Public Understanding Activity for NPP in Japan

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JAIF International Cooperation Center (JICC)

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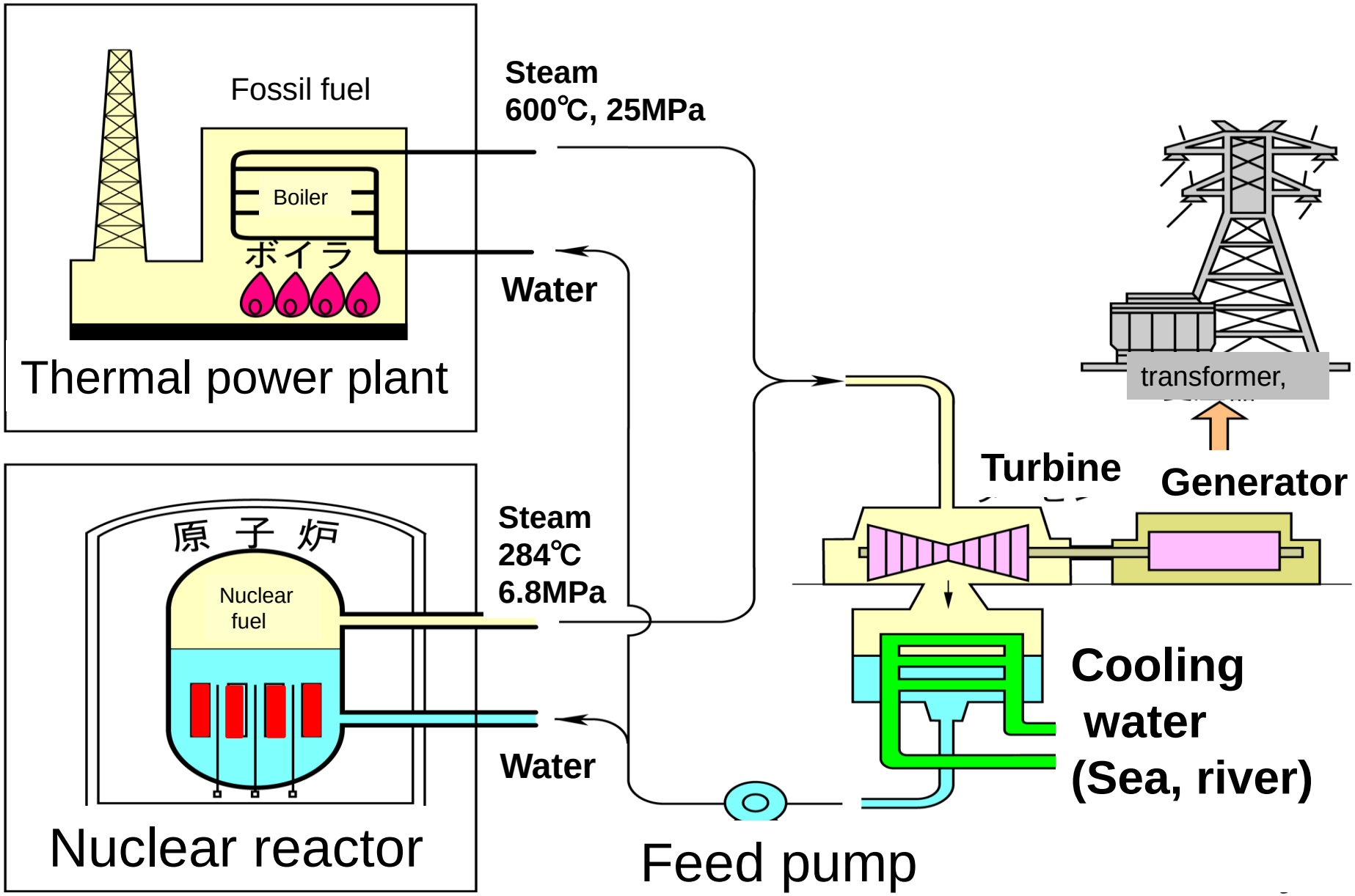
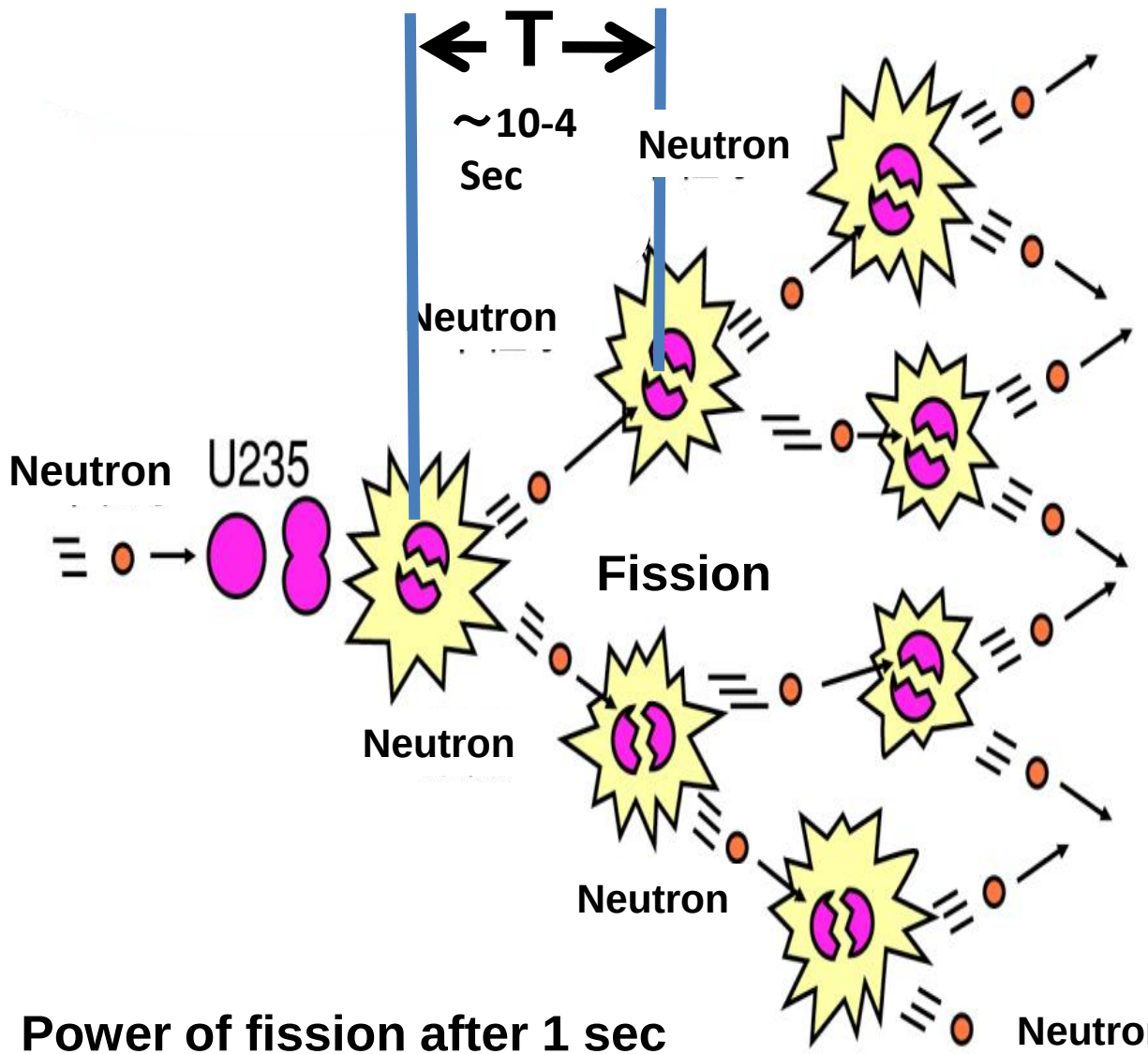
3. Radiations from many natural sources
4. Nice beach near NPPs in Japan

