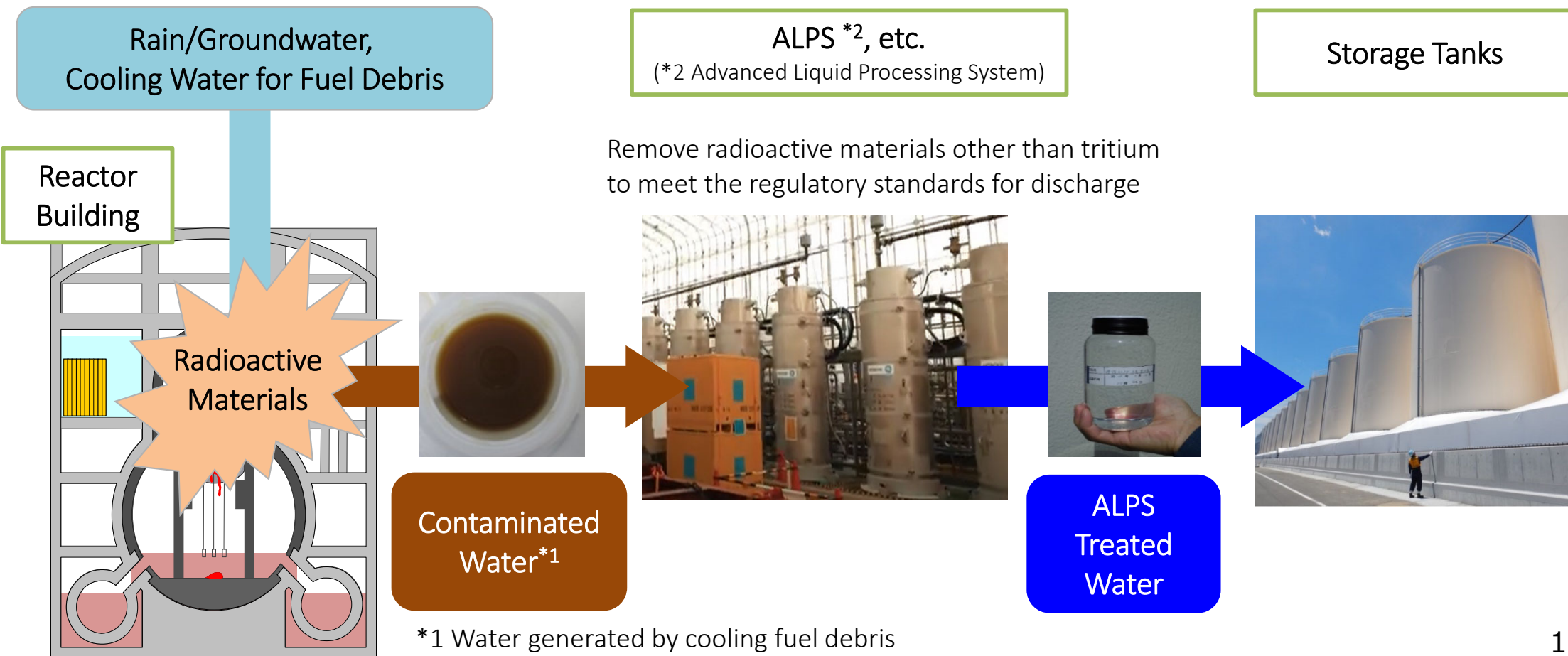


# What is “ALPS treated water”?

- “ALPS treated water” is the water which has been purified from contaminated water<sup>\*1</sup> and in which the radioactive materials are removed by ALPS<sup>\*2</sup> to meet the regulatory standards with an exception of tritium.
- The number of storage tanks on the site exceeds a thousand, which could be an obstacle to secure a site for the planned decommissioning of the plant.



# How to discharge the ALPS treated water into the sea

- Concentrations of the radioactive materials will be far below the regulatory standard values by 1) purifying/re-purifying the radionuclides other than tritium; and 2) diluting by sea water.
- Discharge into the sea at the Fukushima Daiichi NPS will be monitored/reviewed by third parties such as International Atomic Energy Agency (IAEA).

