Research trends of Drinking Water Quality Management in Japan

JST-NSERC Workshop on
Sustainable Water Use

Venue: Fujisoft Akiba Plaza, Tokyo, Japan
Dates: 21st & 22nd October 2013

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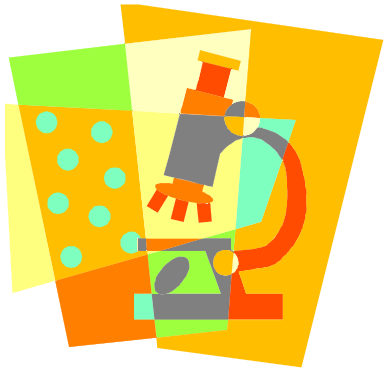
National Institute of Public Health

Contents

1. Trends in drinking-water quality issues in Japan
2. Radioactive nuclides in the nuclear accident
3. Perchlorate contamination and counter measures
4. Formaldehyde precursor - Huge contamination in Tokyo area
5. Risk management



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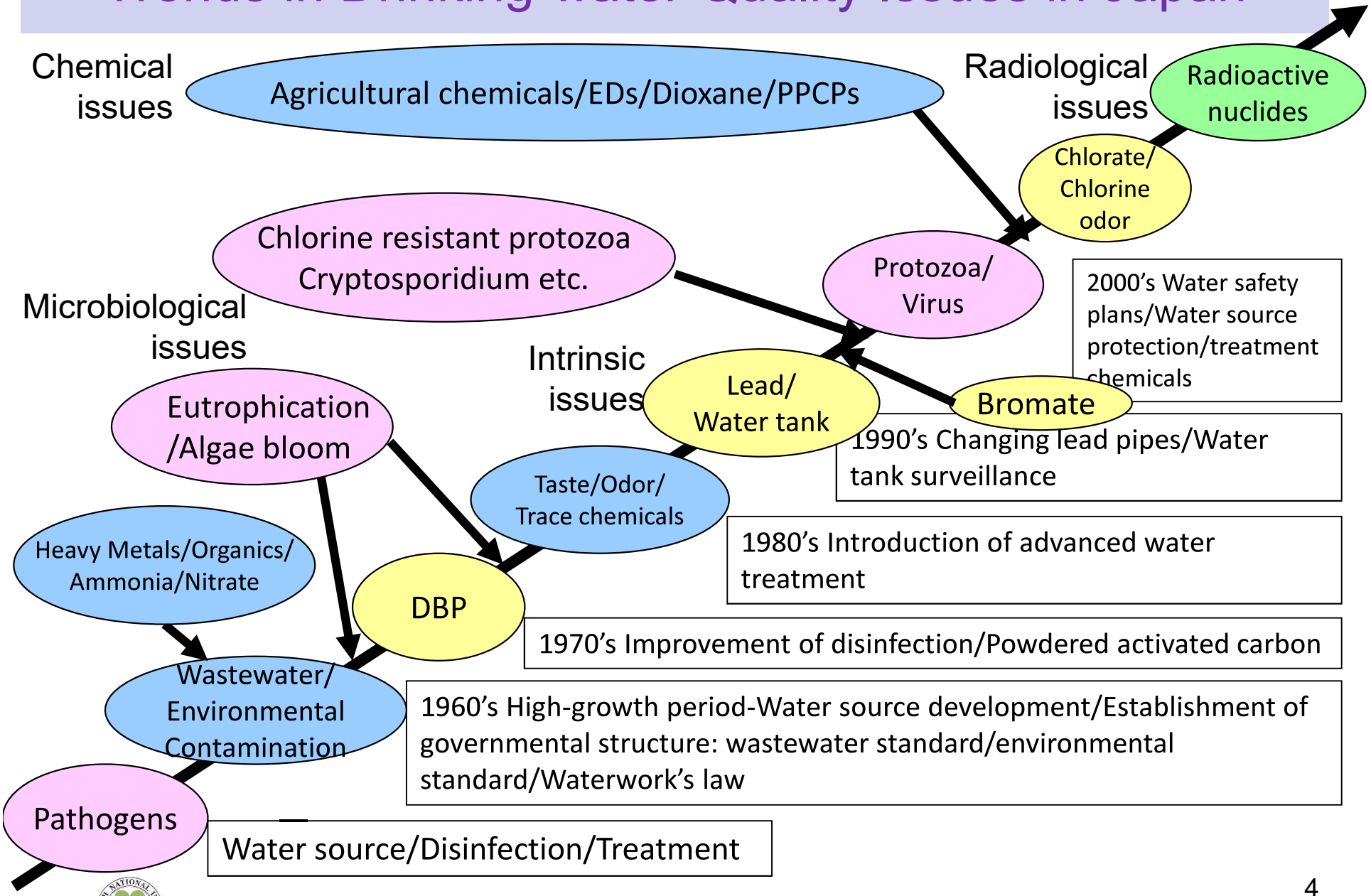
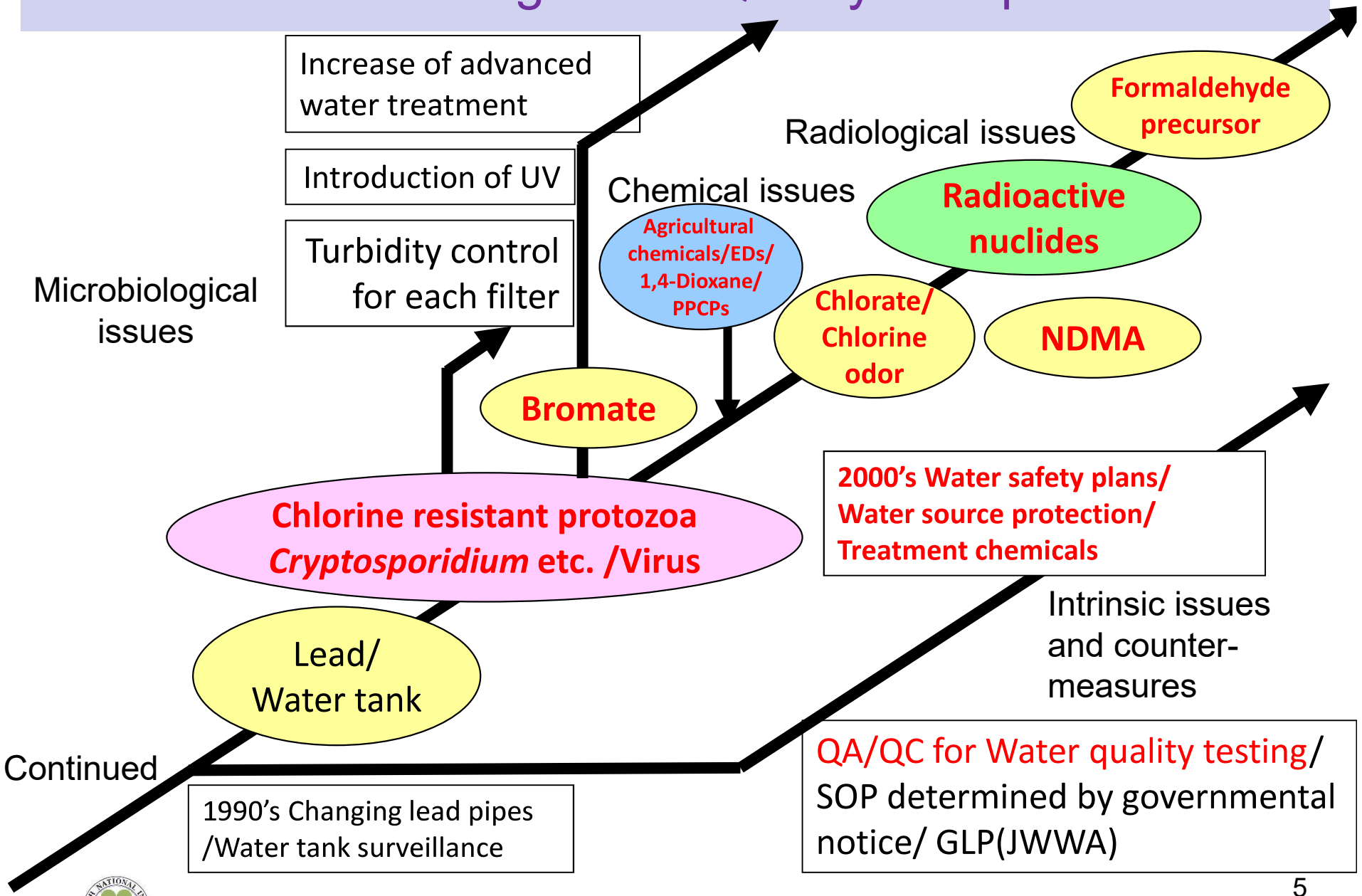
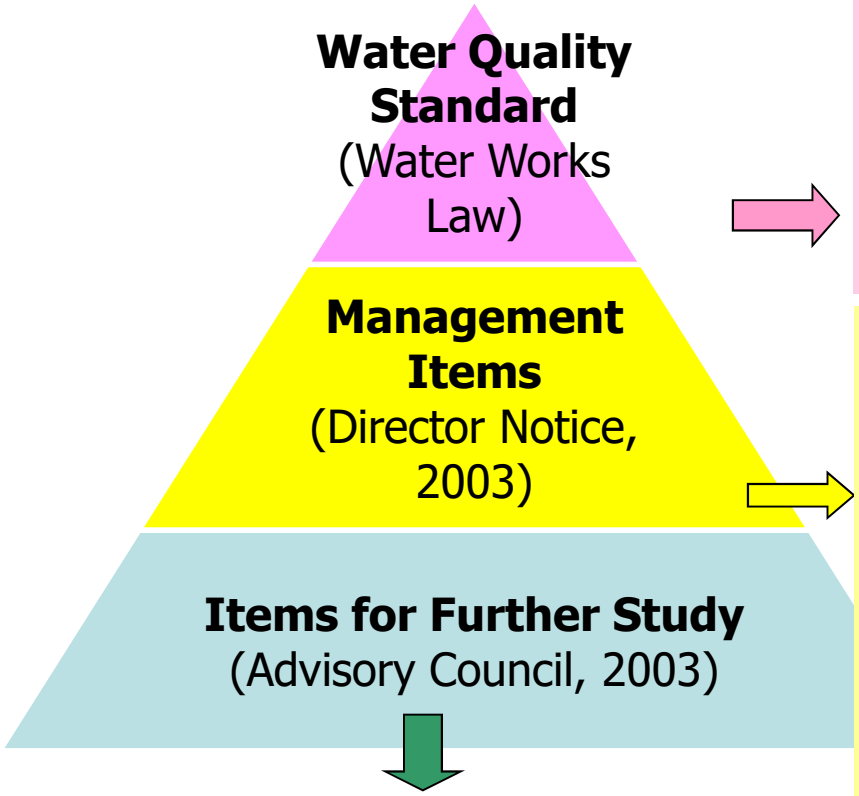
Trends in Drinking-water Quality Issues in Japan



Trends in Drinking-water Quality in Japan -Detail-



Japanese Water Quality Standard and Related Items



- Water works' responsibility for analysis
- Compulsory periodical investigation
- Heavy metals and chemicals detected above 10% of target values
- 30 Health related items + 20 Deteriorates

- Director's request for analysis
- Subsidiary to the Water Quality Standard
- Items of provisional target values and low level detection
- Important items for water quality management
- 15 Health related items including total of 121 agricultural chemicals + 12 Deteriorates

- Undefined toxicological evaluation
- No sufficient data in purified water
- 48 items listed for investigation

