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UK Preparedness and experience for managing food safety after a nuclear accident

Se preparer a gerer les consequences d'un accident nucleaire
SFRP

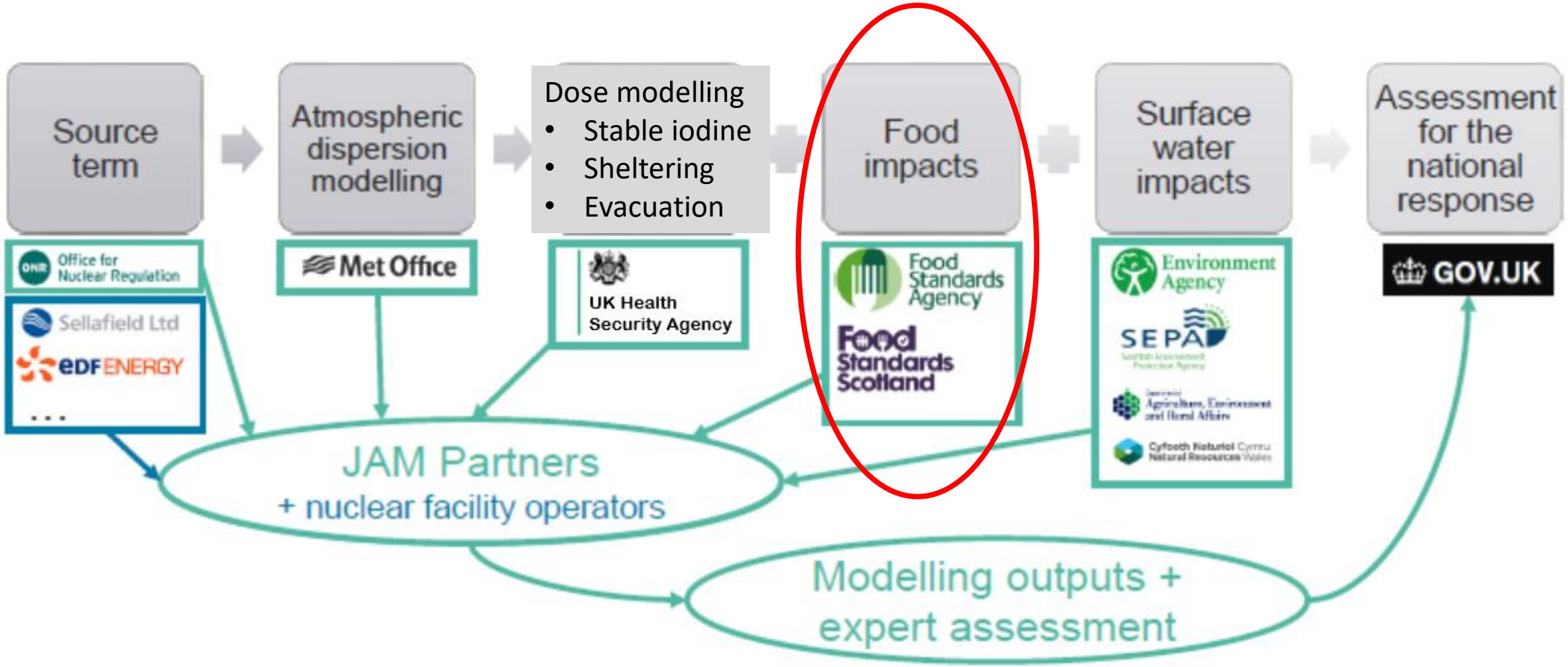
Food Standards Agency (FSA)

- The FSA has a fundamental mission of food you can trust.
- FSA works across England, Wales and Northern Ireland.
- Food Standards Scotland (FSS) have a similar role in Scotland

Following a nuclear accident

- ensure safety of food – risk assessment
- maintain trust in the food chain – food monitoring

Joint Agency Modelling



Maximum Permitted Levels in food

- **Regulation (Euratom) 2016/52** laying down maximum permitted levels of radioactive contamination of food and feed following a nuclear accident
- Retained in UK law after exit from EU
- Maximum permitted levels for four groups of radionuclides
- Sets levels for
  - general food,
  - infant food,
  - liquid food,
  - dairy produce, and
  - minor foods,