Approx. 70% of water in the tanks contain nuclides exceeding the regulatory standards

The water will certainly be purified to meet the regulatory standards (other than tritium)

Tritium will be less than 1,500 Bq/L; and the nuclides other than tritium will be less than 1% of regulatory standards

Regulatory Standards of Tritium

60,000 Bq/L

$\frac{1}{40}$

WHO Standards for Drinking Water

10,000 Bq/L

1,500 Bq/L

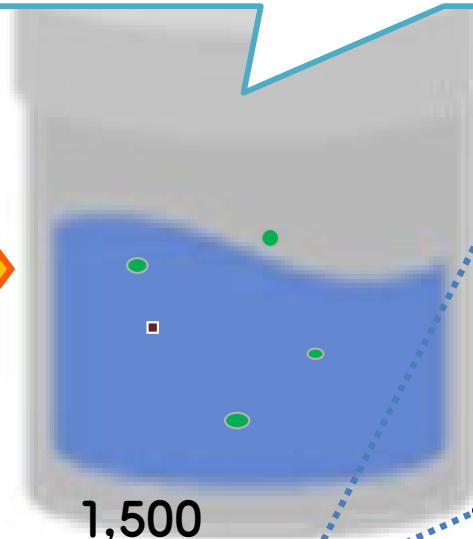
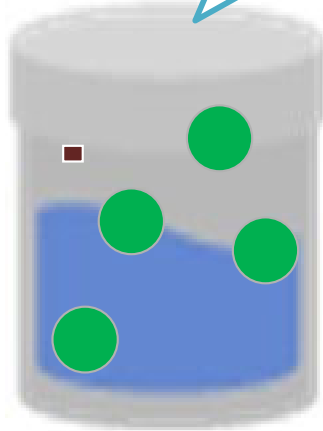
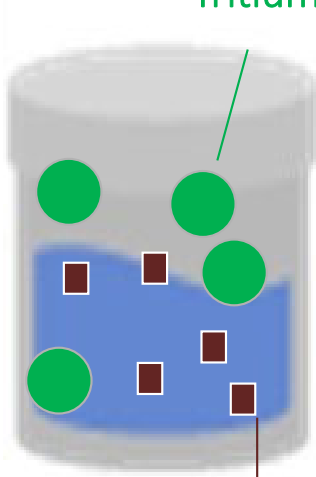
$\frac{1}{7}$