Nuclear Power Station and Thermal Power Station

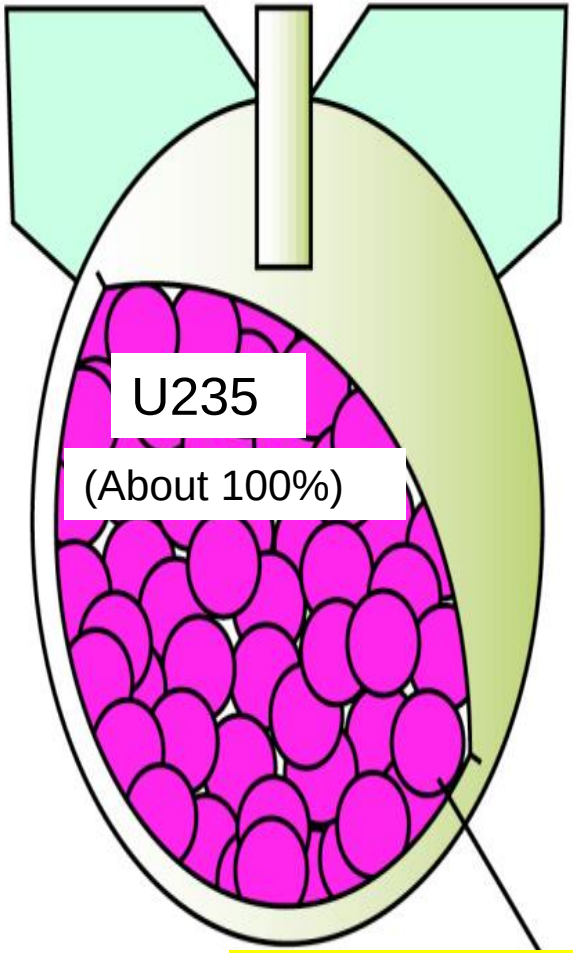


Nuclear Chain Reaction in Nuclear Bomb



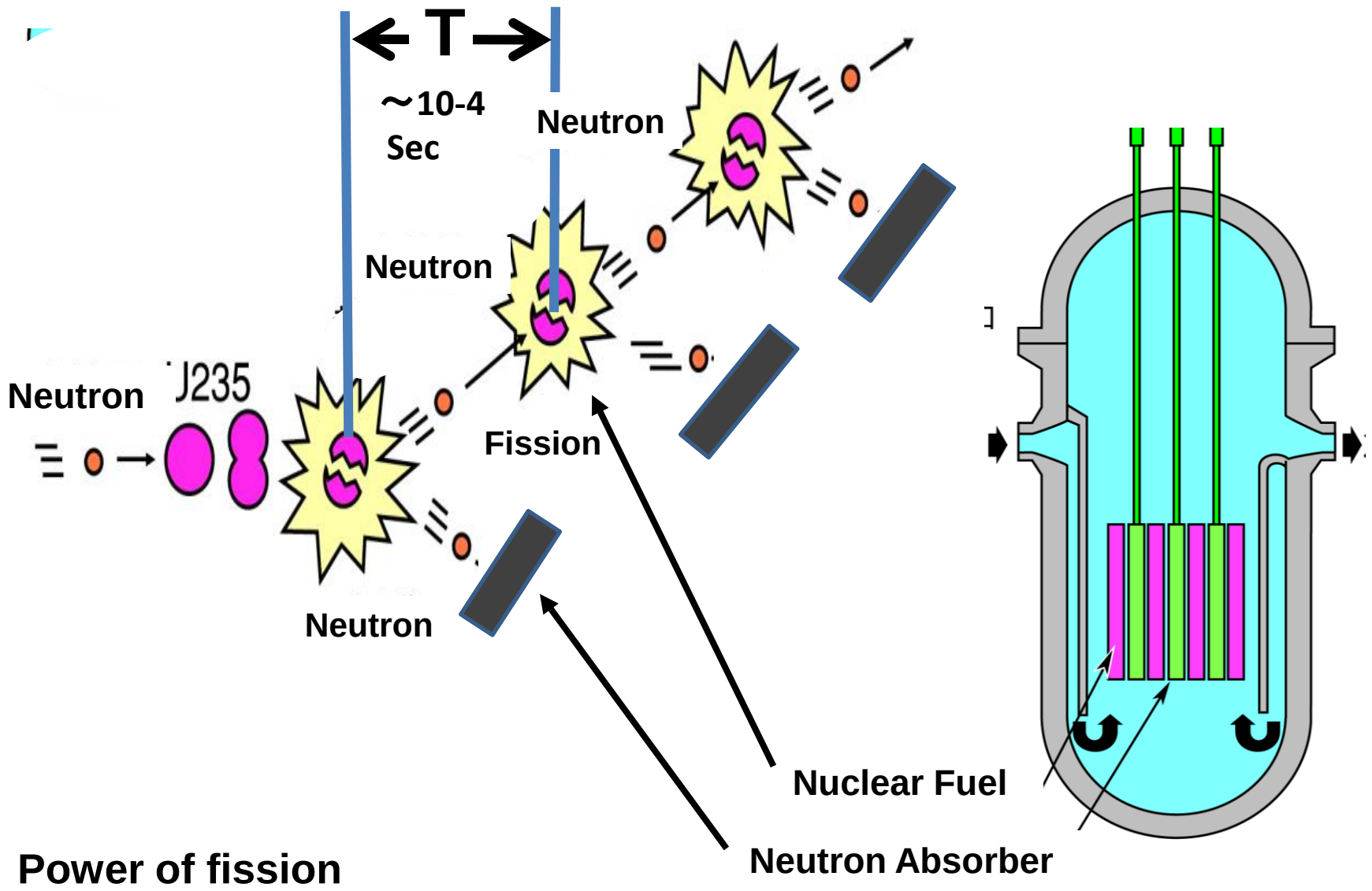
Power of fission after 1 sec

$$P = P_o\, 2^{t/T} = P_o\, 2^{1\,/\,0.0001} = P_o\, 2^{10000}$$



