

Everything You Wanted  
To Know About  
Radiation  
But You Just Never Knew  
Who To Ask

By

Robert L. Skinner



**FEEL**



**SEE**



**HEAR**



**TASTE**



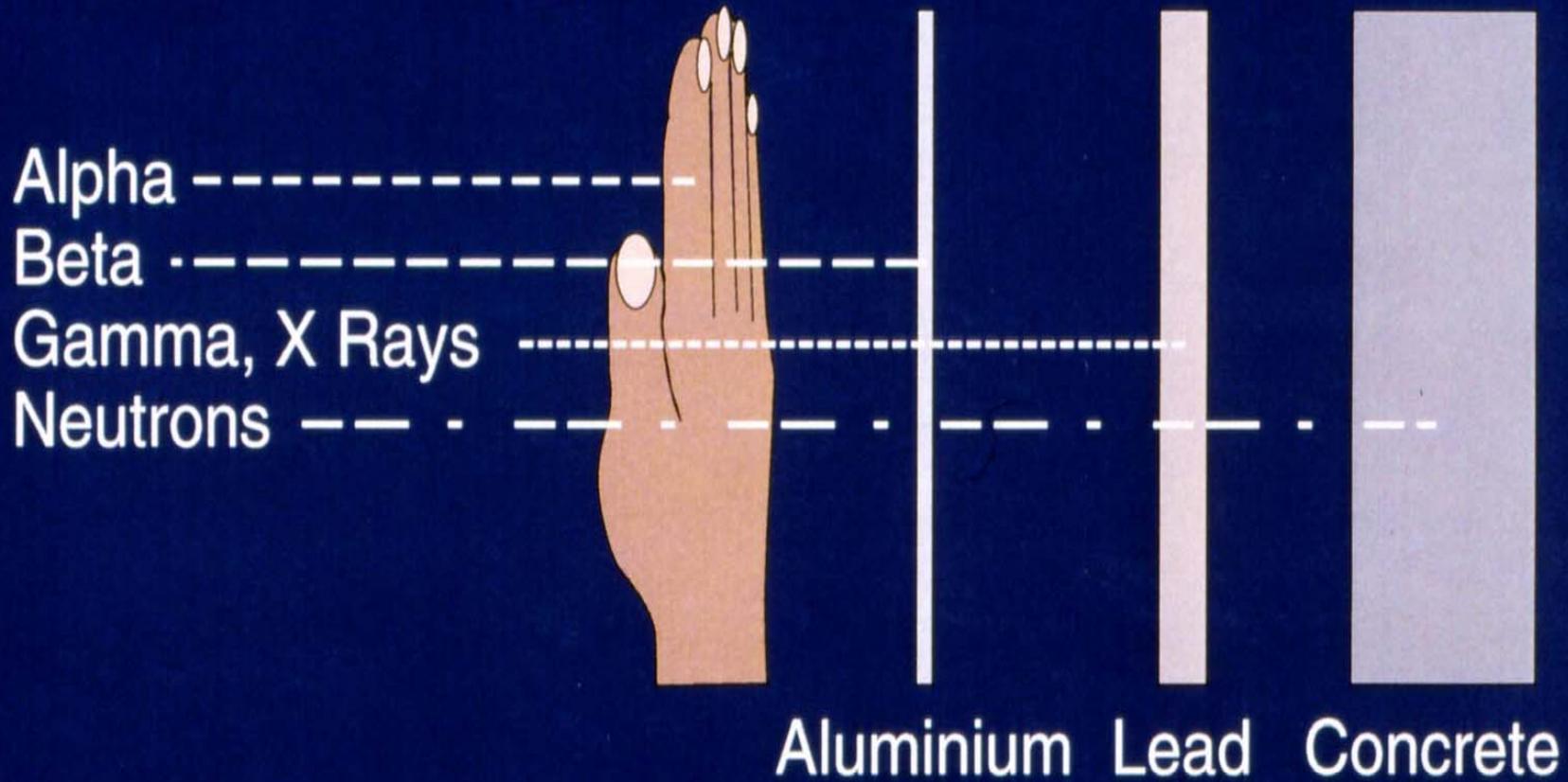
**SMELL**

# RADIOACTIVITY

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The process by which unstable atoms "try" to become stable, and as a result, emit radiation.

