International Academic Conference on Radiation Health Risk Management

Fukushima, Japan; 25 – 27 February 2013

Some Issues Identified from the Fukushima Accident

vis-à-vis

the ICRP System of Radiological Protection

(Keynote Speech 1; Tuesday 26 February)

Abel J. González
アベル·ゴンサレス

Vice-Chair of the International Commission on Radiological Protection (ICRP)
Member of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)
Member of the Commission of Safety Standards of the IAEA

All rights reserved

Autoridad Regulatoria Nuclear; ✉Av. del Libertador 8250; (1429)Buenos Aires, Argentina ☎+54 1163231758;🖷 agonzalez@arn.gob.ar

Thank you,… Nippon Foundation!

Thank you,… 日本 財団 (Nipponzaidan)!

All rights reserved

Thank you,… Fukushima Medical University!

Thank you,… 福島県立医科大学!

(Fukushima kenritsu ika daigaku)!

All rights reserved

Argentine Declaration at the Ministerial Conference on Nuclear Safety, Fukushima, 15-17 December 2012

http://www-pub.iaea.org/iaeameetings/Fukushima/Argentina_StatementN.pdf

- *"Between 11 and 12 September 2011, in the city of Fukushima, a selected international group of experts on radiation and health risks was convened by the Nippon Foundation (日本 財団 Nipponzaidan), headed by the Good Will Ambassador of the World Health Organization, Mr. Yohei Sasakawa, together with the Fukushima Medical University".*
- *"Their work provided the basis of the program of radiological assessment and assistance underway at the University, and was widely reported by the Japanese press".*

All rights reserved

ICRP Task Group 84

All rights reserved

INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION

ICRP ref 4832-6303-9753
June 18, 2011

Terms of Reference for Task Group 84 of the ICRP Main Commission

Initial Lessons Learned from the NPP Accident in Japan vis-à-vis the ICRP System of Radiological Protection

Approved by the Main Commission on June 18, 2011

All rights reserved

ICRP Task Group 84: Membership

- Makoto Akashi , National Institute of Radiological Sciences (NIRS), Japan;
- John D. Boice Jr. , International Epidemiology Institute, USA;
- Masamichi Chino, Japan Atomic Energy Agency (JAEA), Japan;
- Toshimitsu Homma, Japan Atomic Energy Agency (JAEA), Japan;
- Nobuhito Ishigure, Nagoya University, Japan;
- Michiaki Kai Oita, University of Nursing and Health Sciences, Japan;
- Shizuyo Kusumi, ex-Nuclear Safety Commission, Japan;
- Jai-Ki Lee, Hanyang University, Korea;
- Hans-Georg Menzel, CERN, Switzerland;
- Ohtsura Niwa, Fukushima Univ., Japan;
- Kazuo Sakai, National Institute of Radiological Sciences, Japan;
- Wolfgang Weiss, Federal Office for Radiation Protection (BfS), Germany;
- Shunichi Yamashita, Nagasaki University and Fukushima Medical University, Japan;
- Yoshiharu Yonekura , National Institute of Radiological Sciences , Japan, and,
- Abel J. González, Autoridad Regulatoria Nuclear, Argentina (Chair)

All rights reserved

Issues identified

1. inferring radiation risks;
2. attributing radiation effects;
3. quantifying radiation exposure;
4. assessing internal exposures;
5. managing emergency crises;
6. protecting rescuers and volunteers;
7. responding with medical aid;
8. justifying disruptive protective actions;
9. transiting from the emergency to an existing situation;

All rights reserved

Issues identified

10. rehabilitating evacuated areas;
11. categorizing public exposures due to an accident;
12. restricting public individual doses;
13. caring for infants and children;
14. considering pregnant women;
15. monitoring public protection;
16. dealing with ‘contamination’ of territories, rubble and residues, and consumer products;
17. recognizing psychological consequences; and,
18. fostering the sharing of information

All rights reserved

Warning

- The aim is not a critique of ICRP recommendations.
  - ICRP was used successfully in Japan.
  - People were properly protected.
  - No radiation injuries were reported
- The aim is learning lessons for further improvement!
- From the 18 issues identified I have selected 10 for this presentation

All rights reserved

Content

Issues on…

1. …Radiation Risks
2. …Health Effects
3. …Quantities/Units
4. …Internal Exposure
5. …Occupational Protection
6. …Public Protection
7. …Public Monitoring
8. …‘*Contamination*’
9. …Psychological Effects
10. …Comunication

All rights reserved

1.

Issues on Radiation Risks

All rights reserved

Misunderstandings on risk coefficients

- The substantial biological, epidemiological, and ethical foundations supporting the basic notion of ***risk*** used for radiological protection purposes were misunderstood by the public at large in Japan.
- The concept of a dose and dose-rate effectiveness factor (DDREF) was notably misunderstood; in part because its wording is somewhat convoluted, even in English.
- Unfortunately, the media contributed to the misunderstandings.

All rights reserved

Dose and dose-rate effectiveness factor
線量・線量率効果係数（DDREF）

- A judged factor that generalizes the usually lower biological effectiveness (per unit of dose) of radiation exposures at low doses and low dose rates as compared with exposures at high doses and high dose rates.

- （単位線量当たりの）生物学的効果が低線量・低線量率の放射線被ばくでは高線量・高線量率における被ばくと比較して通常低いことを一般化した，判断によって決められた係数。

All rights reserved

For radiation protection purposes, ICRP

uses the concept of

detriment-adjusted nominal risk coefficient

損害で調整された名目リスク係数

All rights reserved

Nominal risk coefficient
名目リスク係数

Sex-averaged and age-at-exposure-averaged lifetime estimates of probability of harm for a *representative* population.

代表的集団における性及び被ばく時の年齢で平均化された生涯リスク推定値。

All rights reserved

Detriment-adjusted risk
損害で調整されたリスク

The probability of the occurrence of a stochastic effect, modified to allow for the different components of the detriment in order to express the severity of the consequence(s).

結果の重篤度を表現するため，
損害の様々な構成要素を考慮に入れるように修正された確率的影響の発生確率。

All rights reserved

Detriment-adjusted nominal risk coefficients

for stochastic effects after exposure to radiation at low dose rate

低線量率放射線被ばく後の確率的影響に対する,

損害で調整された名目リスク係数

[% Sv^{-1}]

Nominal Population 被ばく集団	Cancer & leukæmia がん	Hereditable 遺伝性影響	Total 合計
Whole 全集団	5.5	0.2	5.7
Adult 成人	4.1	0.1	4.2

Rounded value used in RP standards⇒~5%Sv^{-1}

All rights reserved

In sum…..

- Following a review of the biological and epidemiological information on the health risks attributable to ionising radiation, the new ICRP Recommendations reconfirm previous estimates of the detriment-adjusted nominal risk coefficient, which remain unchanged at around 5% per sievert of effective dose.
- This value is coherent and consistent with the estimates of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR).
- **The claims that radiation risks have been underestimated by ICRP are a misrepresentation and are not substantiated**

All rights reserved

2.

Issues on Attributing Radiation Health Effects to Low Doses

All rights reserved

Want to advertise? Just call toll-free: 1-888-377-2222

PUBLISH YOUR NEWS

Search

The Canadian
www.agoracosmopolitan.com

APPLY FOR BANNER
Sell your products or services with
Canada's socially progressive national newspaper

Apply for a Banner 1

Apply for a Banner 2

CKCU RADIO FM

Canadian books

Become a member
SUBSCRIBE FREE click for details

Death toll from Japan nuclear catastrophe could top 500,000

DATE: 13 AUGUST 2011 POSTED BY : SPECIAL TO THE CANADIAN

John H. Large has been reported as having predicted that the death toll in the years ahead could top the 500,000 attributed to the Chernobyl accident of 1986 and warned that panicked repair attempts could lead to an even greater disaster. Mr. Large, a British nuclear engineer, said: "The Japanese don't know how to deal with it. They're ad-libbing.

"Just throwing water on to the reactors, when they cannot get inside to see what the situation is, could mean the fuel goes critical again.

"And while the radiation leak so far is only a tenth of that at Chernobyl, that was in a rural area with a low population. In Japan it's an urban, densely packed area so the potential numbers of deaths and cancers are much higher."