Nuclear bomb

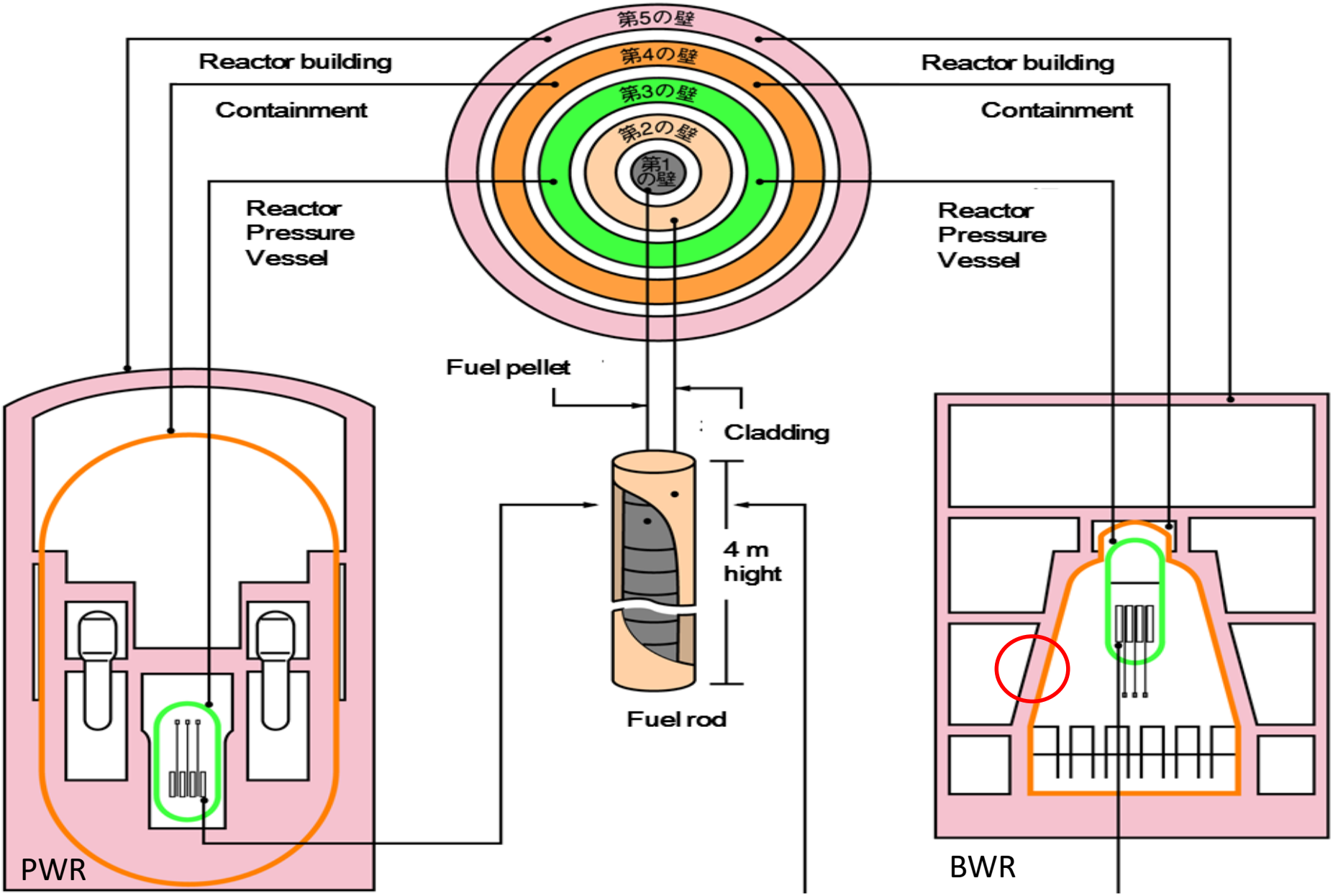
Nuclear Chain Reaction in Reactor



Power of fission

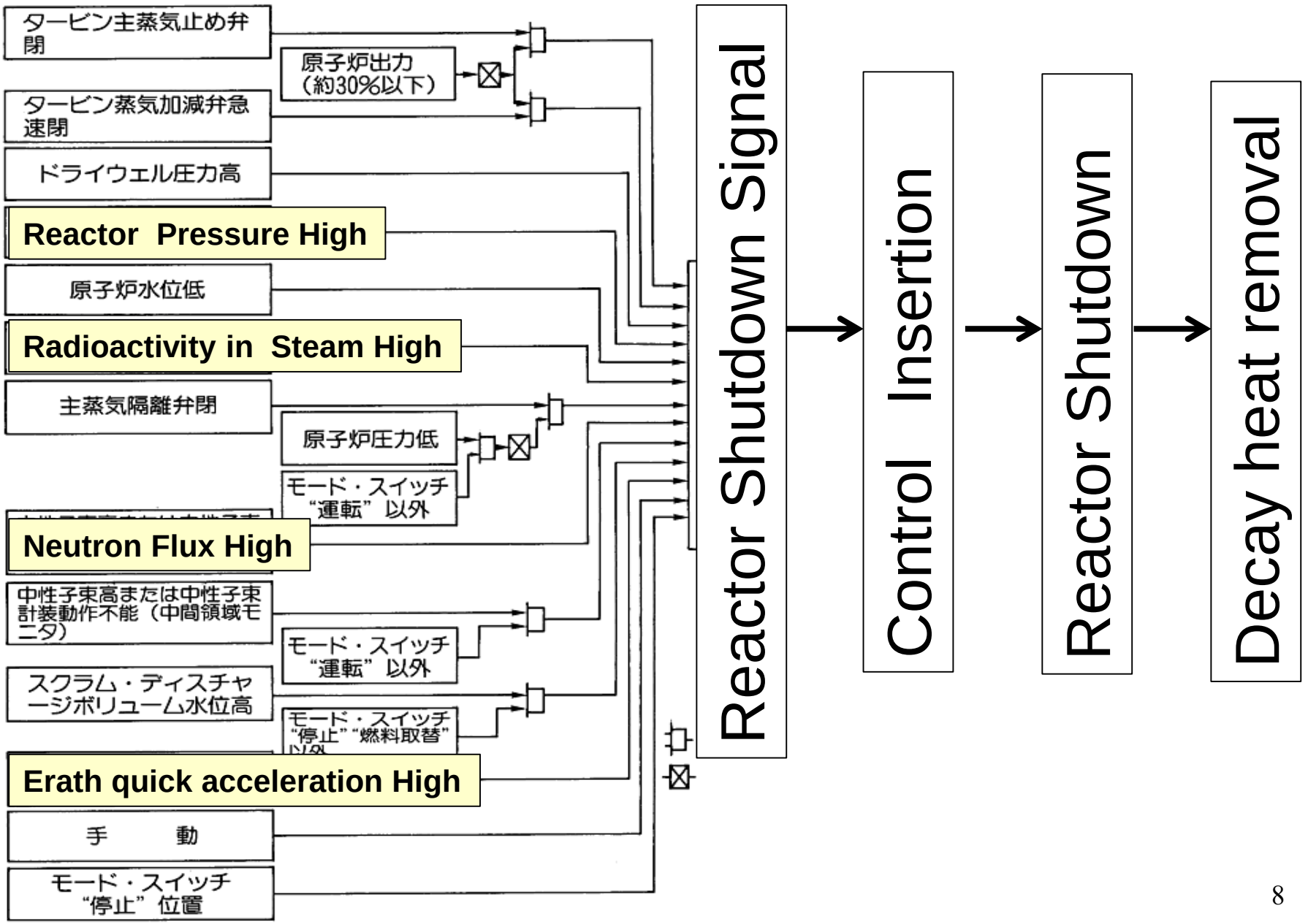
$$P = P_o\, 1^{t/T} = P_o\, 1^{\,1\,/\,0.0001} = P_o$$