Subject to Rolling Revision

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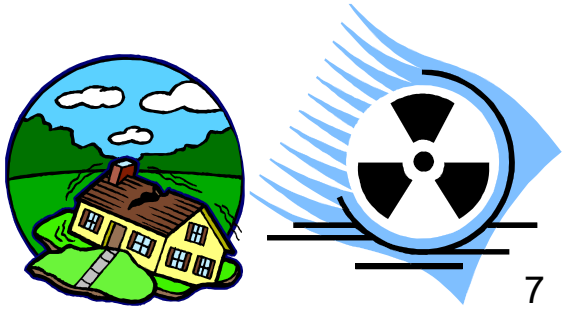
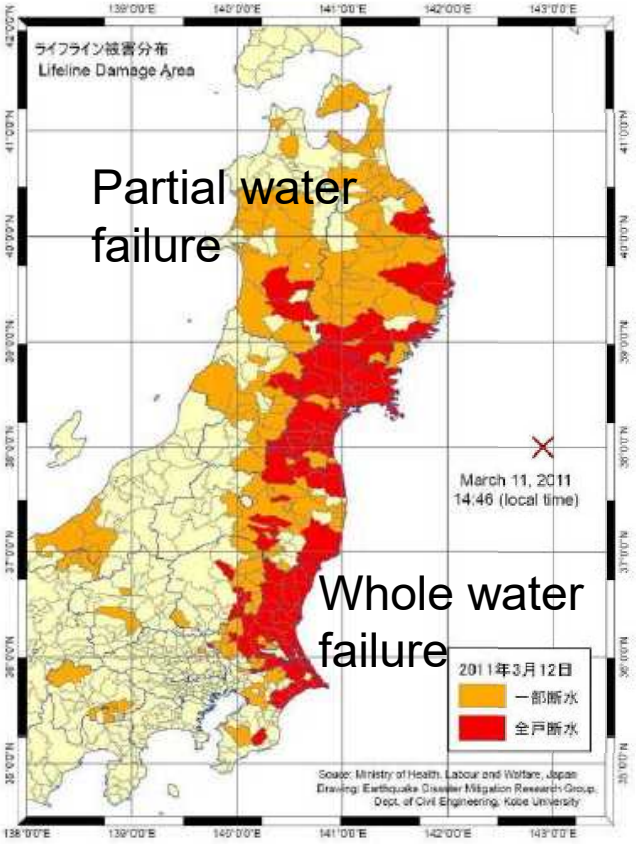


The Great East Japan Earthquake

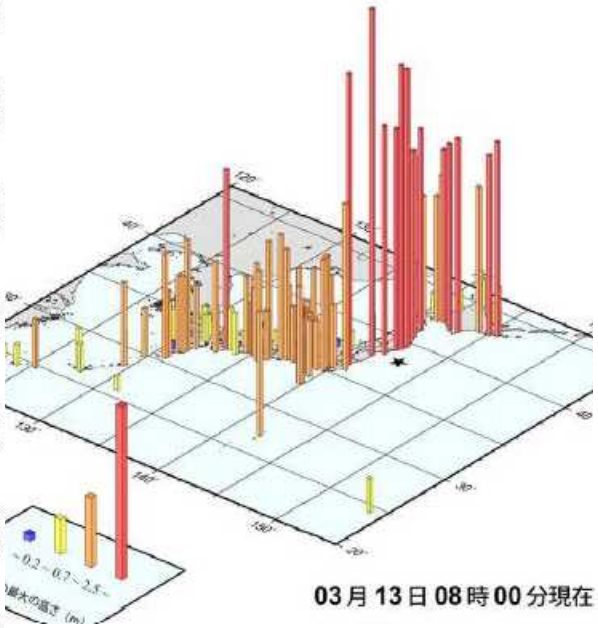
On 11 March 2011,

the Great East Japan earthquake brought triple large disasters;

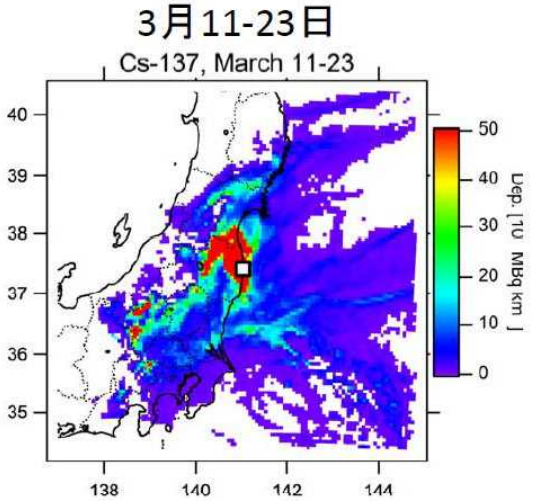
EARTHQUAKE DAMAGE



TSUNAMI

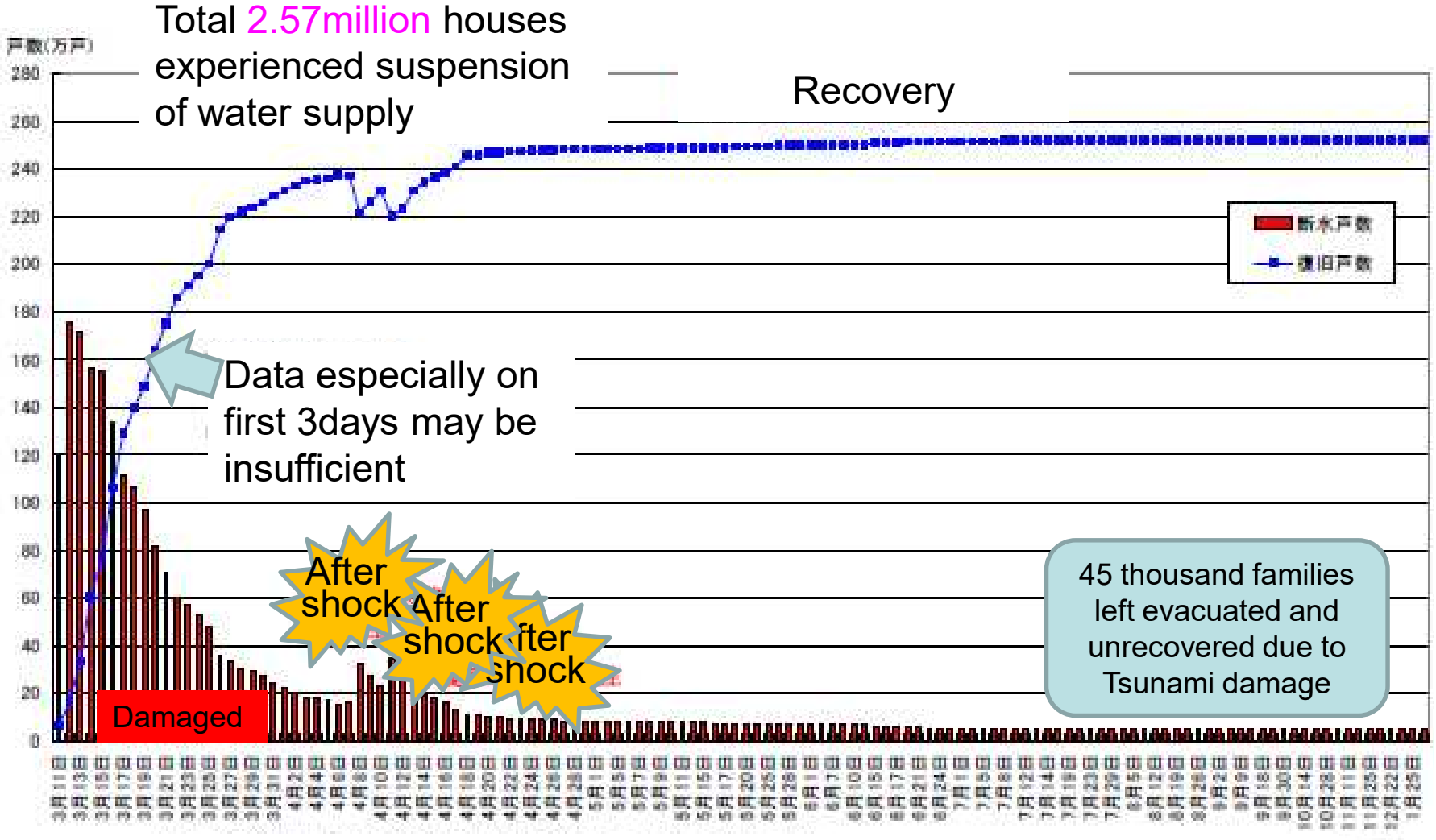


NUCLEAR ACCIDENT



Simulated cesium-137 distribution by Dr.Ohara, NIES

Damage of water supply facilities and recovery, The Great East Japan earthquake, 2011



http://www.mhlw.go.jp/topics/bukyoku/kenkou/suido/houkoku/suidou/dl/121214_033.pdf

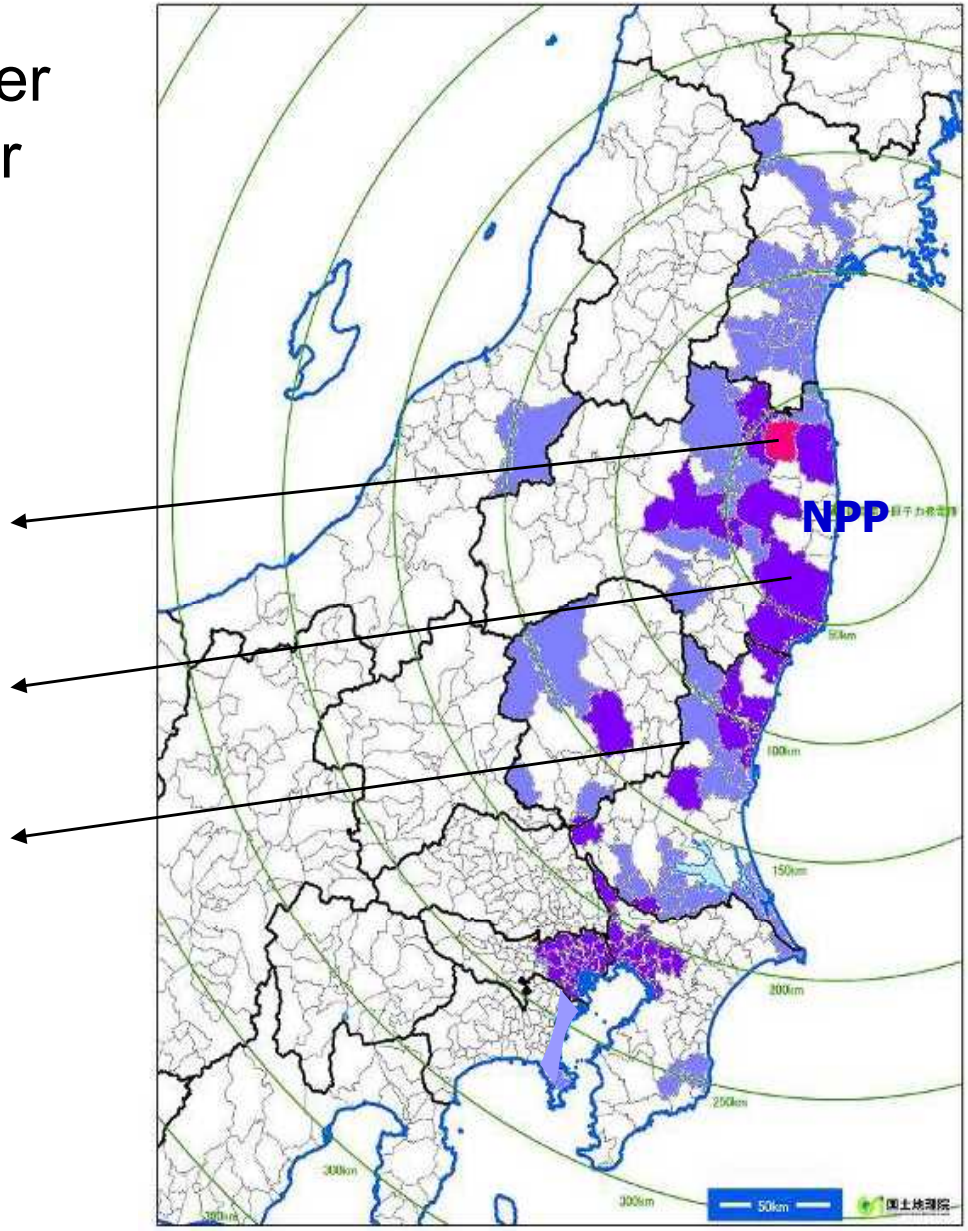
Detection of radionuclides in tap water and water restriction for drinking purpose.

