Uranium
The Shape-Shifter

webinar

Uranium in NB and Beyond

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shapeshifting makes uranium insidiously dangerous

shapeshifting is the ability to physically transform oneself through an inherently superhuman ability

THREE different DANGEROUS TRANSFORMATIONS

1. Mining: RADIOACTIVE PROGENY
2. Reactors: FISSION PRODUCTS
3. Weapons: TRANSURANIC ACTINIDES

Model of a Uranium Atom

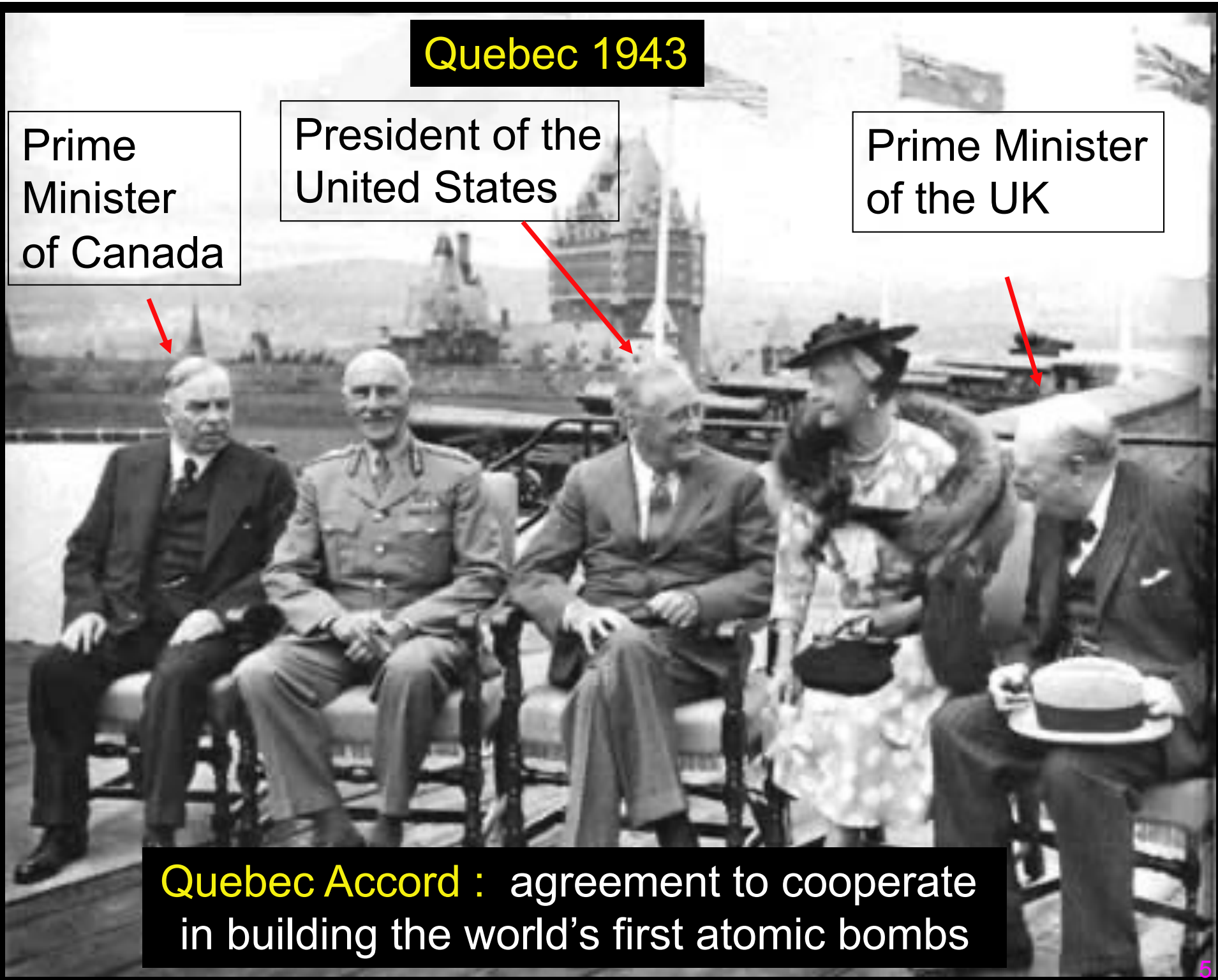
Uranium is the key element in all nuclear fission technology

Nuclear bombs

Nuclear reactors

Photo: Robert Del Tredici

Quebec 1943



Quebec Accord : agreement to cooperate in building the world's first atomic bombs