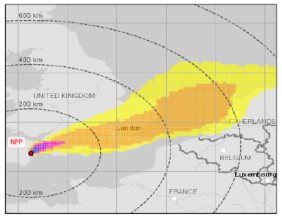
- Applies both to food produced in the EU / UK and imported

	Food (Bq/kg)			
Isotope group Sum of …	General food* 	Dairy produce 	Infant food 	Liquid food 
Strontium isotopes (Sr-90)	750	125	75	125
Iodine isotopes (I-131)	2 000	500	150	500
Alpha-emitting isotopes plutonium and transplutonium (Pu-239 and Am-241)	80	20	1	20
All other nuclides half-life >10 days (Cs-134 and Cs-137)	1 250	1 000	400	1 000

Food Standards Agency
food.gov.uk

* “minor foods” x10 of the general food limit

Food chain modelling



Dispersion Model

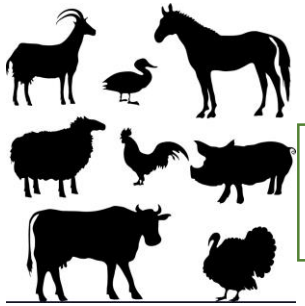
Release into atmosphere
Air concentration and deposition

Air concentration or deposition monitoring

Emergency reference tables of air concentration and deposition

Soil / Plant Model

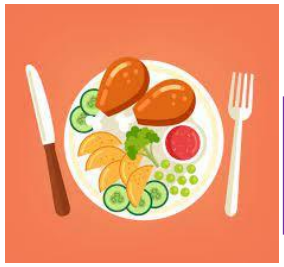
Deposition direct onto plant surface
Deposition and transport through soil
Uptake into plants via roots
Concentration of contaminant in edible fraction of plant (fruit, leaves, tubers)



Animal Model

Inhalation by animal
Consumption of feed or pasture
Concentration of contaminant in edible fraction of animal (meat, eggs, dairy)

Maximum permitted levels in food and feed
(Regulation 2016/52/Euratom)