Radioactive iodine (I-131)

Exceeding the water restriction indicator; 300Bq/kg

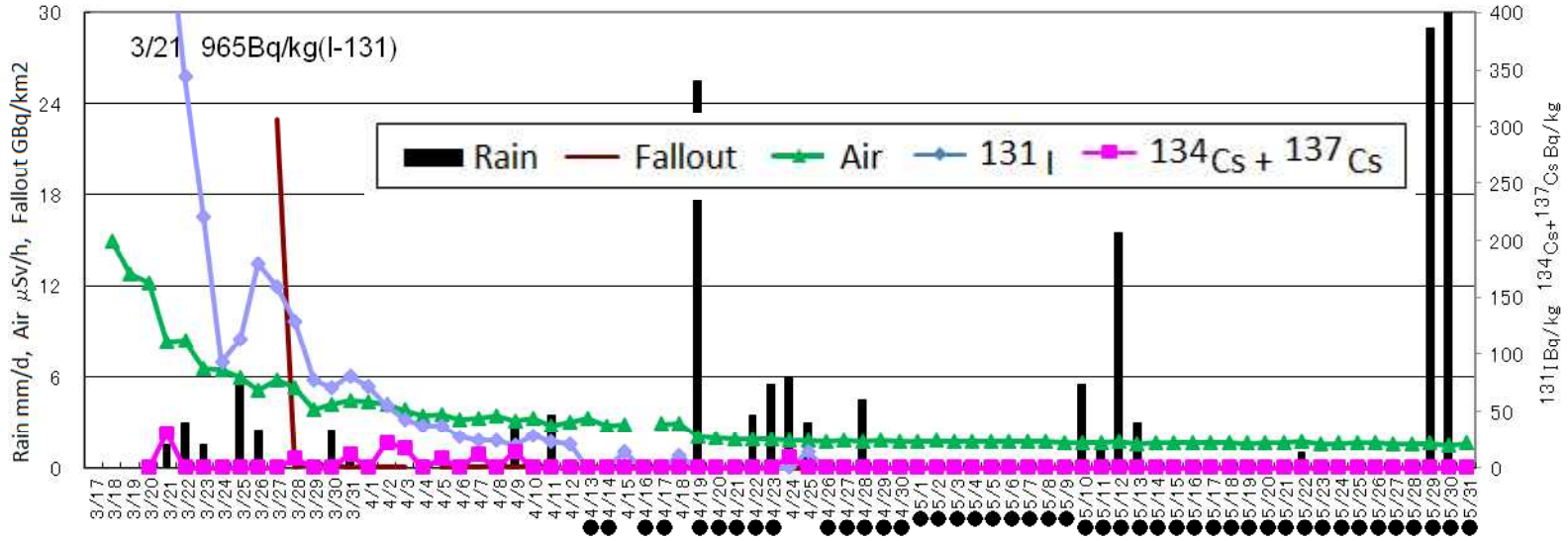
Exceeding the water restriction indicator for infants; 100Bq/kg

Detected above 10Bq/kg

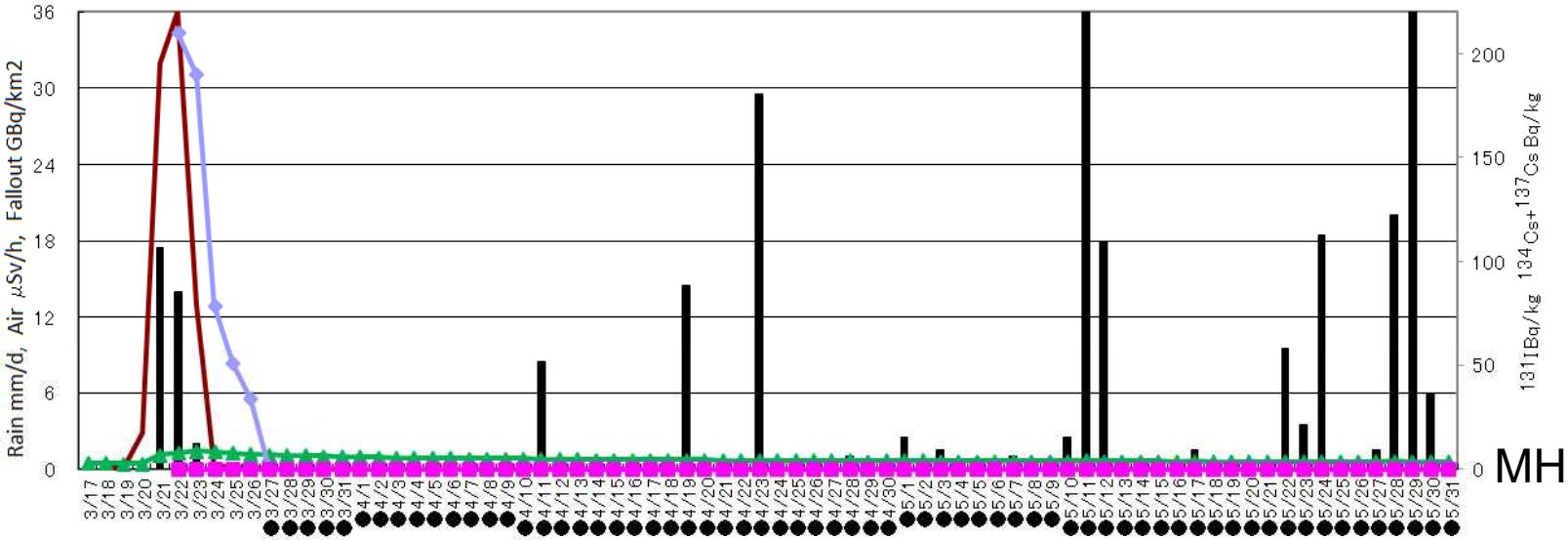


Results of surveys on radioactive materials in tap water

Iitate-mura (village) Small-scale water supply utility in Fukushima prefecture



Tokyo water supply utility



MHLW

● indicates that both radioactive iodine and cesium are under detection level.

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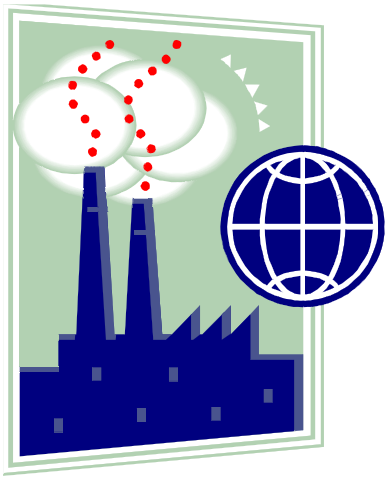
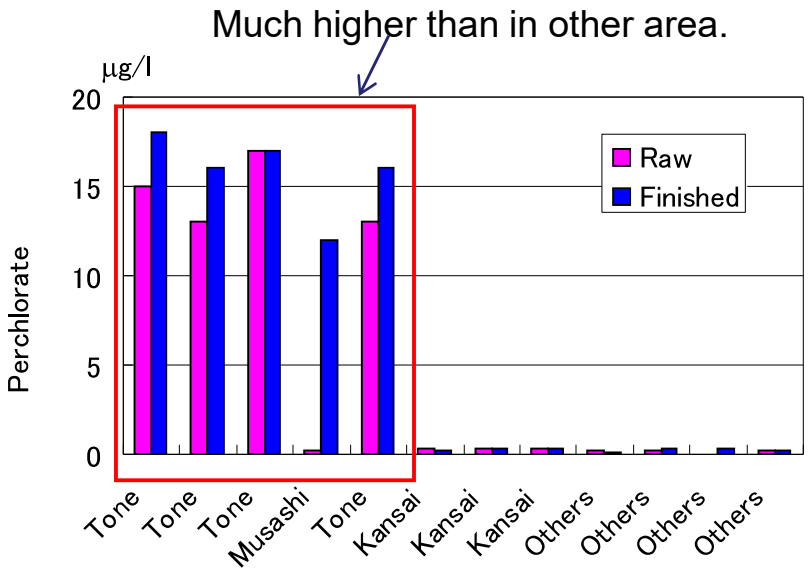
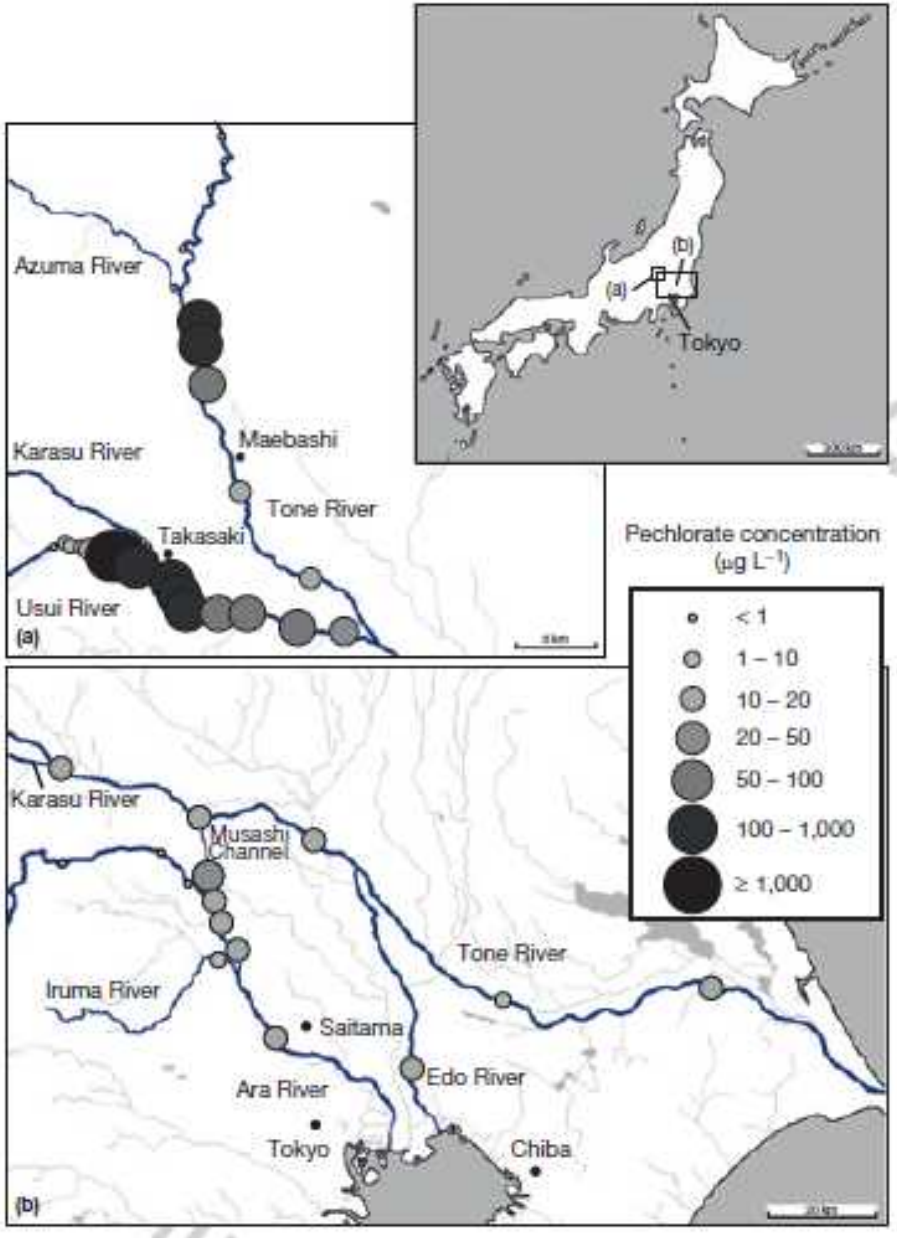