dilute more than 100 times by sea water

re-purify

Tritium

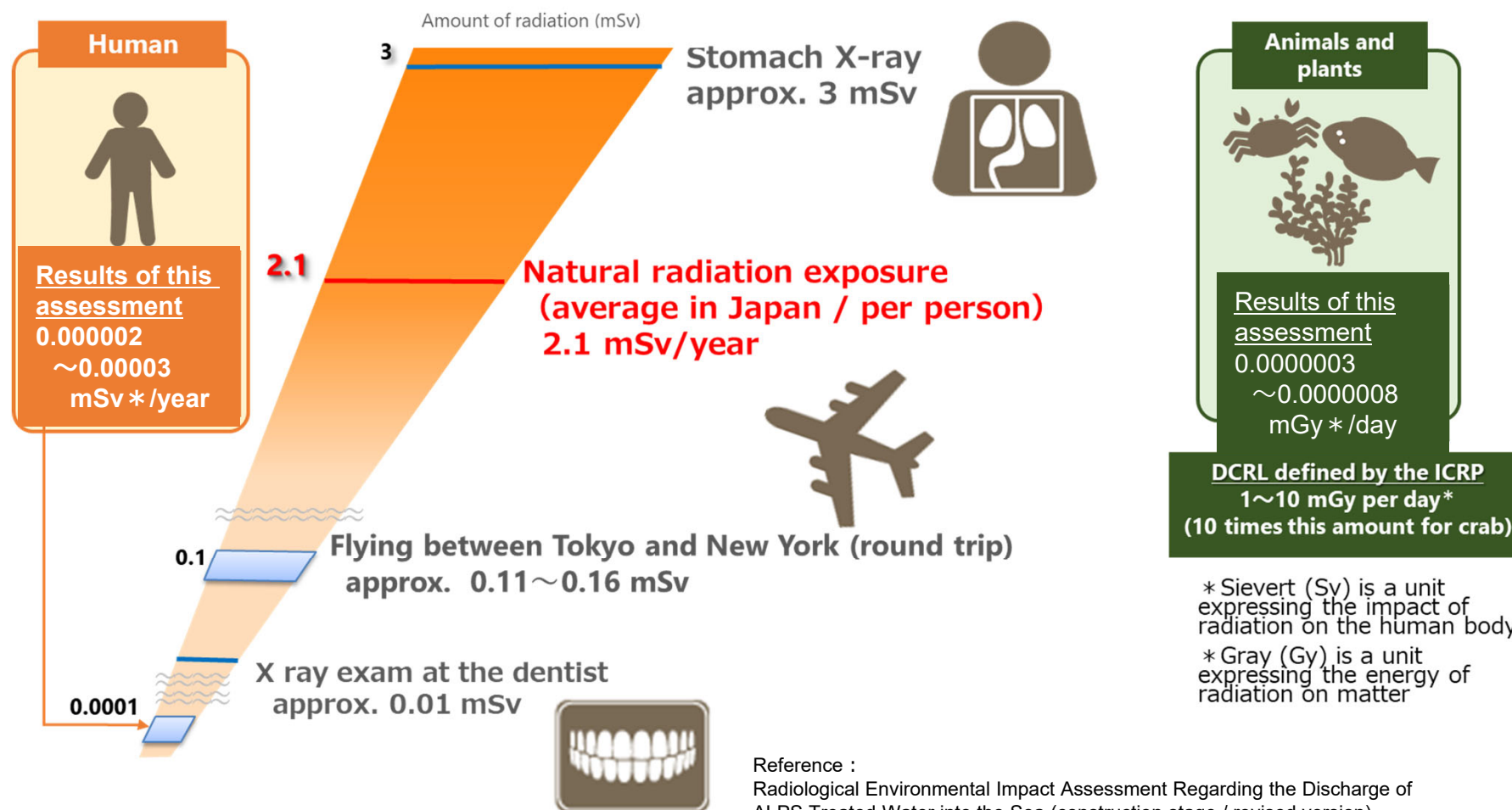
Cobalt, Cesium, etc.



# The radiological impact on