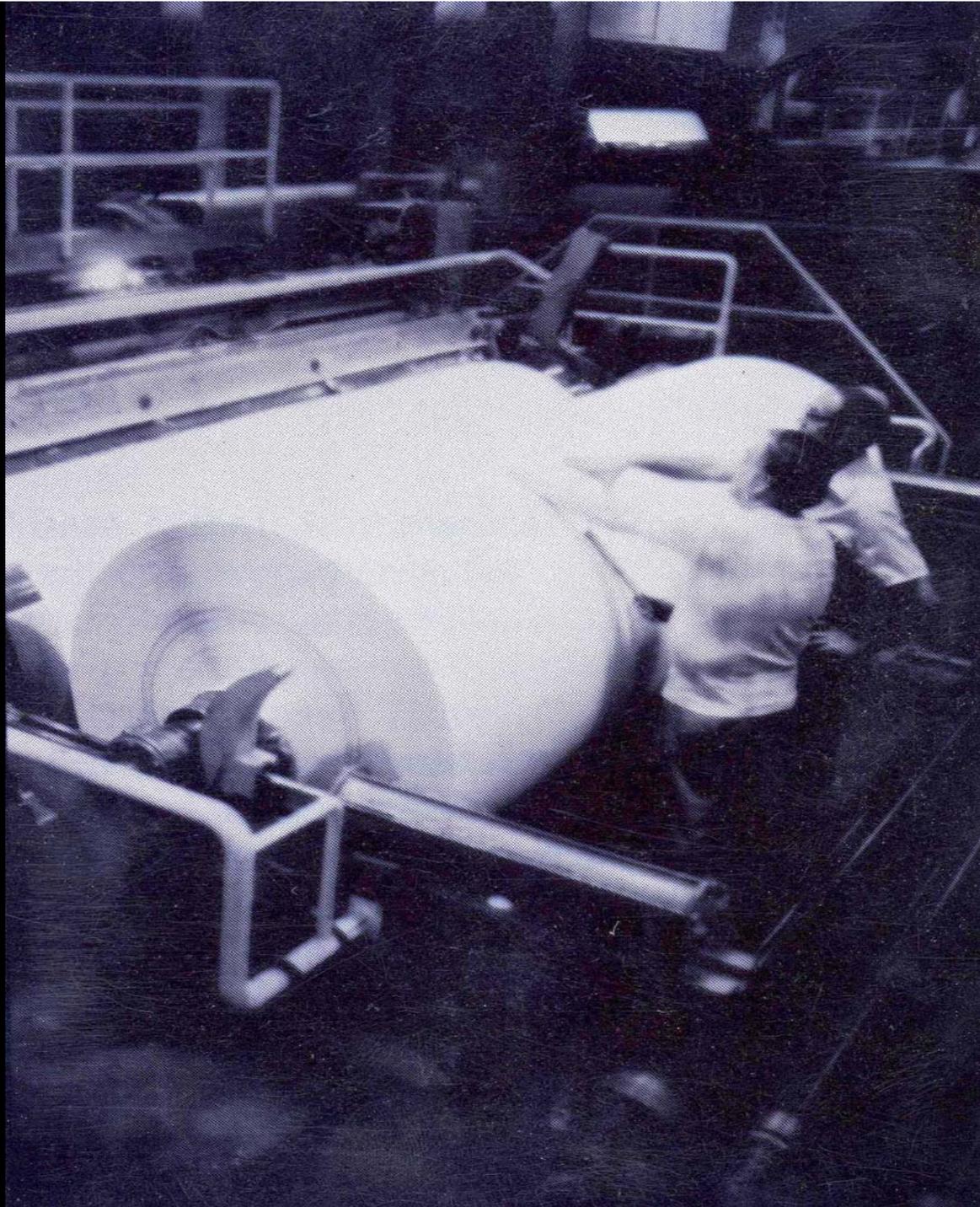
# Types of Radiation





# Every Day Uses of Radioactive Materials and Radiation









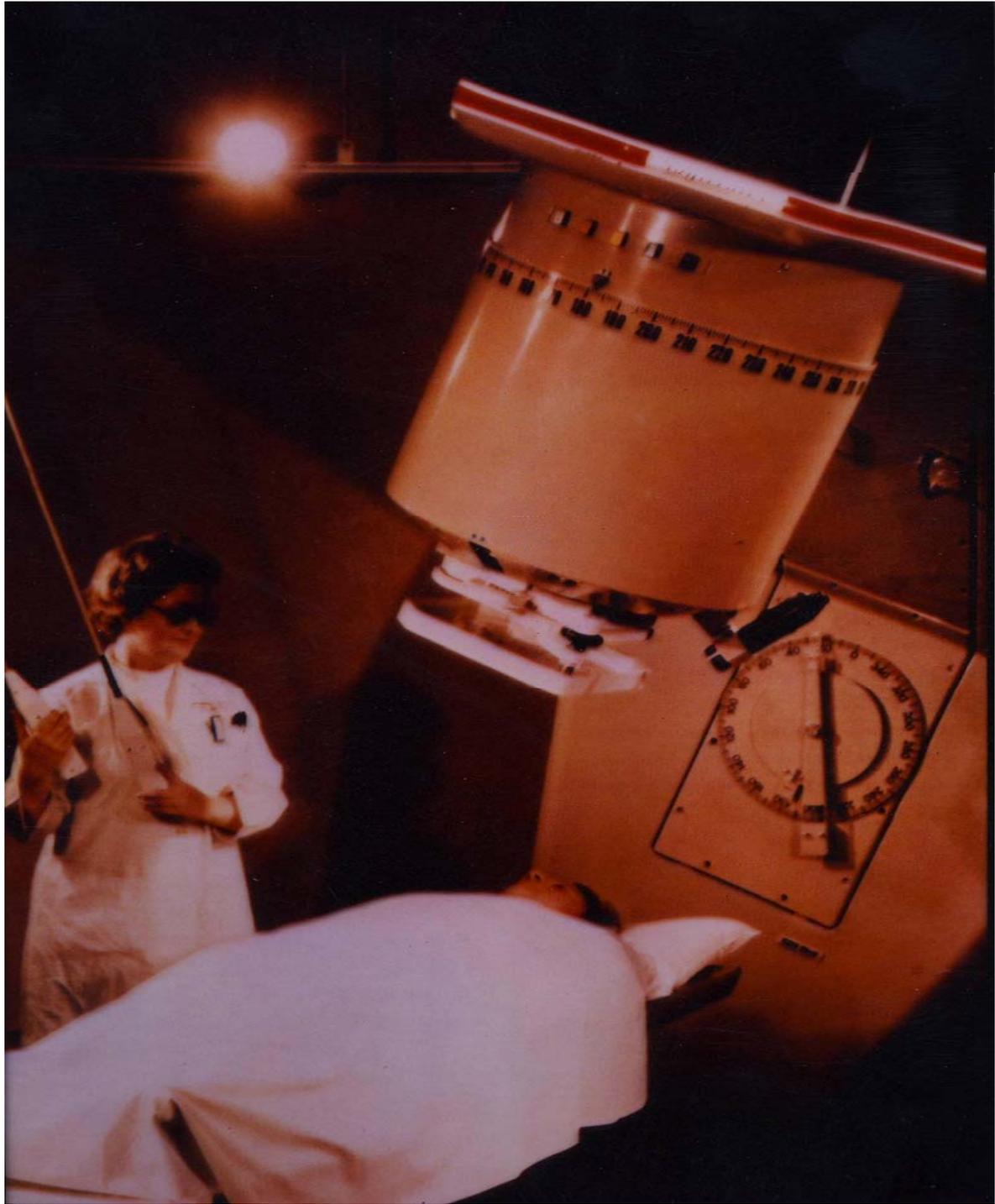


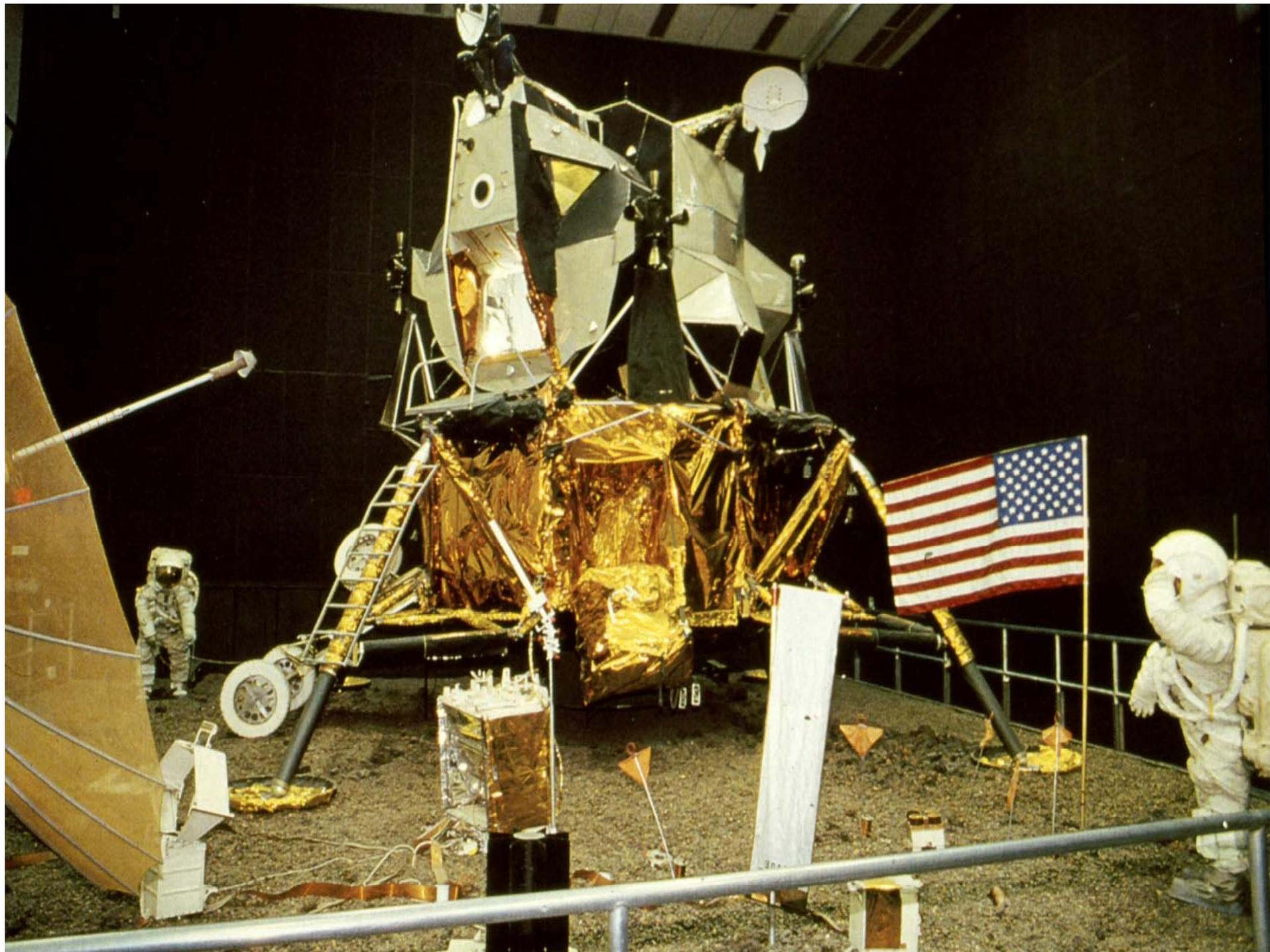
# Medical Uses

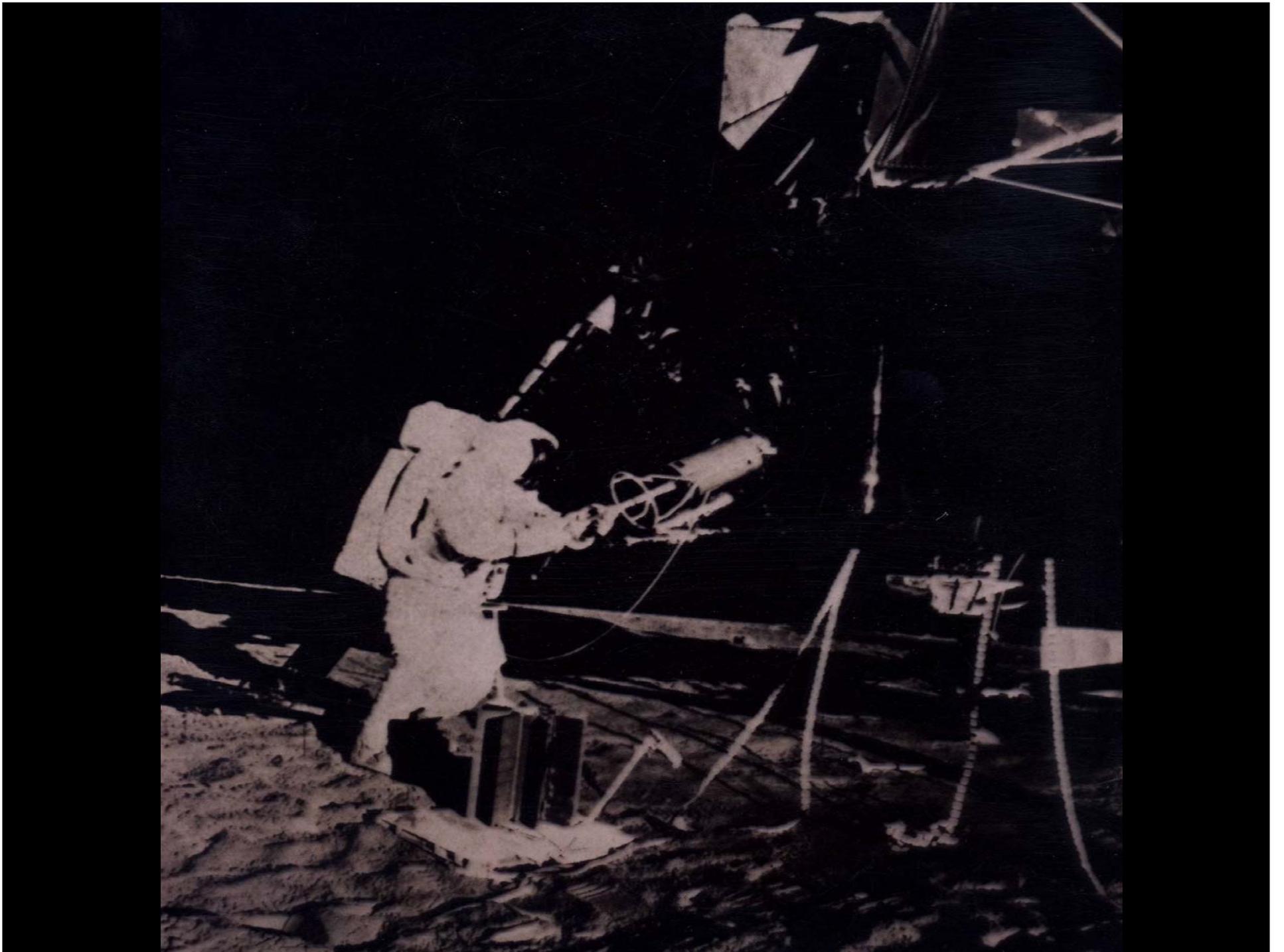
- Picture things
- Measure things
- Destroy things
- Power things



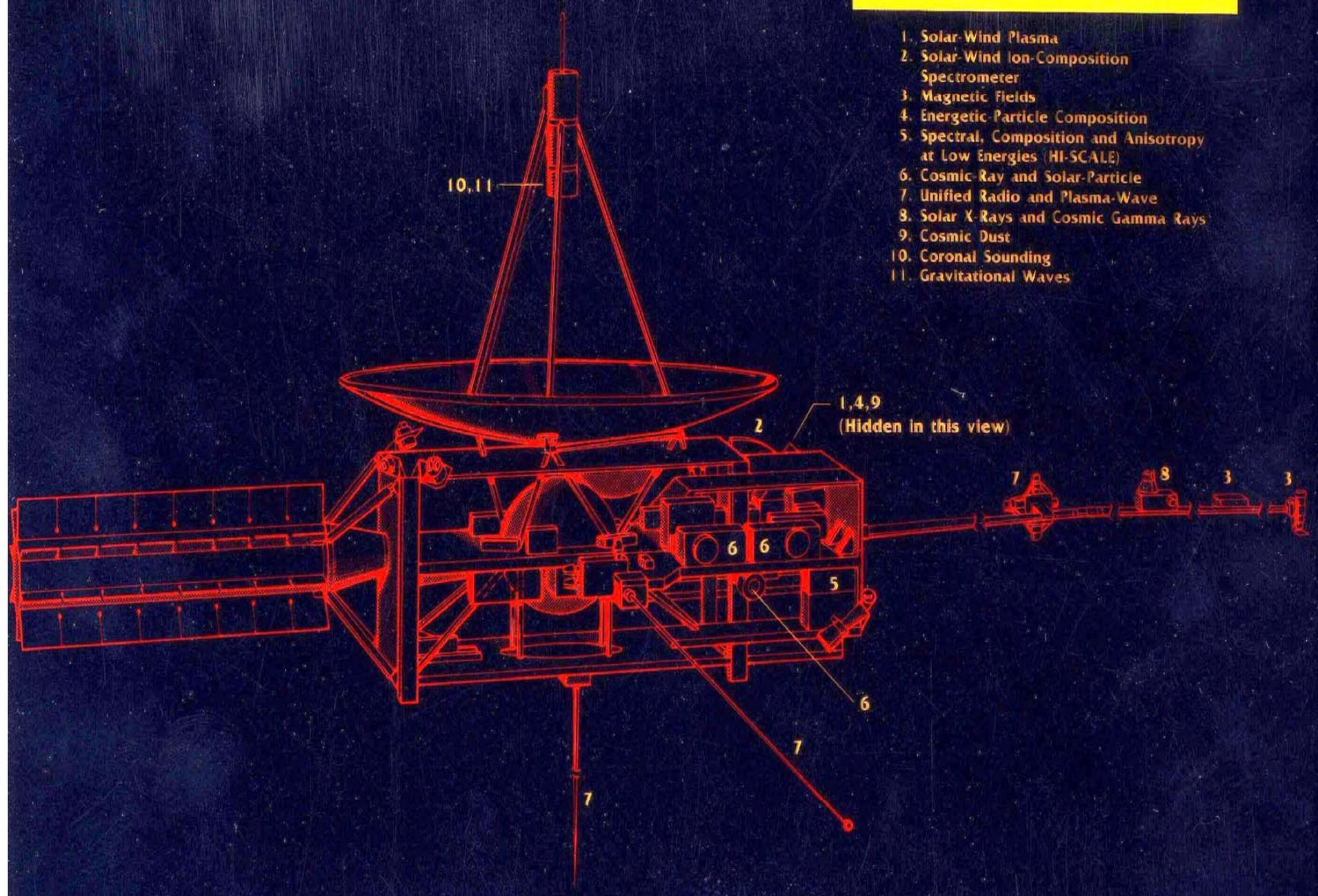








1. Solar-Wind Plasma
2. Solar-Wind Ion-Composition Spectrometer
3. Magnetic Fields
4. Energetic-Particle Composition
5. Spectral, Composition and Anisotropy at Low Energies (HI-SCALE)
6. Cosmic-Ray and Solar-Particle
7. Unified Radio and Plasma-Wave
8. Solar X-Rays and Cosmic Gamma Rays
9. Cosmic Dust
10. Coronal Sounding
11. Gravitational Waves



1,4,9  
(Hidden in this view)