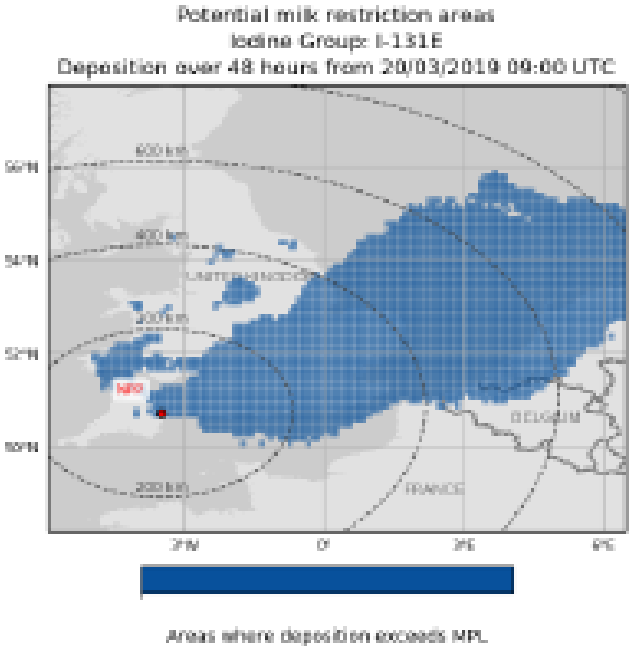


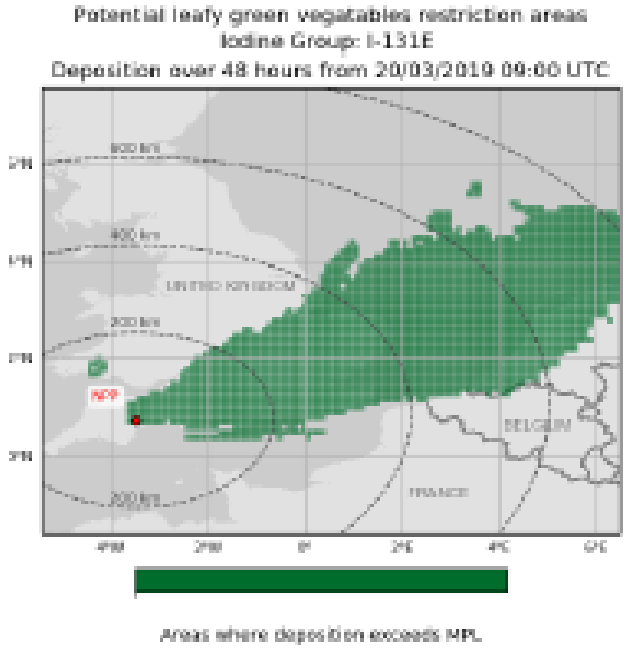
Dose Calculation

Concentration in food
Rate of consumption
Dose to the consumer

Model outputs

- Atmospheric dispersion model output ground deposition
- Apply results from derived reference tables to identify areas where food may exceed Maximum Permitted Levels for
  - each radionuclide group
  - different food groups
- Consider appropriate actions to protect public health





Protective actions for food

- Legal powers are available in the UK to put in place emergency controls
- Powers include:
  - prohibit movement and sale of affected food, animal feed and livestock
  - prohibit slaughter of animals
  - prohibit harvesting of food and feed and other agricultural activities
  - prohibit import or export of food
  - allow issuing of “consents” specifying monitoring or other conditions which must be met before food can be released onto the market

Long-term impact on food safety

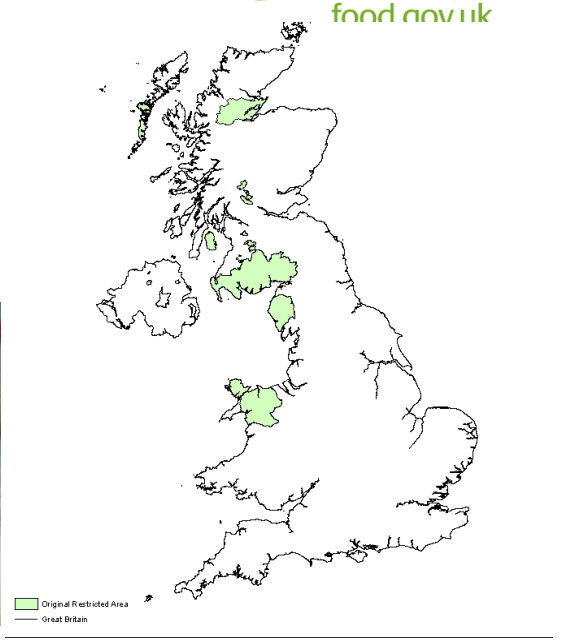
- Some radionuclides can remain for many years
  - I-131 – 8 day half-life
  - Cs-134 – 2 year / Cs-137 – 30 year half-life
  - Sr-90 – 29 year half-life
- Risk due to ingestion as contaminated food products may be continually consumed for a prolonged period
- Lower levels of ground contamination may be safe for continued habitation but not for food production
- Areas with comparatively low level of contamination where no urgent measures applied (for example sheltering) may still need food controls