Mr. Large is an independent nuclear engineer and analyst primarily known for his work in assessing and reporting upon nuclear safety and nuclear related accidents.[LINK] From the mid-1960s until 1986 Large was an academic in Brunel University's School of Engineering, where he undertook research for the United Kingdom Atomic Energy Authority.

Mr. Large prepared a critical review of the preliminary report of the IAEA Fact Finding Mission undertaken to Fukushima Dai-ichi in May 2011. [LINK][LINK]

Polls

Do you welcome and have reservations about Target taking over Zellers in Canada?

- Welcome it
- Have reservation

Vote Result

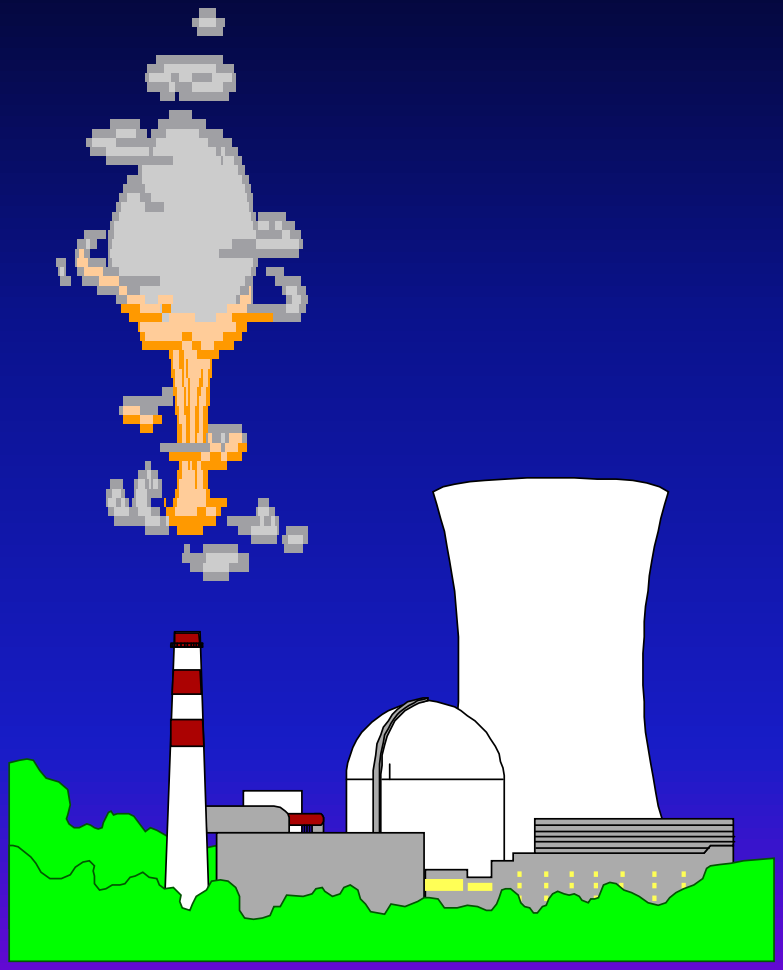
Blog | Books | Latest | Culture

- Manipulative Extraterrestrials control Earth suggests Dr. Michael Salla
- Humanized face of aliens control Earth suggests Dr. Michael Salla
- Perpetuated War and Canada's First Nations
- Toronto Housing ...

All rights reserved

All rights reserved

Modeling



Collective doses

Discharge from Fukushima

All rights reserved

Collective dose
(person-sieverts)

X

Nominal
Risk
Coefficient
(0.05/Sv)

=

Persons (nominal)
=
number of corpses

All rights reserved

• PRESS RELEASE •

International Atomic Energy Agency
World Health Organization
United Nations Development Programme

Contact: Marshall Hoffman, USA
Office (703) 820-2244
Home (703) 533-8482
Cell (703) 801-8602

Melissa Fleming, IAEA, Vienna, Austria
Office (+43 1) 2600-21275
Mobile (+43) 699 165 21275

EMBARGOED: September 5, 2005 at 4 p.m. local time

Released simultaneously from London, Vienna, Washington, and Toronto
B-rolls are available for TV producers.

Chernobyl: The True Scale of the Accident

20 Years Later a UN Report Provides Definitive Answers and Ways to Repair Lives

A total of up to four thousand people could eventually die of radiation exposure from the Chernobyl nuclear power plant (NPP) accident nearly 20 years ago, an international team of more than 100 scientists has concluded.

All rights reserved

March 25, 2006 Saturday

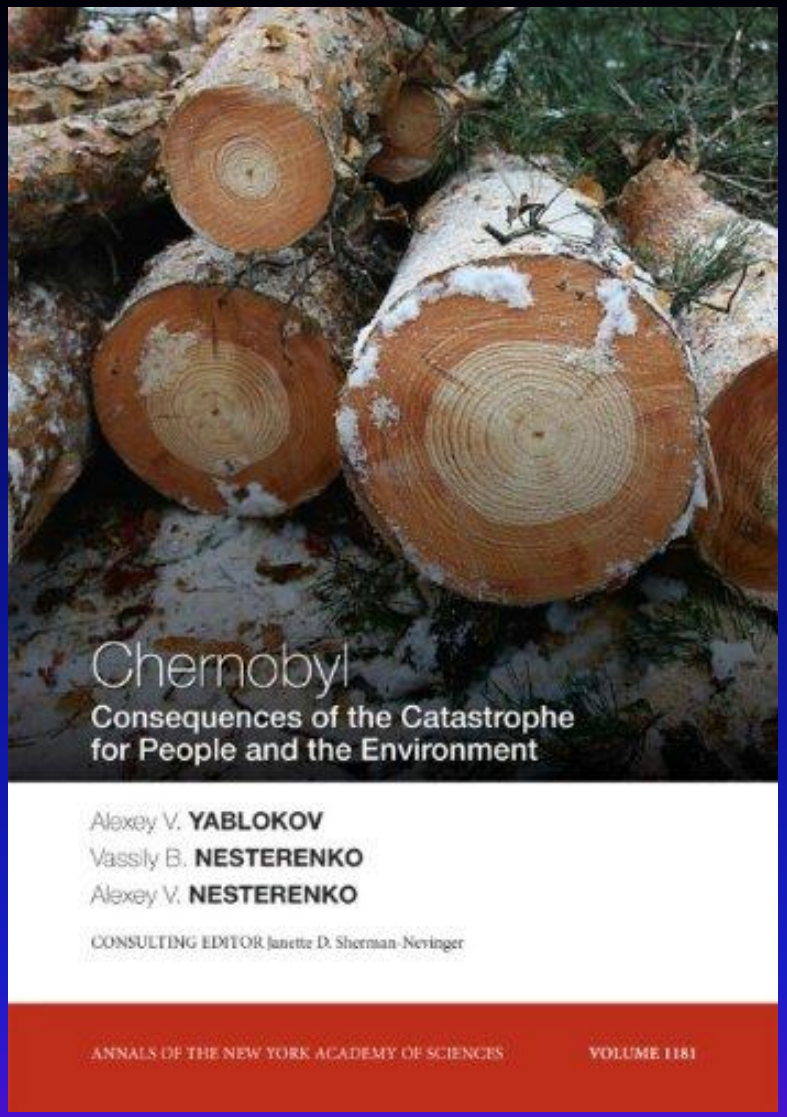
SECTION: GUARDIAN INTERNATIONAL PAGES; Pg. 17

HEADLINE:

UN ignores 500 000 Chernobyl deaths

IAEA says will be less than 4 000

All rights reserved



Chernobyl:

Consequences of the Catastrophe for People and the Environment

Annals

of the

New York Academy of Sciences

Alexey V. Yablokov (Editor),
Vassily B. Nesterenko (Editor),
Alexey V. Nesterenko (Editor),
Janette D. Sherman-Nevinger (Editor)

It concludes that based on records now available,

some 985,000 people died of cancer caused by the Chernobyl accident!

All rights reserved

Scientific misleadingless

International Journal of Cancer

Volume 119, § 6, pp 1224–1235

15 September 2006

REPORTED:

- …[by 2006] Chernobyl may have caused about 1,000 thyroid cancer and 4,000 other cancers in Europe.
- …by 2065 about 16,000 thyroid cancer and 25,000 other cancers may be expected due to radiation from the accident.