the public and the environment

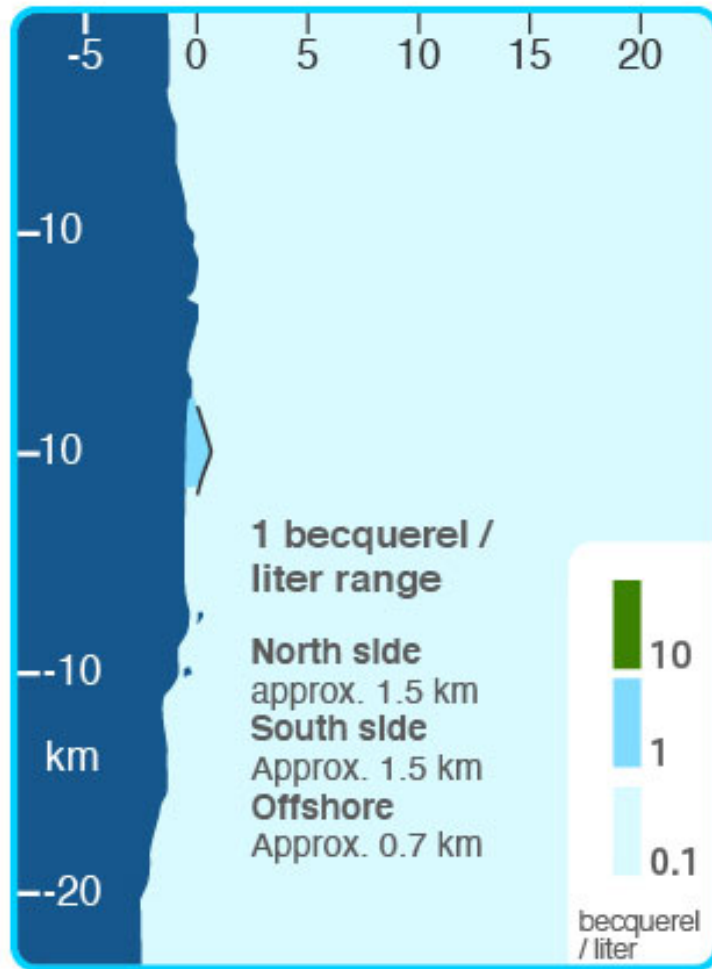
## ◆ The results showed that effects on the public and the environment were minimal.