Perchlorate

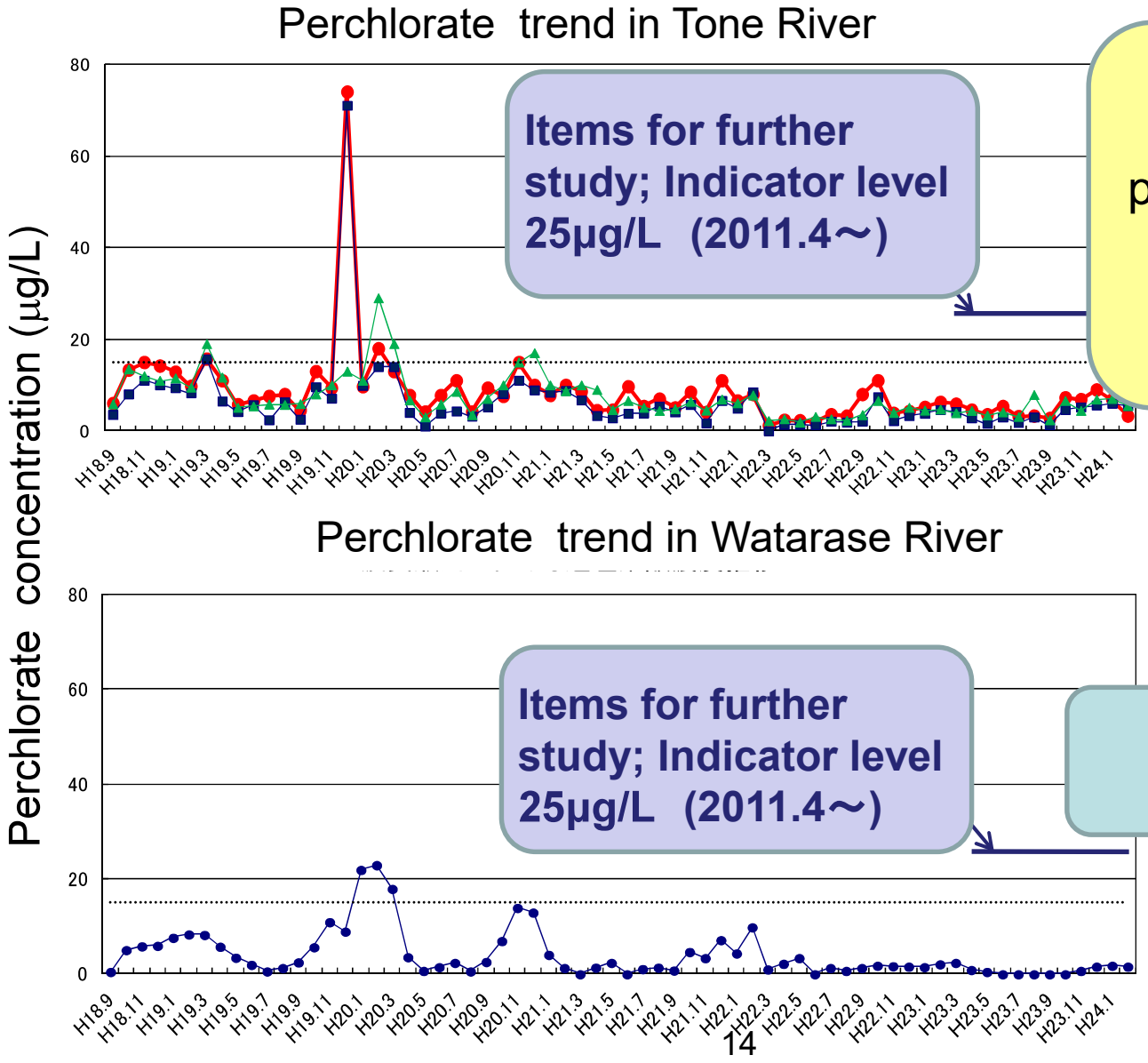
Perchlorate is one of emerging contaminants, used for air bags, rocket fuels, fireworks and so on. It was highly found in water of Tokyo area. Our study proved it was discharged from at least two big factories.





Kosaka K., Asami M., et al., Occurrence of perchlorate in drinking water sources of metropolitan area in Japan, Water Research. 41(15)3474-3482;2007

Trend of perchlorate in Tone and Watarase river



Reduction by manufacturers pushed by MOE, Water Supply Bodies and NIPH

A part of Water Safety Plans

Data from Tokyo Metropolitan Gov.

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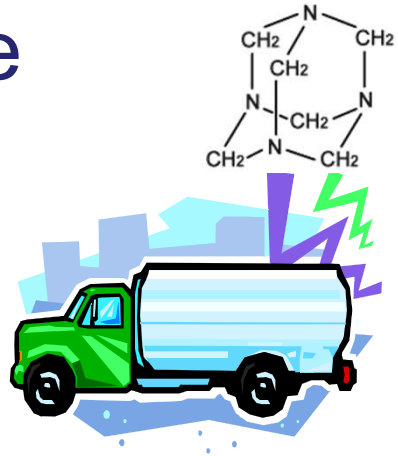
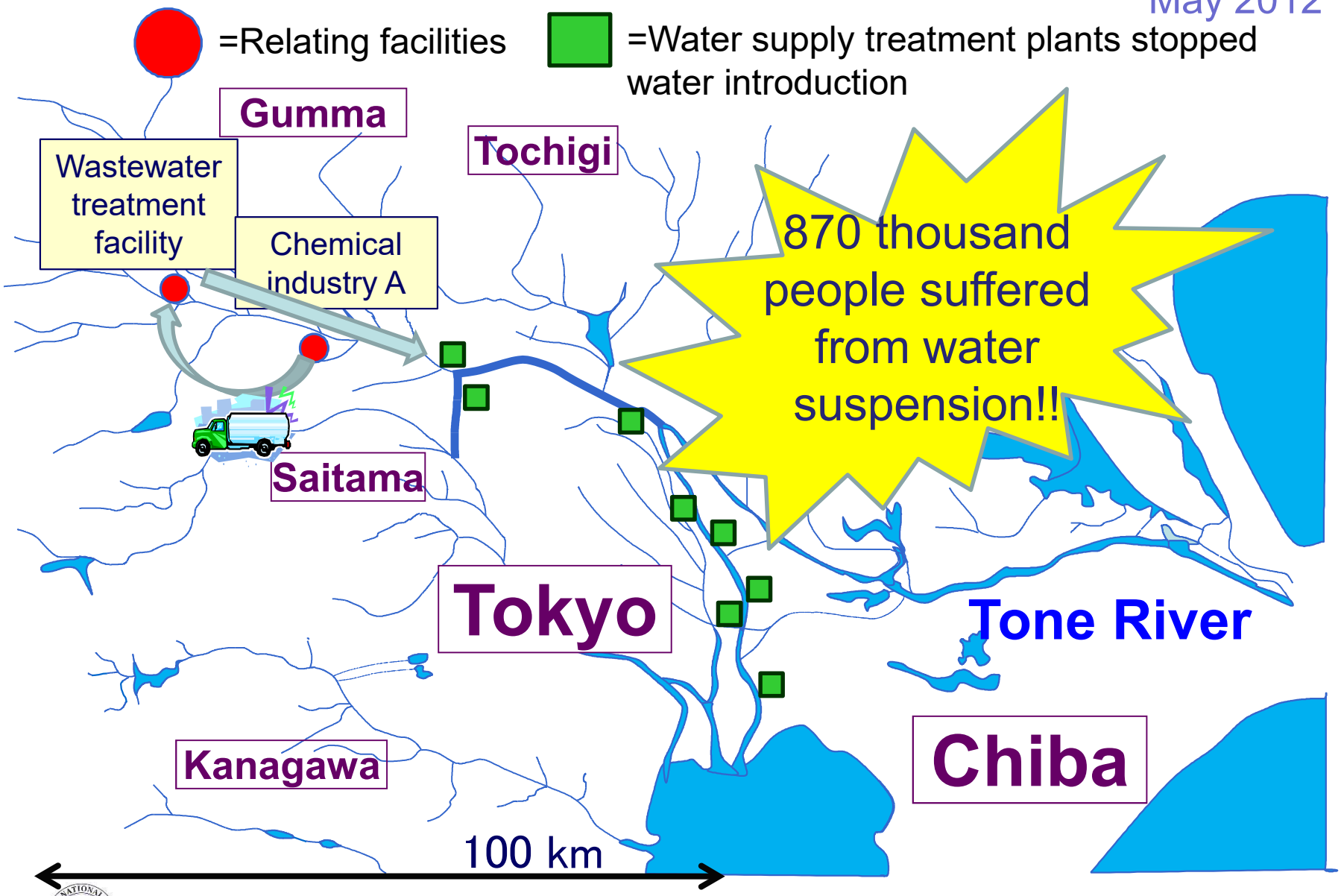


Formaldehyde precursor contamination in Tone river

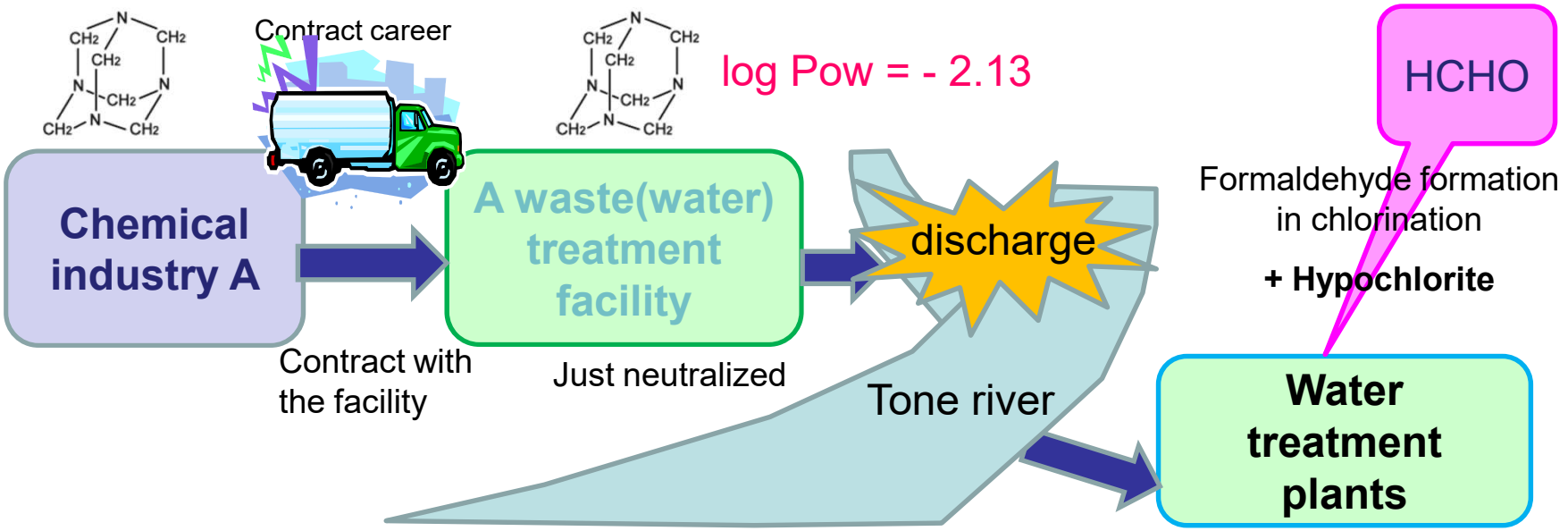
May 2012



Detection of formaldehyde nearly above the standard in water supplies along Tone river

The chemical industry A in Saitama Pref. sent 60 tons of Hexamine to waste(water) treatment facility. It took over treatment of the waste without knowing exact contents of the waste, simply treated and discharged into the river.

Hexamine：PRTR substance



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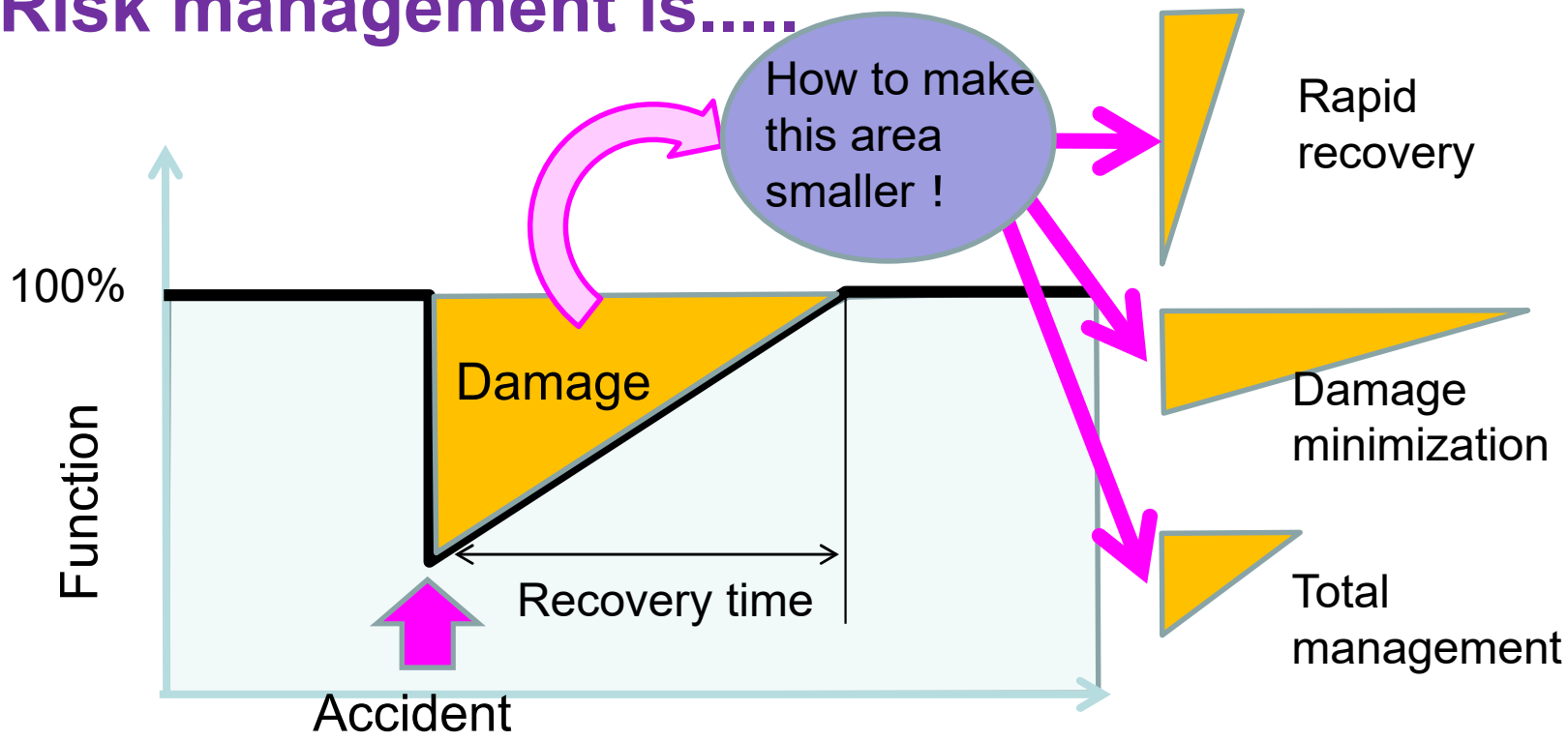
Risk management of water supply

- How to avoid or shorten water failures!
- Water safety plans—source identification, water analysis, and crisis management.
- Customers need continuous water supply!
- Hydrophilic substances are important, which can be detected, thanks to recent progress of analytical equipment, but cannot be removed.
- MHLW is trying to list up “harmful substances” to water supply, in order to ask discharging facilities to reduce amount !