Deline, in the North-West Territories

Photo: Robert Del Tredici

burlap sacks used and thrown away

Photo: Robert Del Tredici

CANADA
DEPARTMENT OF MINES

INVESTIGATIONS IN ORE DRESSING AND METALLURGY

1931

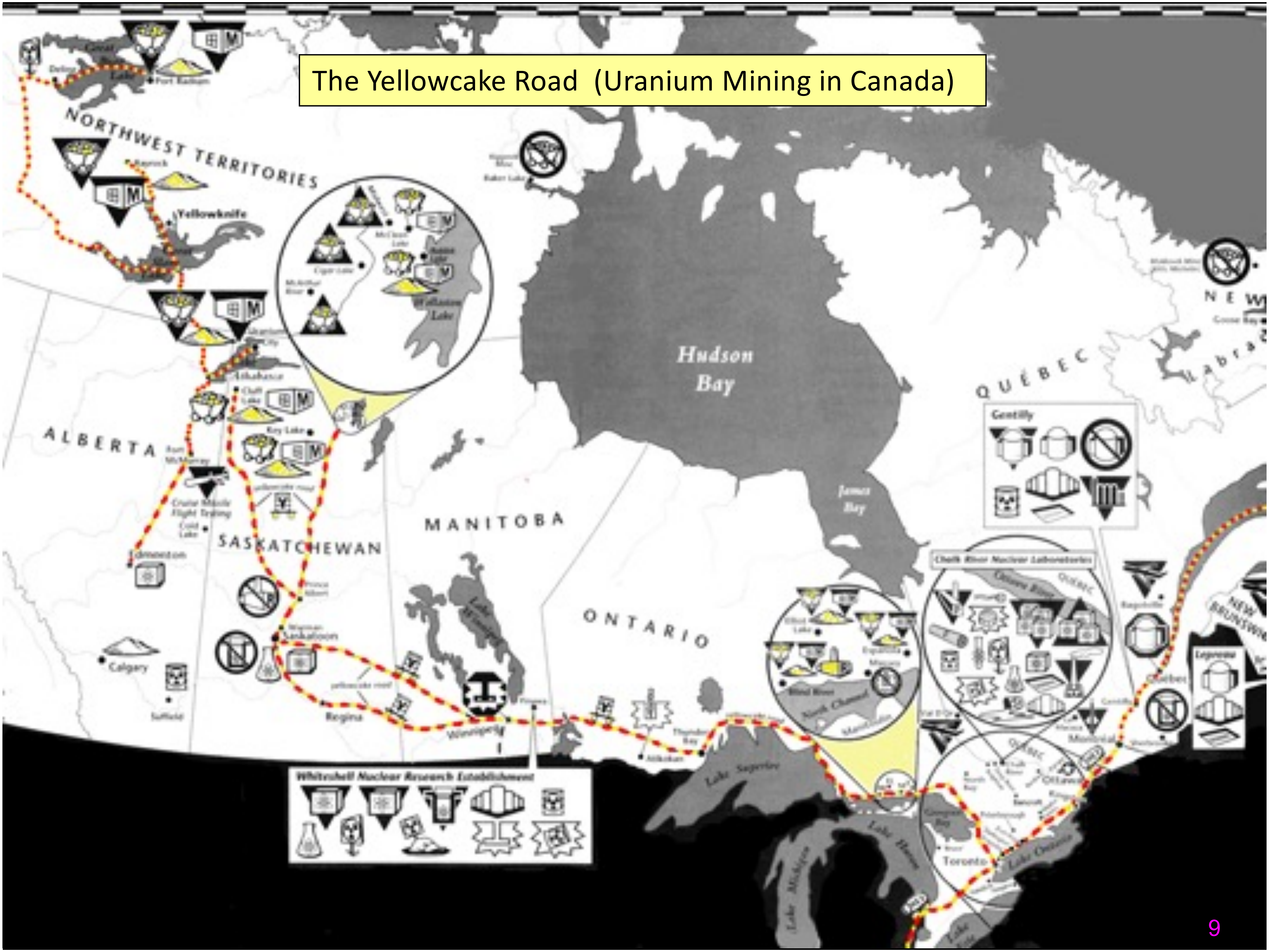
OTTAWA

PRECAUTIONS FOR WORKERS IN THE TREATMENT OF RADIUM ORES

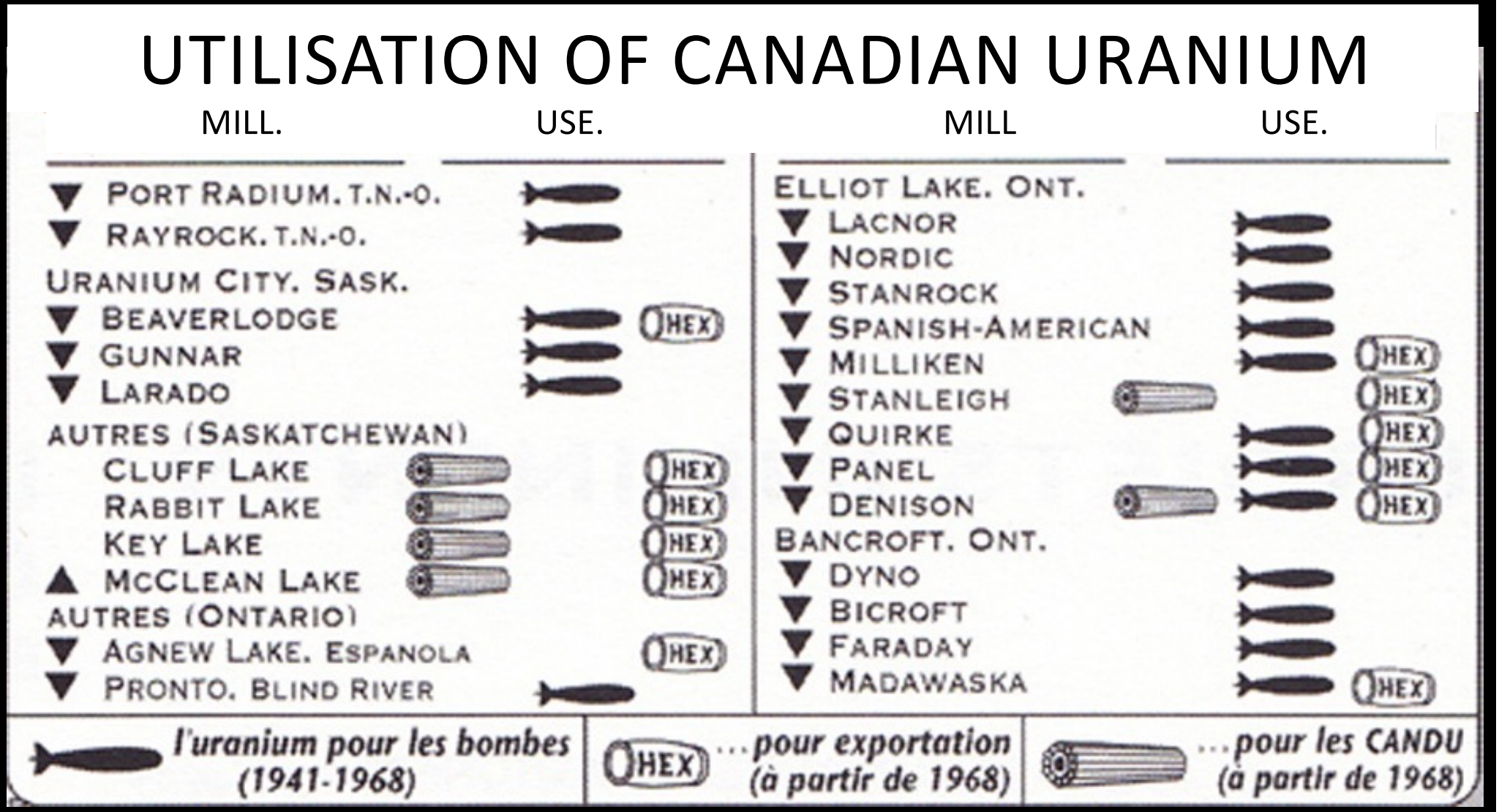
W. R. McClelland

The hazards involved in the handling of high grade radioactive materials make necessary the adoption of certain precautions. Recent investigations in the field of radium poisoning have led to the conclusion that precautions are necessary even in the handling of substances of low radioactivity. The ingestion of small amounts of radioactive dust or emanation over a long period of time will cause a build up of radioactive material in the body, which eventually may have serious consequences. lung cancer, bone necrosis and rapid anemia are possible diseases due to deposition of radioactive substances in the cell tissue or bone structure of the body.

