Nuclear Plant Emergency Response

Food and Water Safety

Module 6

Objectives

- Describe the cause of contamination of food and water with radioactive materials.
- Explain the public health meaning of radioactivity levels measured in food and water.

In the United States

EPA boosts radiation monitoring after low levels found in milk

By the CNN Wire Staff
March 31, 2011 6:51 p.m. EDT

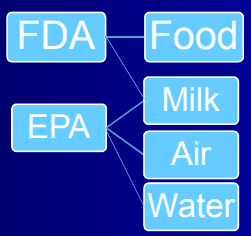
CNN Health

Results from screening samples of milk taken in the past week in Spokane, Washington, and in San Luis Obispo County, California, detected radioactive iodine, or iodine-131, at a level 5,000 times lower than the limit set by the U.S. Food and Drug Administration, officials said.

Life Cycle

- I-131 gets into the grass, then into the cow, then into milk.
- Cs-137 will get into the cow's meat primarily.

Responsible Federal Agencies



Goal

- Avert the risk to the public by limiting the exposure to radiation through ingesting or drinking food or water contaminated with radioactive materials.

Steps

- Setting limits on amount of radionuclides allowed in food including milk.
- Setting limits on allowable radiation exposure from drinking water.
- Taking protective action measures to limit the amount of contamination with radionuclides.

Food Safety Limit: Derived Intervention Levels (DIL)

- Refer to concentrations of radioactive material in food items (meat, fruits, and vegetables)
- Levels expressed in radioactivity per unit mass (Bq per kg of food)
- Use the DILS as a guide to implement protective measures

FOOD SAFETY

- How do we determine DILs?
- How do we implement protective measures?

Food Safety Limit: DIL

- Concentrations of radioactive material in food items
- Based on a Protective Action Guide of 5 mSv or a dose to any one organ of 50 mSv (whichever is more limiting.)
- This dose establishes an upper limit to the risk of cancer from the radiation exposure

Lifetime Cancer Mortality Risk

- In the US general population without exposure to radiation from an accident: risk of cancer mortality: **1 in 5**
- In a population of 10,000 individuals, we will see 2000 deaths from cancer over a lifetime.

Radiation Related Cancer Risk

- 5 mSv exposure increases the risk of cancer mortality by about **2 in 10,000**
- In a population of 10,000 individuals: 2 deaths from cancer over a lifetime with 5 mSv radiation exposure.
- This will increase the number of deaths from 2000 to 2002.

Limitations of this Estimate

- The estimate is based upon extrapolation from higher doses
- Data not available for exposure to **low** dose radiation.

Assumptions for Derived Intervention Levels (DILs)

- Very conservative
- Different radionuclides may have different DILs
- IF people consume food containing the radionuclide for a specific period of time at the DIL, then their dose is limited to the protective action guide of **5 mSv**.

Food

- 30% of the food ingested is contaminated.
- Consumption for I-131 occurs over 60 days and over 1 year for Cs-137 and Cs-134.

Milk Assumptions

- 100% of the consumed diet is contaminated with radioactive material like I-131 for infants.
- Consumption needs to be for 60 days for I-131.

Water

- Set maximum contaminant level.
- Limit the amount of radiation exposure to avoid reaching the protective action guide (5 mSv) by drinking 2 liters per day of the contaminated water for an entire year.

Water Safety-Communicating to the Public

Japanese official drinking water from Fukushima

Protective Actions

- Limit or avoid the amount of contamination that can become incorporated in human food and animal feeds.
- Limit and avoid consumption of human food and animal feeds ***suspected*** of being contaminated until the concentration of contamination has been determined.

Examples

- Remove food from commerce
- Remove contaminant from surface of food (can or vegetables)
- Shelter cows and change their feeds
- Sometimes, there are volunteer efforts. For example…

FDA Monitoring Systems

- Test samples
- After the Dai-ichi incident, increased focus on Japan exports which accounted for 4% of US food imports.

There is help available!

State Radiation Control Programs

- Every state has one.
  http://www.crcpd.org/Map/map.html
- Coordination with this office is vital in both planning for and responding to a nuclear or radiological incident.

EPA Response Assets

- Radiological Emergency Response Team
  - Rad monitoring expertise, sample prep vehicles, and mobile laboratories
- Environmental Radiation Ambient Monitoring System: RadNet

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EPA Monitoring Systems- RADNET

- Water:
  - Precipitation
  - Drinking water
- Milk
- Air

Nuclear Plant Emergency Response

The Advisory Team for Environment, Food, and Health

Provide s coordinated advice and recommendations to the State, federal agencies on environmental, food, and health matters.

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Advisory Team in Action Empire '09; June 2009

Summary Points

- Food, milk, and water can become contaminated with radionuclides after a NPP accident.
- FDA and EPA use Protective Action Guides to assure the safety of the public.
- FDA and EPA monitor the amount of radioactivity in food and water and implement protective actions as necessary.

Questions?