Multi-walls to contain radioactive fission products



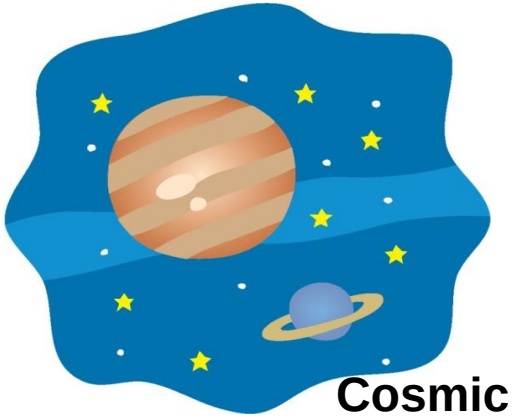
Concrete of containment vessel of BWR(about 2m)

Reactor Shutdown system



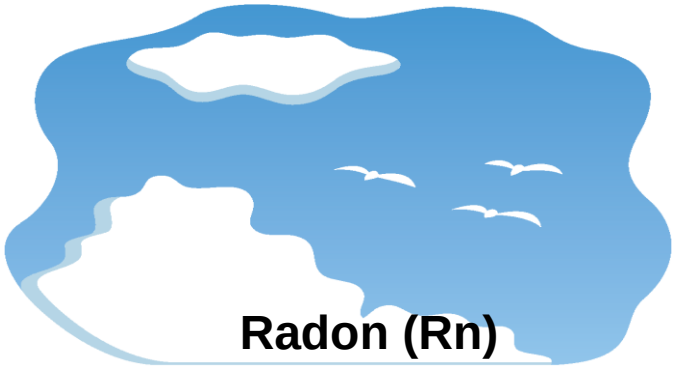
Natural Radiation Source

From Outer Space



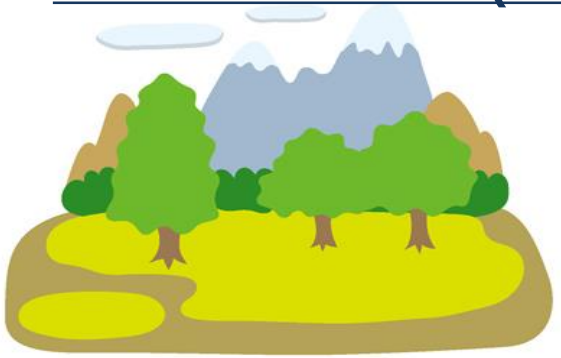
Cosmic rays

From Air



Radon (Rn)

From the Ground(rocks and soil)



Uranium(U),
Thorium(Th),etc.

From Foods

Potassium (K)

Effects of Radiation

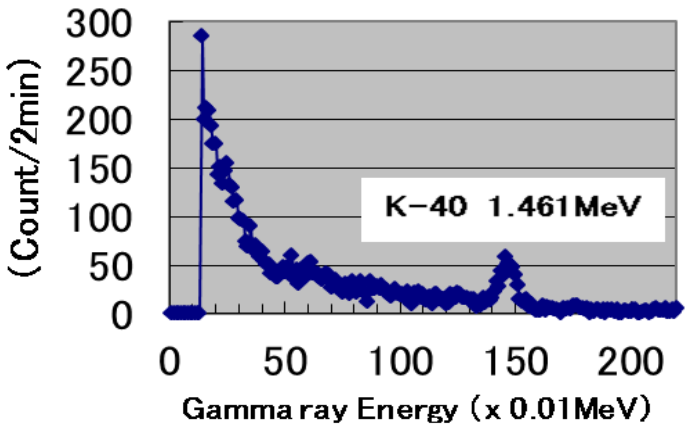
◆ **Natural radioactivity in human body and foods**

Potassium-40	4,000 Bq
Carbon-14	2,500 Bq
Rubidium-87	500 Bq
Lead-210 & Polonium-210	20 Bq

Radioactive materials in the body

(for an average Japanese weighing 60 kg)

NaI detector of d=20cm x2

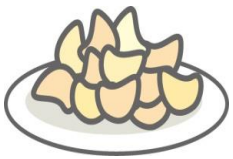


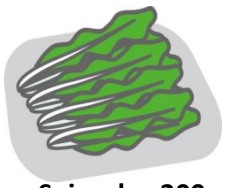
Measured amount of ^{40}K is 3000Bq in Yamashita's body

Potassium-40 ^{40}K in Japanese foods per kg (Bq/kg)