CAVEATS

- …several hundred million cancers are expected from other causes…
- …estimates are subject to considerable uncertainty…
- …it is unlikely that the cancer burden could be detected...
- …trends in cancer incidence and mortality in Europe do not indicate any increase in cancer rates that can be attributed to Chernobyl..

All rights reserved

UNSCEAR:
Report to the UN General Assembly

All rights reserved

A/67/46

United Nations

Report of the United Nations Scientific Committee on the Effects of Atomic Radiation

Fifty-ninth session
(21-25 May 2012)

General Assembly
Official Records
Sixty-seventh session
Supplement No. 46

All rights reserved

§ 25. The Committee has addressed the attribution of health effects to different levels of exposure to ionizing radiation, and has reached the following conclusions:

.....

(f) In general, **increases in the incidence of health effects in populations cannot be attributed reliably to chronic exposure to radiation at levels that are typical of the global average background levels of radiation.**

This is because of the uncertainties associated with the assessment of risks at low doses, the current absence of radiation-specific biomarkers for health effects and the insufficient statistical power of epidemiological studies. Therefore, **the Scientific Committee does not recommend multiplying very low doses by large numbers of individuals to estimate numbers of radiation-induced health effects within a population exposed to incremental doses at levels equivalent to or lower than natural background levels.**

All rights reserved

Preliminary dose estimation

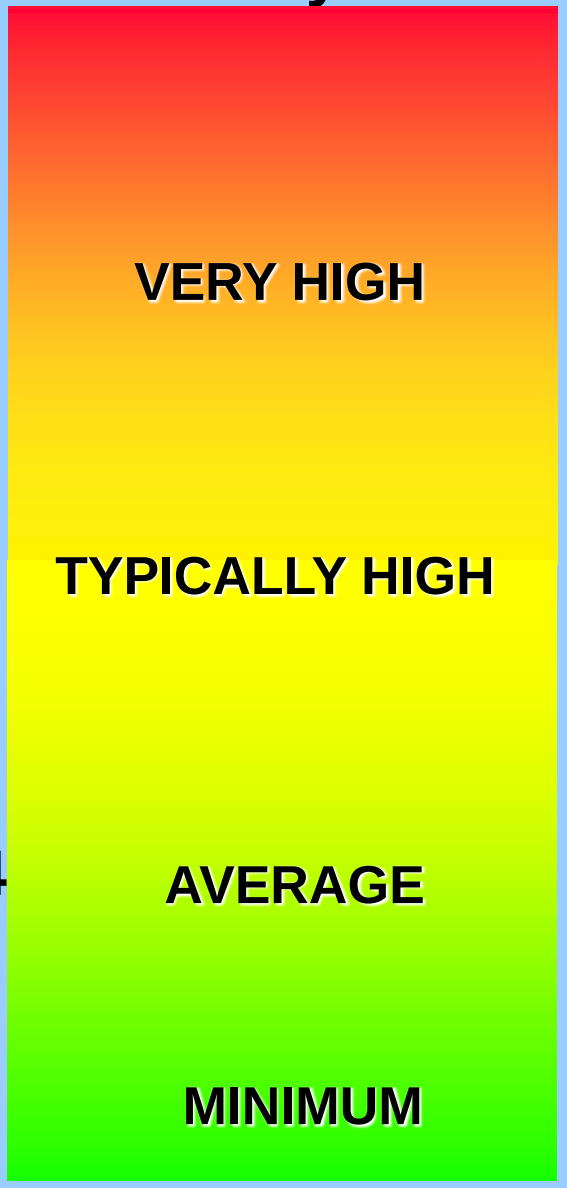
from the nuclear accident after the 2011 Great East Japan Earthquake and Tsunami

World Health Organization

All rights reserved

Natural Background

annual dose
mSv/year



Few people
In few areas ⇒ ~100

VERY HIGH

Many people
In many areas ⇒ ~ 10

TYPICALLY HIGH

Majority of people
around the world ⇒ ~ 2.4

AVERAGE

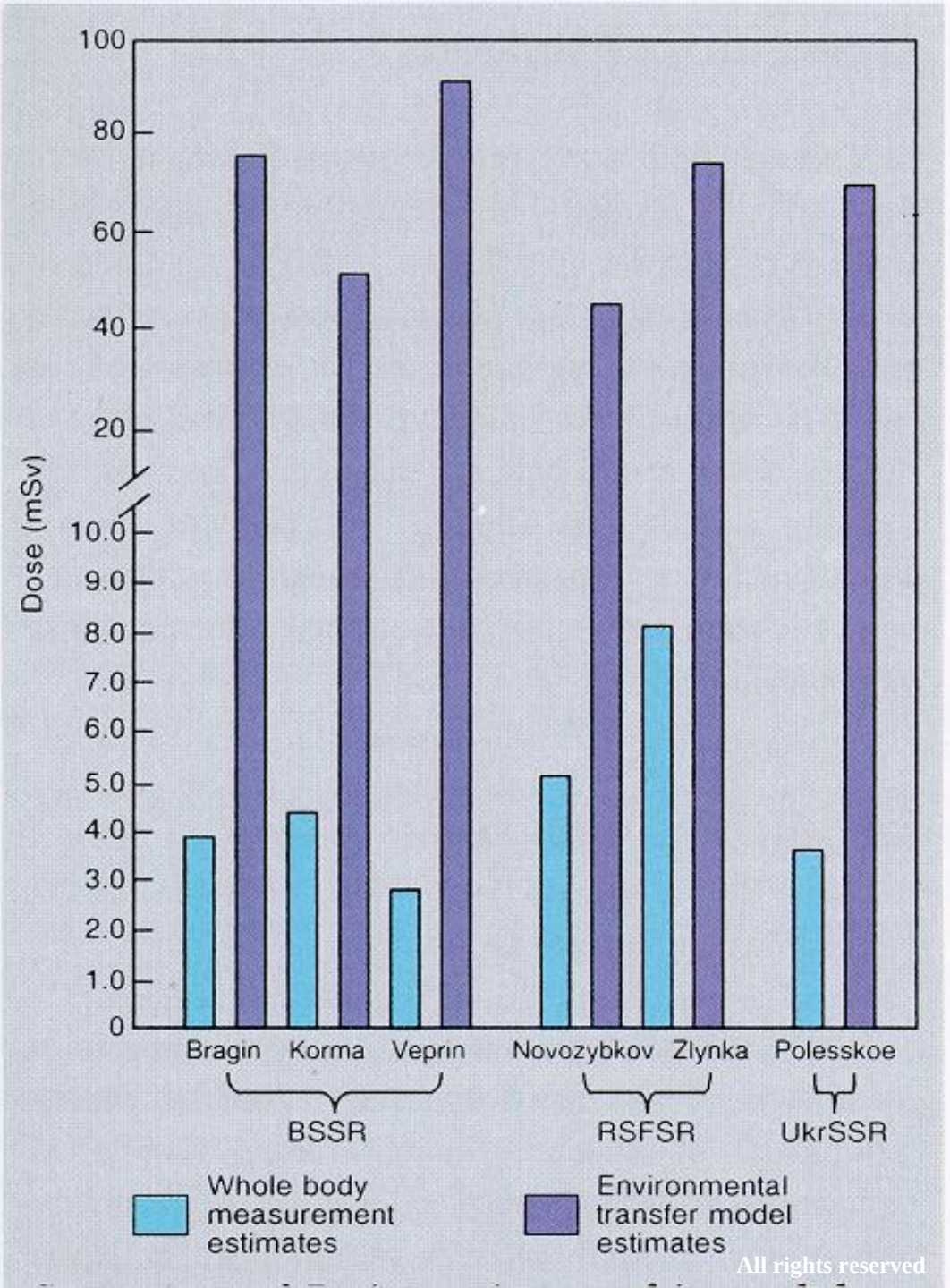
~ 1

MINIMUM

Calculated Doses due to the Accident

All rights reserved

In Chernobyl,
radiation doses
measured
in vivo
were much lower
than those estimated
theoretically.