Windscale 1957

British Pathé news clip: https://youtu.be/hJnPWShSmKg

Post-Chernobyl
‘Mark and Release’ Controls in UK

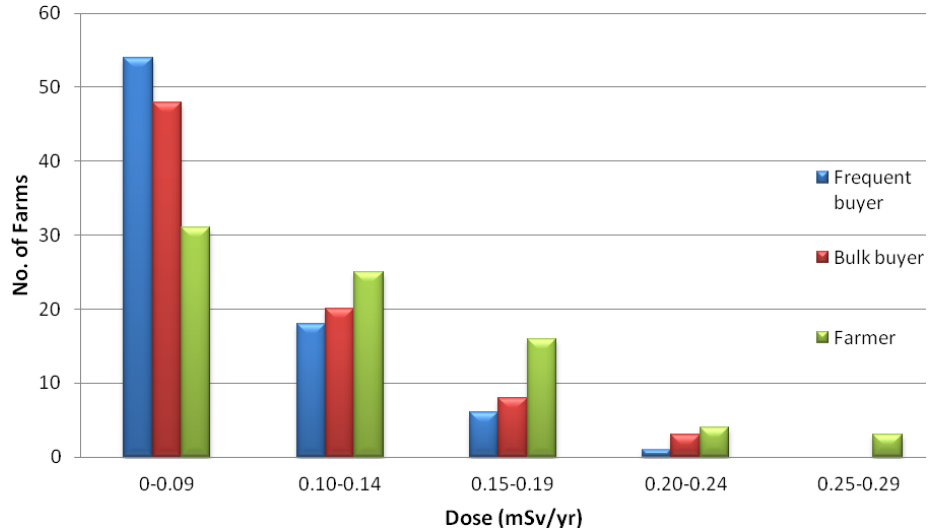
- Restrictions placed on sheep in upland areas
- Sheep live monitored before they could move out of the area
- If assessed < 1 000 Bq/kg - free to move and enter food chain
- If assessed > 1 000 Bq/kg – prohibited from slaughter for minimum three months and identified by a paint mark
- Gradual removal of controls
  - 1987 9,792 farms / 4.3 million sheep
  - 2011 N Wales 330 farms / NW England 8 farms



Removal of controls

- New survey to establish more realistic dose
  - random selection of 80 farms out of 338
  - 10% of flock (minimum 40 sheep) monitored
  - late spring / early summer and shortly after sheep moved off upland grazing (when levels of Cs-137 in sheep peak)
- Probabilistic dose model:
  - radiocaesium concentration within flock
  - consumer characteristics
    (age, consumption rates and purchasing habits)
- Define representative person
  - Adult
  - Frequent buyer (26 times per year)
  - 95th% consumption rate (20 kg/year)
  - 97.5th% of the radiocaesium distribution in their sheep meat intake