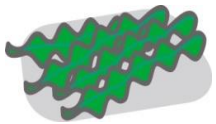

Dried Kelp 2,000


Dried Mushroom 700


Chips 400


Spinach 200


Beef 100

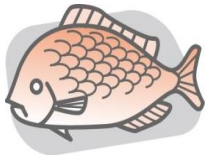

Soft Seaweed 200

Milk 50


Bread 30


Rice 30

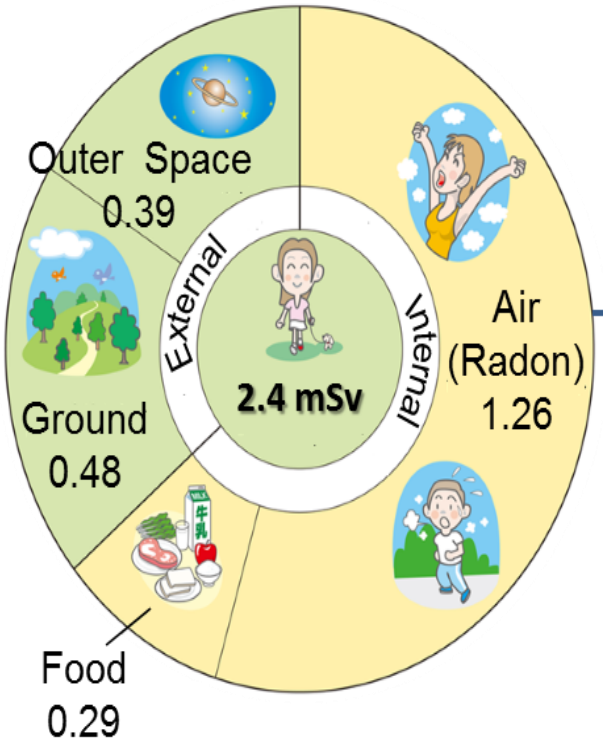
Beer 10

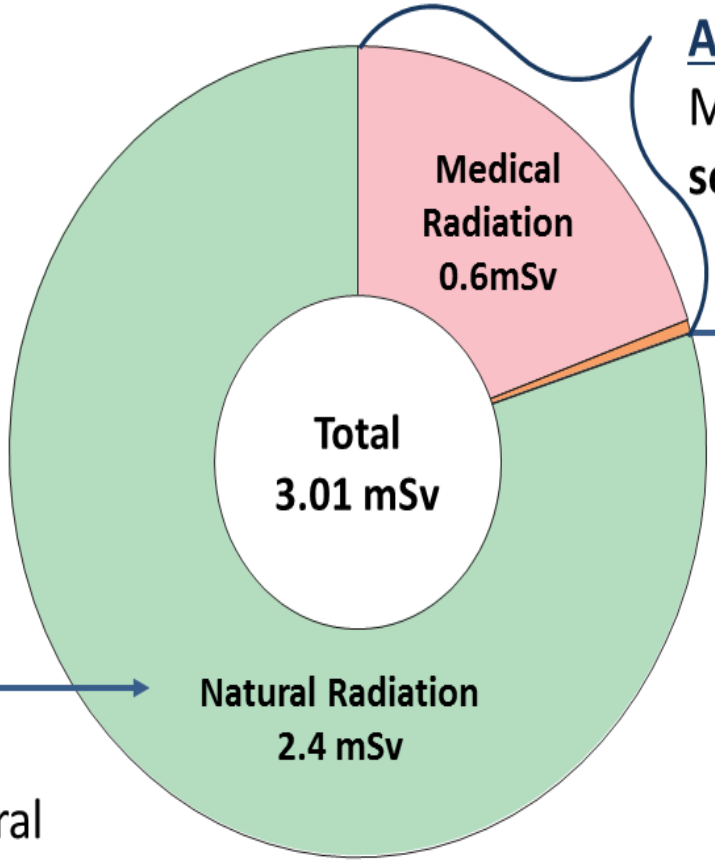

Fish 100

Source: Nuclear Safety Research Association "Research on environmental radiation data (1983)"

Radiation Doses from Natural and Artificial Sources

- The annual average dose in the world -





Artificial Source

Medical exposure is **selectable**.

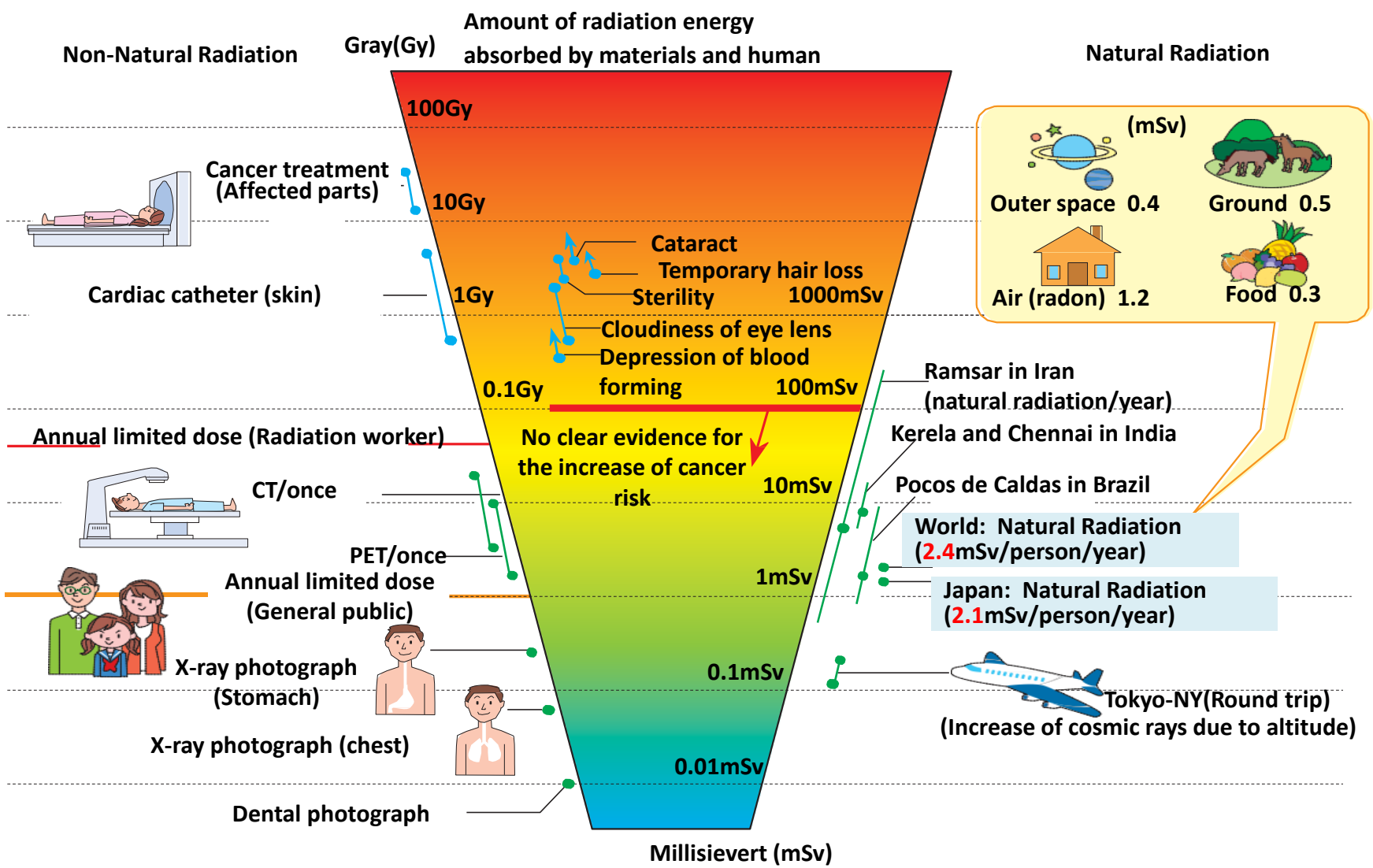
Natural Source

Exposure from the natural sources is **unavoidable**.

Atmospheric nuclear test	0.005 mS
Occupational exposure	0.005 mSv
Chernobyl accident	0.002 mSv
Nuclear cycle (Public)	0.0002 mSv

Effects of Radiation

Relationship between Radiation Levels and Health

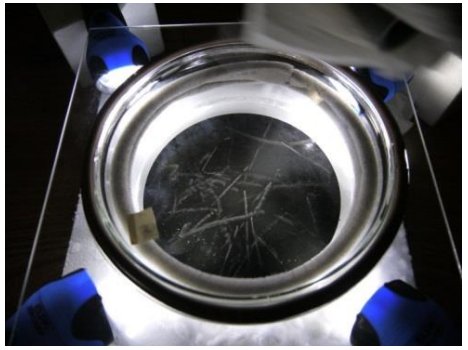


Radiation ricks (cancer, hereditary effects*) on human body

Source: Documents from National Institute of Radiological Sciences and others
http://www.mext.go.jp/b_menu/shuppan/sonota/attach/1344729.htm , http://www.nirs.go.jp