All rights reserved

In sum, at low radiation doses ….

1. ….**EFFECTS** cannot be **retrospectively** demonstrated; therefore:

   actual effects can not be attributed.

…but…

2. ….**RISKS** can be **prospectively** inferred; therefore:

   radiation protection is required.

All rights reserved

Risk (危険) is akin to

***Probability* (確率)**

i.e., to the ability to estimate by *inference*

the *prospective possibility* of health effects

Health effects (健康影響) are akin to

***Provability* (証明可能性)**

i.e., to the ability to reveal by *evidence*

the *retrospective true existence* of health effects

All rights reserved

3.

Issues on Quantities and Units

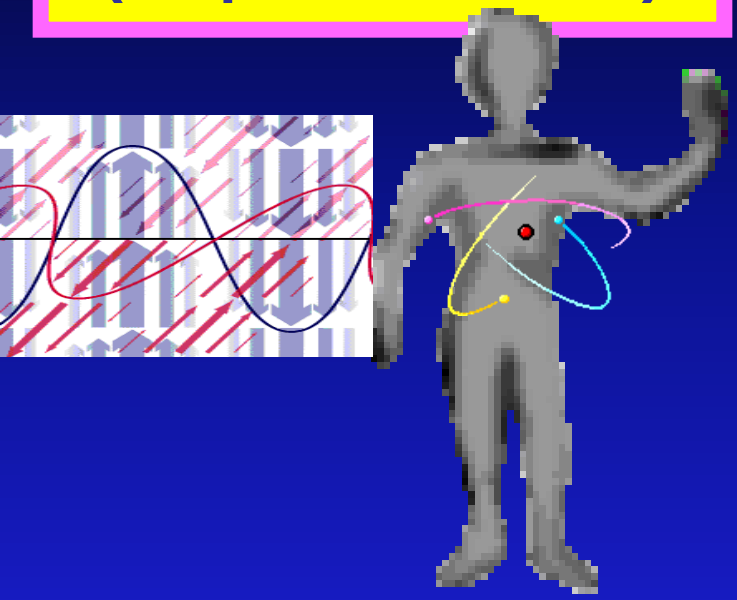
All rights reserved

Quantities Used in Radiological Protection

放射線防護に用いられる諸量

All rights reserved

Activity，*A*
放射能
(bequerel or curie)

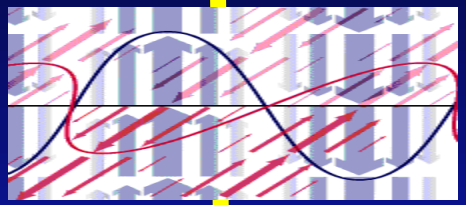


Absorbed dose, *D*
吸収線量
(gray or rad)

Fluence，*Φ*
フルエンス

All rights reserved

Absorbed dose, *D*
吸収線量
(gray or rad)



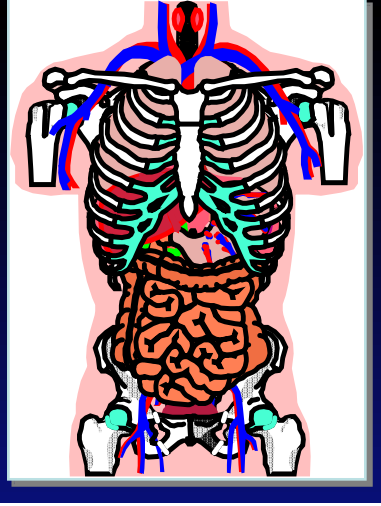
Radiation weighting factor, w_R
放射線加重係数

放射線のタイプ	放射線加重係数, w_R
光子	1
電子[a]とミュー粒子	1
陽子と荷電パイ中間子	2
アルファ粒子，核分裂片，重イオン	20
中性子	中性子エネルギーの連続関数（図1と式(4.3) 参照）

Equivalent dose, H_T
等価線量
(sievert or rem)

All rights reserved

Equivalent dose, H_T
等価線量
(sievert or rem)



Tissue weighting factor), w_T
組織加重係数

組　織	w_T	Σw_T
骨髄（赤色），結腸，肺，胃，乳房，残りの組織*	0.12	0.72
生殖腺	0.08	0.08
膀胱，食道，肝臓，甲状腺	0.04	0.16
骨表面，脳，唾液腺，皮膚	0.01	0.04
合計		1.00

残りの組織：副腎，胸郭外(ET)領域，胆嚢，心臓，腎臓，リンパ節，筋肉，口腔粘膜，膵臓，前立腺（♂），小腸，脾臓，胸腺，子宮/頸部（♀）。

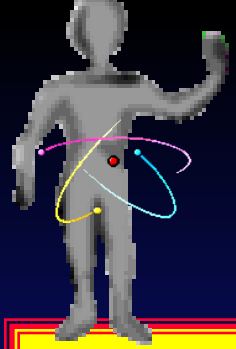
Effective dose, E
実効線量
(sievert or rem)

All rights reserved

These quantities and units have caused considerable communication problems, including the following:

- the differences between the quantities and the units are not well understood even by educated audiences;
- the distinction between the quantities for radiological protection and the operational quantities used for radiation measurement is even more difficult to understand in part due to semantic problems;
- the use of the same unit for the equivalent dose in an organ and the effective dose in the body has enhanced confusion further;
- the lack of a formal quantity for a radiation-weighted dose for high doses was, fortunately, not a problem in this accident but continues to be an unresolved issue; and,
- why there are so many different quantities in radiation protection?

All rights reserved



Activity
(Bq, curies)

Fluence
(cm^{-2})

Absorbed
Dose
(Gy, rad)

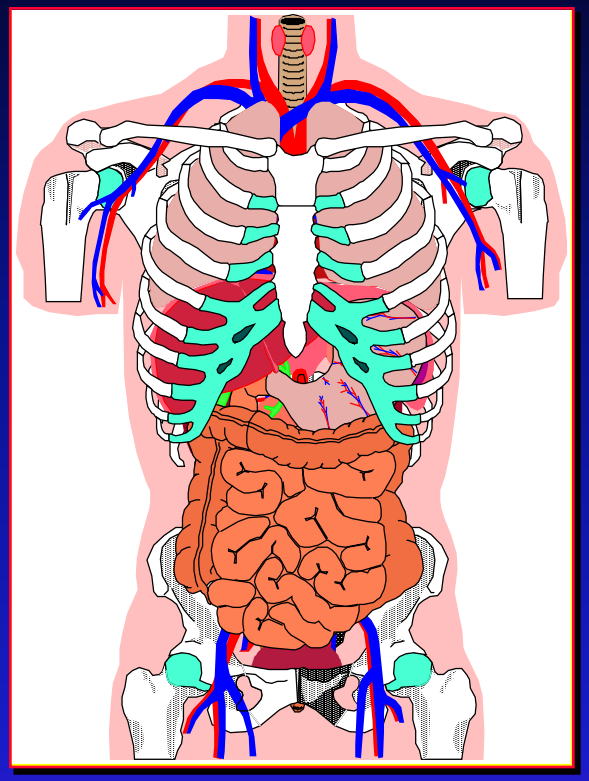
W_R

Equivalent
Dose (organ)
(Sv, rem)

W_T

Efective
Dose
(Sv, rem)

All rights reserved



Standards:
Equivalent Dose

Monitoring
Dose Equivalent

All rights reserved

Confusion!

- The quantities ***equivalent dose*** and ***effective dose*** have a common unit, ***sievert***. (confusion in the reporting of thyroid doses).
- Further confusion between the use of the quantity ***equivalent*** ***dose*** (等価線量) for radiological protection purposes and the quantity ***dose*** ***equivalent*** (線量当量) for calibrating instruments.

All rights reserved

4.