The Yellowcake Road (Uranium Mining in Canada)



UTILISATION OF CANADIAN URANIUM



FIRST EXAMPLE OF SHAPE SHIFTING

radioactivity is a form of
nuclear energy
that cannot be shut off!

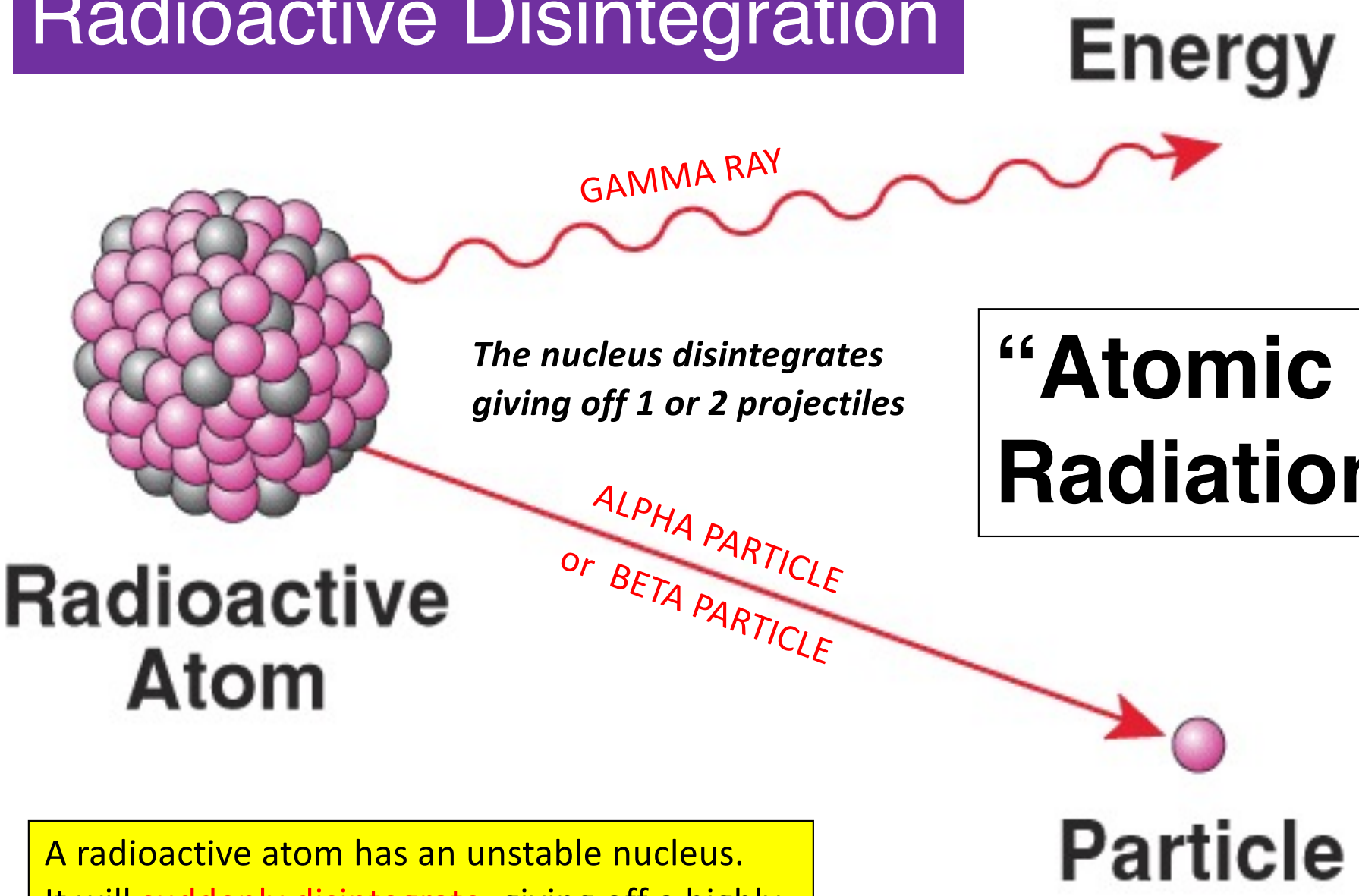
it was discovered 125 years ago
by Henri Becquerel

the unit of radioactivity
is called a “becquerel”

Henri Becquerel 1896

discovered radioactivity of uranium & thorium

Radioactive Disintegration



A radioactive atom has an unstable nucleus.
It will suddenly disintegrate, giving off a highly energetic particle and/or a photon of energy.
These projectiles are damaging to living cells.

Radioactivity

chronic exposure
increases the incidence of
cancer, leukemia, genetic damage,
strokes, heart attacks, other blood diseases
and low intelligence in young children

…but there is a "latency period";
the onset of disease may occur years
or decades after exposure

In a “cloud chamber” you can see the tracks of all 3 types of emissions from uranium ore

discovered radium and polonium,
-- two of the "decay products" of uranium

Each disintegration creates a new element called a "decay product"
also called "progeny"

Uranium has a long "decay chain" with about two dozen progeny

Its decay products are much more radioactive than uranium itself

Radium Dial Painters 1920

radium-226

Girls hired to use radioactive paint to make numerals on instrumenty dials glow in the dark …

… ingested minute amounts of radium when they licked the tips of their brushes to get a very fine point .