10,11

2

7

8

3

3

6

6

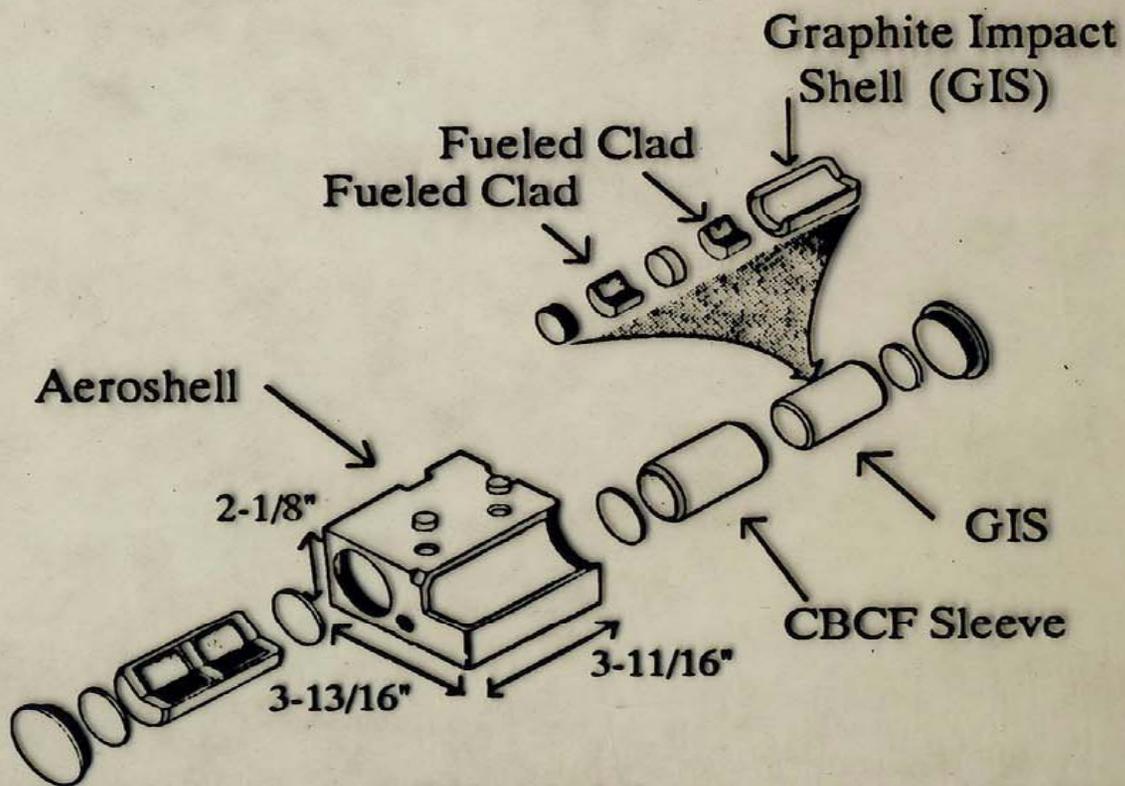
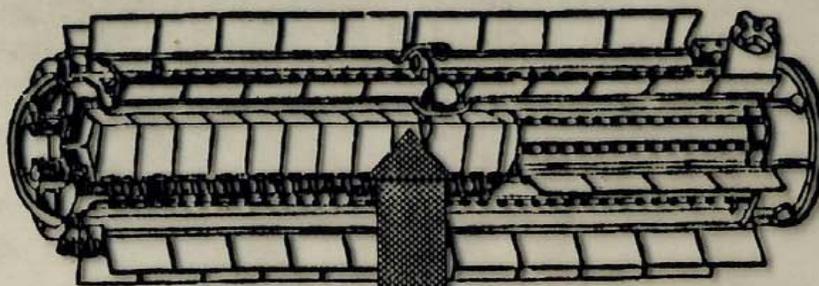
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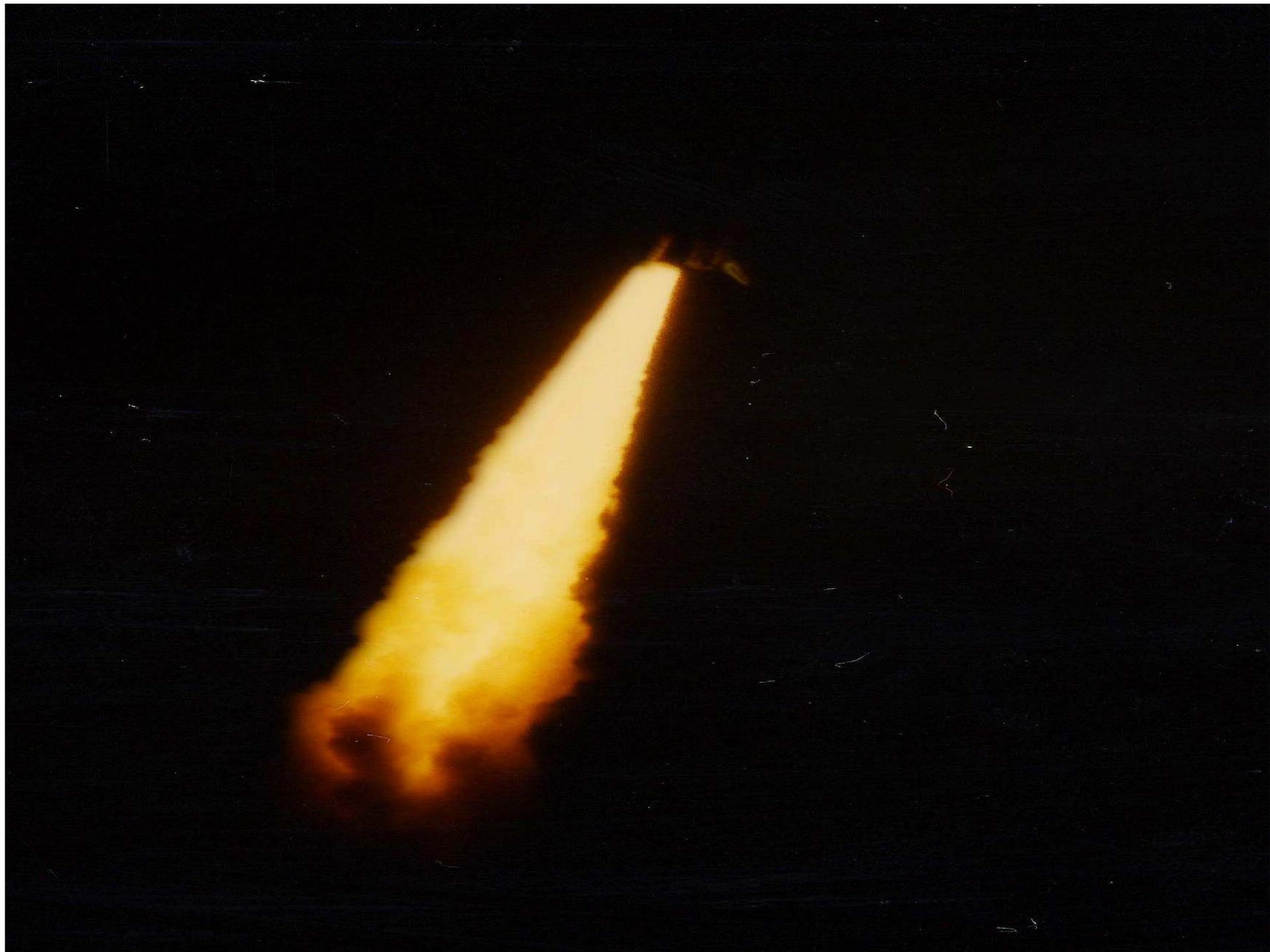
7

7

*Ulysses RTG*



*GPHS Module*







# Irradiation of Food





PAPINO<sup>®</sup>

COUNT  
GRADE  
GRADE ID  
CODE  
PAPINO<sup>®</sup> BRAND

PAPAW'S



COUNT  
GRADE  
GRADE ID  
CODE  
PAPINO<sup>®</sup> BRAND

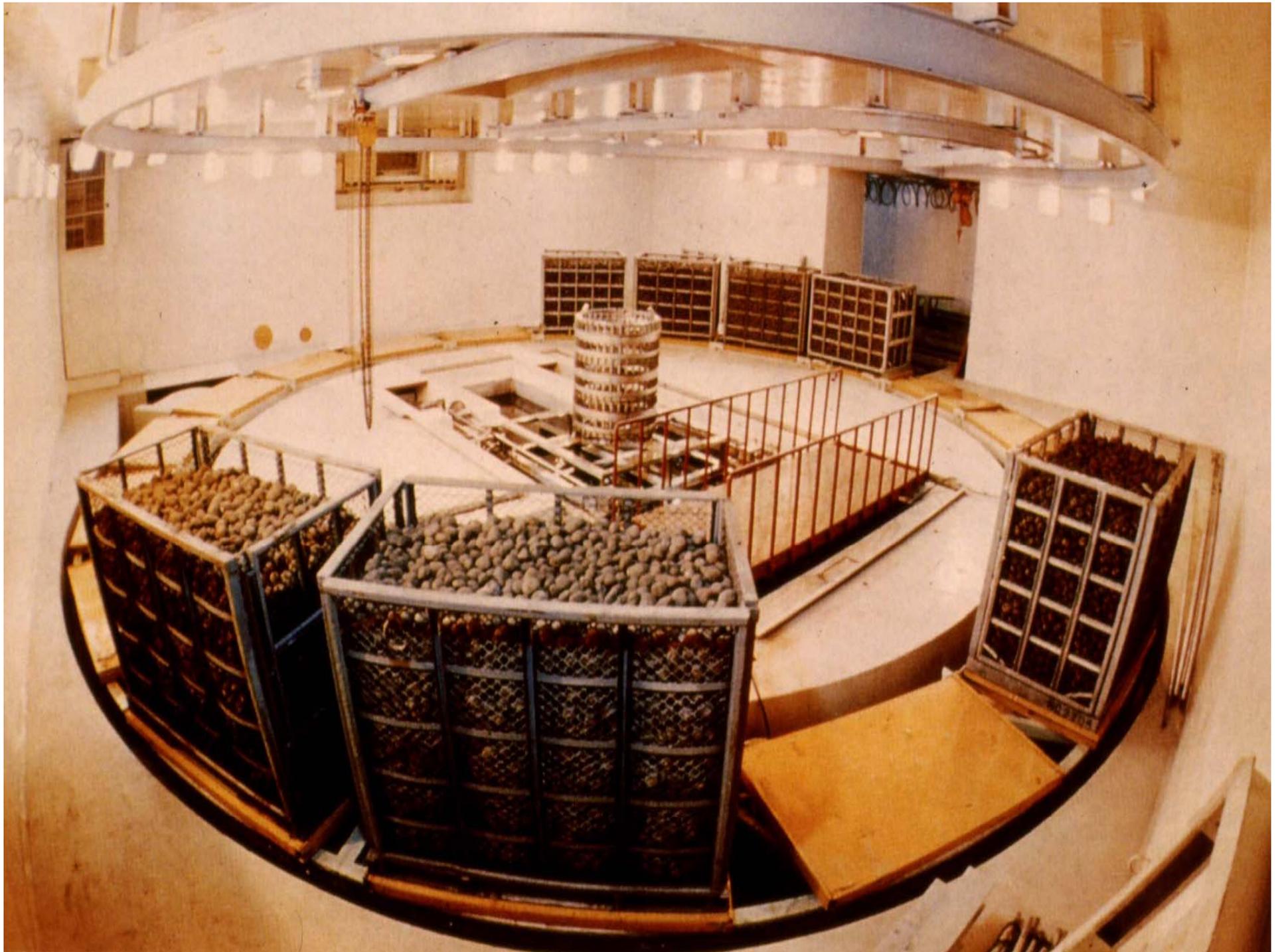
PAPAW'S

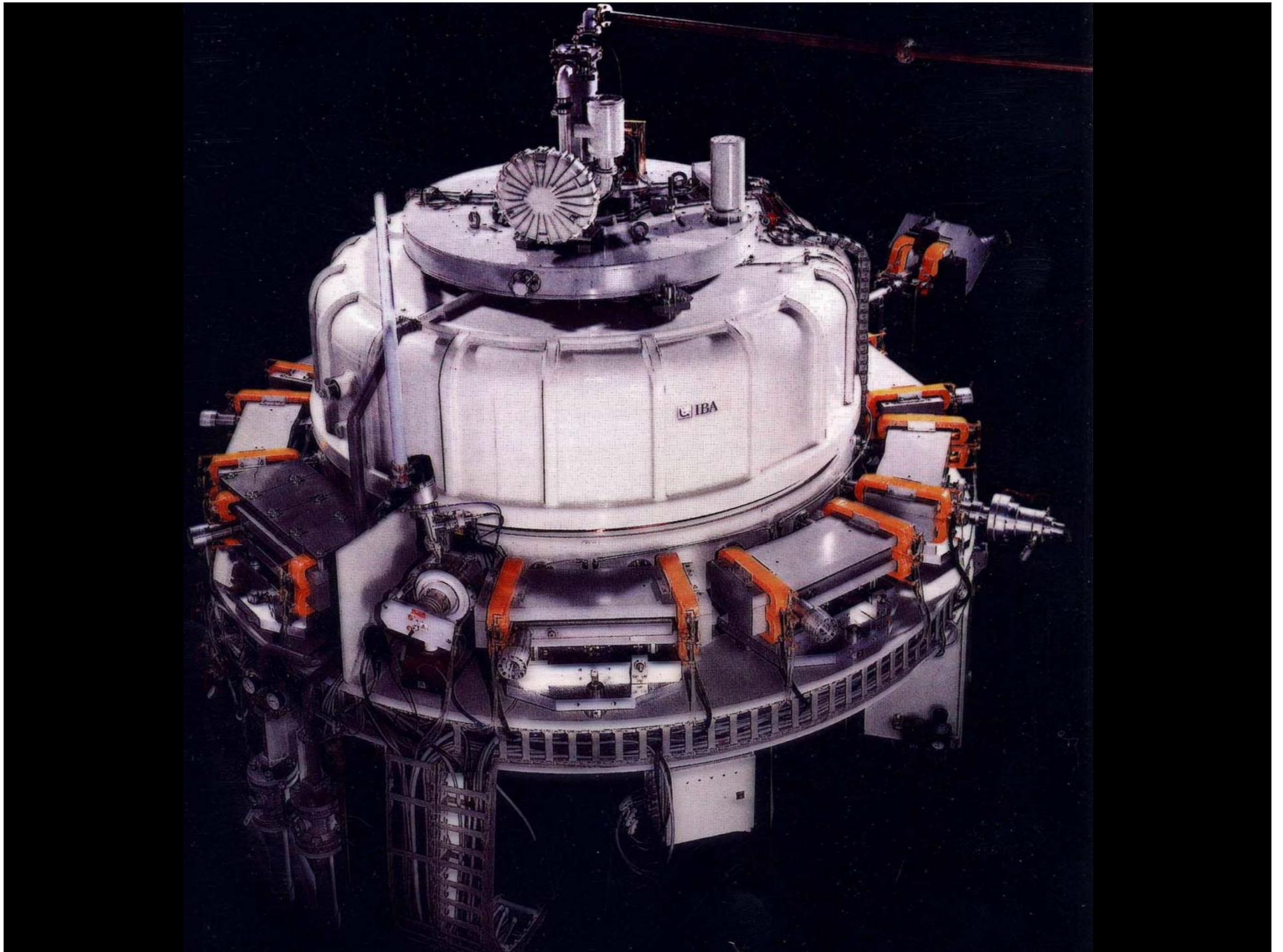
UNTREATED

RADURA<sup>®</sup>











## FOOD ITEMS CURRENTLY IRRADIATED



Citrus

Tomatoes

Potatoes

Onions

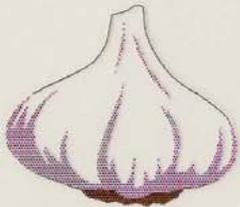
Garlic

Strawberries

Papayas

Mushrooms

Avocados



Spices

Tea

Beans

Flour

Chicken

Frog Legs

Pork

Shrimp

Fish

Frozen Juices

Grain

Cherries

Grapes

Dates

Apricots

Pears

Asparagus

Bread

Dried Fruits

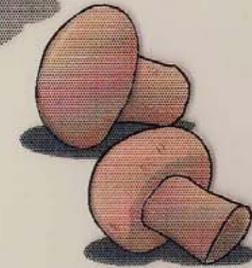
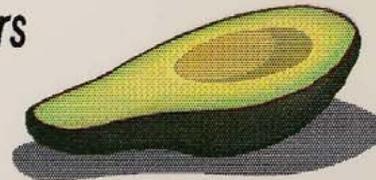
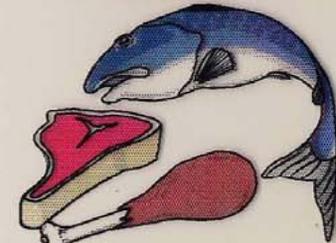
Yeast

