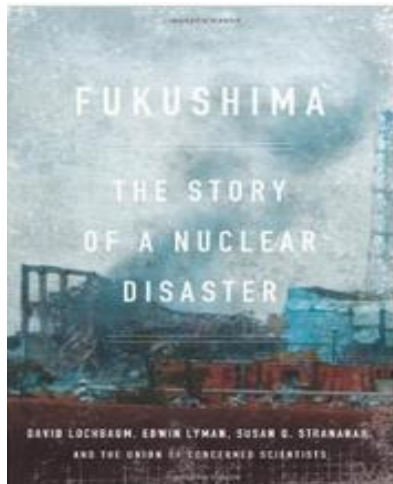
“3A” Club

- has a food testing station;
- organises children’s outdoor summer camps;
- provides information and counters discrimination against Fukushima residents.

Yokei Suzuki, “3A” Club, Koriyama

Yokei Suzuki (*right*) does voluntary work at the “3A” club, mapping radioactive hot spots using the centre’s GPS equipped radiation monitor, and helping residents with “do-it-yourself” decontamination of their homes and gardens.

Further Information

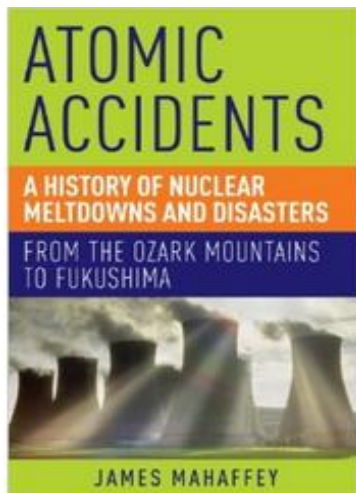


Fukushima: The Story of a Nuclear Disaster

David Lochbaum, Edwin Lyman, Susan Stranahan,
Union of Concerned Scientists

320 pages

ISBN 1620970848

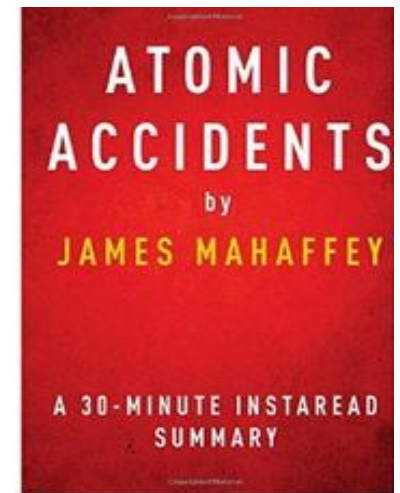


Atomic Accidents: A History of Nuclear Accidents and Disasters from the Ozark Mountains to Fukushima

James Maheffey

464 pages

ISBN 1605986801



98 pages

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