Sub-Working Group (1) : Discussion on
elementary - high school education

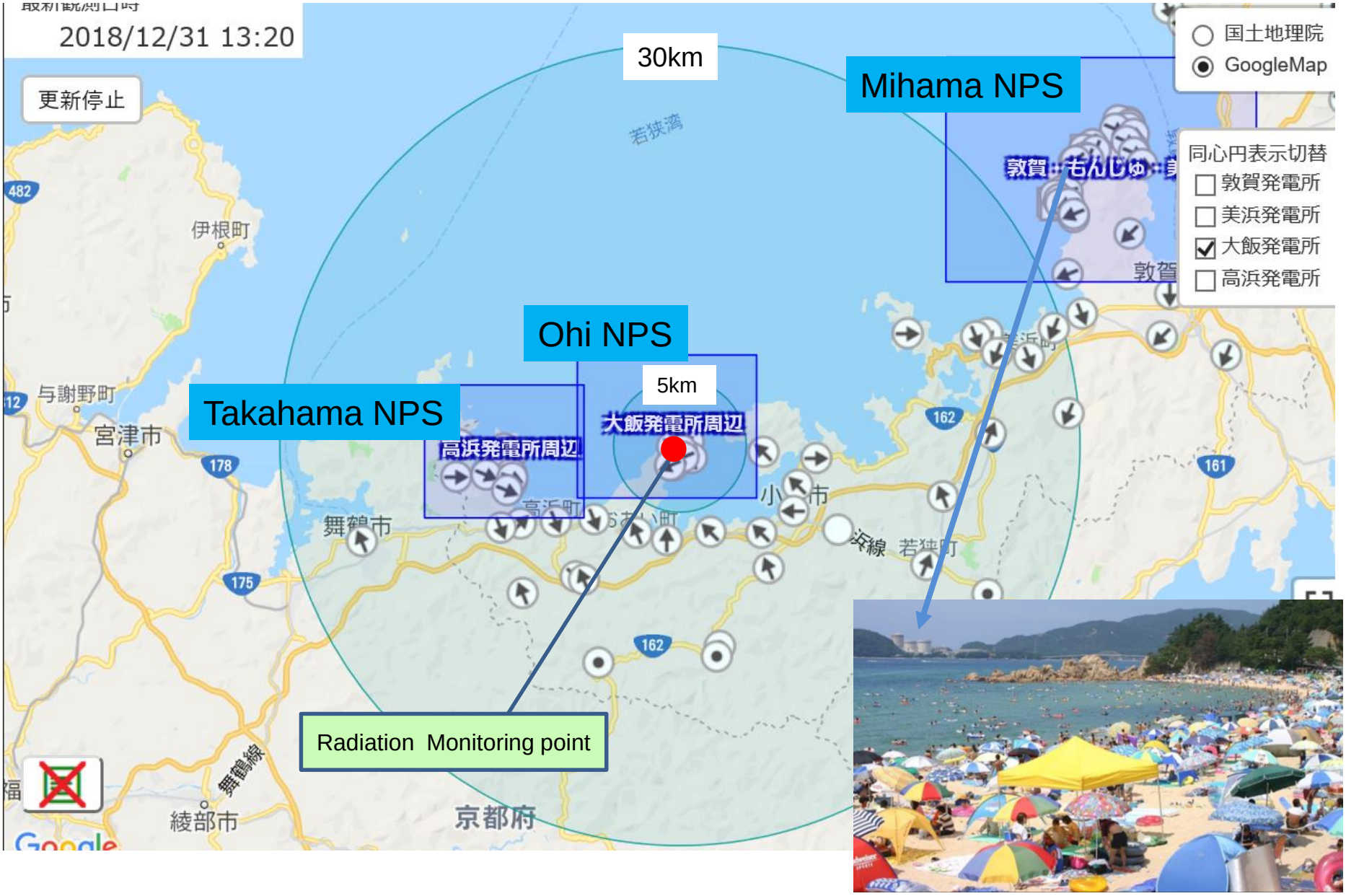
Training on radiation for teachers-in-future
(students at education fac. of university)



Radiation experiments for children

- Field radiation measurements

- Experiment with cloud chamber (above)


2018/12/31 13:20
更新停止
30km
5km
Mihama NPS
Ohi NPS
Takahama NPS
大飯発電所周辺
高浜発電所周辺
敦賀
もんじゅ
国土地理院
GoogleMap
同心円表示切替
敦賀発電所
美浜発電所
大飯発電所
高浜発電所
Radiation Monitoring point
若狭湾
伊根町
与謝野町
宮津市
舞鶴市
綾部市
小浜市
若狭町
京都府
舞鶴線
482
178
175
162
161

Radiation Monitoring point in Ohi NPS site MP4

簡易帳票

縦軸最大値： auto μSv/h

空間放射線量率 前年度最大値
降水量 感雨

Ambient radiation dose rate
空間放射線量率（μSv/h）

0.10
0.08
0.06
0.04
0.02
0.00

No increase in ambient radiation dose after operation of NPPs

0.05μSv/h x24h x365days =0.44mSv/year

Restart of unit No.4 1180MW

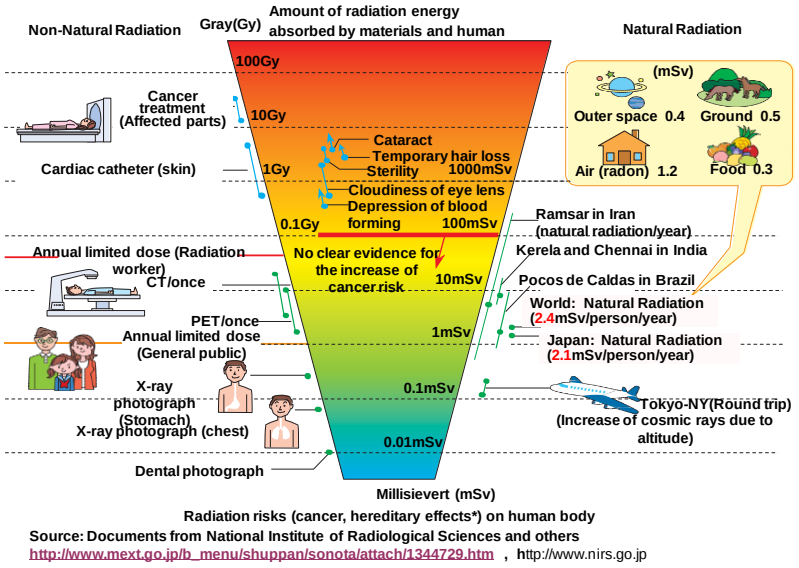
Restart of unit No 3 1180MW

2018/01 2018/03 2018/05 2018/07 2018/09 2018/11

2017/12/31～2018/12/30

Conclusion

1. NPPs posses many safety feature and are totally difference from Nuclear bomb
2. Everybody experiences radiations from natural sources
3. Nice beach is near NPPs in Japan