Rice



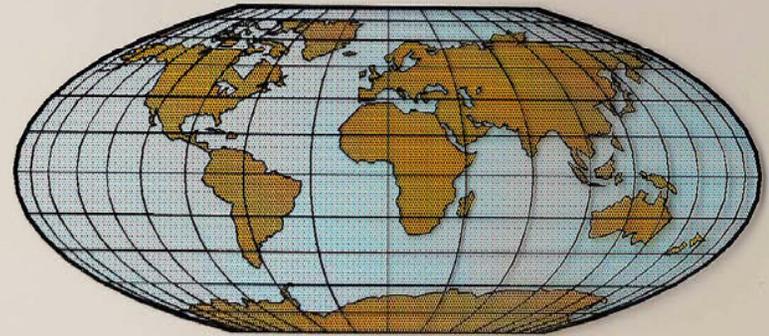
And Others

Special Hospital Meals



## COUNTRIES UTILIZING FOOD IRRADIATION

<i>Argentina</i>	<i>Germany</i>	<i>Philippines</i>
<i>Bangladesh</i>	<i>Hungary</i>	<i>Poland</i>
<i>Belgium</i>	<i>India</i>	<i>South Africa</i>
<i>Brazil</i>	<i>Indonesia</i>	<i>Spain</i>
<i>Bulgaria</i>	<i>Israel</i>	<i>Syria</i>
<i>Canada</i>	<i>Italy</i>	<i>Thailand</i>
<i>Chile</i>	<i>Japan</i>	<i>Russia</i>
<i>China</i>	<i>Korea</i>	<i>United Kingdom</i>
<i>Cuba</i>	<i>Mexico</i>	<i>USA</i>
<i>Czechoslovakia</i>	<i>Netherlands</i>	<i>Uruguay</i>
<i>Denmark</i>	<i>New Zealand</i>	<i>Yugoslavia</i>
<i>Finland</i>	<i>Norway</i>	<i>Vietnam</i>
<i>France</i>	<i>Pakistan</i>	





**ENDORSES FOOD IRRADIATION**



*American Medical Association*  
*American Veterinary Medical Association*  
*American Meat Institute*  
*Food Technology Institute*  
*Institute of Food Technologists*  
*Kiplinger Agricultural Letter*  
*Mayo Clinic*  
*Prevention Magazine*  
*U. S. Department of Agriculture*  
*U. S. Food and Drug Administration*  
*U. S. Public Health Service*  
*World Health Organization*





# DANGER



NEW JERSEY IS THE MOST POLLUTED... THE MOST CONTAMINATED... THE MOST POPULATED STATE. MUST WE NOW EAT HAZARDOUS FOOD ALSO?

# WE'RE MAD

## WE'RE NOT GOING TO

AND

## IT ANYMORE

URGENT  
THE DANGER

### EMERGENCY MEETING

## YOU MAY BE FORCED TO EAT IRRADIATED FOODS

A NEW POTENTIALLY HAZARDOUS FOOD TREATMENT IS UPON US. WE MAY NOT EVEN KNOW WHETHER OR NOT OUR FOOD HAS BEEN EXPOSED TO COBALT-CESIUM RADIOACTIVITY AS A SPOilage TREATMENT BEFORE IT IS SOLD TO US IN OUR FOOD STORES.

- FACT I THIS "TREATMENT" DAMAGES THE FOOD WHILE RETARDING SPOilage AND INCREASING SHELF-LIFE. IT DAMAGES THE NUTRIENT QUALITY, THE VITAMINS, MINERALS, AND ENZYMES. IT MAY CHANGE THE CHEMICAL ADDITIVES ALREADY IN AND ON THE FOOD.
- FACT II IT DAMAGES THE PEOPLE WHO EAT IT. RADIATION TREATMENT TO FOOD MAY CAUSE CHROMOSOMAL DAMAGE AND BIRTH DEFECTS. RADIATION CAUSES NEW, DANGEROUS CHEMICAL PRODUCTS IN THE FOOD THAT CAN LEAD TO CANCER.
- FACT III IT DAMAGES THE ENVIRONMENT. RADIOACTIVE MATERIAL THAT IS USED TO TREAT FOOD WILL BE TRANSPORTED TO YOUR NEIGHBORHOOD WHERE ADDITIONAL FACTORIES WILL BE SET UP. THE POTENTIAL FOR TRANSPORTATION ACCIDENTS WILL INCREASE. THERE HAVE BEEN ACCIDENTS IN AND AROUND FOOD IRRADIATION PLANTS ALREADY.

**But wait . . . WE ARE LUCKY TO HAVE A BILL BEFORE CONGRESS!**  
(CONGRESSMAN BOSCO INTRODUCED BILL H.R. 4762)  
WE NEED OUR PEOPLE TO GET THEIR U.S. REPRESENTATIVES TO SUPPORT THIS BILL . . . BECAUSE THINGS MAY BE TIPPING OUR WAY AT LAST!

THIS BILL IS A BLESSING. THAT IT HAS ALREADY BEEN INTRODUCED IN THE U.S. HOUSE OF REPRESENTATIVES WAS A LUCKY BREAK FOR ALL OF US. THIS BILL WILL INSIST ON PROPER SCIENTIFIC RESEARCH BEFORE WE ARE FORCED TO EAT CESIUM-COBALT IRRADIATED FOODS. IT WILL ALSO PREVENT ANY IRRADIATED FOOD FROM BEING SOLD TO US UNMARKED IN OUR SUPERMARKETS AND FOOD STORES.

\* IN ORDER TO GET OUR BILL PASSED

READ THE LETTER TO THE CONGRESSMAN ON YOUR MIND WHETHER OR NOT YOU AGREE WITH IT. DO AGREE WITH ITS INTENT (AND WE HOPE YOU DO) FOLLOW THE DIRECTIONS ON THE INSTRUCTION GET THE BILL INTO LAW.

BUT IT CAN HAVE THE SAME COVERAGE AND ALL LINKS IN A NATIONWIDE ENVIRONMENTAL ACT IN UNISON - WE CAN EFFECT CHANGE. HOW HOW THEY KNOW WHAT THEY'RE ORGANIZING.

NOT A CHAIN LETTER.

The Department of Energy has a solution to the problem of radioactive waste.

You're going to eat it.



OH SURE, BEAUTIFUL, WHAT AN IDEA

Take the waste products of nuclear power plants... add a little pinch of radioactive cesium... a tablespoon of radioactive cobalt... mix a little... stir a little... bake in a medium-high nuclear oven and voilà! A food "treatment" process. (That's what our food needs... another "process".) Now, fold ingredients into truck and don't leak. Then into our friendly irradiation plant. It serves the food and the environment. It saves the food.

well, OK, it can't be... "Oh, we



**TREATED BY**



**IRRADIATION**

# Salmonella Bacteria

- Found in 30-40% of all poultry sold in U.S.
- Poisons 2,000,000 people yearly
- Kills 2,000 people yearly

Source: National Center for Disease Control

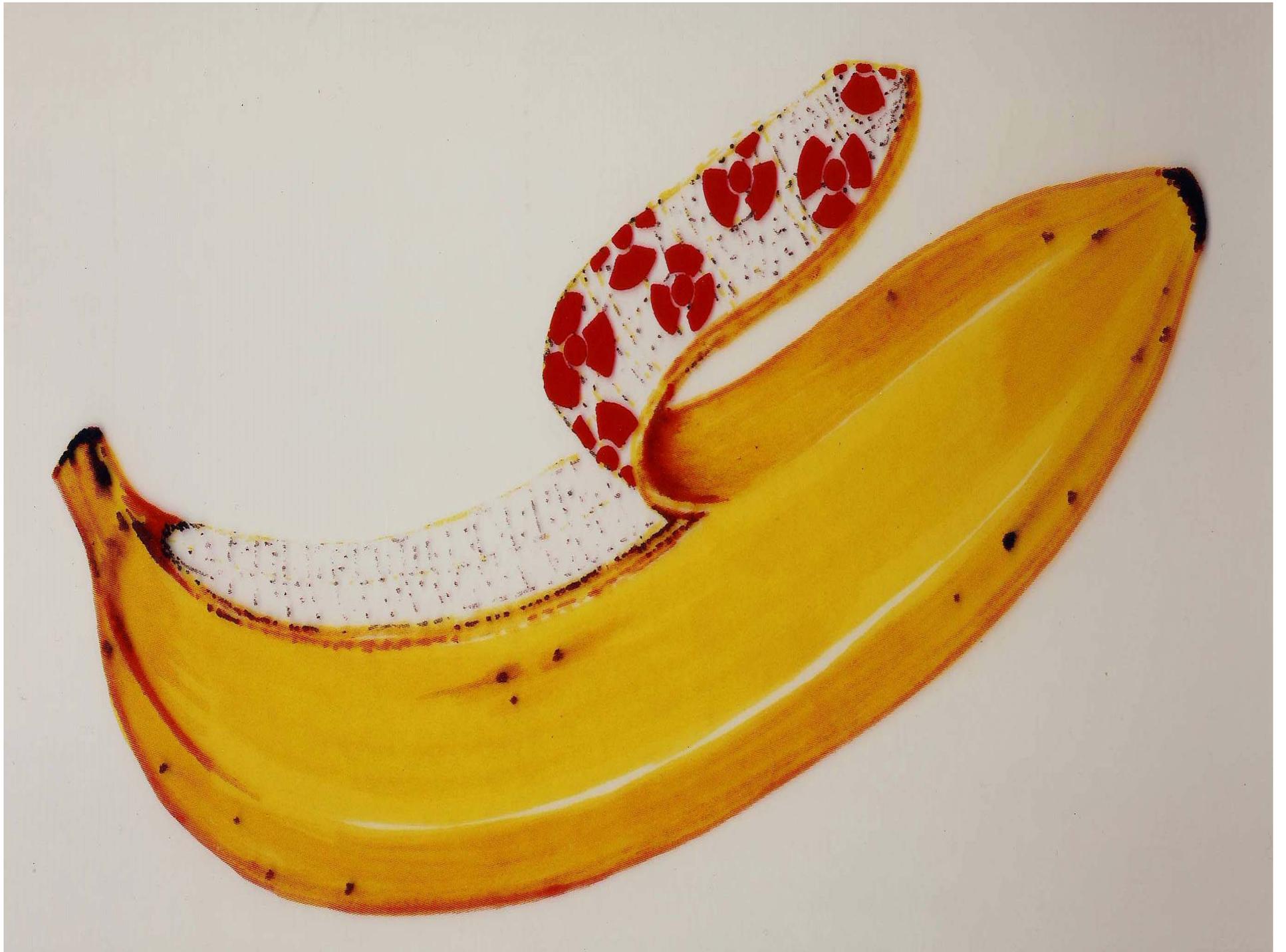
# Food-Borne Illness in the U.S.