- ① Results of the assessment on the public found that the exposure dose was approx. 1/1,000,000 to approx. 1/70,000 of natural radiation exposure (average in Japan : 2.1 mSv/year).
- ② Results of the assessment on animals and plants (flatfish, brown seaweed) found that the exposure dose was approx. 1/3,000,000 to approx. 1/1,000,000 of the derived consideration reference level (DCRL) defined by the ICRP. (In the case of crab, approx. 1/30,000,000 to approx. 1/10,000,000)

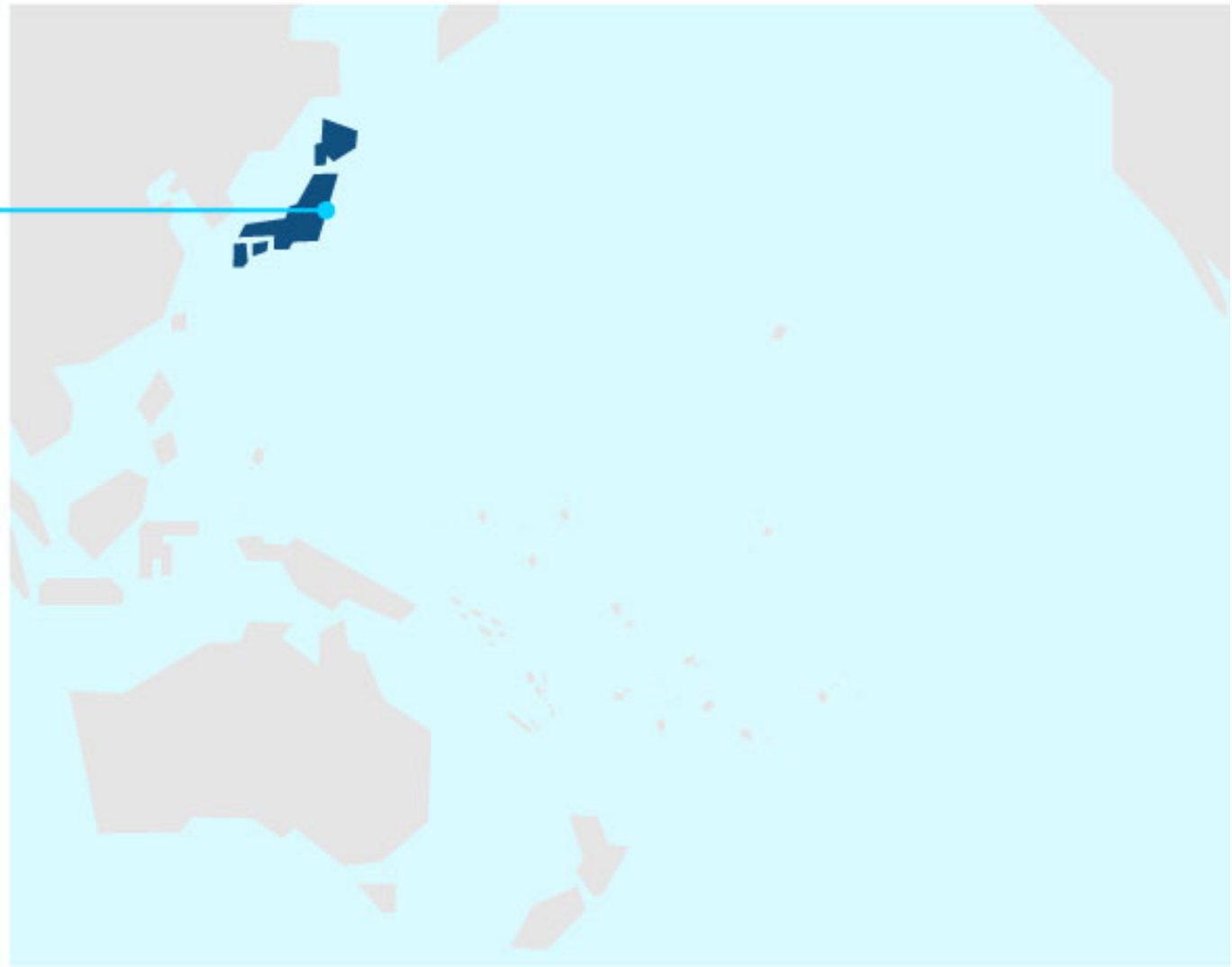


# Diffusion Simulation in the sea

- According to the diffusion simulation, the concentration of tritium will be almost the same as the level of the natural sea water.



Discharged amount:  
22 trillion becquerels/year



# What is tritium?

- As a relative of hydrogen, tritium exists in nature, and is found in rain, sea and tap water, as well as inside of our body as a form of tritiated water.
- Tritium emits weak radiation, which can be blocked by a sheet of paper. It is not accumulated in human body and is excreted together with water from the body.
- It is very difficult to remove tritium from water, since it has the same properties as hydrogen.