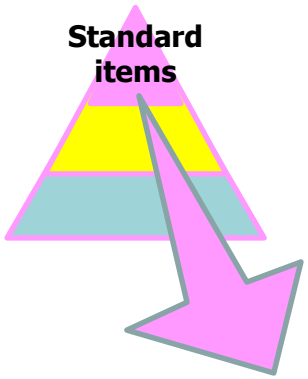
Risk management is.....



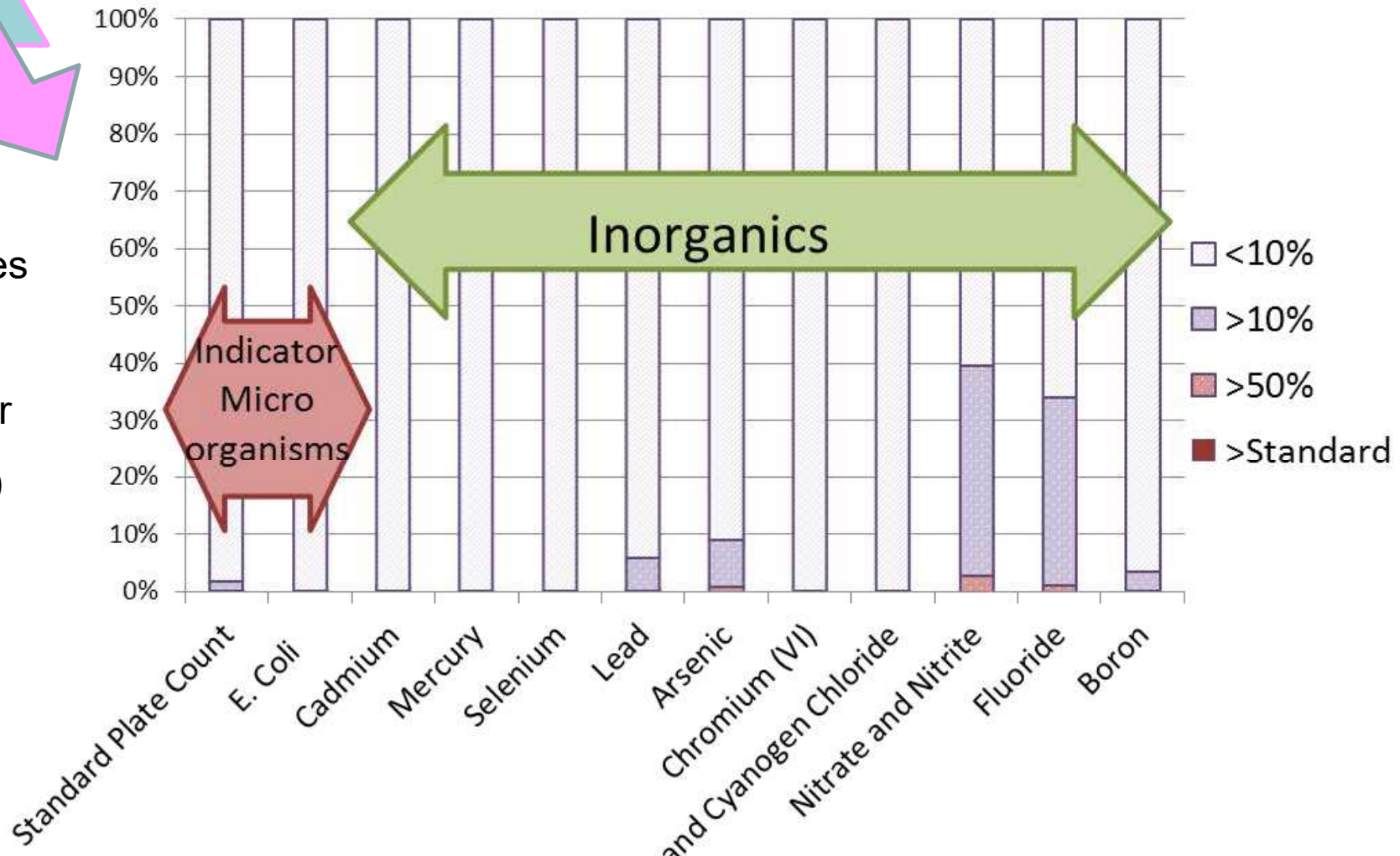
Thank you for your attention!

Please contact to asami@niph.go.jp, if you have questions.

Standard items and data exceeding 10, 50 and 100% of the standard value

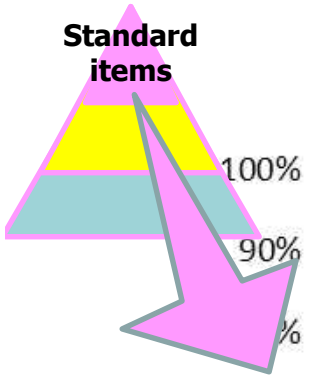


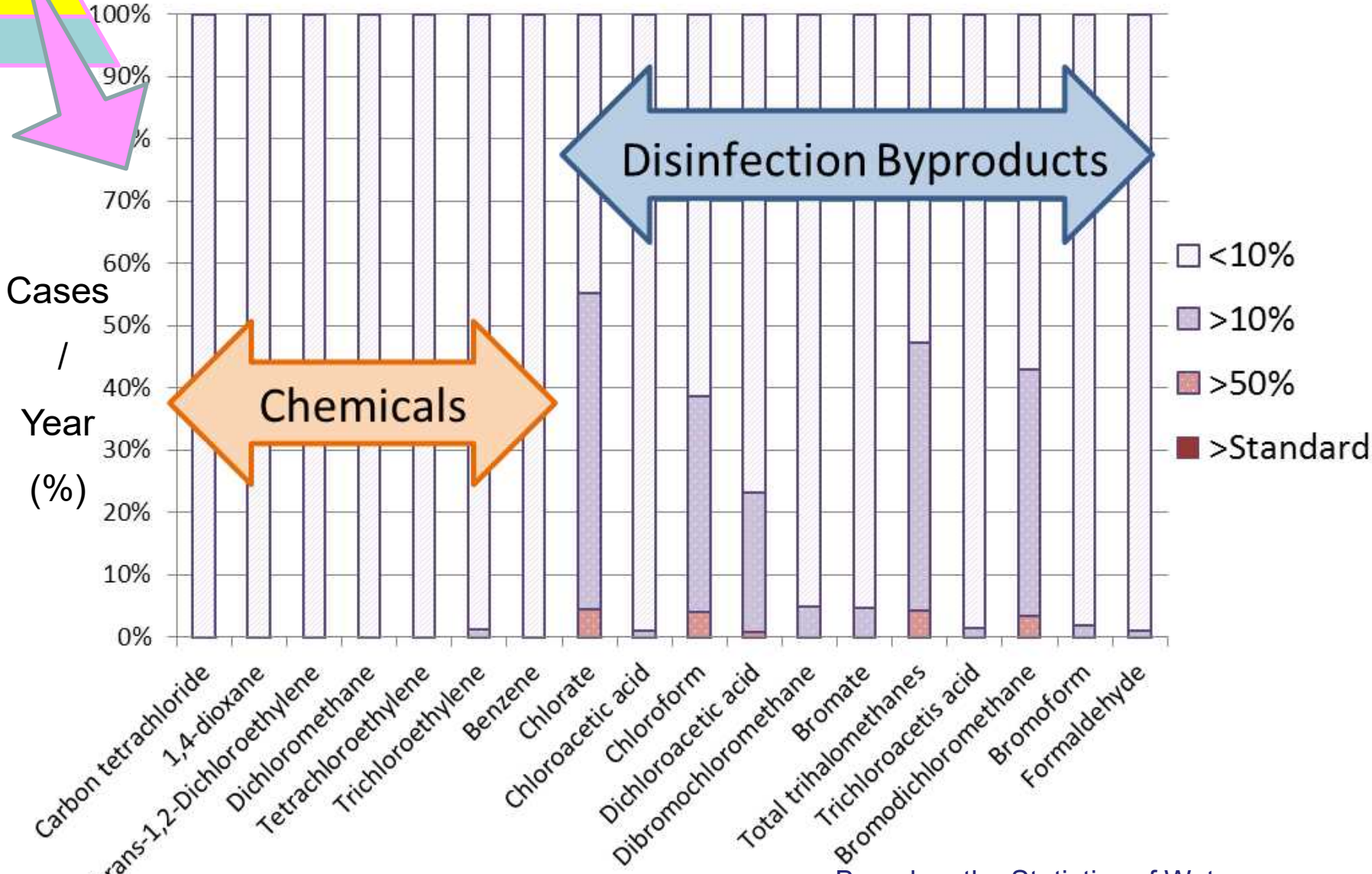
Cases / Year (%)