- 6.5 million cases yearly
- 9000 deaths

Source: National Center for Disease Control

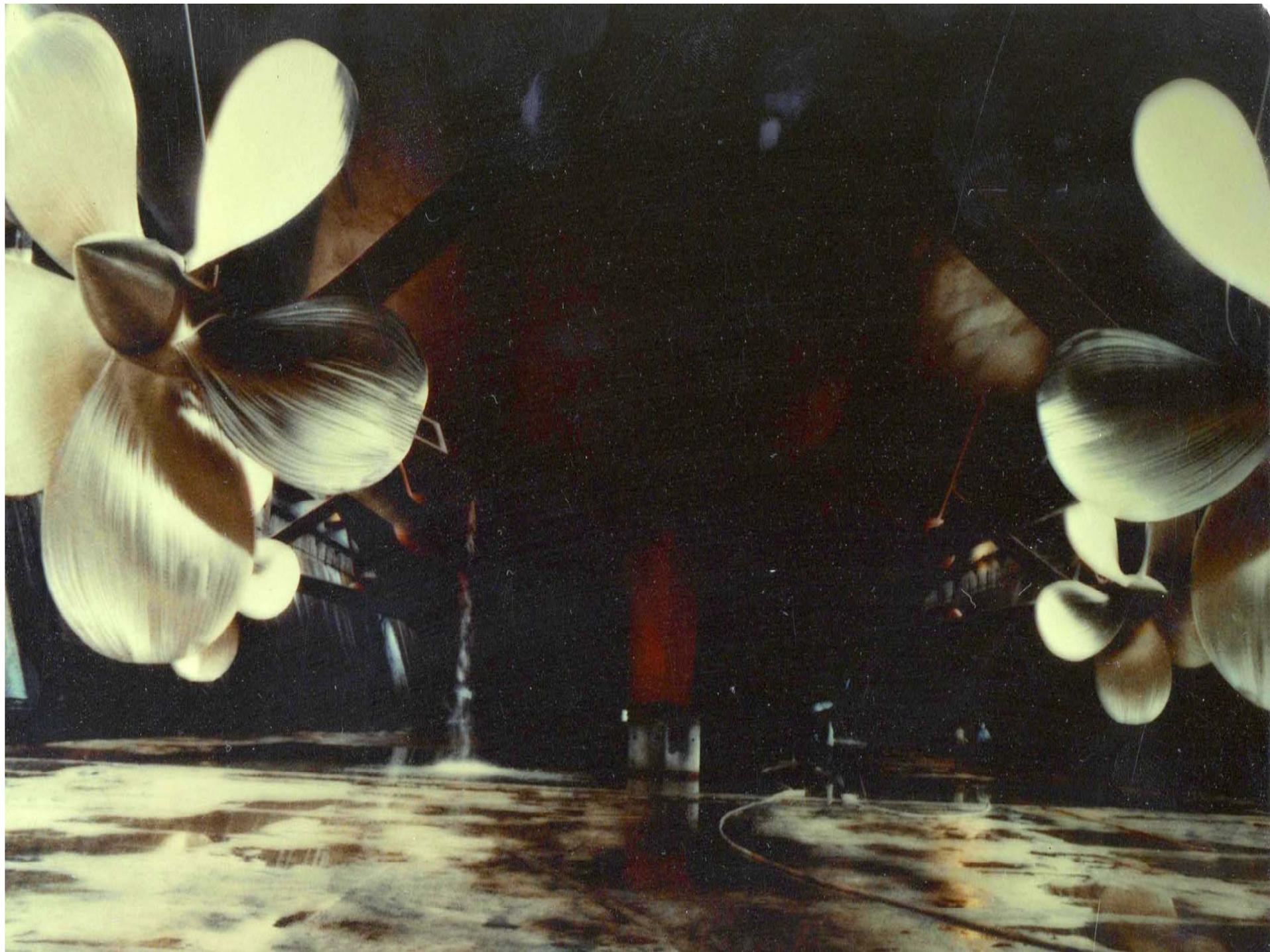
# **Irradiation is Also Used to Sterilize**

- **Medical supplies**
- **Baby bottle nipples**
- **Disposable diapers**
- **Milk cartons**
- **Cosmetics**

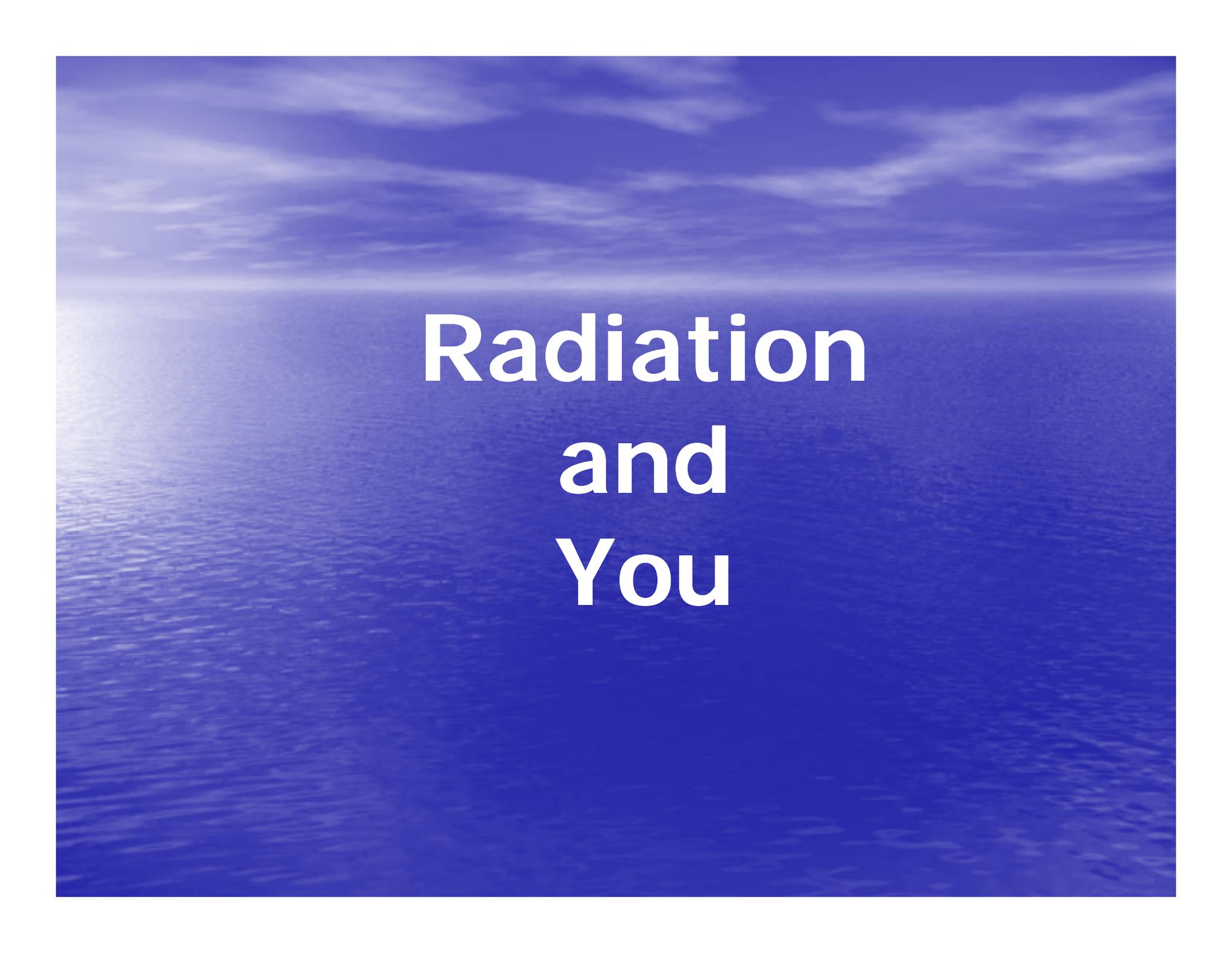






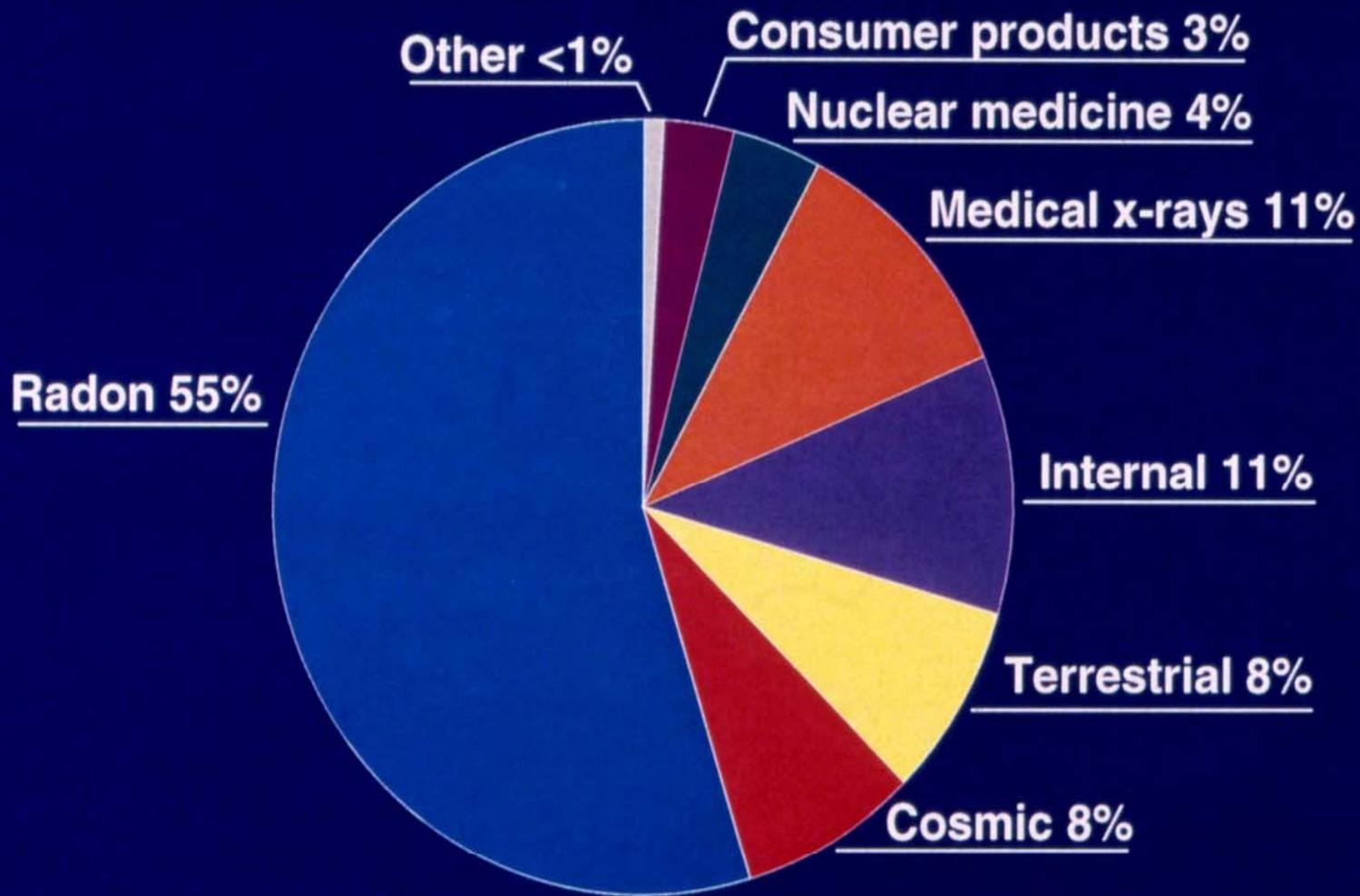






# Radiation and You

# Sources of Radiation Exposure to U.S. Population

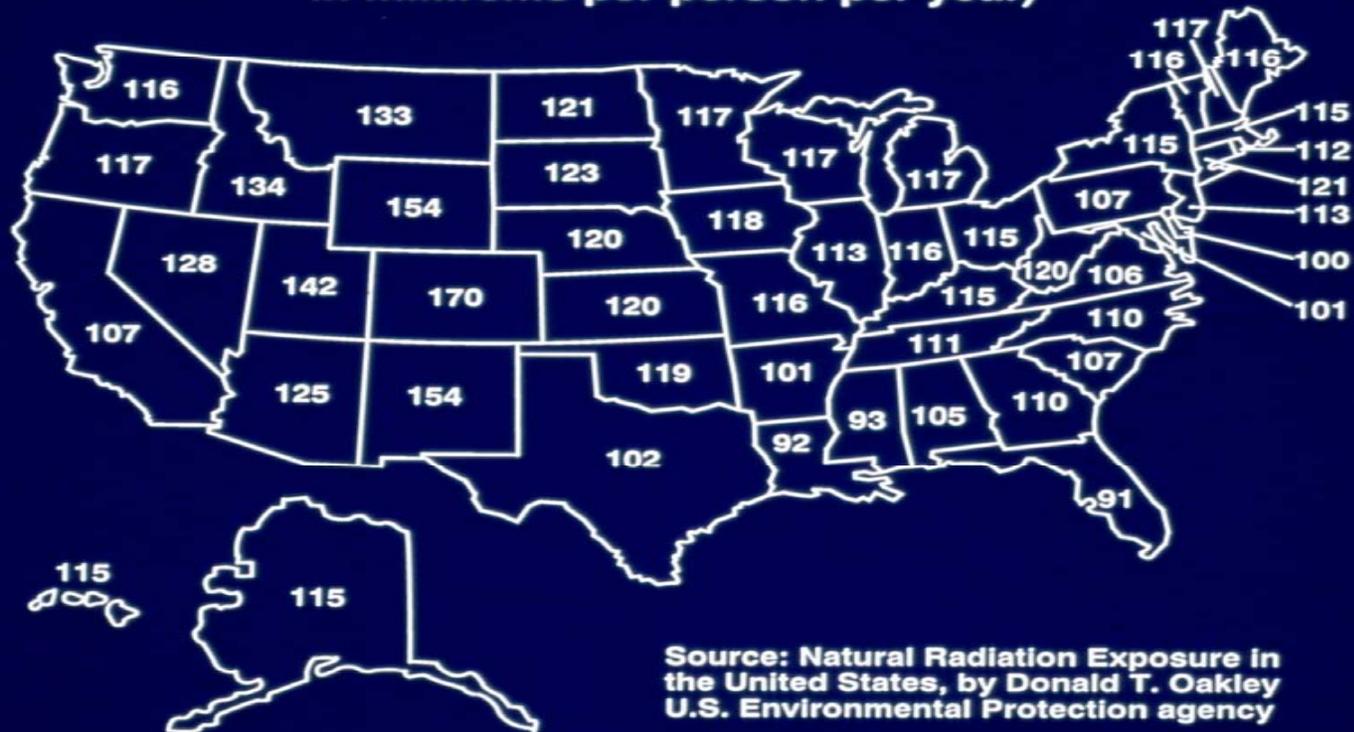


**Natural radiation 82%**  
**Man-made radiation 18%**

Source: National Council on Radiation Protection and Measurement 11/87

# Average Natural Radiation\* Background By State

(cosmic, terrestrial and internal body radiation  
in millirems per person per year)