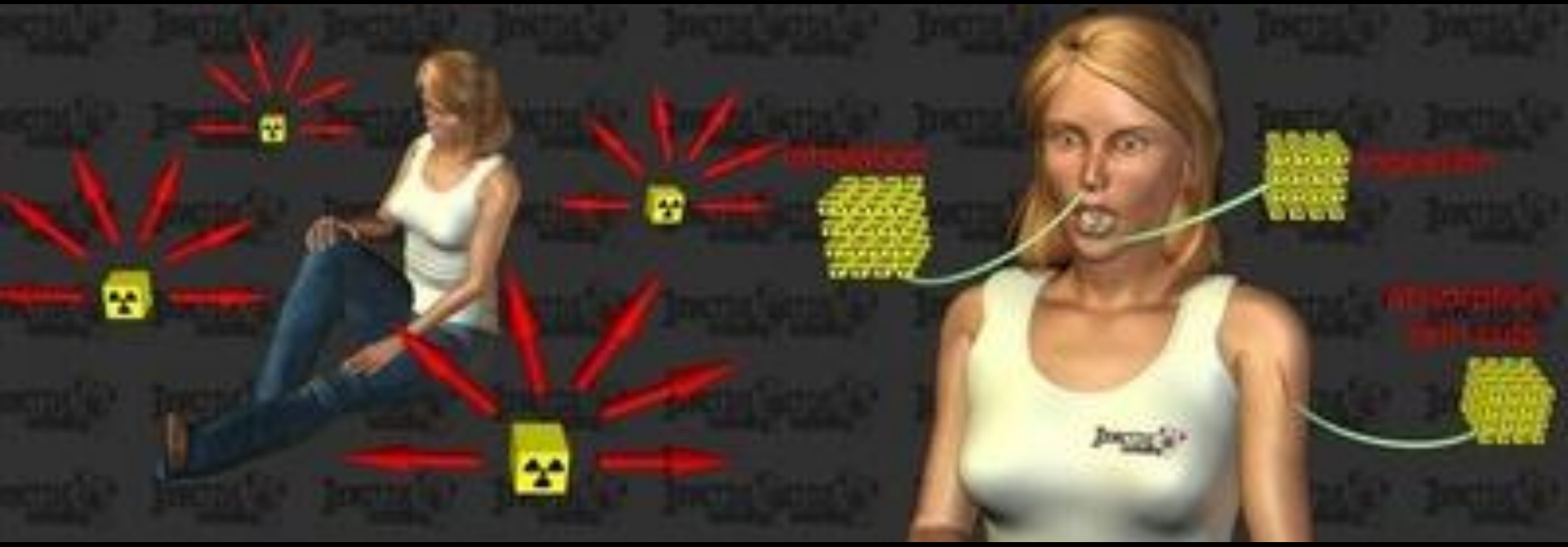
Issues on internal exposure

All rights reserved

Concerns on internal exposure

- The sophisticated system of protection for restricting internal exposure is misunderstood.
- Internal exposures are perceived as more dangerous than external exposures.
- This created a lot of anxiety among the people.

All rights reserved



All rights reserved

United Nations
A/AC.82/R.690

General Assembly

Distr.: Restricted

26 April 2012
Original: English

United Nations Scientific Committee
on the Effects of Atomic Radiation

Fifty-ninth session
Vienna, 21 to 25 May 2012

Agenda item 4(e)
Technical discussions

BIOLOGICAL EFFECTS OF SELECTED INTERNAL EMITTERS

Information contained in this document is preliminary and only for internal use by the Committee.
It should, therefore, not be cited in any published material until final approval by UNSCEAR.

All rights reserved

5.

Issues on Occupational Protection

All rights reserved

Protection of rescuers and volunteers

- There is a lack of an *ad hoc* international protection systems applicable to

  rescuers and volunteers.

- This complicates the regulation of the occupational doses of ‘nuclear’ workers.

All rights reserved

All rights reserved

Radiation Worker = Volunteers ?

All rights reserved

Occupational Dose Restrictions

mSv in a year

1000

500

100

50

20

Every effort not to exceed it

All reasonable efforts not to exceed it

Annual dose limit

Average dose limit

Optimization of Protection

EMERGENCY

NORMAL

2 April, 2013

All rights reserved

Protection of rescuers and volunteers

- The current occupational protection regime was conceived for ‘normal’ workers working in ‘normal situations’ and ‘emergency situations’
- It was not specifically envisaged for ‘rescuers’, in one extreme, and ‘volunteers’, in the other extreme.
- The issues is being resolved by the IAEA + ILO

All rights reserved

6.

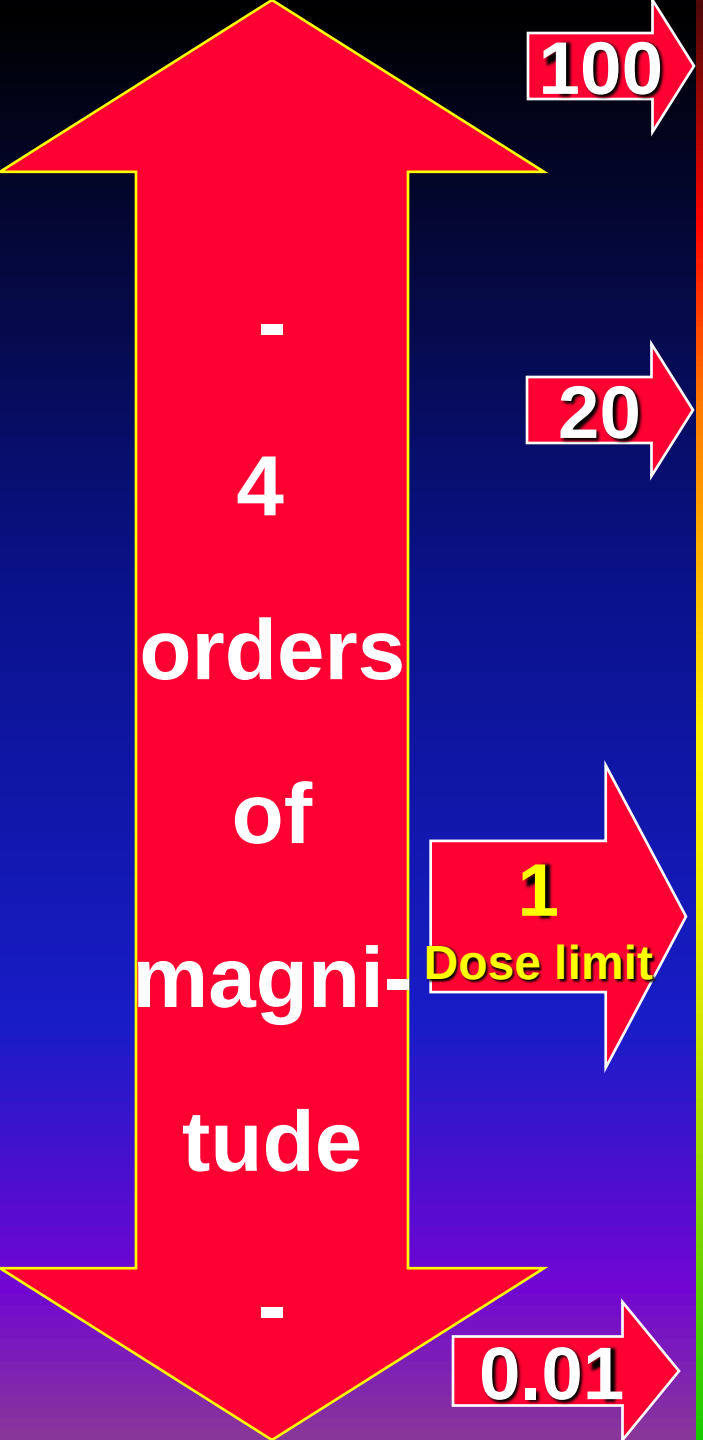
Issues on Public Protection

All rights reserved

Level of Doses

- The ICRP reference levels for the protection of the public were widely misunderstood by the public and their representatives and also by specialists.
- As a result the public felt unprotected.

All rights reserved



NO INDIVIDUAL/SOCIETAL BENEFIT ABOVE THIS

- Emergency workers
- Evacuation/relocation in emergencies
- High levels of existing controllable exposures
- Information, training, monitoring

Σ?

DIRECT OR INDIRECT BENEFIT TO THE INDIVIDUAL

- Occupational exposure
- Sheltering, stable iodine, in emergencies
- Existing exposures such as radon
- Comforters and carers to patients
- Information, training, monitoring or assessment

SOCIETAL, BUT NO INDIVIDUAL DIRECT BENEFIT

- Normal situations
- No information or training,
- No individual dose assessment

Δ?