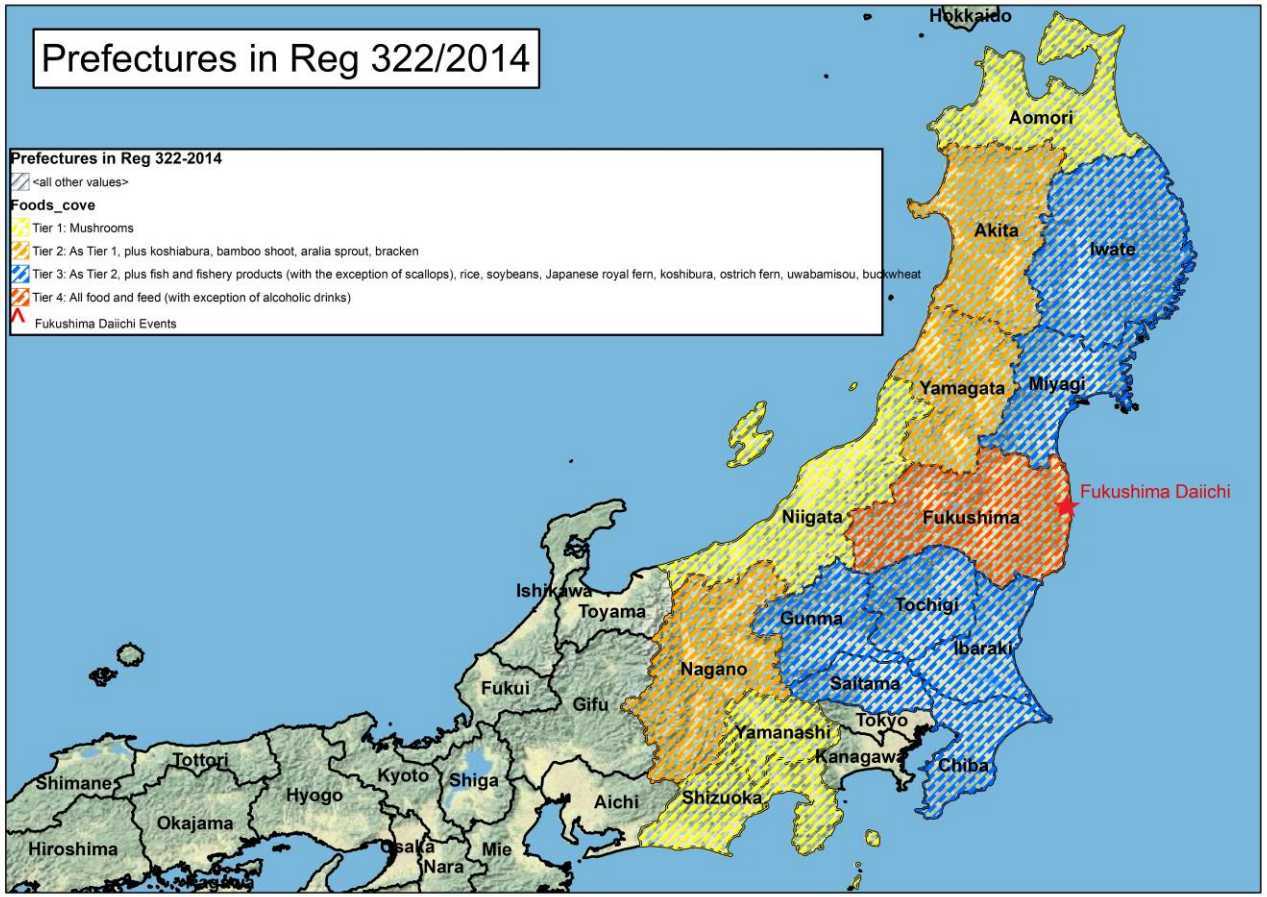
Outcome



- Majority of sheep far below 1 000 Bq/kg of radiocaesium
- Doses to the representative person
  - range <0.05 to 0.21mSv/year
  - mean <0.09 mSv/year
  - Less than 1 - 20 mSv/year range recommended by ICRP for existing exposures
  - Less than 0.26 mSv/year – “tolerated dose” of 1 000 Bq/kg policy
- Communication plan established in co-ordination with farming organisations and food industry
- All controls removed on 1 June 2012

Fukushima and imported food

- Japan applied a maximum level of 500 Bq/kg for radiocaesium
- January 2012:
  Japan lowered to 100 Bq/kg to improve consumer confidence
- Import controls on food were implemented by the EU – matched the maximum level used in Japan for consistency



Fukushima and imported food

- Regularly reviewed and controls removed where no ins of food found over 100 Bq/kg
- In 2021, controls remain on:
  - some species of fish
  - wild mushrooms
  - foraged vegetables
- Following the UK's exit from the EU, FSA carried out a risk assessment
- Outcome: removing enhanced controls
  - ➡ negligible increase in dose
  - ➡ negligible increased risk to UK consumers
- Remaining controls to be removed in the UK (excluding Northern Ireland) by the end of June 2022.

UK Recovery Handbook

Prevent / minimise contamination pre-deposition

- Protect crops from contamination (greenhouses)
- Short term sheltering of animals

Protective actions to prevent consumption of contam food

- Restrict harvest, collection, movement and sale of food

Land management / remediation

- Change land use
- Land improvement
- Remove or plough in top-soil

UK Recovery Handbook

Minimise creation of waste (post-contamination)

- Check and release monitoring
- Natural attenuation
- Animal feed regimes:
  clean feed, selective grazing or feed additives

Reduce volume of waste

- Processing and storage of milk products for disposal

Waste disposal

- Incineration
- Landfill
- Land spreading of milk and/or slurry

https://www.gov.uk/government/publications/uk-recovery-handbooks-for-radiation-incidents-2015

Summary

- Food safety significant for medium to long term response
- Maintaining consumer confidence is important
- Work closely with other emergency responders for co-ordinated advice
- Maximum permitted levels set in legislation for quick response following an accident
- Experience gained from several incidents:
  - Windscale
  - Chernobyl
  - Fukushima
- Variety of recovery options available for different situations
- Plan for removal of controls when no longer needed

Merci

Questions?

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