Source: Natural Radiation Exposure in  
the United States, by Donald T. Oakley  
U.S. Environmental Protection Agency

**VARIATION IN RADIATION LEVELS IS CAUSED  
PRIMARILY BY DIFFERANT ALTITUDES ABOVE SEA  
LEVEL, AND BY NATURAL ROCK FORMATIONS  
CONTAINING TRACES OF URANIUM OR THORIUM  
AND THEIR RADIOACTIVE DAUGHTER ELEMENTS.**

# Radiation Exposure From Everyday Life (Annual Total)



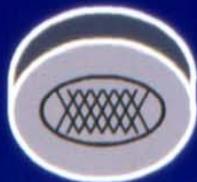
**Photogray Glasses**  
0.1 mrem



**Television**  
1.0 mrem



**Natural Gas Stove**  
0.2 mrem



**Smoke Detectors**  
0.1 mrem



**Gas Lantern Mantles**  
0.1 mrem

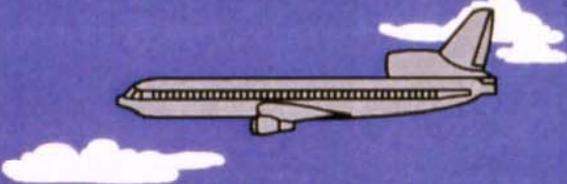


**INEL**  
0.009 mrem

# Approximate Additional\* Radiation Background

\*In Addition to Minimum Natural Background Exposure

Minimum Human Exposure  
is Approximately 125 mrem/yr



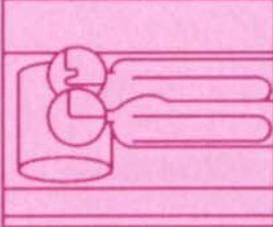
**Flying in Airplane Above  
33,000 ft.**  
0.5 to 1.0 mrem/hr  
(The higher you are and the further north you go  
the higher the exposure level)



**Passing or Being Passed  
By a Nuclear Waste Truck**  
0.01 mrem/per pass  
(Maximum)



**Living in  
Colorado**  
70 to 90 mrem/yr



**Sleeping With  
Another Human**  
1 mrem/yr

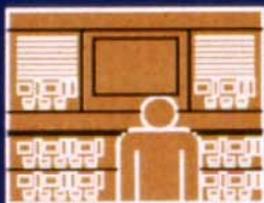


**Living Near  
Some Granite Rock  
Formation**  
25 to 100 mrem/yr

# Approximate Additional\* Radiation Background

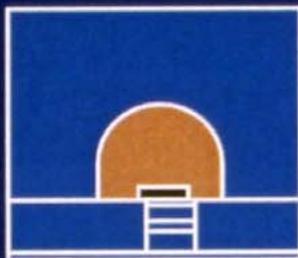
\*In Addition to Minimum Natural Background Exposure

Minimum Human Exposure is Approximately 125 mrem/yr



**Nuclear Power Plant  
Operating Room**

50 mrem/per  
working year  
(2000 working hours)