Deaths of Radium Dial Painters

from ingesting minute amounts of radium

Fatal anemias

Bone cancers

Head cancers

radium is a bone-seeker

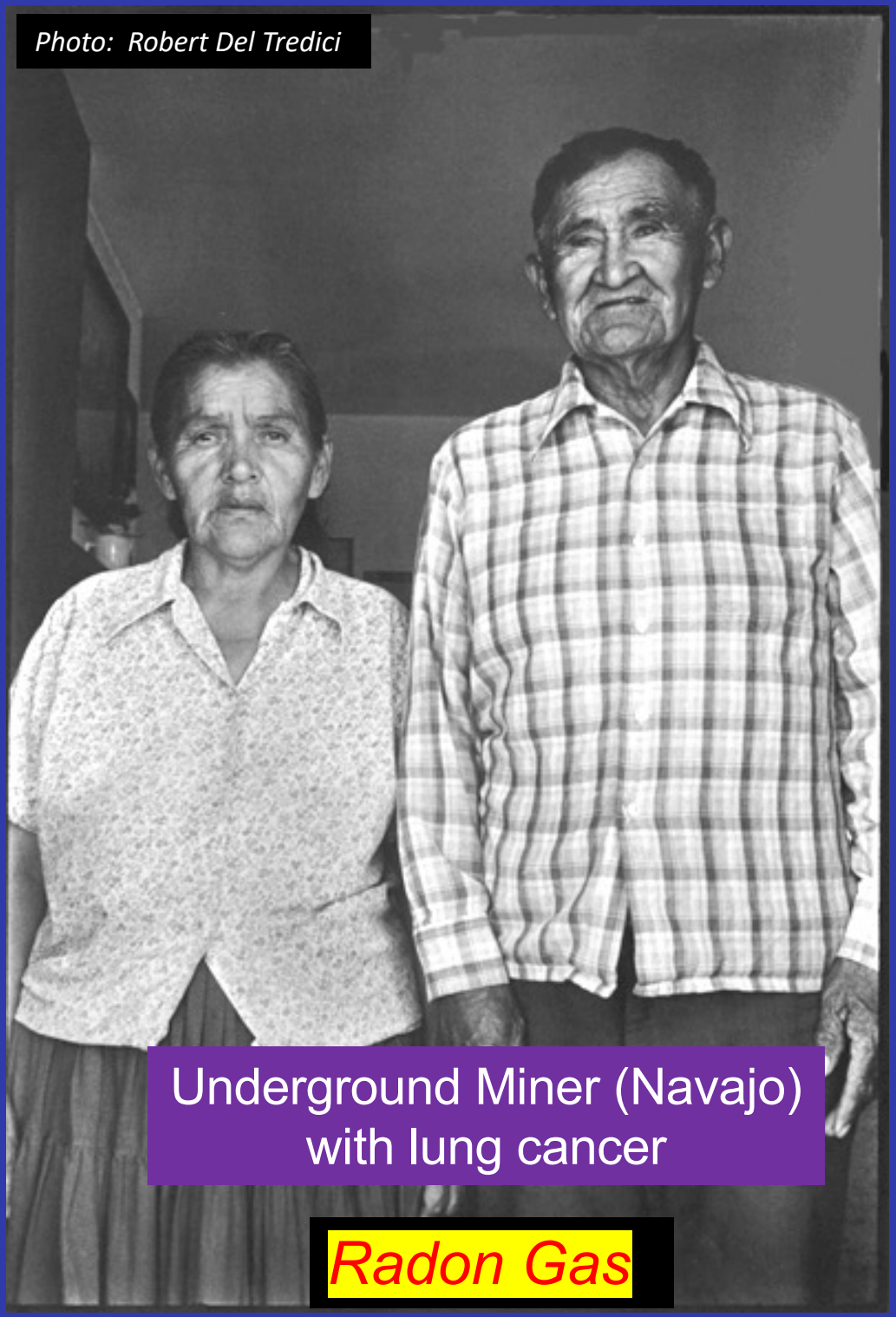
radium (like calcium) – goes to **bones and teeth**

dial painters developed severe dental damage called "**radium jaw**"

radium also damaged **blood-forming organs** in their bone marrow

many **died of anemia** (as did Marie Curie and her daughter Irene) and others **of bone cancer**

radon gas (produced by radium) was **carried by blood to the brain** and caused head cancers



radioactive **radon gas** is produced when radium atoms disintegrate

radon is the leading cause of **lung cancer** among non-smokers

radon causes lung cancers and other lung diseases in **uranium miners**

radon gas deposits solid **radioactive materials** in lung tissue

radon is seven times **heavier than air** and travels great distances …

Alexander Litvinenko 2006

..polonium-210..

murdered by polonium poisoning in London England
(a tiny amount added to a cup of tea)

polonium is chemically similar to potassium – it attaches itself to the **red blood** corpuscles …

polonium travels throughout the body damaging **soft organs** …

polonium is 250 billion times **more toxic than hydrogen cyanide** …

polonium is the only material that can deliver a dose of **whole-body alpha radiation**…

polonium is produced by the **disintegration of radon** atoms …

American Health Physics Society

polonium-210

causes up to

90 % of the deaths

attributed to tobacco

(lung cancers, heart attacks, strokes)

polonium is a blood-seeker

radon gas from soil and uranium-rich fertilizer builds up under a canopy of tobacco leaves …

radon disintegrates to form radioactive **lead-210 that sticks to the resinous hairs on tobacco leaves** …

harvested tobacco has very minute amounts of radioactive lead-210 …

lead-210 disintegrates to form polonium-210 that is inhaled by smoker …

polonium-210 **damages the lung** to cause cancer and **enters the blood** to cause strokes and heart attacks…

Los Alamos National Laboratory's Chemistry Division

http://periodic.lanl.gov/elements/84.html

Polonium-210

Weight by weight

it is about 250 billion times

as toxic as hydrogen cyanide.

by the way . . .

