Radionuclides in Food – Where Metrology Matters

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Radiological Laboratory

specialized – relatively small with strong academic influence

federal framework – DOD, DOE, NRC, EPA (MARSSIM, MARLAP)

trusting analysis results – what is role of metrology?
(for radionuclides in food)
early 1950's cold war
nuclear weapon testing
( international concern )

- Soviet shoot down U.S. U2 (moratorium ends)
- 200 nuclear tests 1961 - 1962
- Test Ban Treaty
- Nuclear power plants 1st in 1957, ~100 by mid-1980's

FDA radionuclide in food program
Risk Analysis

- Monitor, evaluate, decide, act
- Collect & study data & information
- Share info, address concerns of “stakeholders”

Risk Management
Risk Communication
Risk Assessment
**acute**
(e.g., salmonella poisoning)
- a specific "event"
- symptoms (come fast)
- must act quickly

**chronic**
(e.g., atherosclerosis)
- years of exposure
- may get disease (some day)
- have time to think/decide

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**unsafe**

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**safe**

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**distinct boundary**

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**flexible guideline**

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**not detected**

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**unsafe**

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**unacceptable**

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**radionuclides in food**
"Flexible Guideline"

\[ DIL = \frac{PAG}{f \cdot Intake \cdot DC} \]

where

- **DIL** = derived intervention level (Bq/kg)
- **PAG** = protective action guide (mSv)
- \( f \) = fraction of intake assumed to be contaminated (unitless)
- **DC** = Dose Coefficient (mSv/Bq)
How much food would I have to eat this year to reach the PAG?

<table>
<thead>
<tr>
<th>cesium-137 level (Bq/kg)</th>
<th>intake (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000</td>
<td>380</td>
</tr>
<tr>
<td>500</td>
<td>770</td>
</tr>
<tr>
<td>250</td>
<td>1,500</td>
</tr>
<tr>
<td>100</td>
<td>3,800</td>
</tr>
<tr>
<td>25</td>
<td>15,000</td>
</tr>
<tr>
<td>10</td>
<td>38,000</td>
</tr>
</tbody>
</table>

radioactivity level (Bq/kg) vs. Intake (kg)