**Gate House of  
Nuclear Power Plant**

0.1 mrem/yr



**U.S. Capital**

20 mrem/per  
working year



**X Ray Technician**

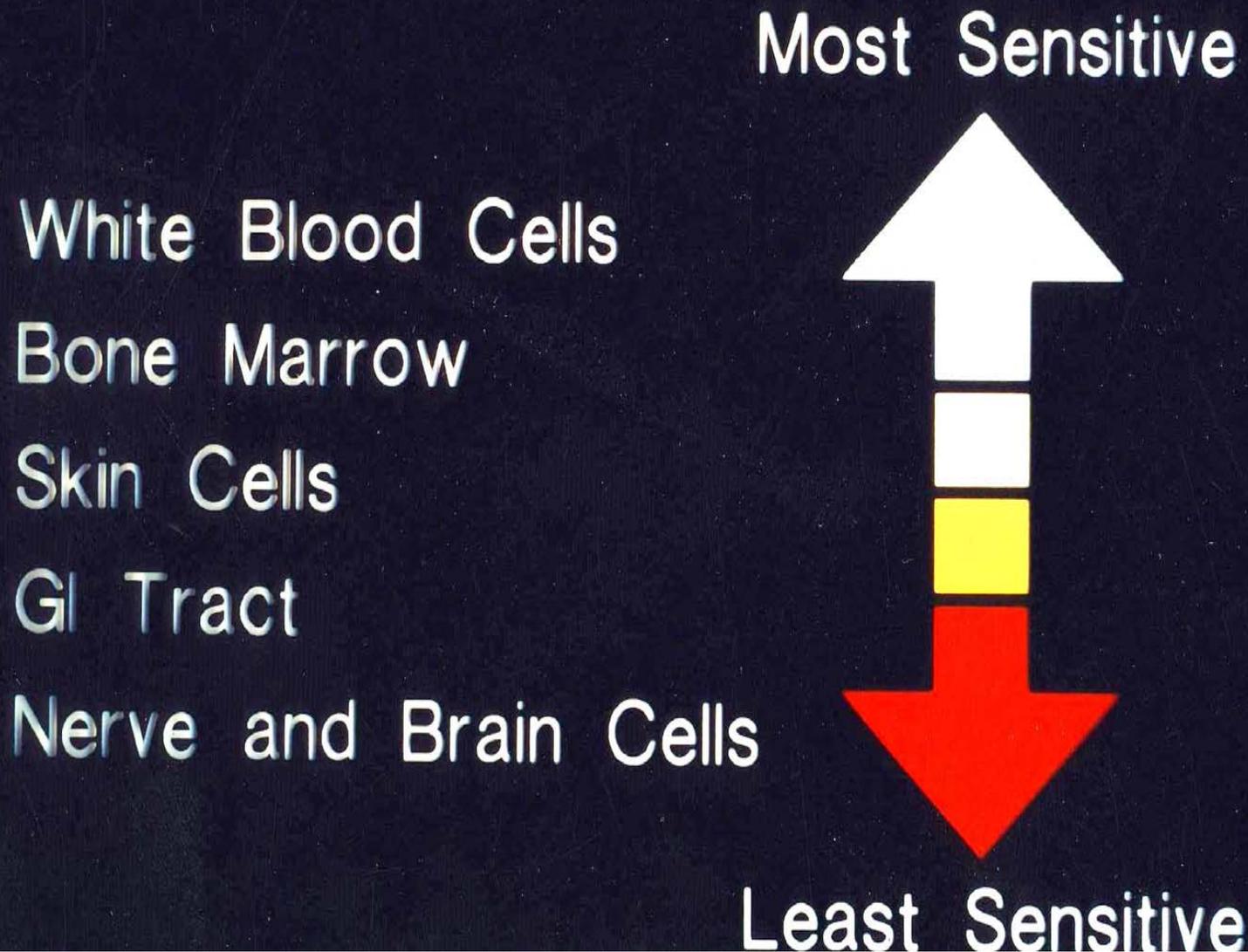
51 mrem/yr

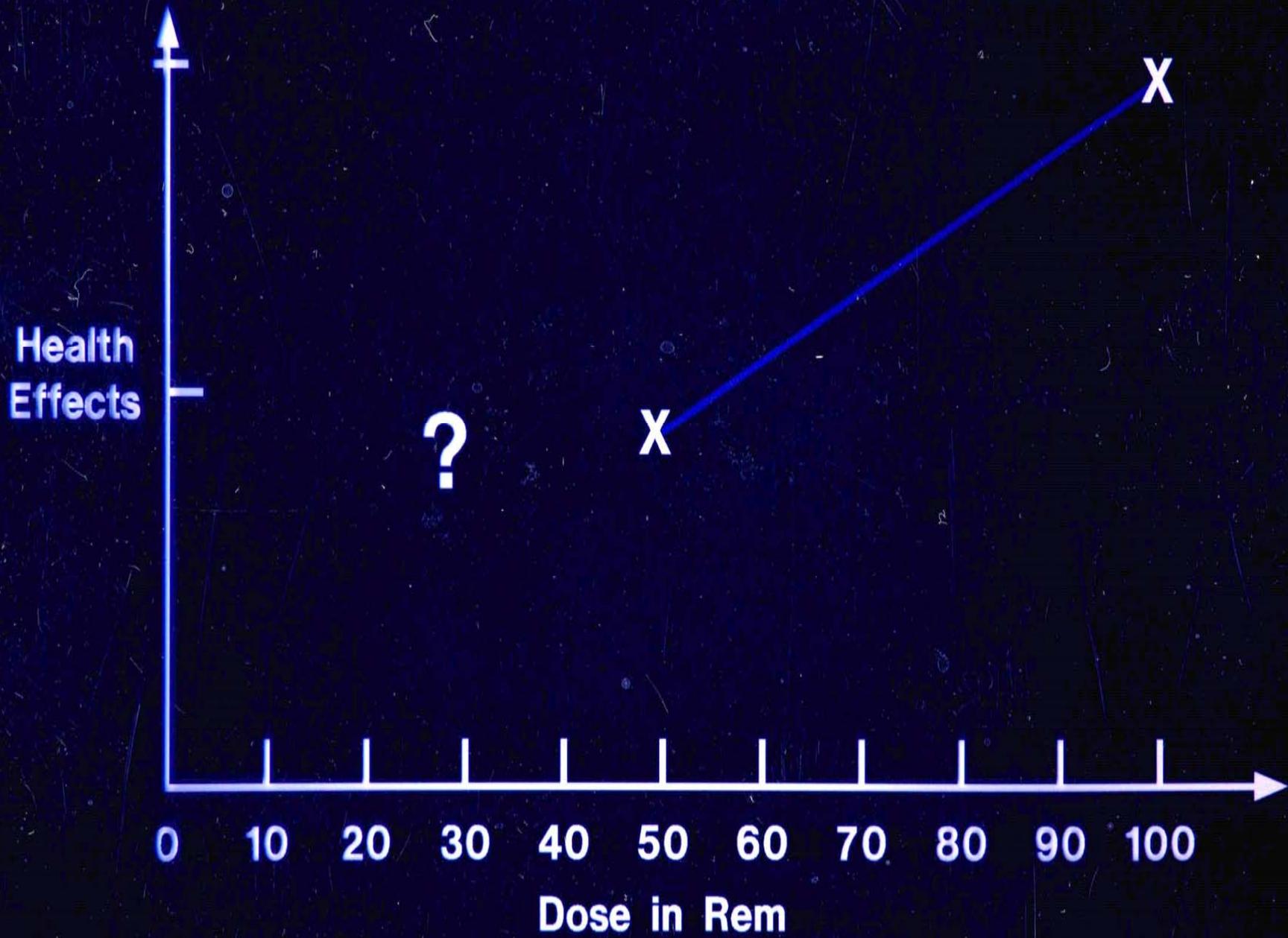


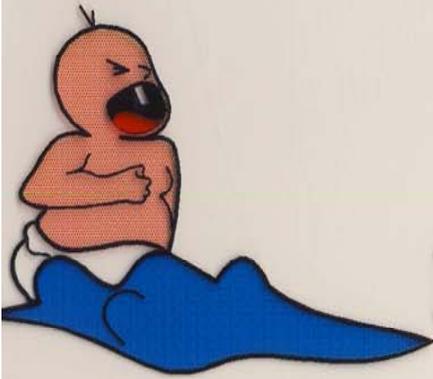
**Grand Central  
Station**

120 mrem/per  
working year

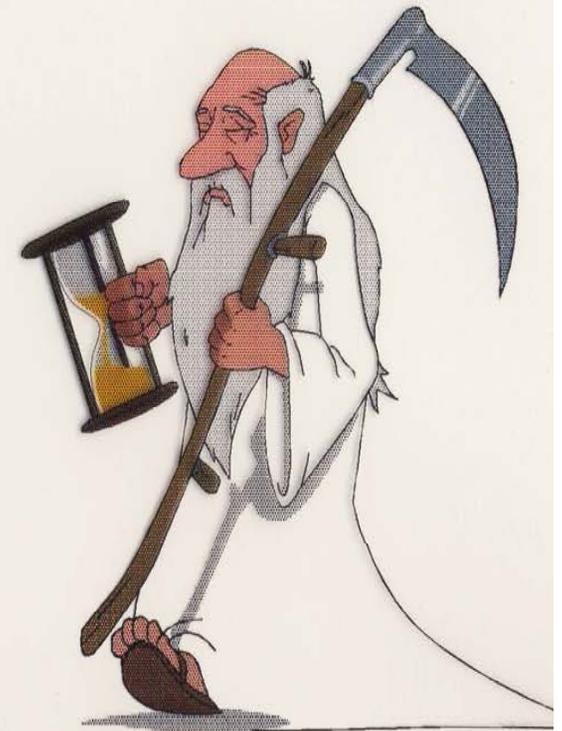
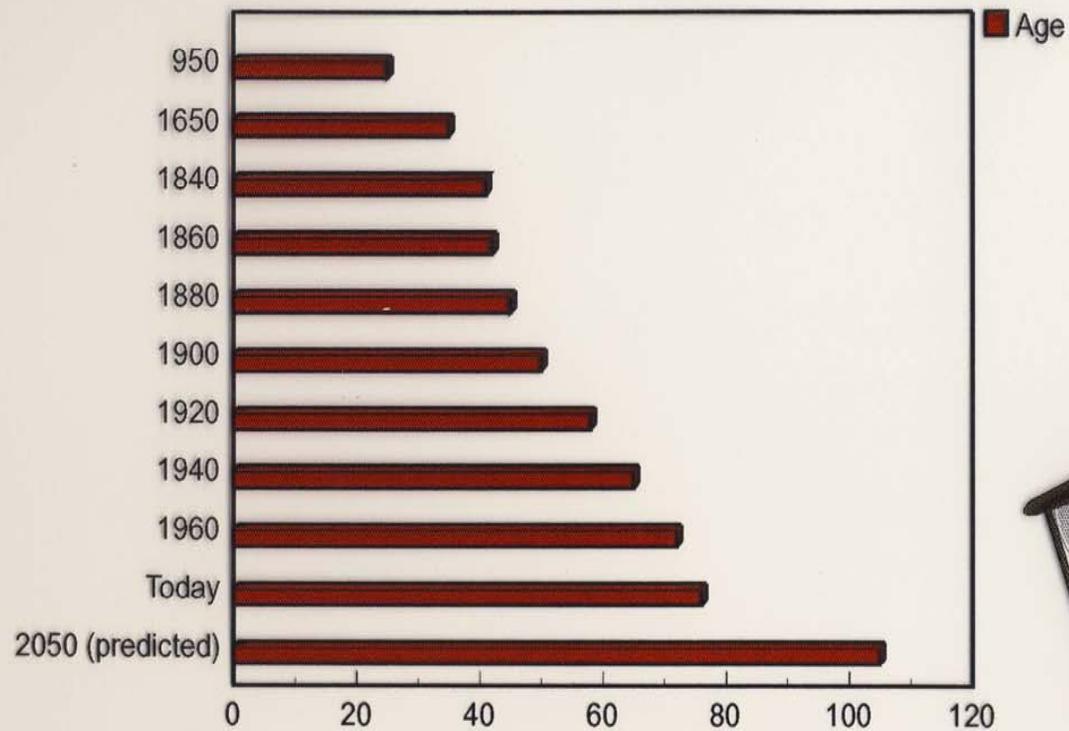
# SENSITIVITY OF CELLS/TISSUES



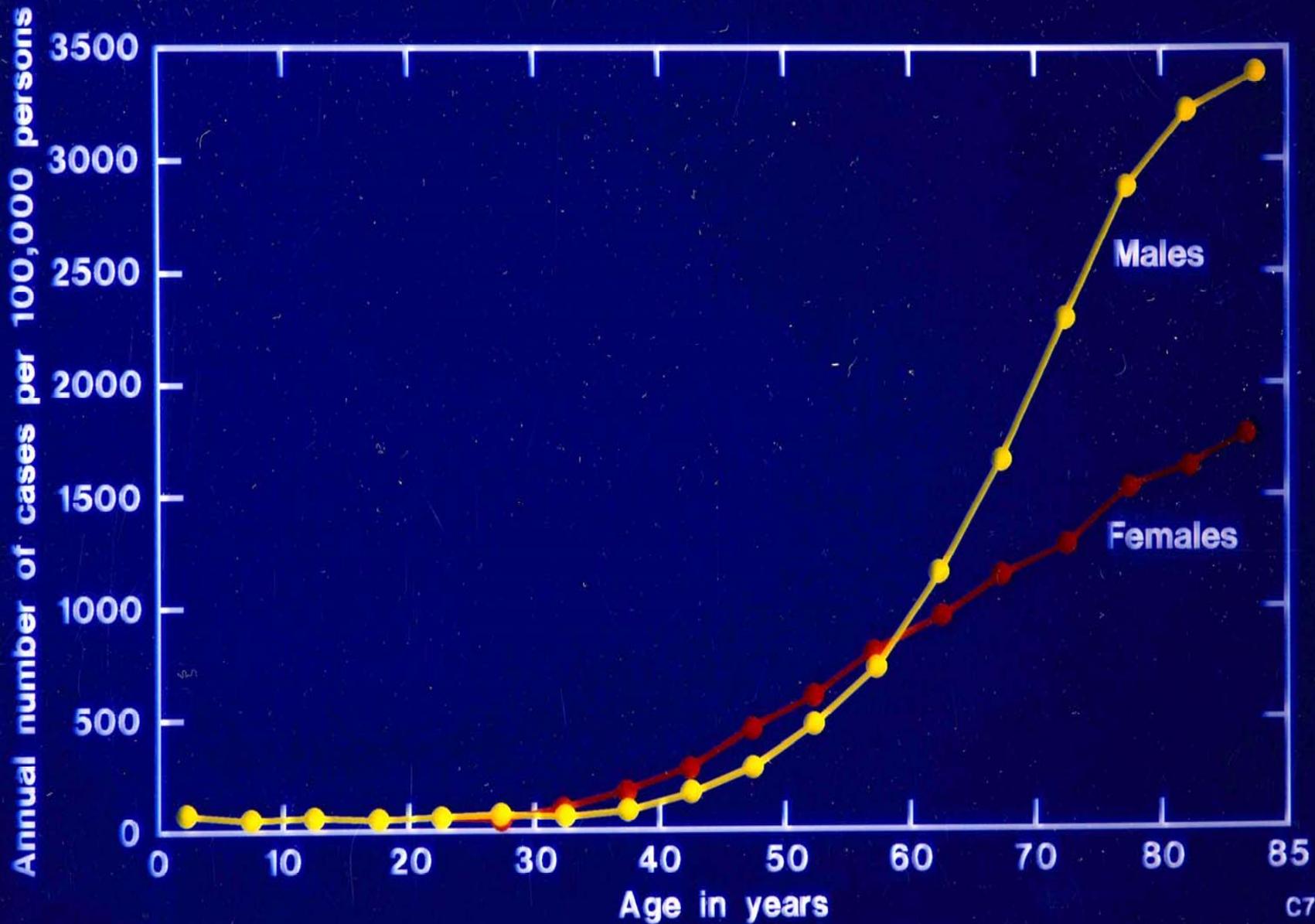




# Life Expectancy in Years

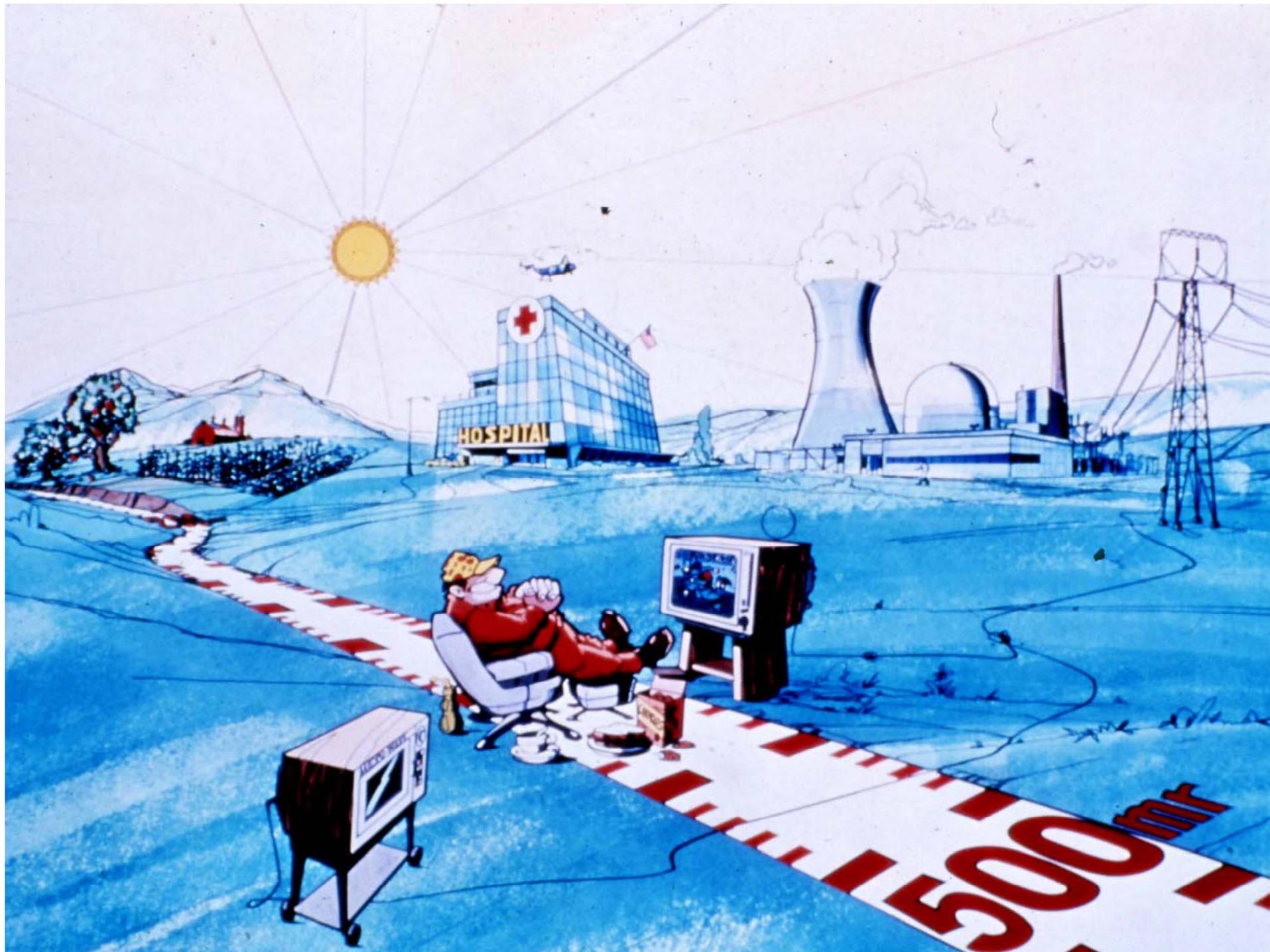


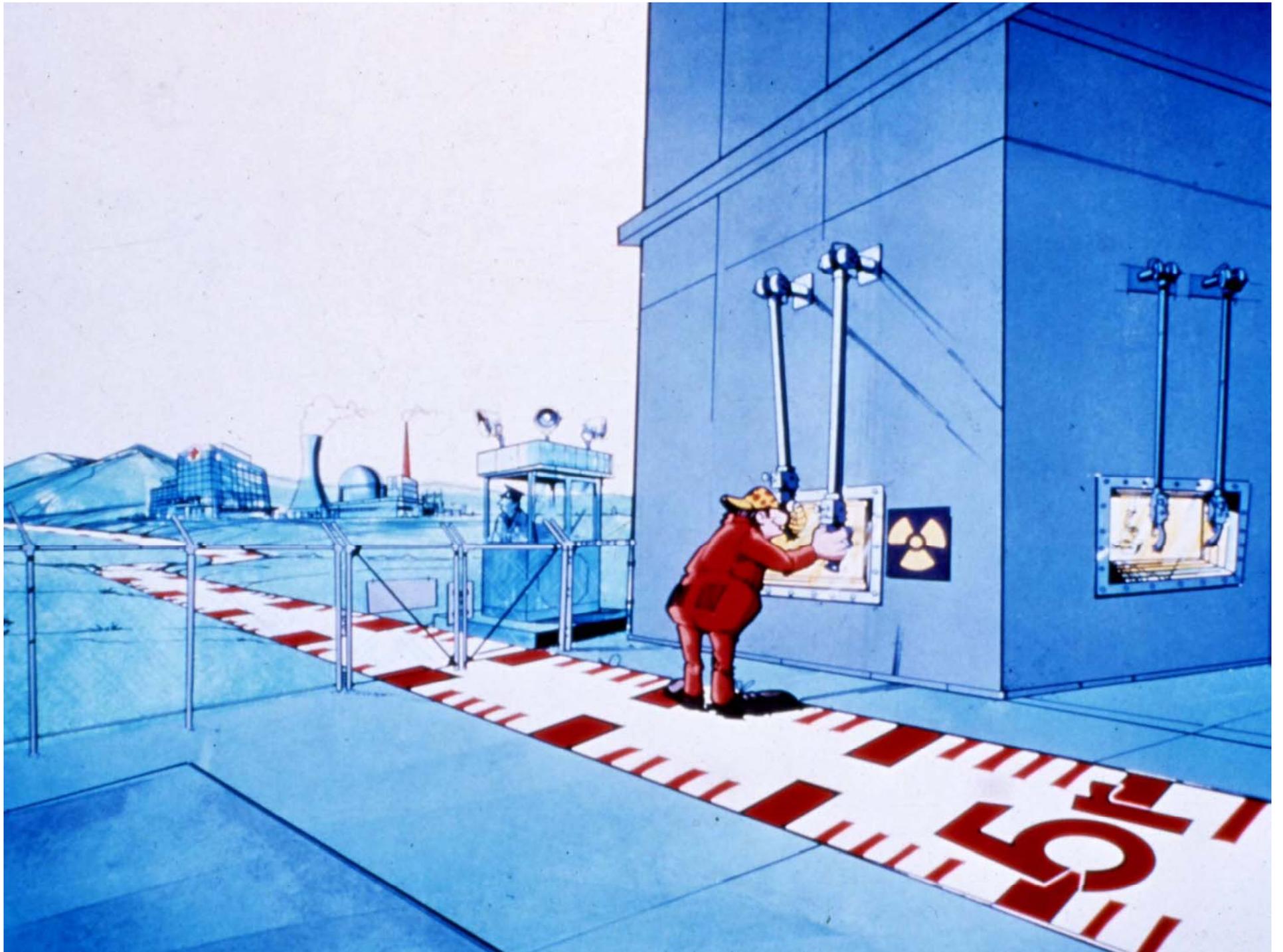
# Cancer Incidence at Different Ages in the United States