these deadly radionuclides

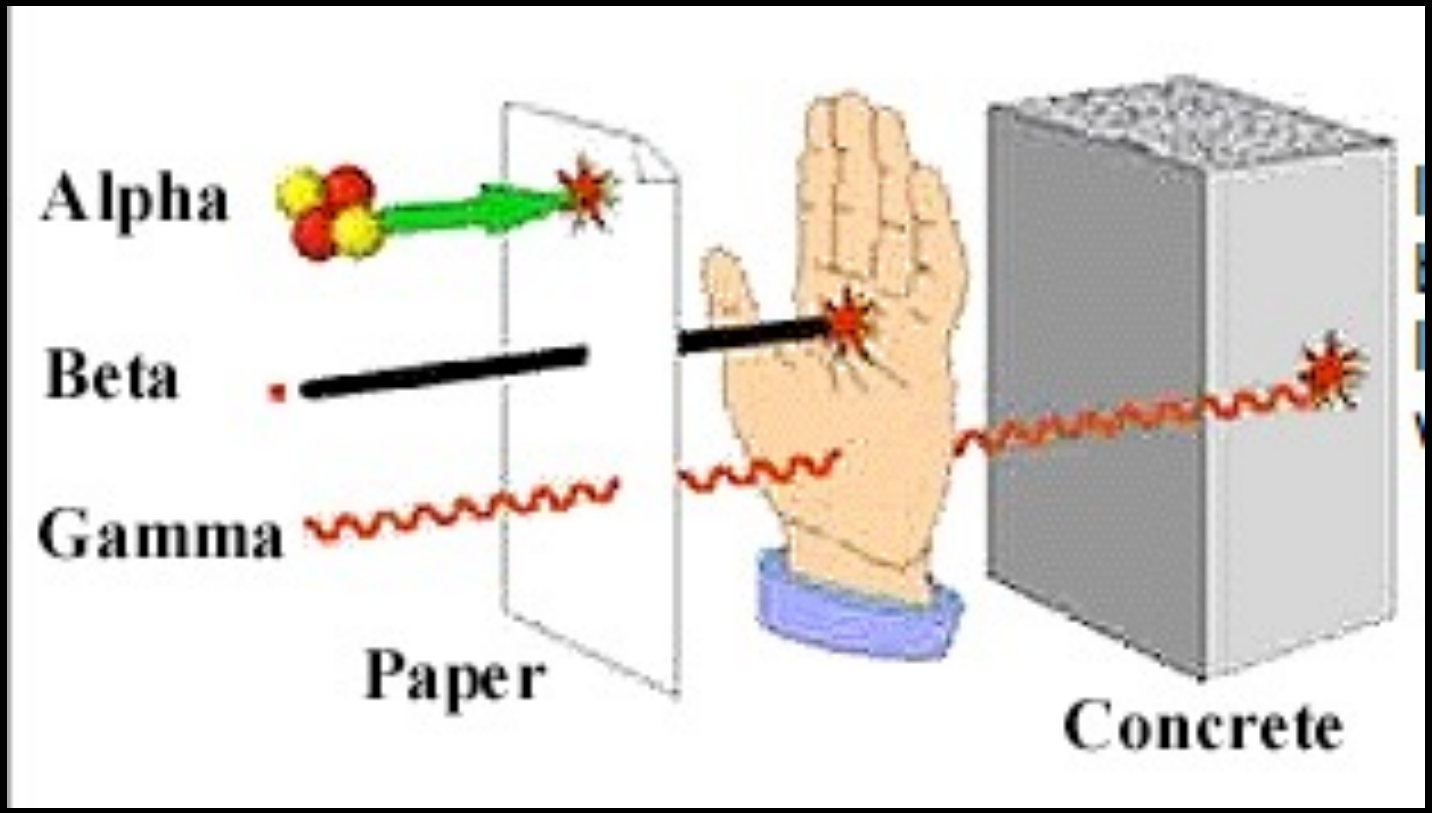
~ radium, radon, and polonium ~

are all alpha emitters

harmless outside the body,
but deadly inside

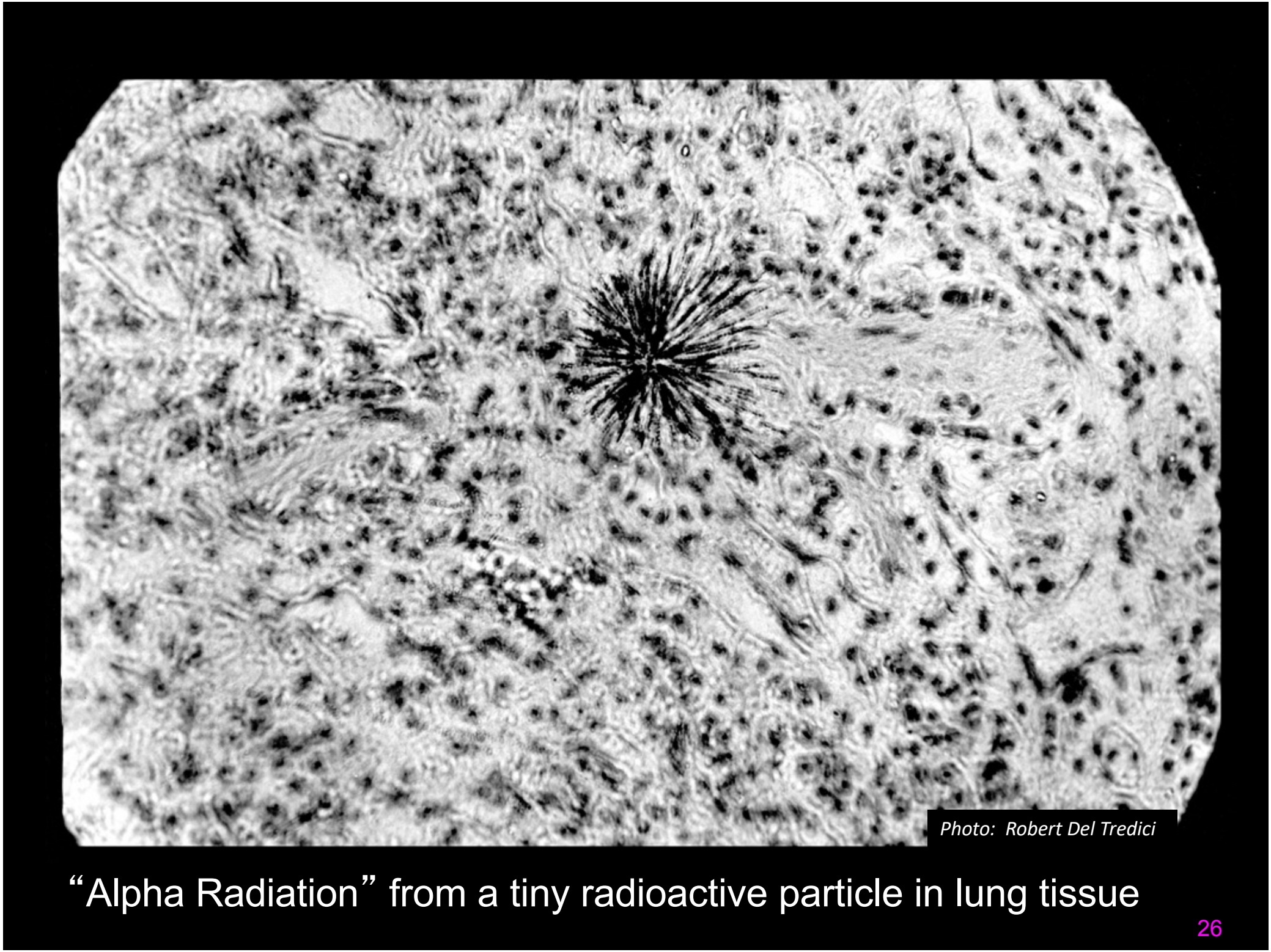
uranium and plutonium
are also alpha emitters