Based on the Statistics of Water Supply –Water Quality–, 2010

Standard items and data exceeding 10, 50 and 100% of the standard value





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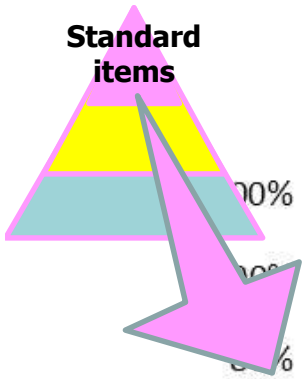
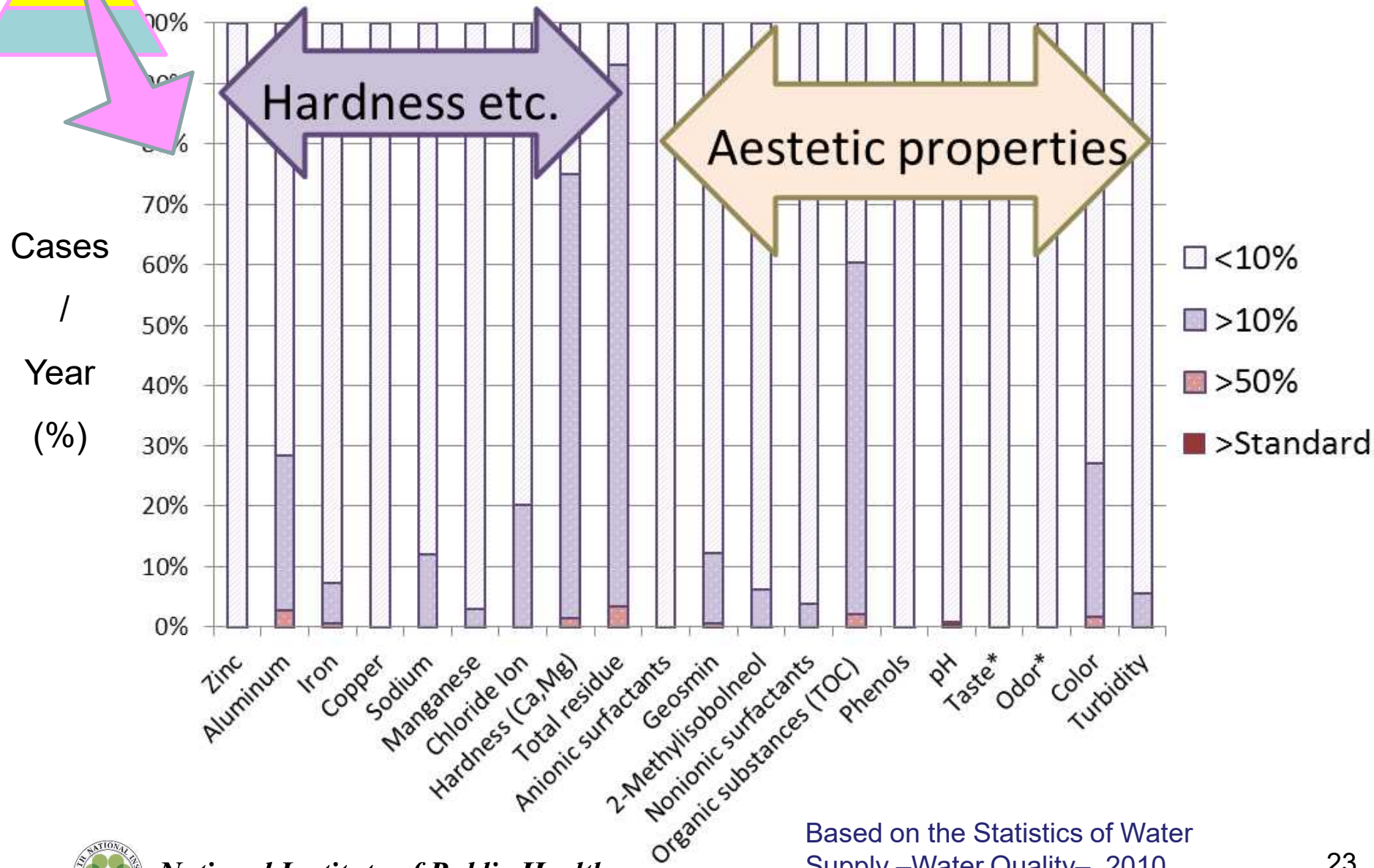
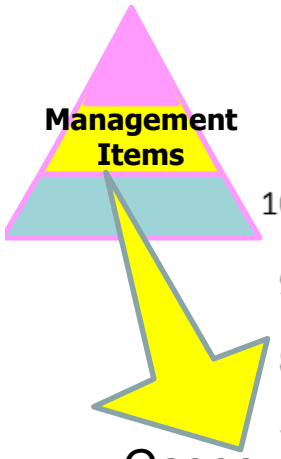
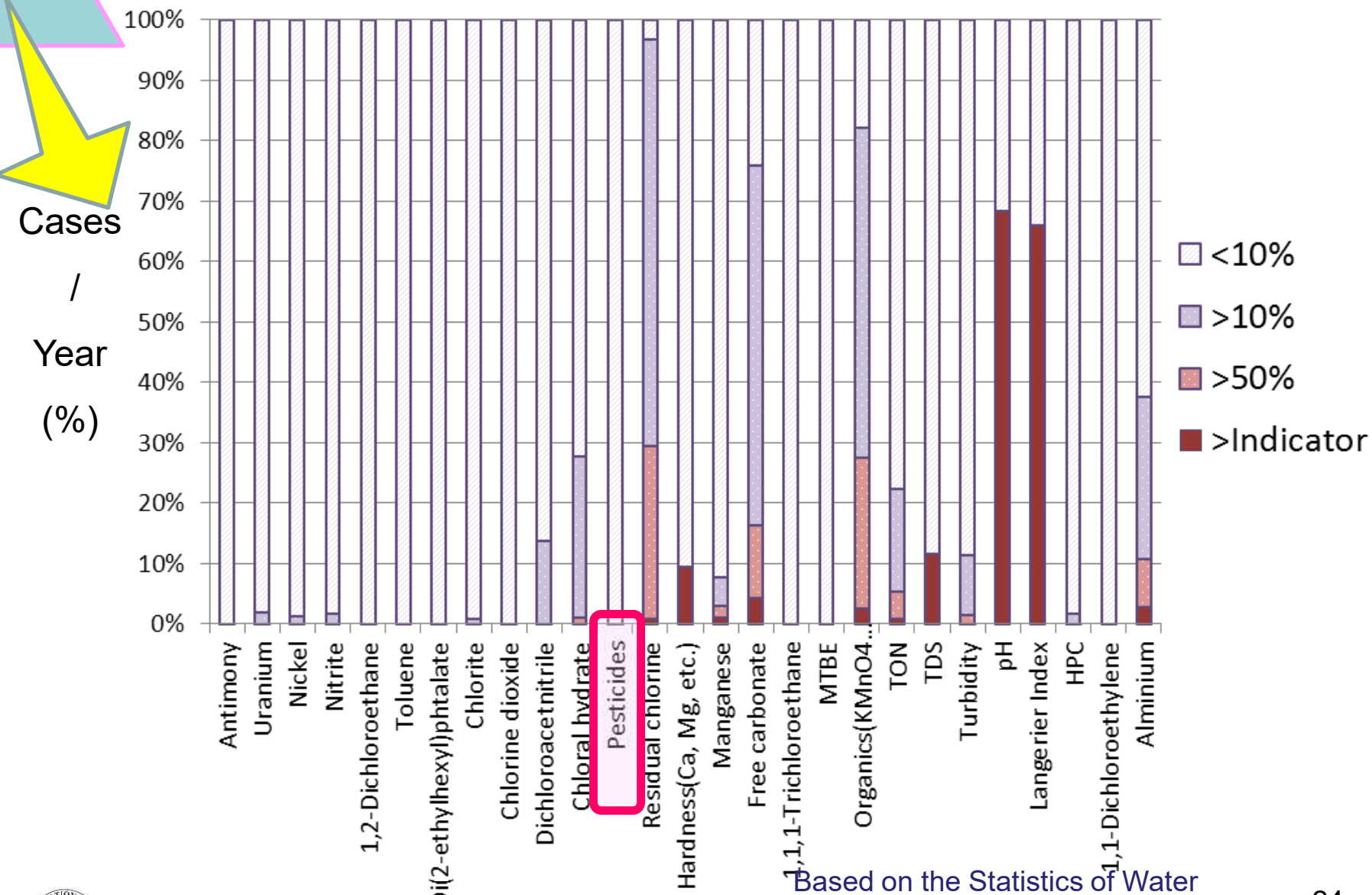




Based on the Statistics of Water Supply –Water Quality–, 2010

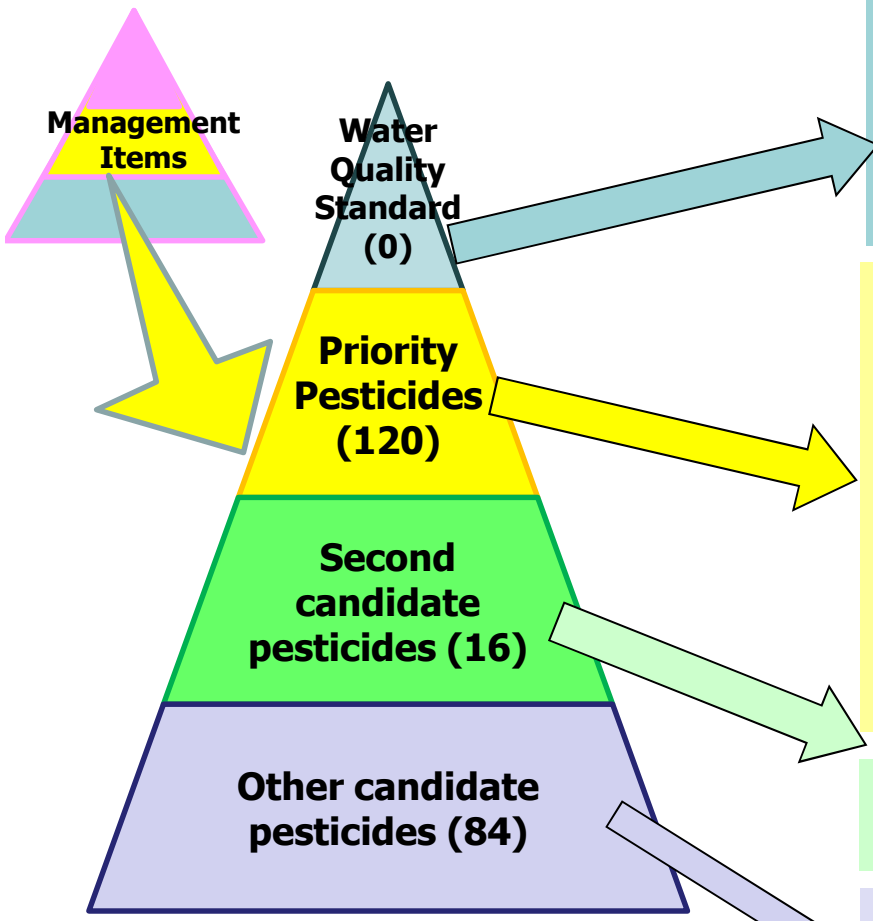
Management items and data exceeding 10, 50 and 100% of the indicator value





Based on the Statistics of Water Supply –Water Quality–, 2010

Management of Agricultural Chemicals



- Chemicals detected above 10% of target values
- None of agricultural chemicals categorized as water quality standard

- High possibility of detection
- analytical methods partly available
- Production, ADI, and area distribution were considered.
- Managed as **"Total Agricultural Chemicals" -total sum of the detected values divided by each target value**

$$DI = \sum_i \frac{DV_i}{GV_i} \leq 1$$

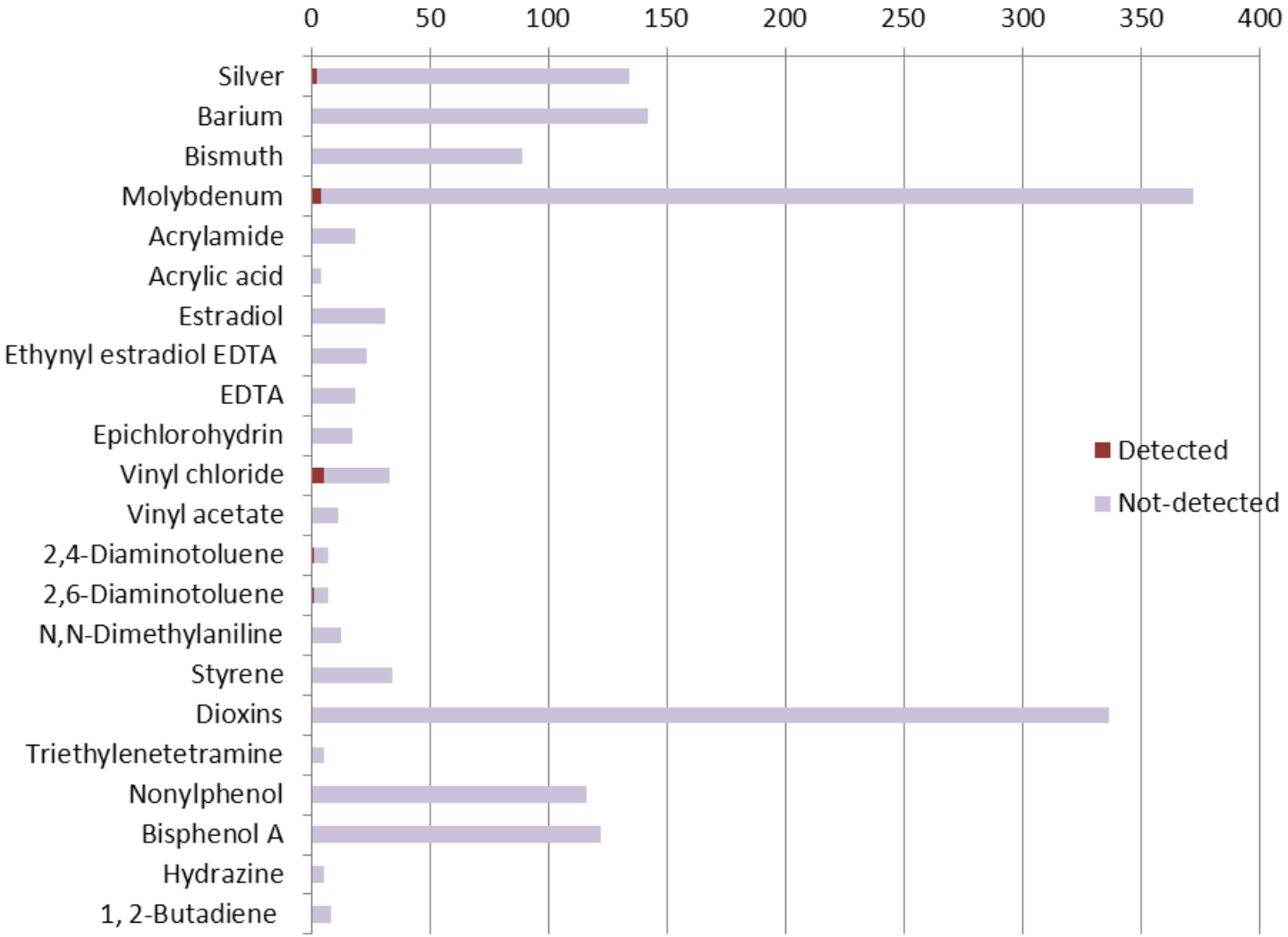
- Pesticides for further study

- Less important but may detected.
- Estimated domestic shipping below 50 tons/year