Exclusion, exemption, clearance

All rights reserved

- **A typical question from the public is:**

Why doses of 20 mSv per year are permitted after the accident, when doses greater than 1 mSv per year were unacceptable before the accident?

All rights reserved

Lost in translation?

All rights reserved

- The Japanese expression for dose limit, 線量限度, is less ambiguous than its English version.
- 線量 means dose, used as an adjective, and
- 限度 means bound, boundary, end, border, brim, edge, verge, used as a substantive;
- Namely, 線量限度 means *a boundary of dose that shall not be exceeded under no circumstance*.
- It is therefore unsurprising that the population was perplexed with the use of dose restrictions higher than the dose limits.

All rights reserved

- If the dose limit is 1 mSv per year,

Why higher doses per year could be acceptable?

(Particularly after an accident when people expect to be better protected)

- Hans Blix's dictum:

"There is much confusion on the subject of the regulation of low doses, mainly but not exclusively on the part of the public; there are also very confusing statements on the topic among specialists…..people are surprised that what we term a dose limit is much lower than the natural background radiation doses that we unavoidably incur…..few decision makers understand…the… control [of] additions to background doses."

Last key note address as IAEA DG – Seville; Nov.17, 1997

All rights reserved

- In addition, the terms used for the individual restrictions applied to dose (線量) are difficult in English and, unsurprisingly, unclear in Japanese.
- Sophisticated explanations are required for understanding the concepts of:
- dose limit, 線量限度;
- dose constraint, 線量拘束値 ; and,
- reference level, 参考レベル.

All rights reserved

Moreover, the type of dose is not apparent, both in English and in Japanese.

A dose (線量) can be:

- an extant dose (現存線量) in the habitat

[which is sometime termed total dose (総線量)],

or

- an additional dose (追加線量) added by a given source.

All rights reserved

In an emergency exposure situation, the dose to deal with can be:

- the projected dose (予測線量),
- the avertable dose (回避線量), or
- the residual dose (残存線量).

All rights reserved

Dose?
What
dose?

All rights reserved

Are Children Properly Protected?

- Parents do not believe that children are adequately protected by the radiation protection standards

All rights reserved

The protection of children from the consequences of the accident has been of particular concern in Japan

All rights reserved

Detriment-adjusted nominal risk coefficients

for stochastic effects after exposure to radiation at low dose rate [% Sv^{-1}]

Nominal Population	Cancer & leukæmia	Hereditable	Total
Whole	5.5	0.2	5.7
Adult	4.1	0.1	4.2

All rights reserved

United Nations
General Assembly

A/AC.82/R.692
Distr.: Restricted

30 April 2012
Original: English only

United Nations Scientific Committee
on the Effects of Atomic Radiation

Fifty-ninth session
Vienna, 21 to 25 May 2012

Agenda item 4(g)
Technical discussions

EFFECTS OF RADIATION EXPOSURE ON CHILDREN

Information contained in this document is preliminary and only for internal use by the Committee.
It should, therefore, not be cited in any published material until final approval by UNSCEAR.

All rights reserved

Radiation, pregnancy and hereditary effects

All rights reserved

Pregnancy

Should I terminate my pregnancy?

- The situation is responsible for great apprehension among pregnant women and probably for unnecessary terminations of pregnancies.

All rights reserved

Importance of

of clarifying effects on pregnancy

All rights reserved

7.
Issues on Public Monitoring

All rights reserved

Why members of the public are not monitored?

If is it done for them….

….why not for them

All rights reserved

Absence of Environmental Monitoring Policy

- There is a lack of updated international recommendations on environmental monitoring policy following a large accidental release of radioactive materials into the environment.

All rights reserved

RADIATION PROTECTION

Principles of Environmental Monitoring related to the Handling of Radioactive Materials

ICRP PUBLICATION 7

A Report by Committee 4 of the International Commission on Radiological Protection

Adopted by the Commission on September 13, 1965

PUBLISHED FOR
The International Commission on Radiological Protection
BY
PERGAMON PRESS
OXFORD · LONDON · EDINBURGH · NEW YORK
TORONTO · PARIS · BRAUNSCHWEIG

All rights reserved

Principles of Monitoring for the Radiation Protection of the Population

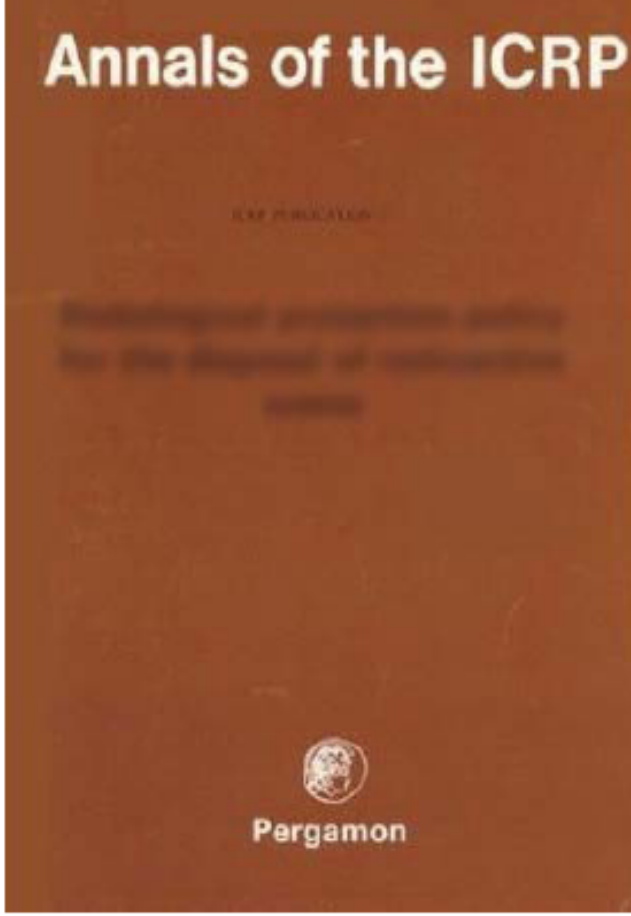
ICRP Publication 43

Ann. ICRP 15 (1), 1985

Abstract - Since the publication of the previous report dealing with environmental monitoring the commission has revised its basic recommendations and some aspects of its philosophy dealing with dose limitation. Although many of the previous recommendations are still relevant it was felt necessary to reassess the general principles on which monitoring programs should be based, to make the recommendations consistent with current radiation protection philosophy and to extend the scope to all types of monitoring outside the workplace. In this report all exposures are considered except occupational exposure and exposure to patients from medical uses of radiation.

Recommended reference format for citations

ICRP, 1985. Principles of Monitoring for the Radiation Protection of the Population. ICRP Publication 43. Ann. ICRP 15 (1).



All rights reserved

8.

Issues on '*Contamination*'

All rights reserved

Mission impossible: Dealing with 'contamination'

- There are no clear quantitative standards to deal with "*contamination*"; e.g.:
  - remediation of the "contaminated" territories;
  - disposing of "contaminated" debris and rubble;
  - Use of "contaminated" consumer products.
- This is one of the more important issues to deal with in aftermath of Fukushima.

All rights reserved

‘Contamination' is a confusing term

- from Latin *contaminare*, ‘made impure’.
- Religious origin (e.g., no-kosher food)
- Professional denotation: presence of radioactivity
- Public connotation: radioactive danger

All rights reserved

Translation to Japanese

Contamination → 汚染

- **汚 → Dirt, Filth**

汚さ → dirtiness　　汚物 → filthiness　　汚泥 → sludge

- **染 → Dyed**

汚染 → painted with dirt?