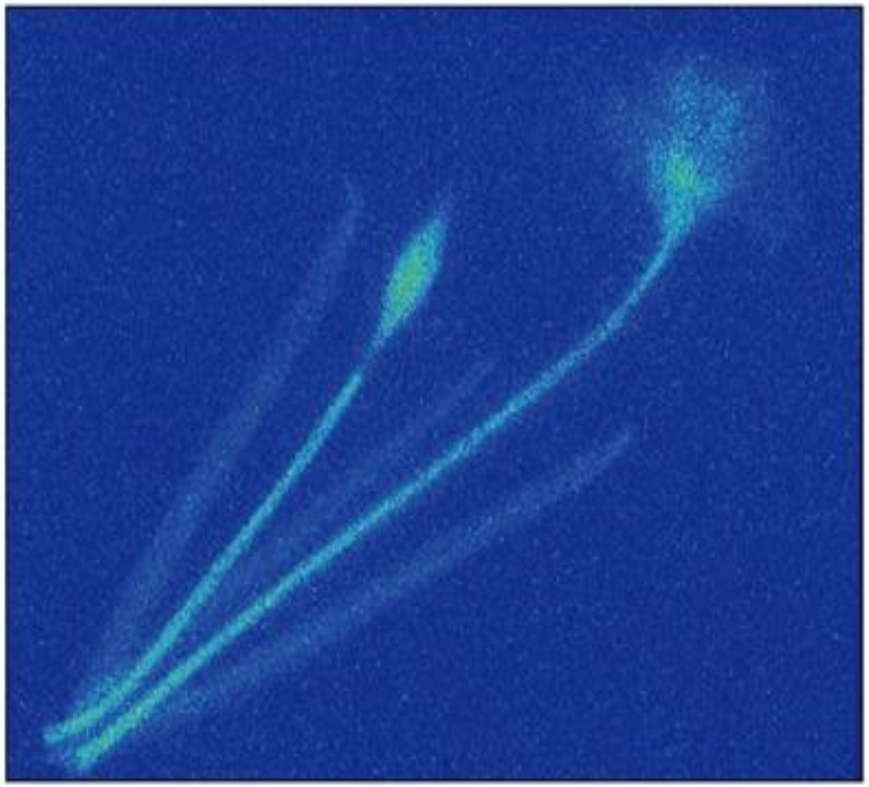
It is difficult to fear something justly.

It is easy to fear something too little, or too much for radiation. But it seems rather difficult to fear the radiation justly.

--TERADA Torahiko (1935) (translation from Japanese).

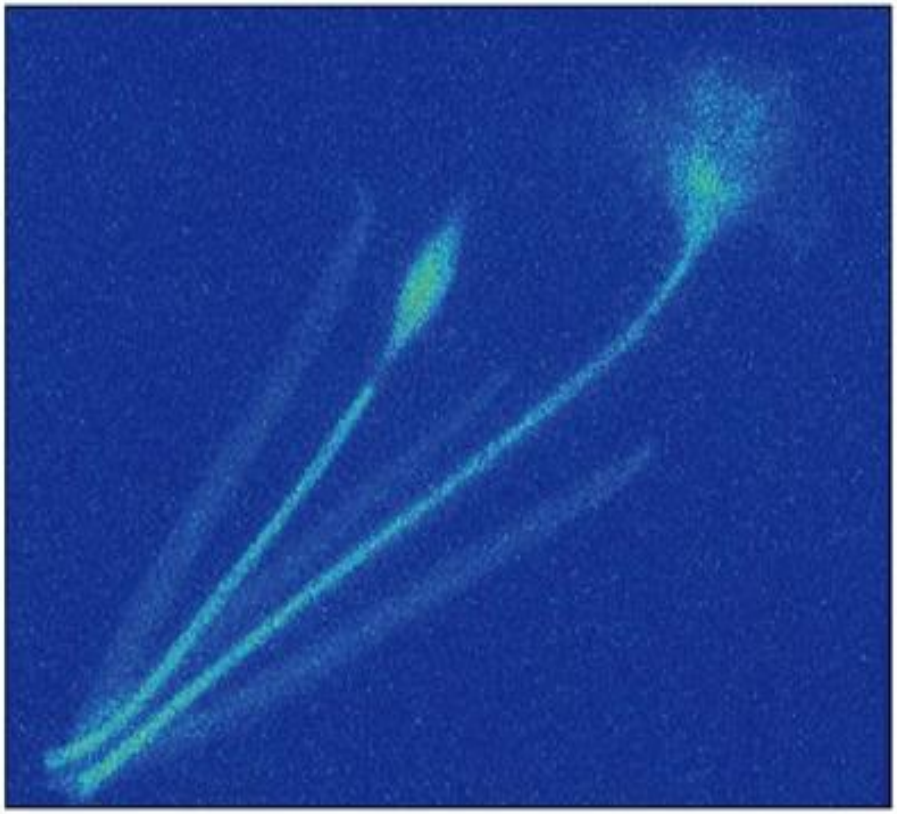

Thank you for opening your eyes
Please visit Japan.