Excluded pesticides (14)
- **Not important nor detected**

Items for further study 1/2

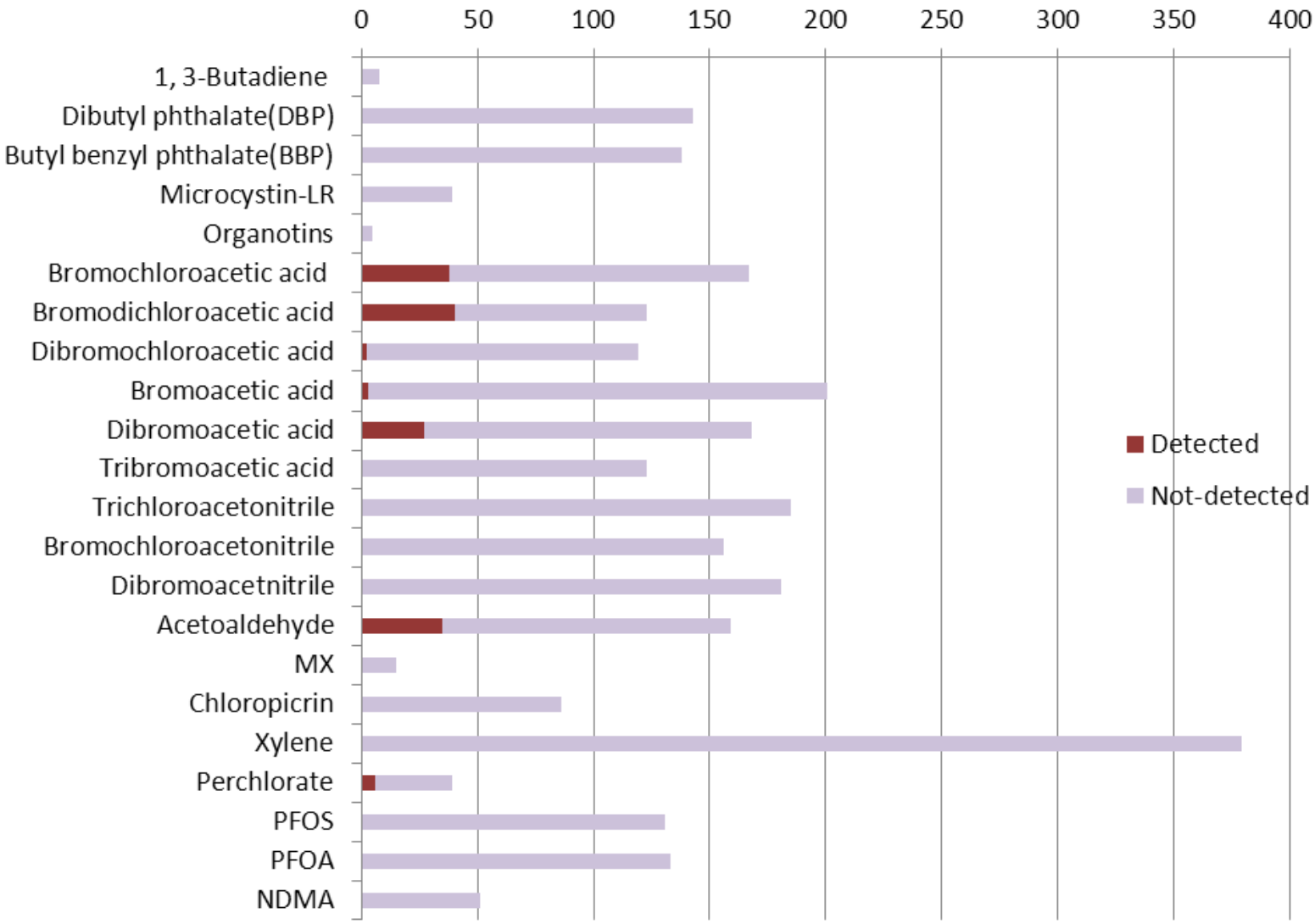
Data obtained



Based on the Statistics of Water Supply –Water Quality–, 2010

Items for further study 2/2

Data obtained

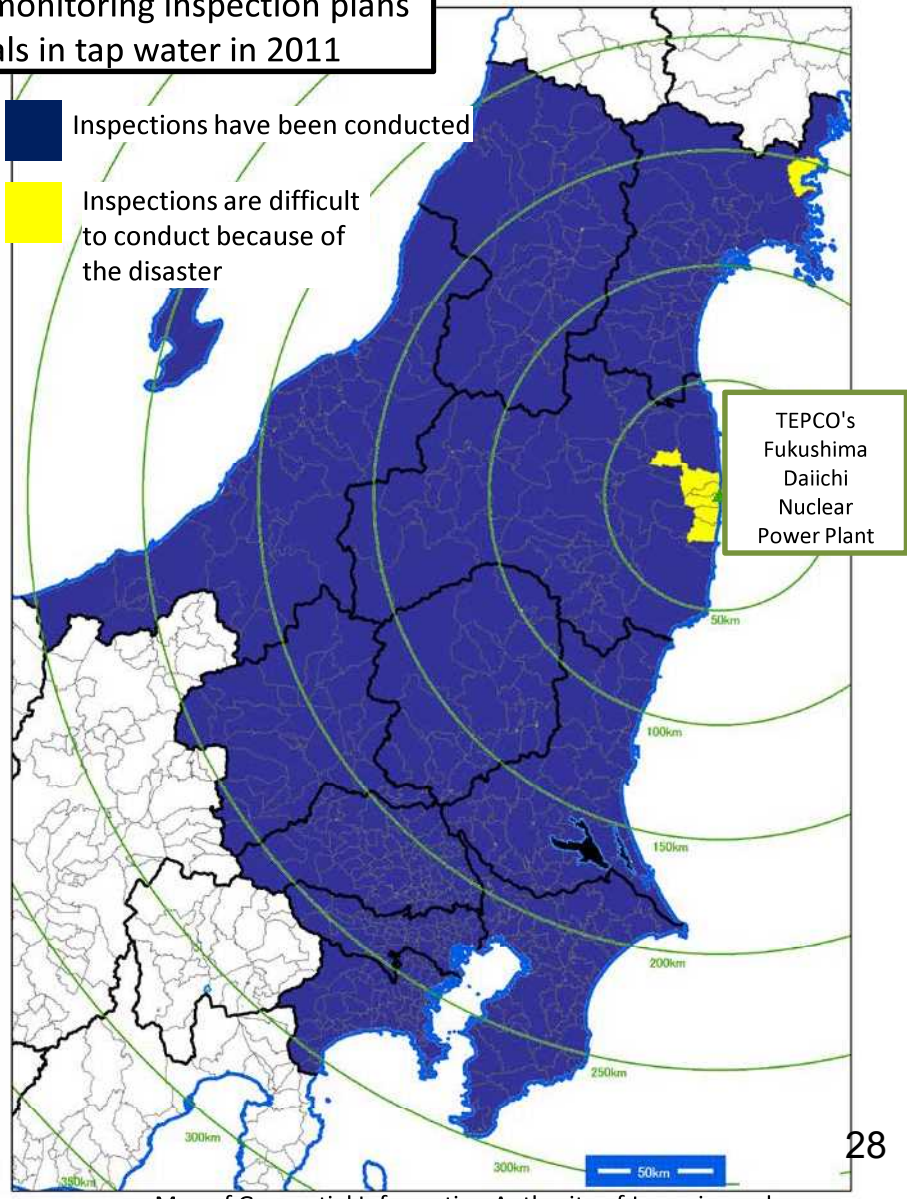


Based on the Statistics of Water Supply –Water Quality–, 2010

Surveys on radioactive materials in tap water at early stage

- Speedy public announcements of survey results have been made.
- Continuous and regular surveys on tap water had been conducted at emergency state—almost for one year.
- Focused and regular monitoring has been conducted in Fukushima prefecture and its neighboring regions including Tokyo.

Implementation status of monitoring inspection plans on radioactive materials in tap water in 2011



Map of Geospatial Information Authority of Japan is used.

Tentative Map of Radiation Dose in Air

A map of air radiation dose at 0.5-1m height measured by national or local governments, tentatively made at early stage based on volunteer info collection; http://www.nnistar.com/gmap/fukushima.html and contoured by Dr. Kunihiko Takahashi, National Institute of Public Health, Japan.