All rights reserved

All rights reserved

'Contaminated' Territories

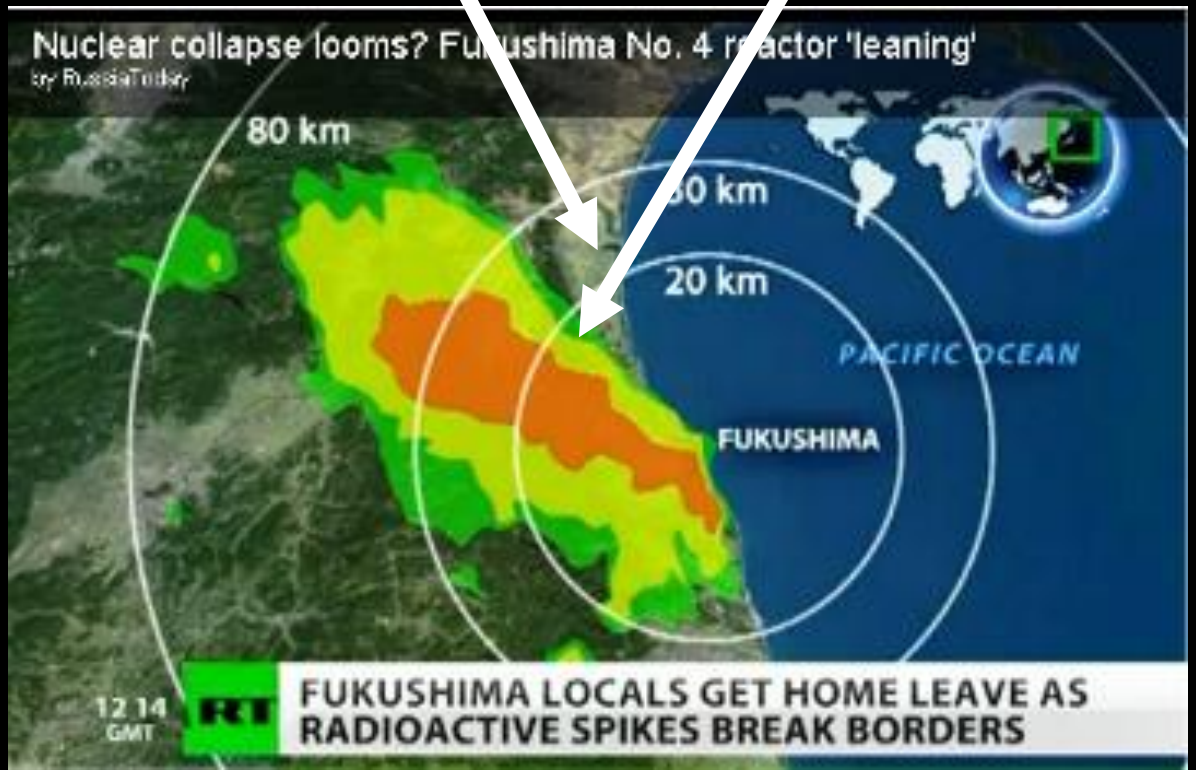
All rights reserved

What is the meaning of ‘contaminated’ territories?

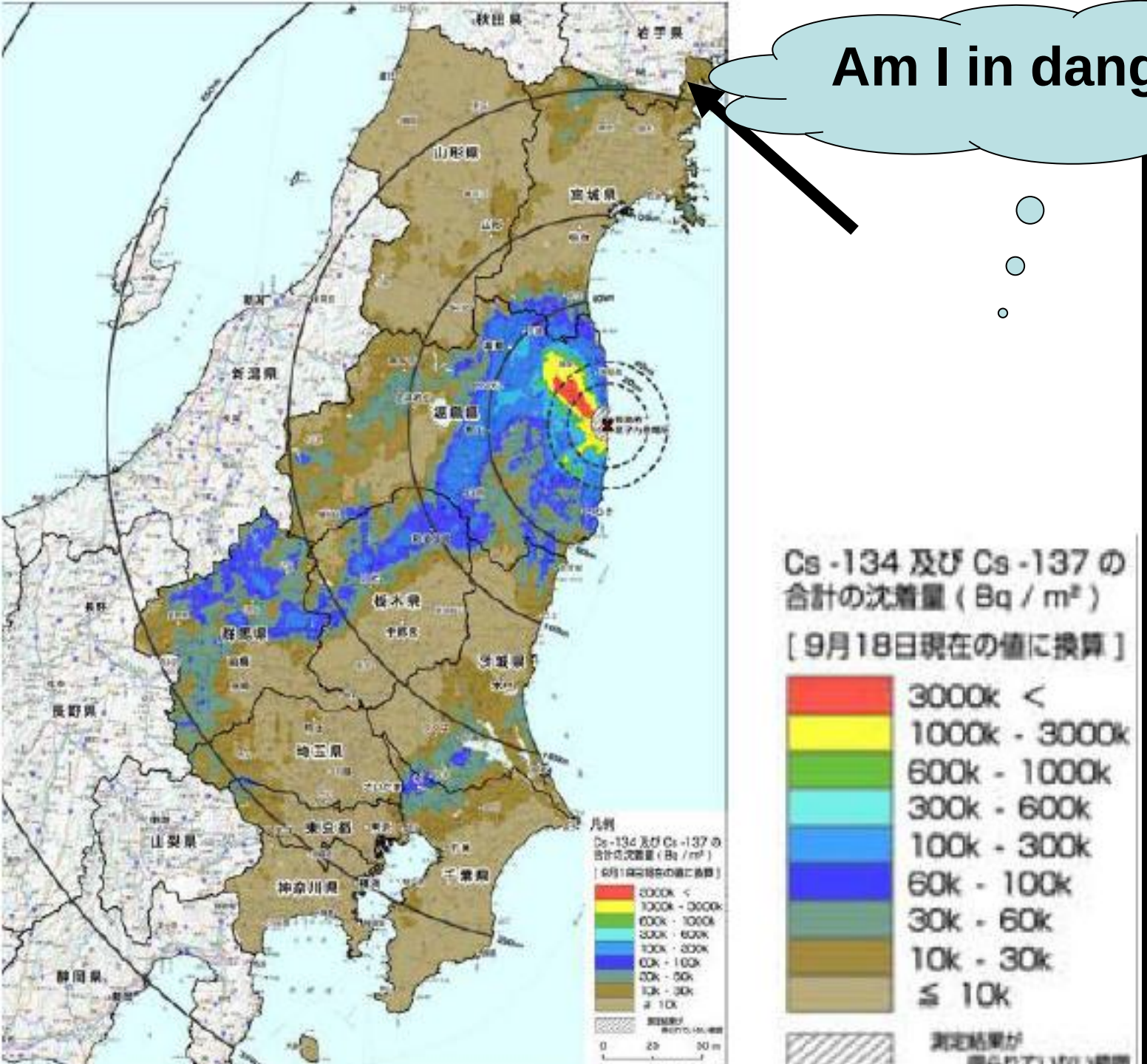
All rights reserved

We are not in danger!

We are in danger!