Mysterious World of Radiation

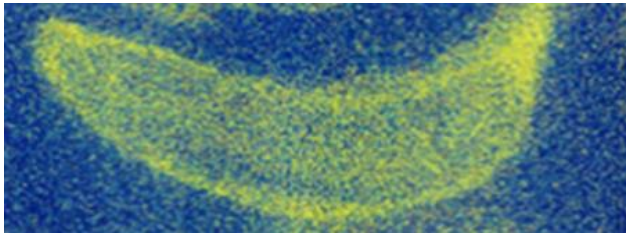


Radiation from Plants

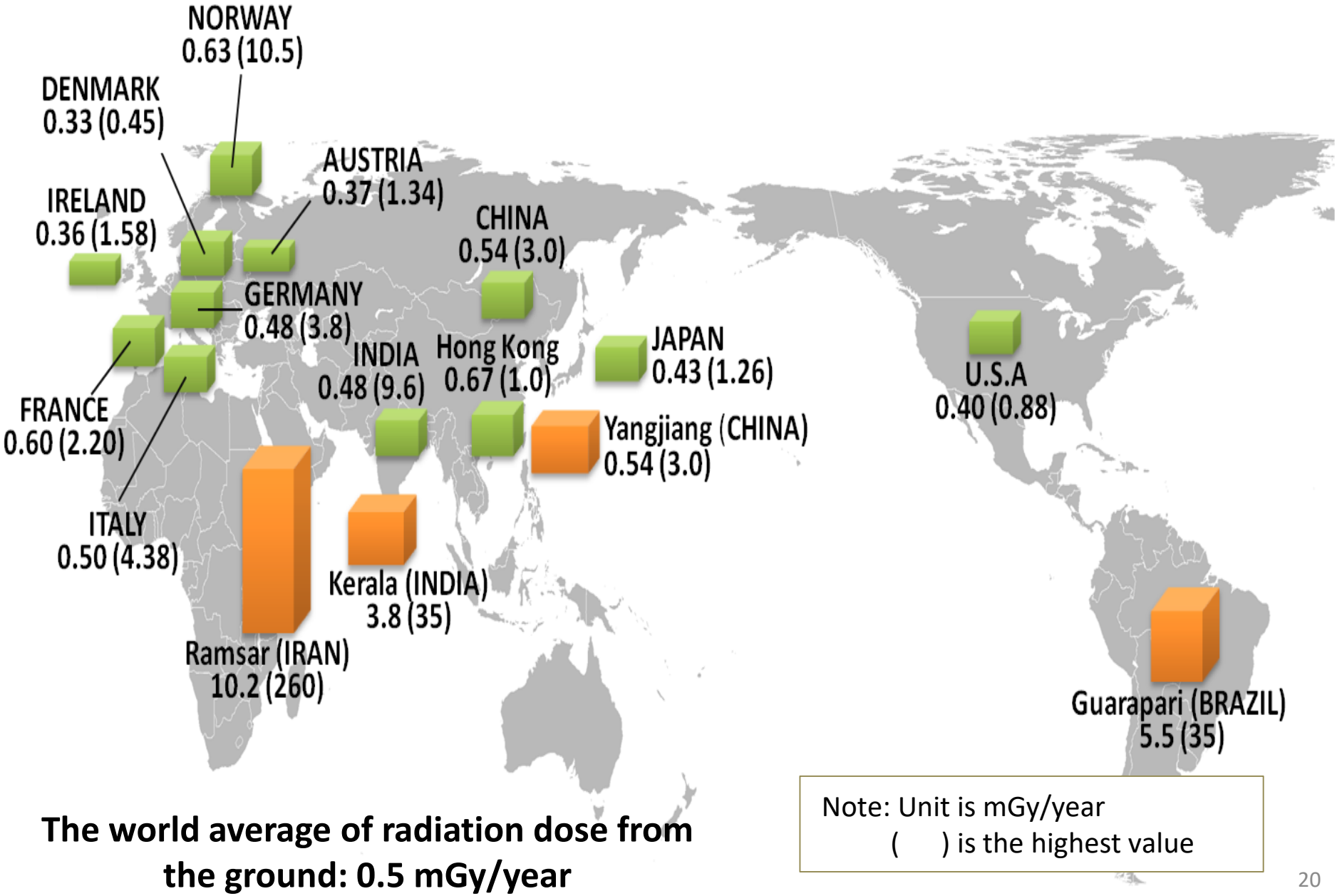
The more radiation the flower emits, the brighter the colour is shown on the plate.



Potassium K is contained in plants. K contains 0.012% of ^{40}K emitting radiation. Half-life is 1.3 million years



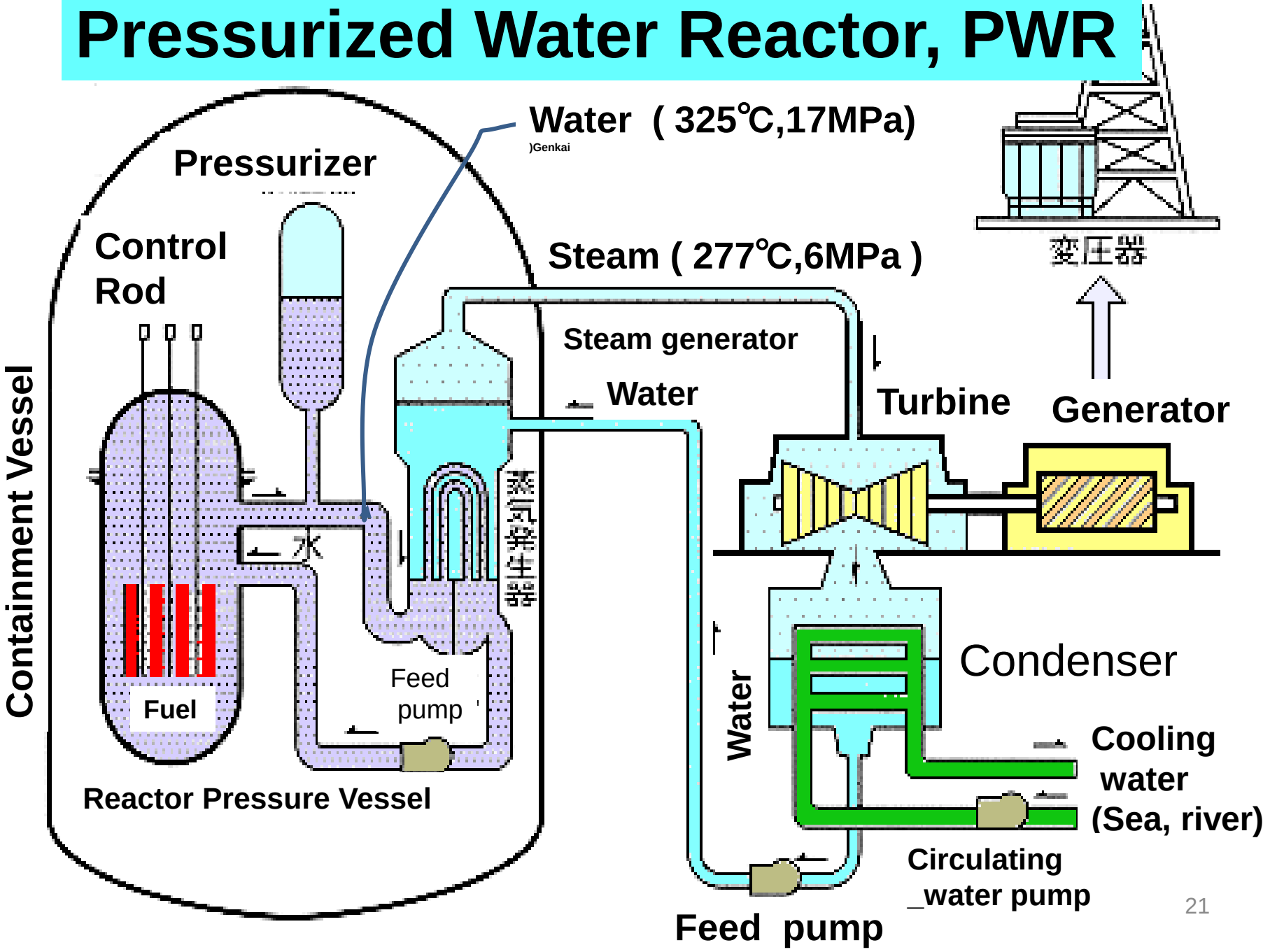
Radiation dose in the World (from the ground)



The world average of radiation dose from the ground: 0.5 mGy/year

Note: Unit is mGy/year
( ) is the highest value

Pressurized Water Reactor, PWR



Comparison of Risk factors

Risk factor	Cancer Risk
Radiation exposure: 1000 ~ 2000mSv	1.8 times
Smoking Drinking (540cc of Japanese sake /day)	1.6 times
Underweight	1.29 times
Overweight	1.22 times
Radiation exposure: 200 ~ 500mSv	1.19 times
Lack of exercise	1.15 ~ 1.19 times
High salt intake	1.11 ~ 1.15 times
Radiation exposure :100 ~ 200mSv	1.08 times
Poor diet (lack of vegetable)	1.06 times

Reference

[Relative risk of cancer by radiation and lifestyle]

The table below is the survey result published by National Cancer Center in Japan. The table indicates that how many times cancer risks increase (relative risk) by comparing between a target group and a control group (e.g. smokers and non-smokers).

Source: Japan Radioisotope Association “Radiation’s ABC(2011)” and others