Alpha particles can be stopped by a sheet of paper.
Alpha emitters are harmless outside the body, but
exceedingly dangerous when ingested or inhaled.

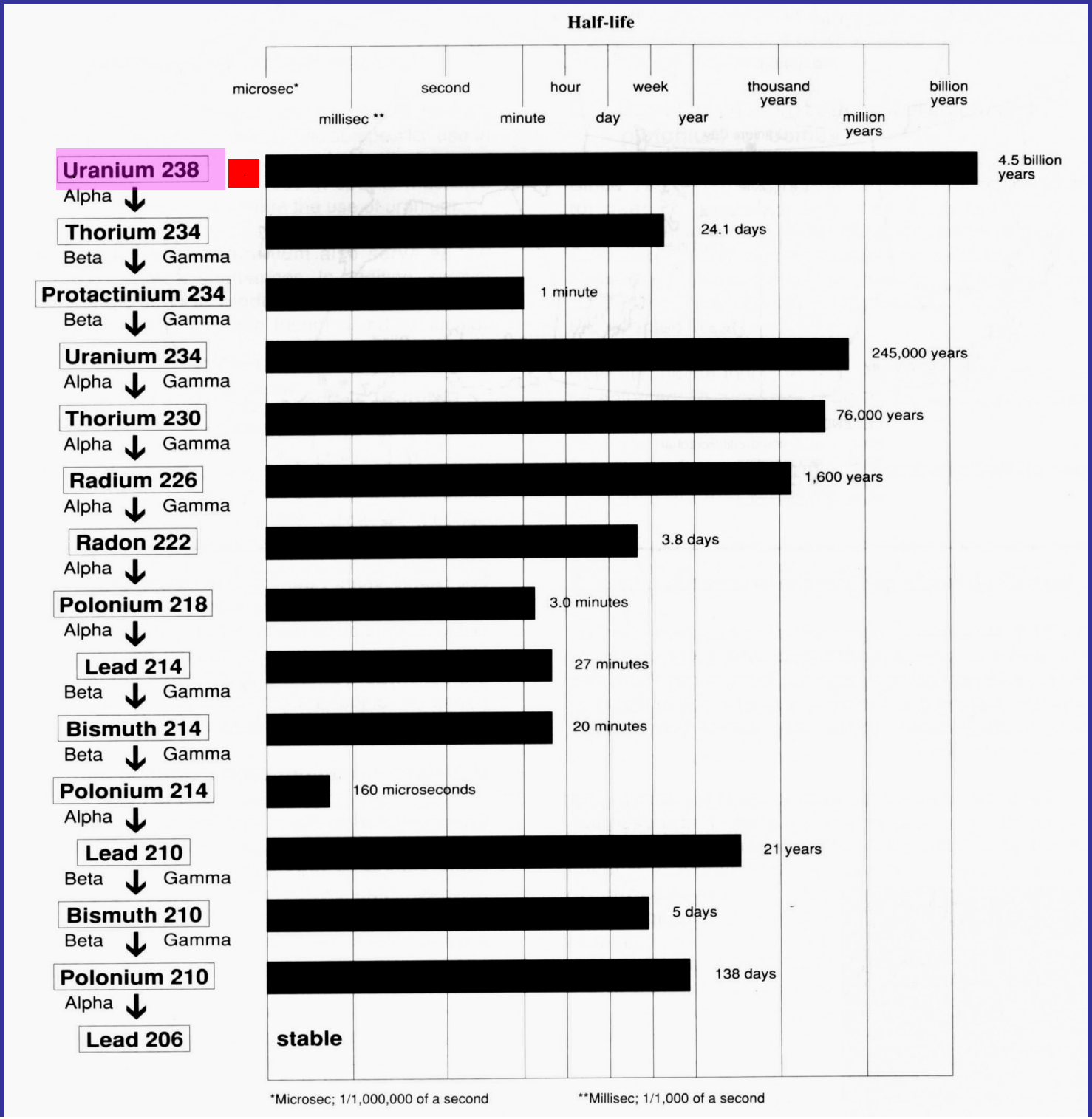


Beta particles penetrate only part-way.
They can damage eyes or skin externally.
But the main danger is internal exposure.

Gamma rays are highly penetrating.
They give "whole body" radiation.
Heavy shielding is often needed.