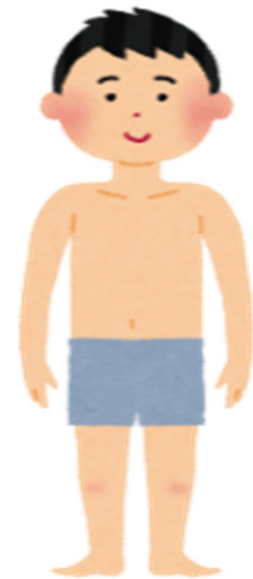
**Tap water**

$\simeq 1 \text{ Bq/L}$



**Rain in Japan**

**= 220 Trillion Bq/year**

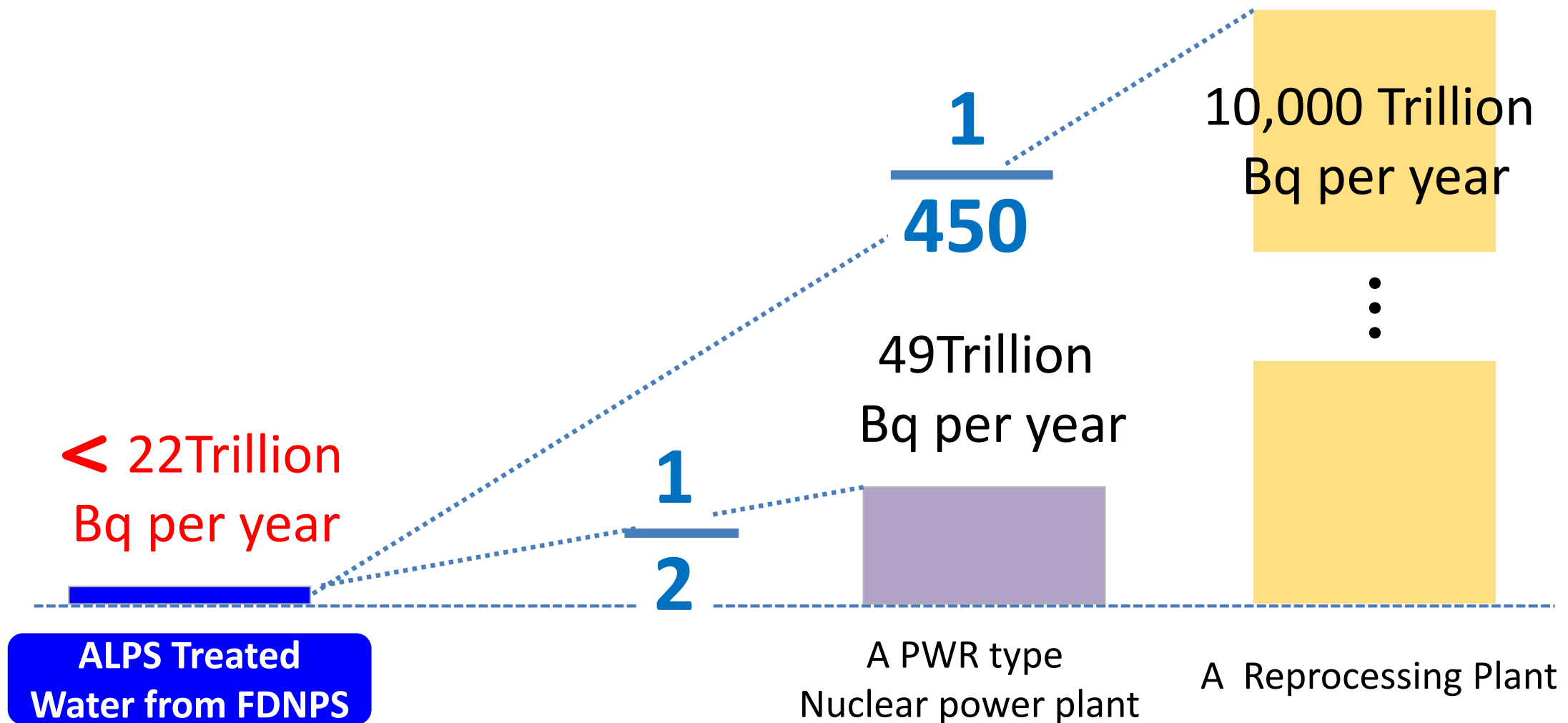


**Human body**

**Tens of Bq**

# Annual amount of tritium discharge: comparison with other countries

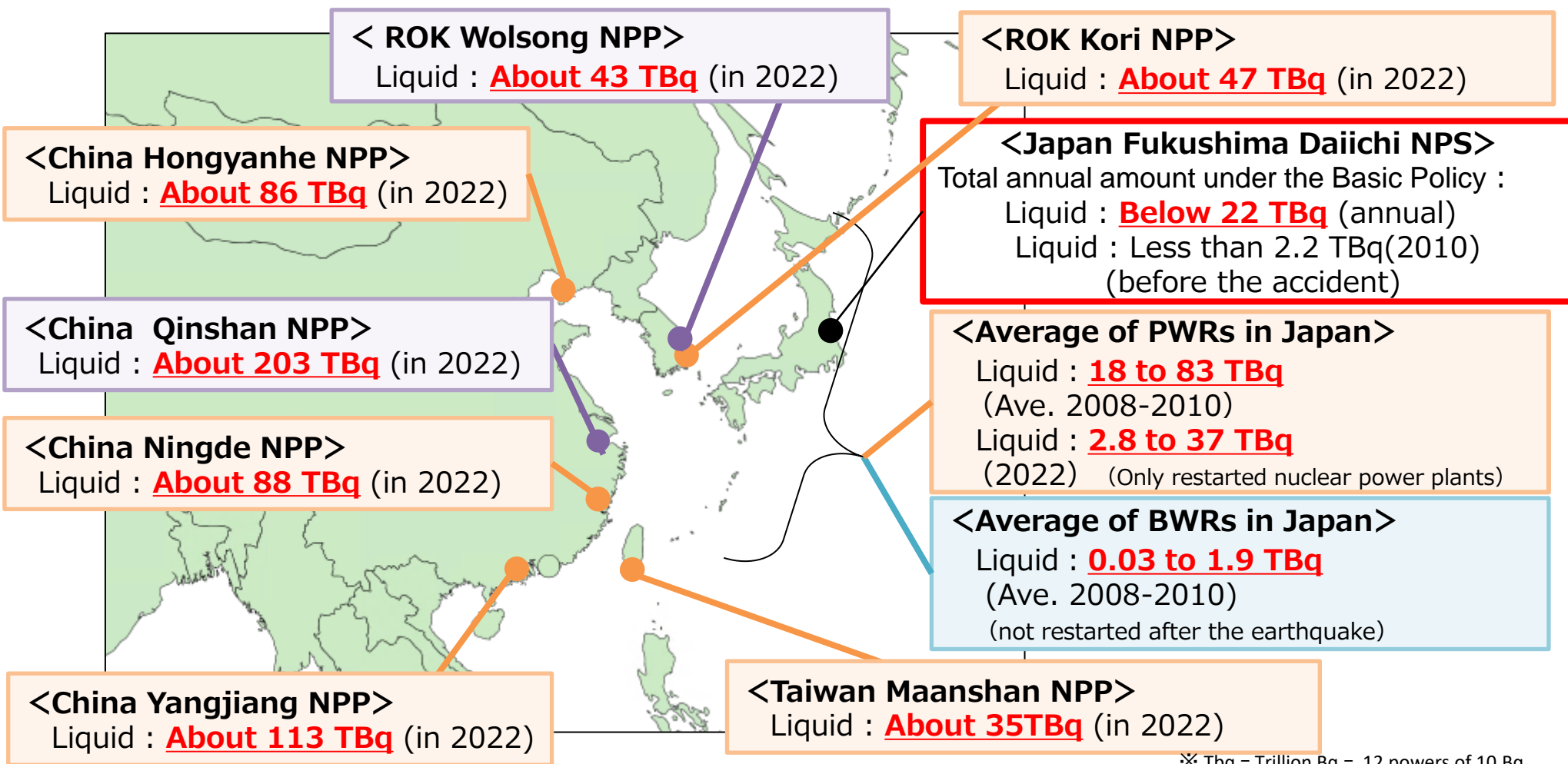
- The total annual amount of tritium to be discharged will be at a level below the operational target of the FDNPS before the 2011 nuclear accident (22 Trillion Bq/year), which is lower than the ones of many nuclear facilities both at home and abroad (see the diagram below).





# Ref. Annual amount of tritium discharged in East Asia

- At nuclear facilities both at home and abroad, tritium is discharged as liquid waste into rivers and the sea etc.\*, and also into the atmosphere through the ventilation process, in compliance with the domestic laws and regulations.
- \*Discharge from vessels etc. into the sea is prohibited by the London Convention.



※ TBq = Trillion Bq = 12 powers of 10 Bq

Source : JNES, NRA Japan, KHNP website, China Nuclear Energy Association, Taiwan Power Company website