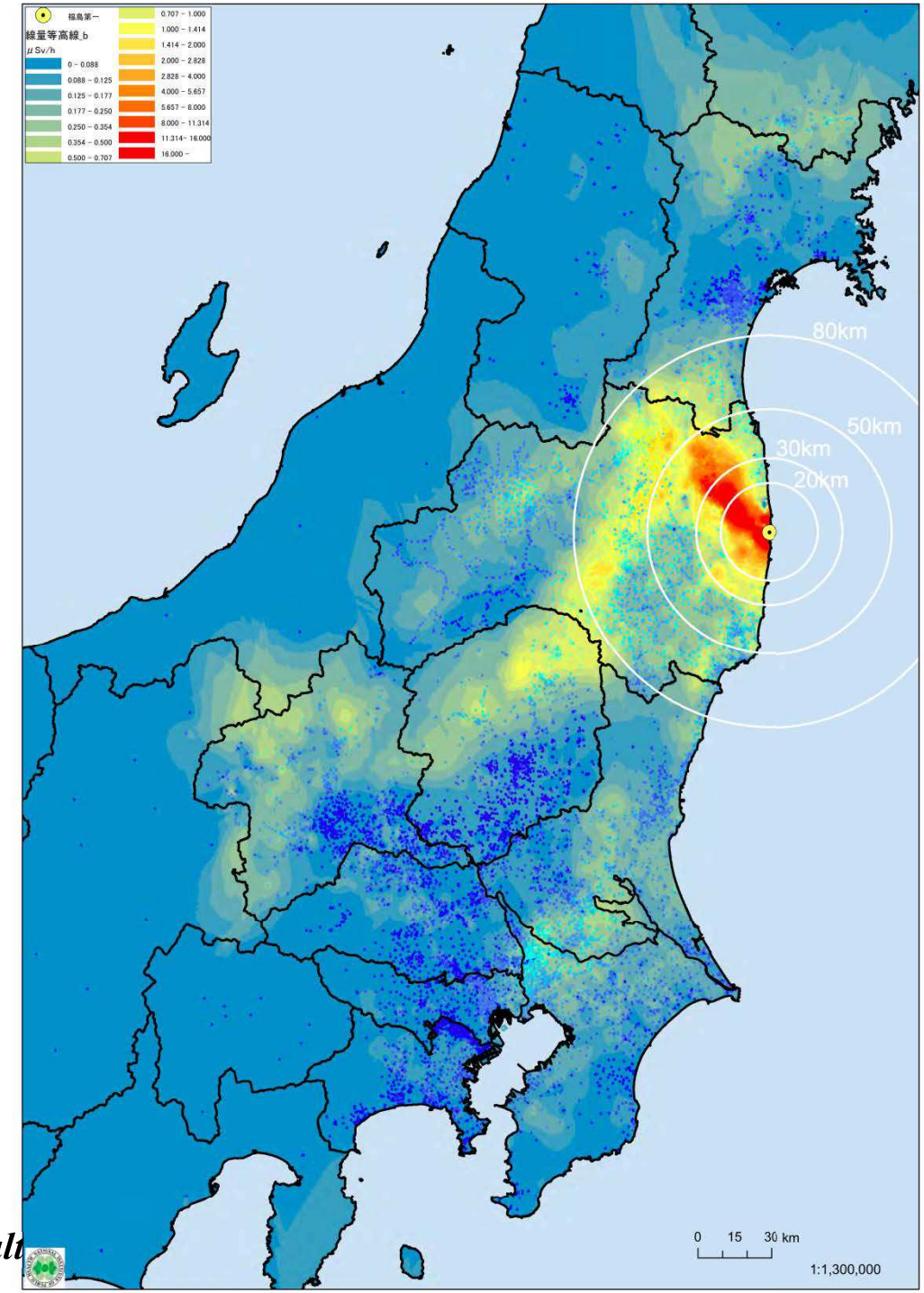


Image of iodine behavior in environment

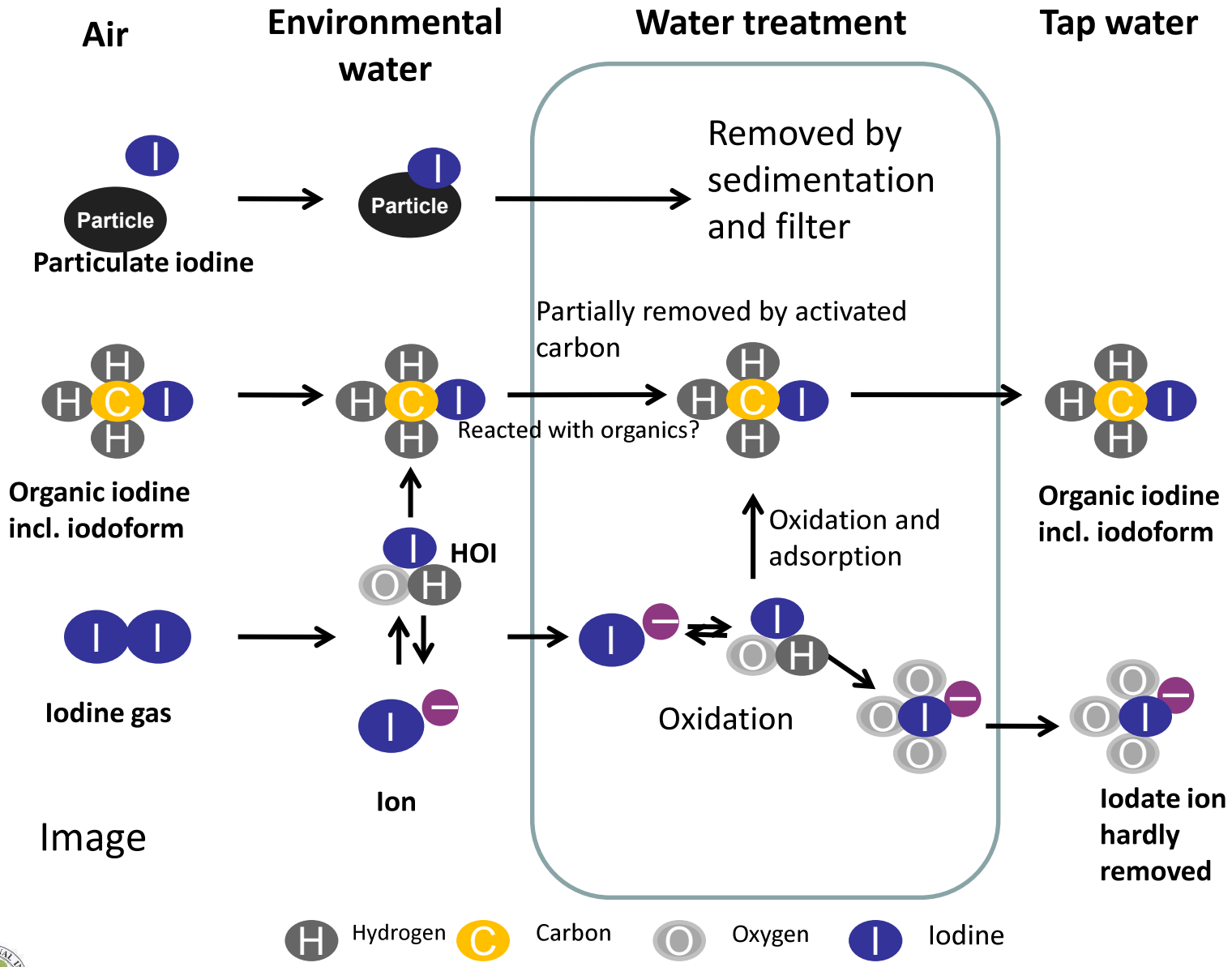
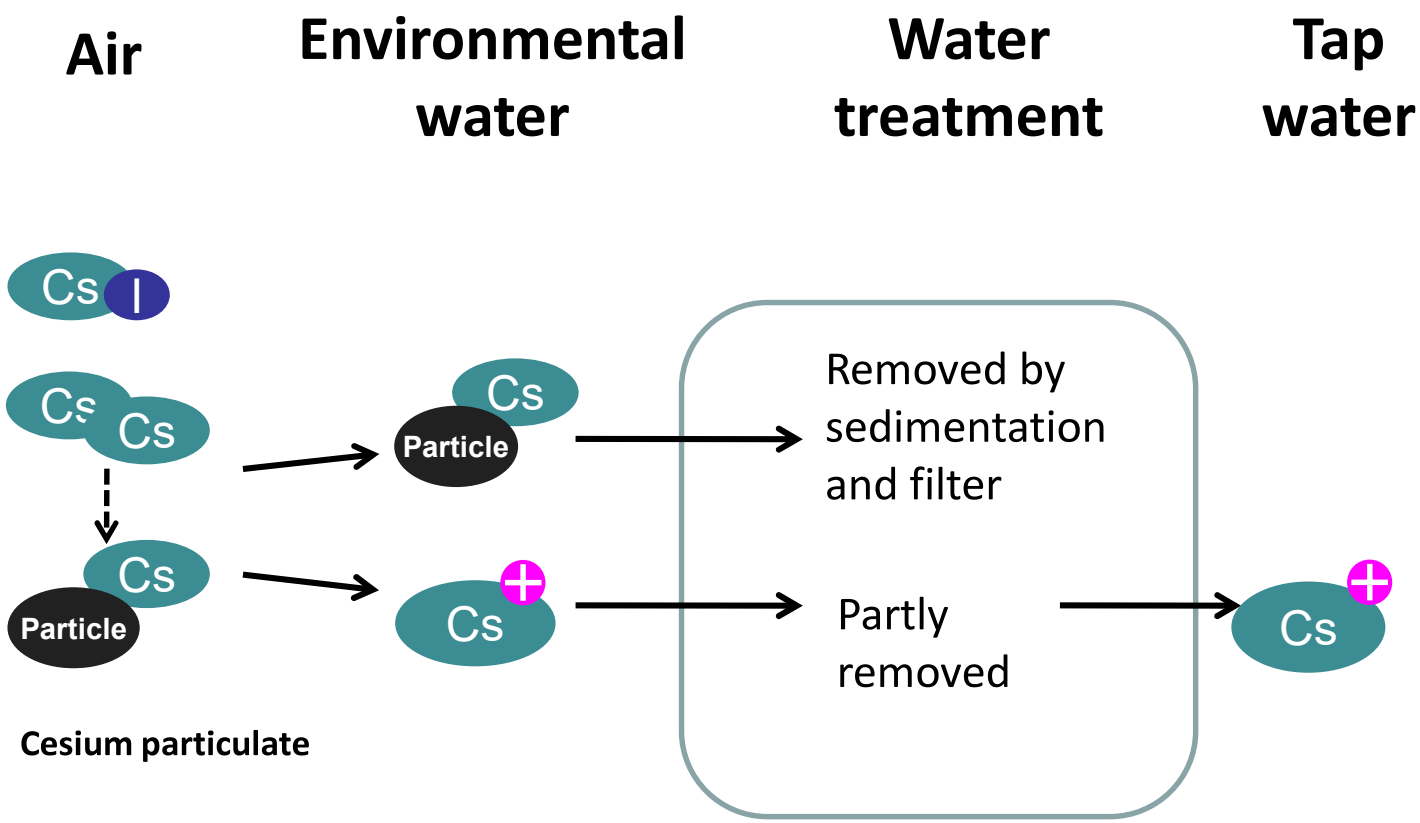


Image of cesium behavior in environment

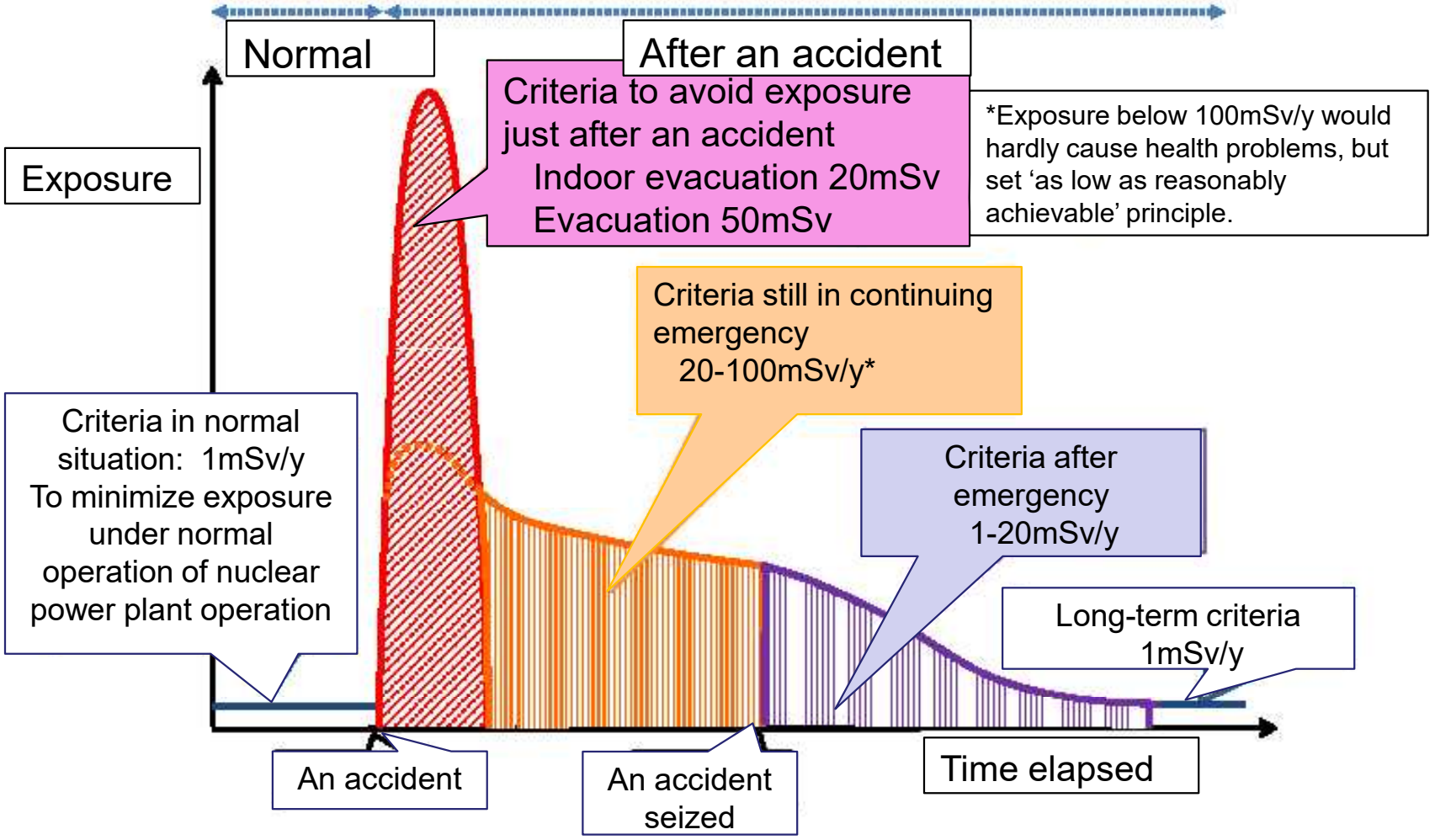


Usually cation (Cs^+) can adsorb onto turbid or particulates

I Iodine Cs Cesium

Nuclear Safety Commission, Japan 2002

Rationale of Protection for Radiological Exposure



http://www.nsc.go.jp/info/20110411_2.pdf

Radioactive iodine-drinking water guideline level

	Iodine-131 (Bq/L)
WHO GDWQ	10
Japanese Emergency Indicator for infants	**100**
Japanese Emergency Indicator for adults	**300**
IAEA intervention level in emergency	3000

Remade from http://www.who.or.jp/index_files/FAQ_Drinking_tapwater_JP.pdf