"Alpha Radiation" from a tiny radioactive particle in lung tissue


Half-life
microsec*
millisec **
second
minute
hour
day
week
year
thousand years
million years
billion years
Uranium 238
Alpha
4.5 billion years
Thorium 234
Beta
Gamma
24.1 days
Protactinium 234
Beta
Gamma
1 minute
Uranium 234
Alpha
Gamma
245,000 years
Thorium 230
Alpha
Gamma
76,000 years
Radium 226
Alpha
Gamma
1,600 years
Radon 222
Alpha
3.8 days
Polonium 218
Alpha
3.0 minutes
Lead 214
Beta
Gamma
27 minutes
Bismuth 214
Beta
Gamma
20 minutes
Polonium 214
Alpha
160 microseconds
Lead 210
Beta
Gamma
21 years
Bismuth 210
Beta
Gamma
5 days
Polonium 210
Alpha
138 days
Lead 206
stable
*Microsec; 1/1,000,000 of a second
**Millisec; 1/1,000 of a second

After the uranium is extracted
85% of the radioactivity in the ore
Is left behind in the uranium tailings

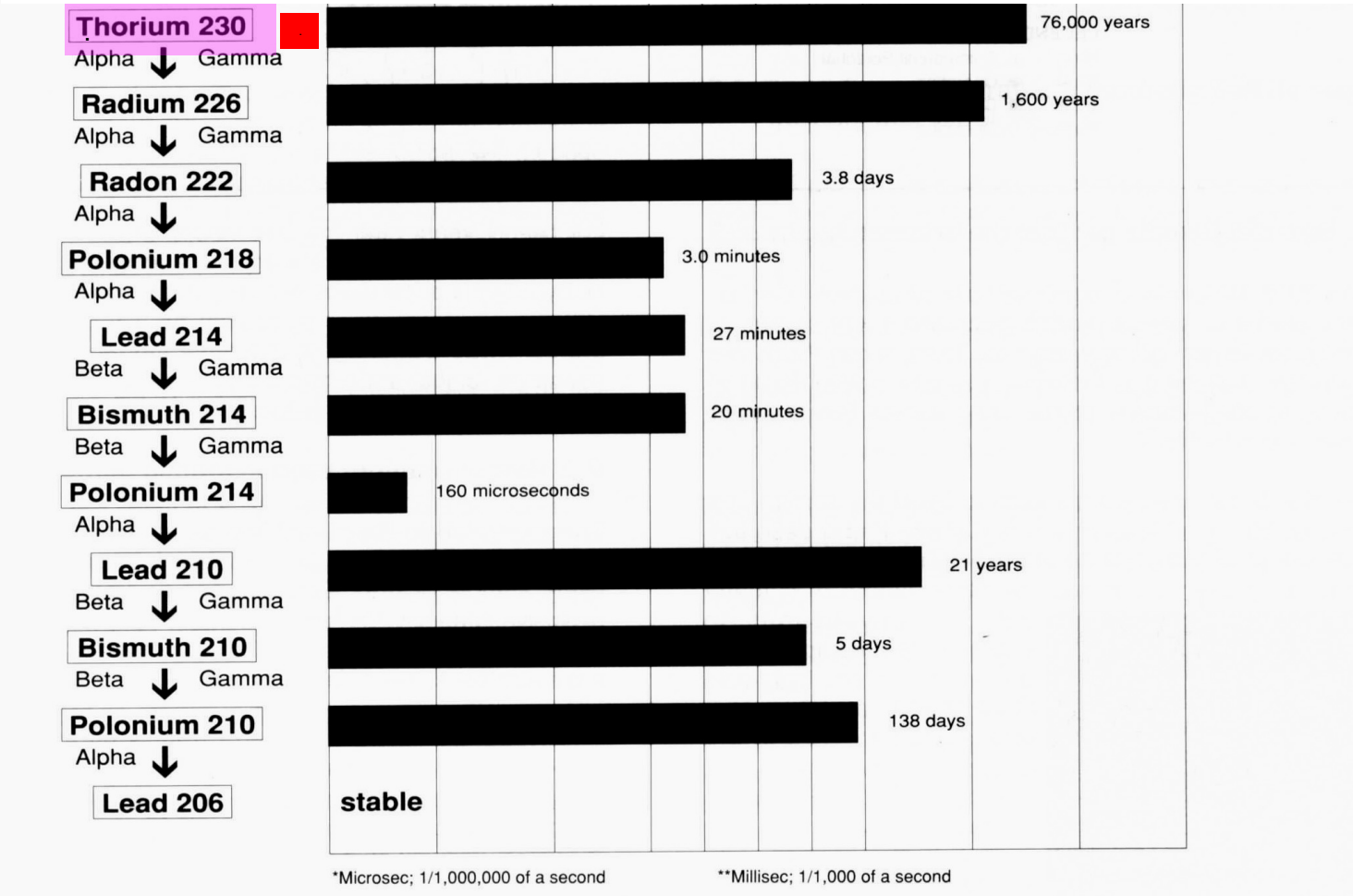
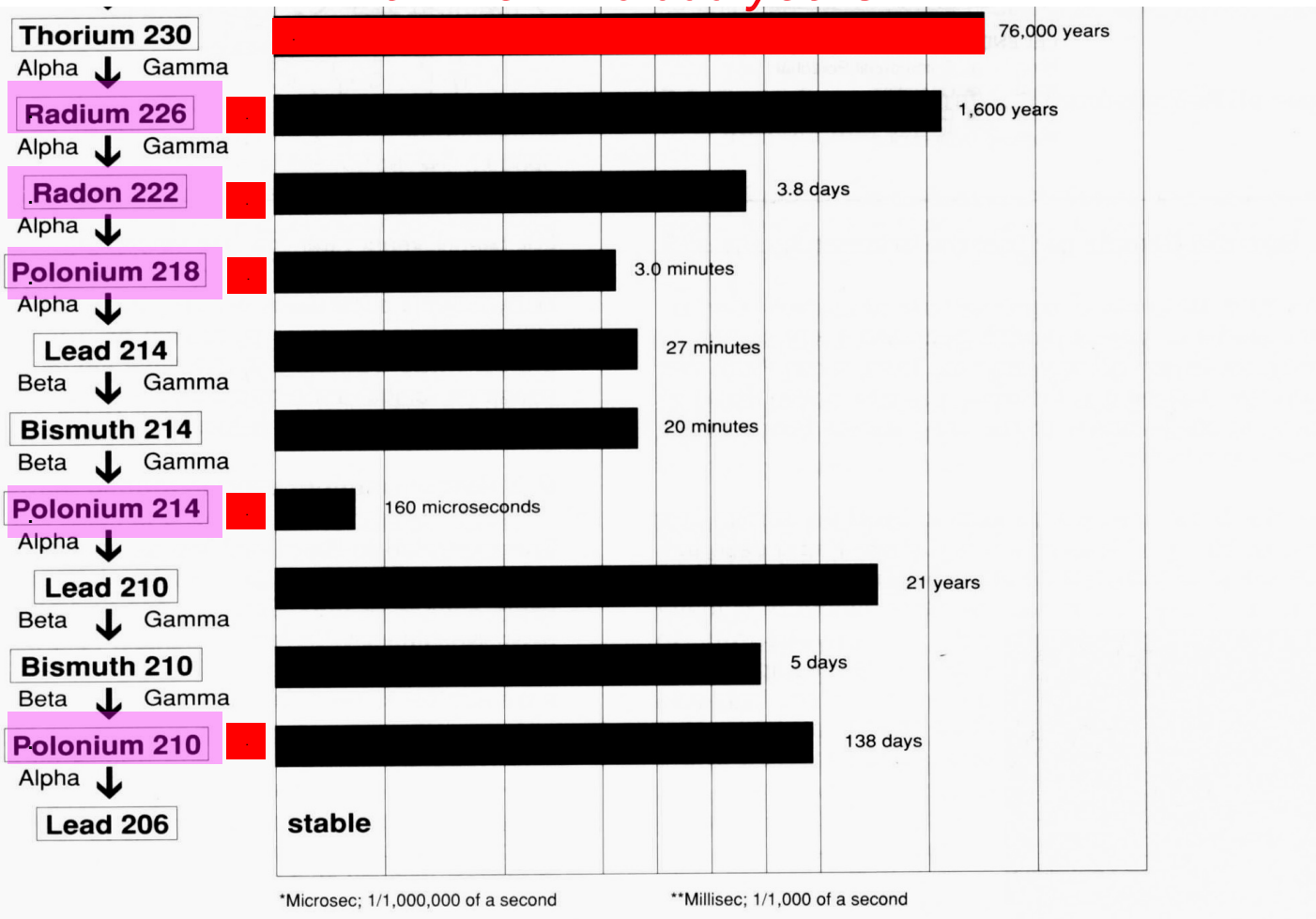