BWR: Boiling Water Reactor

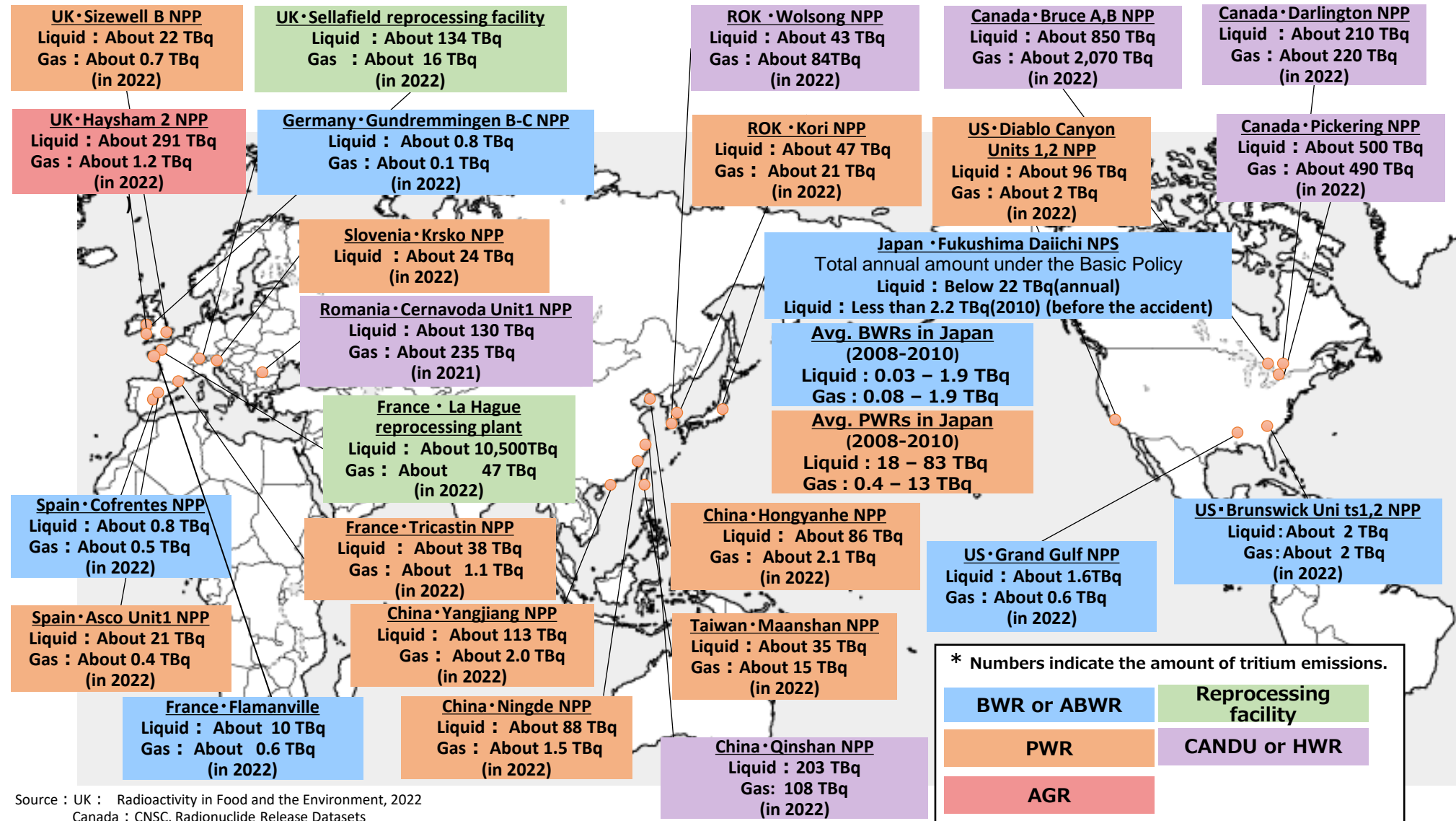
PWR: Pressurized Water Reactor

CANDU: Canada Deuterium Uranium

# Ref. Annual amount of discharge of tritium over the world

- At nuclear facilities in the world, tritium is discharged as liquid waste into rivers and the sea etc.\*, and also into the atmosphere through the ventilation process, in compliance with the laws and regulations of each country and region.

\*Discharge from vessels into the sea is prohibited by the London Convention



Source : UK : Radioactivity in Food and the Environment, 2022  
Canada : CNSC, Radionuclide Release Datasets  
Other countries and regions : Prepared from reports published by electricity providers in various countries and regions.

<Ref.>  $1 \times 10^{12} \text{Bq} \approx \text{about } 0.019 \text{g}$  (Tritiated water)