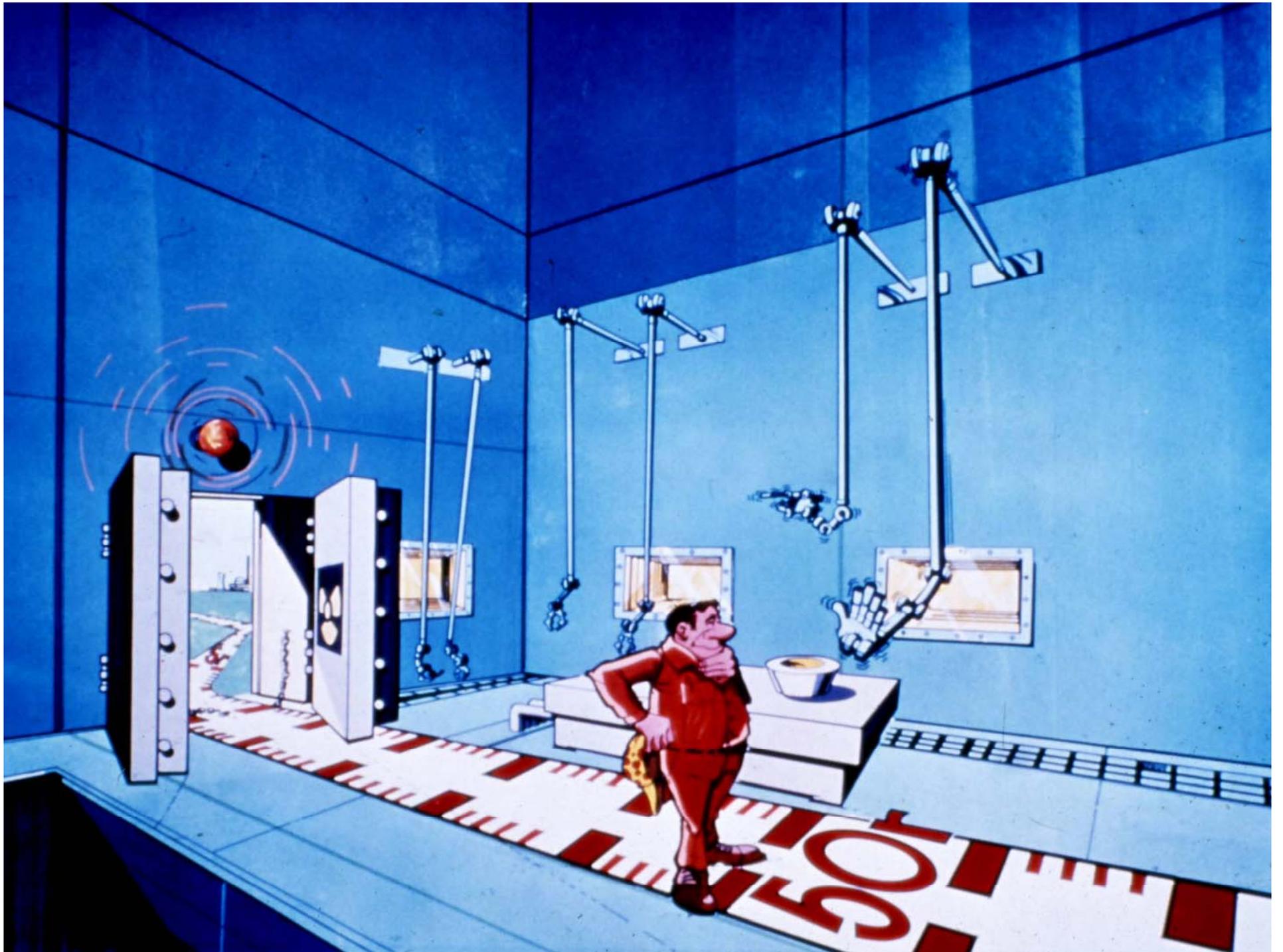


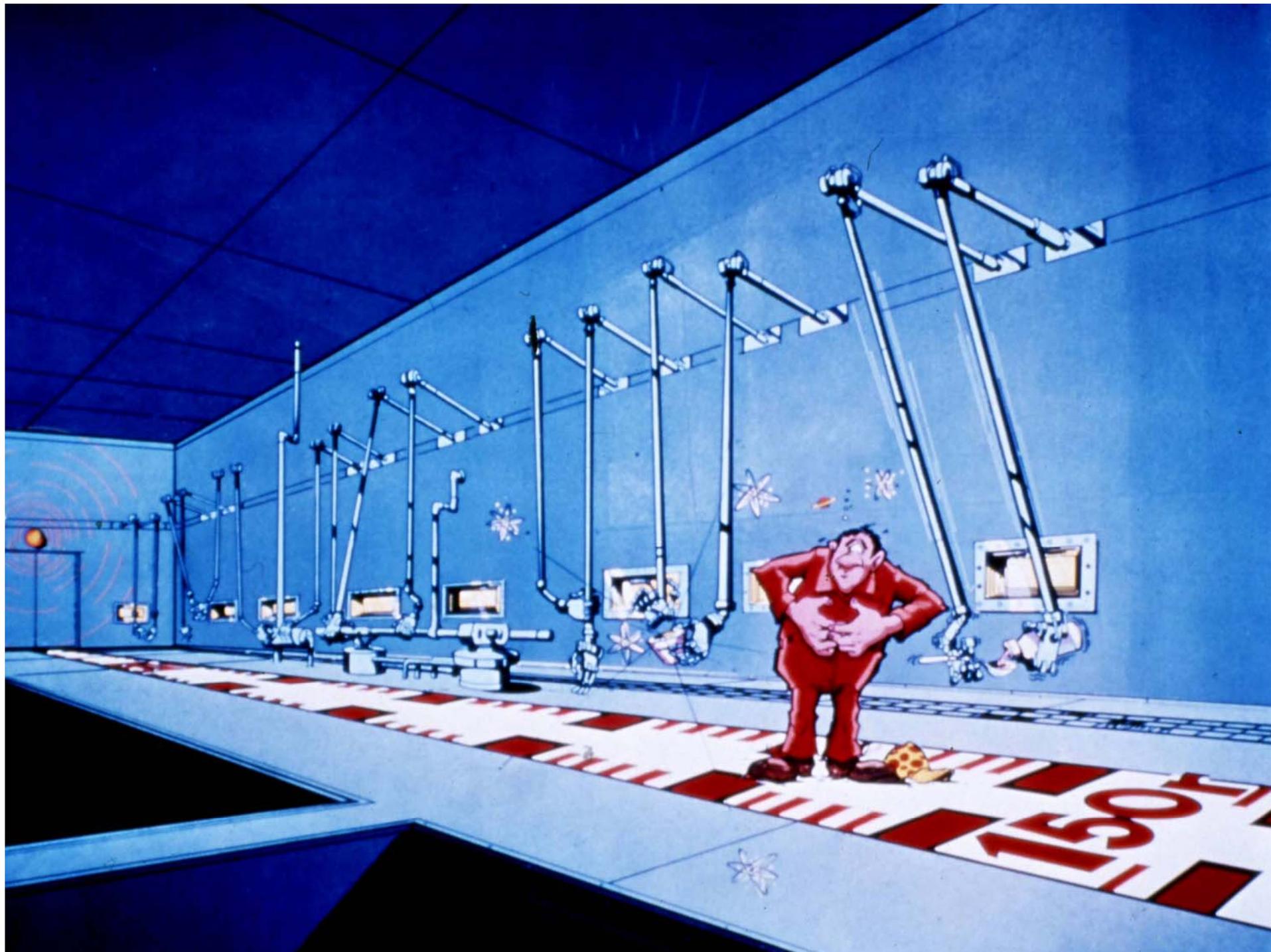




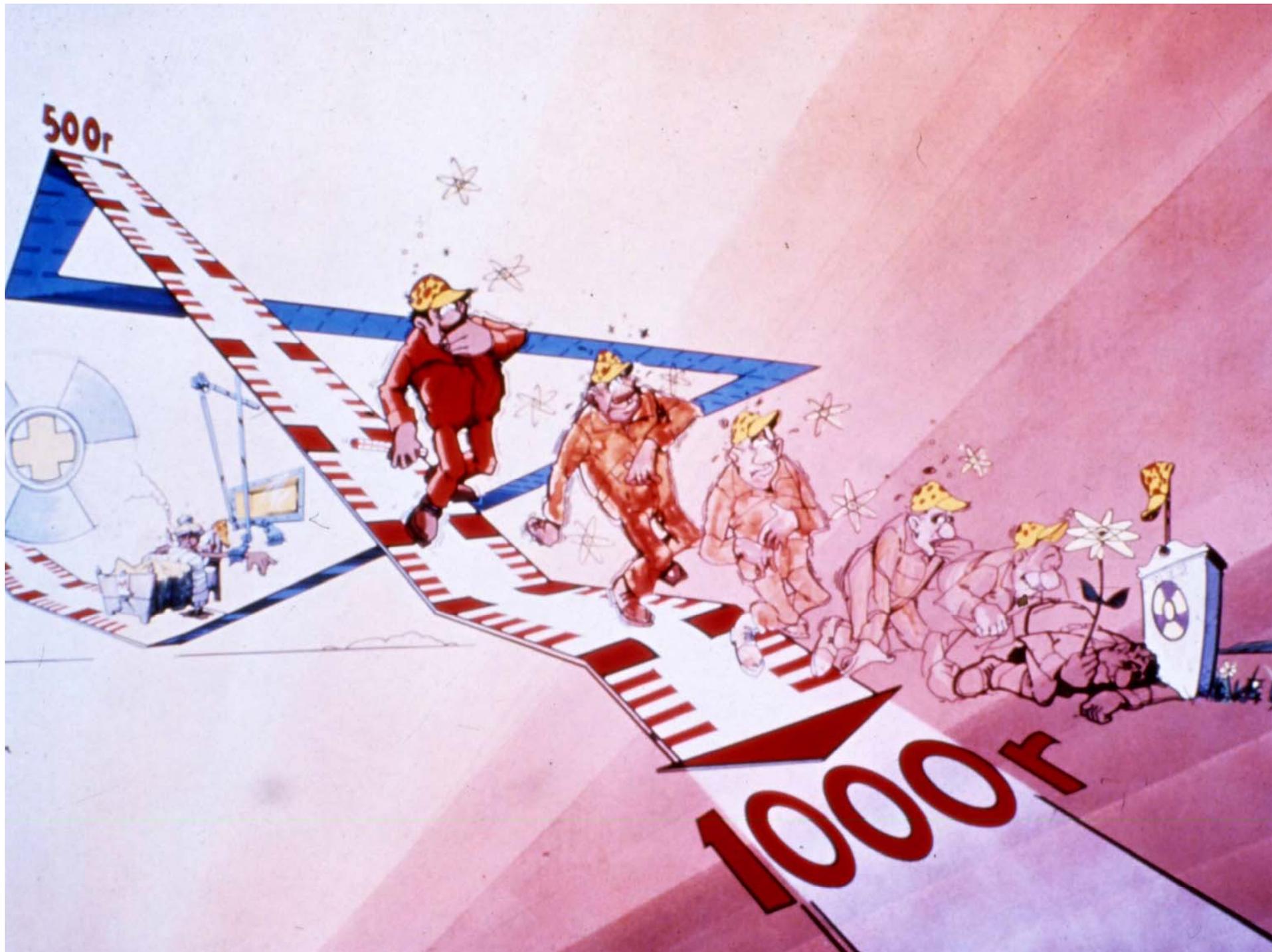


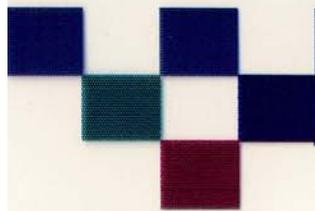












# U.S. Food Irradiation Rules

<u>Product</u>	<u>Purpose</u>	<u>Dose kGy (Rad)</u>
Wheat	Insects	0.2 - 0.5 (20,000 - 50,000)
Potatoes	Extended Shelf Life	0.05 - 0.15 (5,000 - 15,000)
Spices	Insects	30 (max) (3,000,000)
Pork Carcasses	Trichinosis	0.3 min - 1.0 max (30,000 - 100,000)
Fruits & Vegetables	Slow Ripening	1 (100,000)
Poultry	Salmonella	3 (300,000)



# 9 of 200



Forms of Cancer  
Can Be  
Caused By  
Radiation

# Radiation Protection Factors

- Time
- Distance
- Shielding
- Quantity

All substances are poisons.  
There are none which is not a  
poison. The right dose  
differentiates a poison and a  
remedy.

Paracelsus 1493-1541