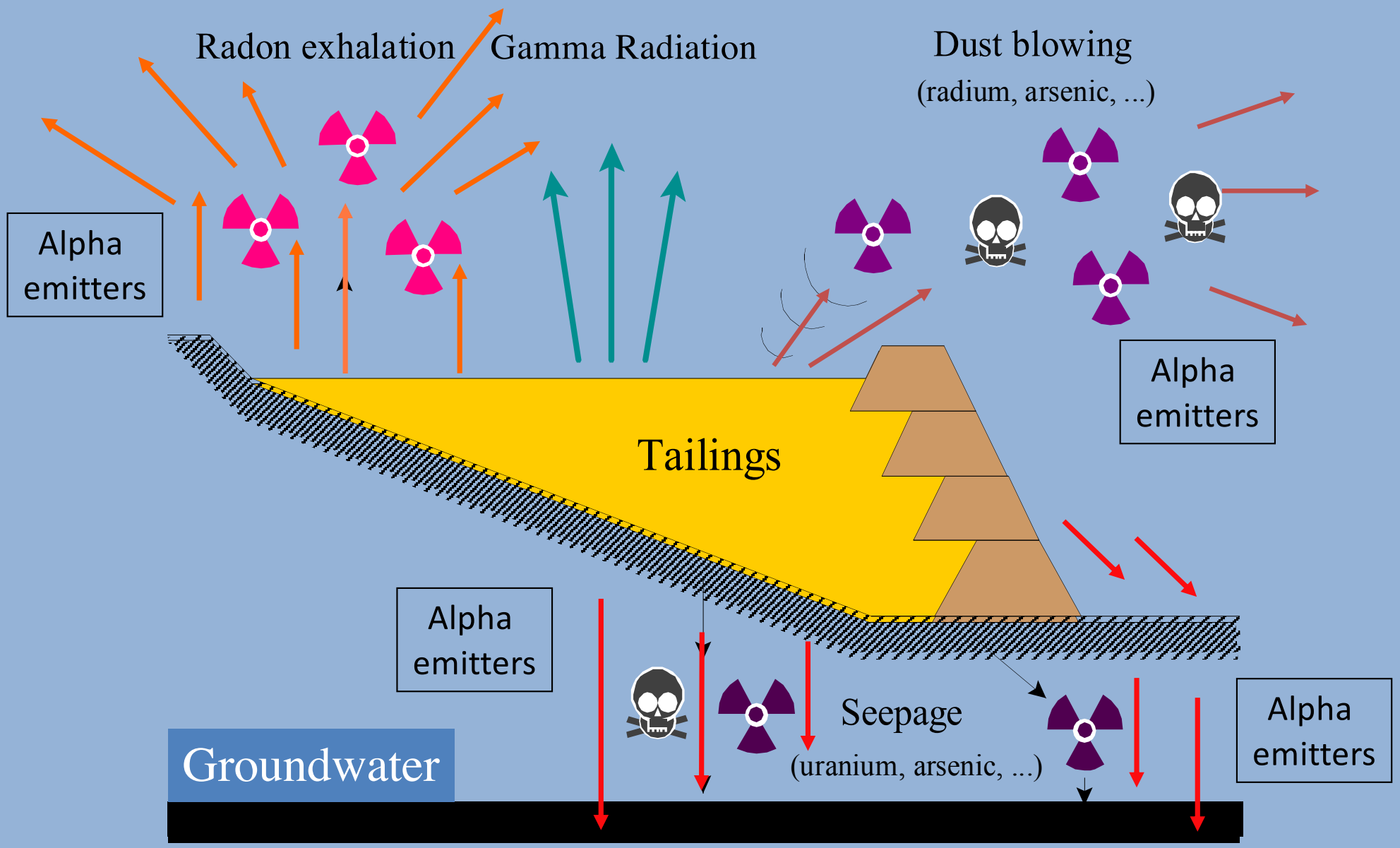
Photo: Robert Del Tredici

In the voluminous uranium tailings thorium-230 replenishes the inventory of radium, radon and polonium for hundreds of thousands of years

half life = 76 000 years



Uranium Mill Tailings Hazards



SECOND EXAMPLE OF SHAPE SHIFTING

nuclear fission in a

nuclear reactor

uranium atoms are
"split" producing
broken fragments -

- hundreds of new
radioactive elements

THIRD EXAMPLE OF SHAPE SHIFTING

Plutonium is created as a derivative of uranium *(along with other transuranics)*

Plutonium has become the primary nuclear explosive in the world's nuclear arsenals

Using plutonium as a nuclear fuel makes it more available for bombs