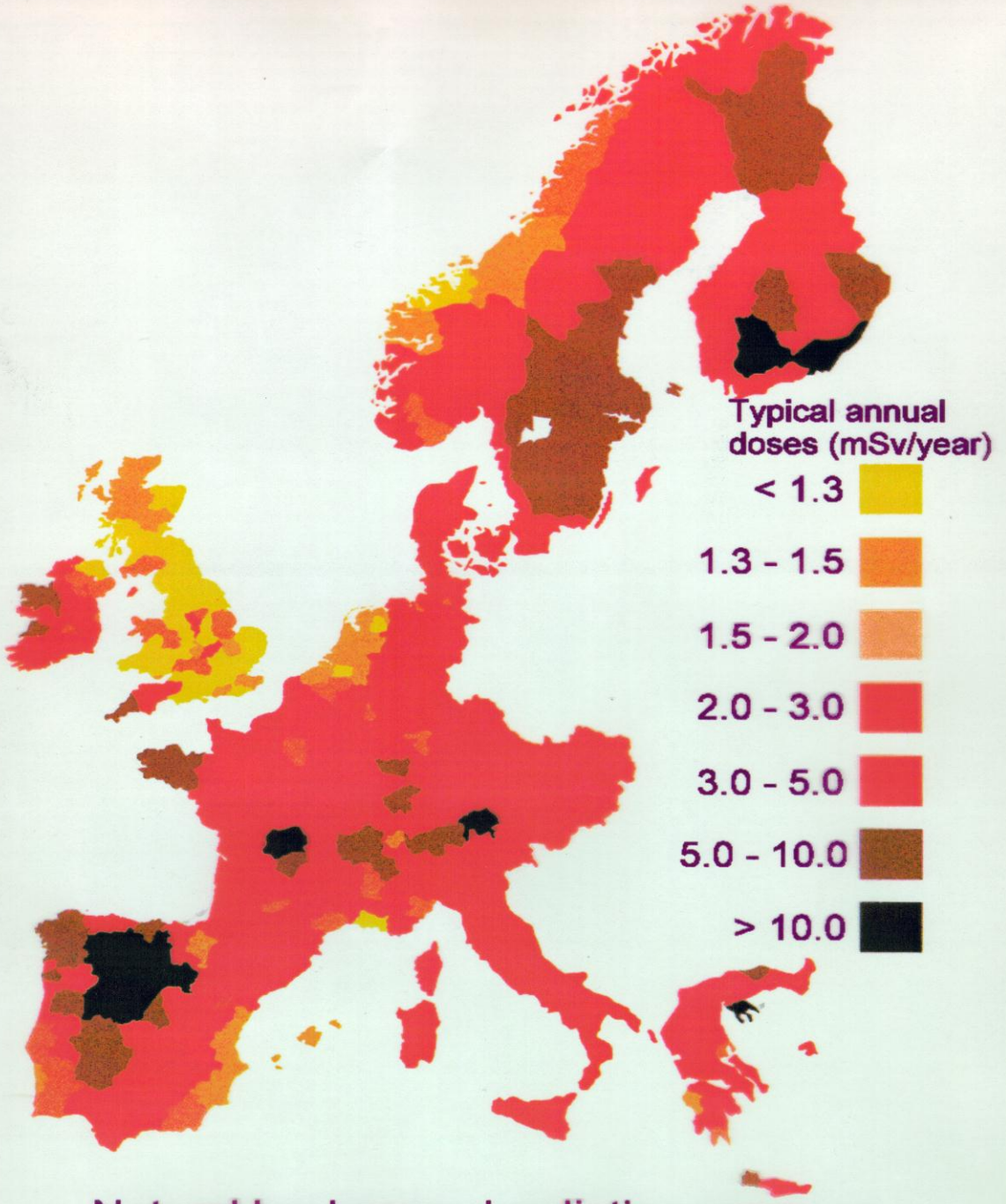


All rights reserved



Am I in danger?

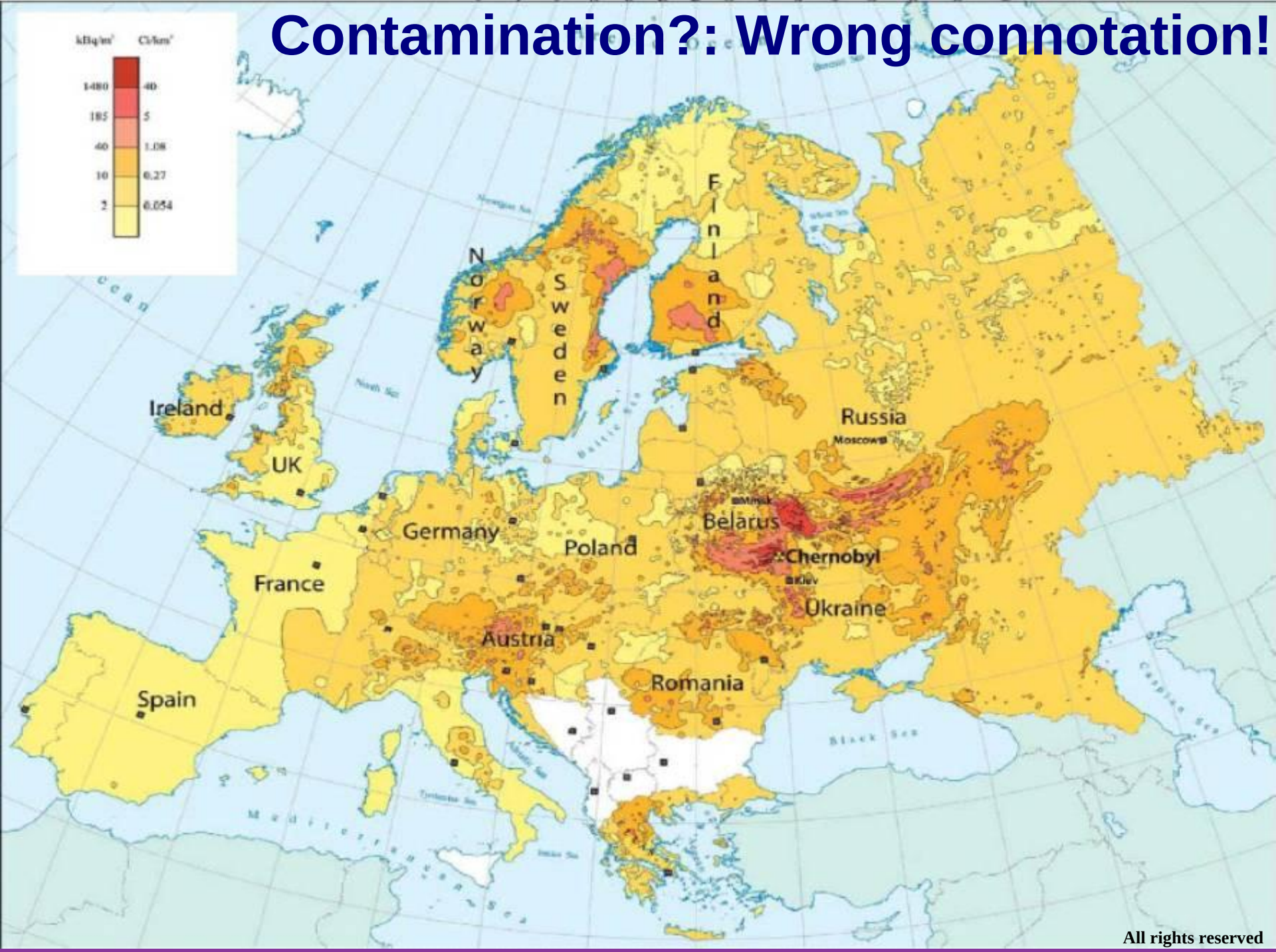
All rights reserved



Natural background radiation exposure

All rights reserved

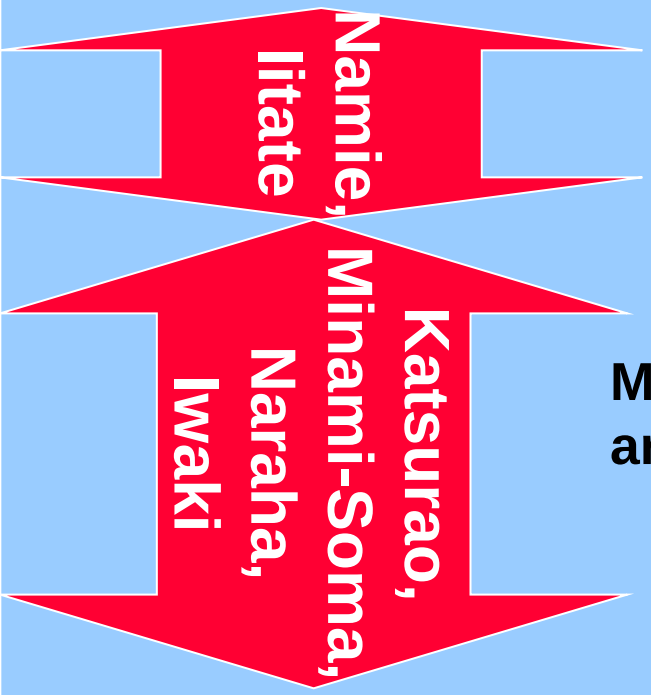
Contamination?: Wrong connotation!



All rights reserved

Natural Background

annual dose
mSv/year



Few people
In few areas ⇒ ~100

VERY HIGH

Many people
In many areas ⇒ ~ 10

TYPICALLY HIGH

Majority of people
around the world ⇒ ~ 2.4

AVERAGE

~ 1

MINIMUM

All rights reserved

All rights reserved

Can we play on the outdoor area?

All rights reserved

How to ‘remediate’ ‘contaminated’ territories

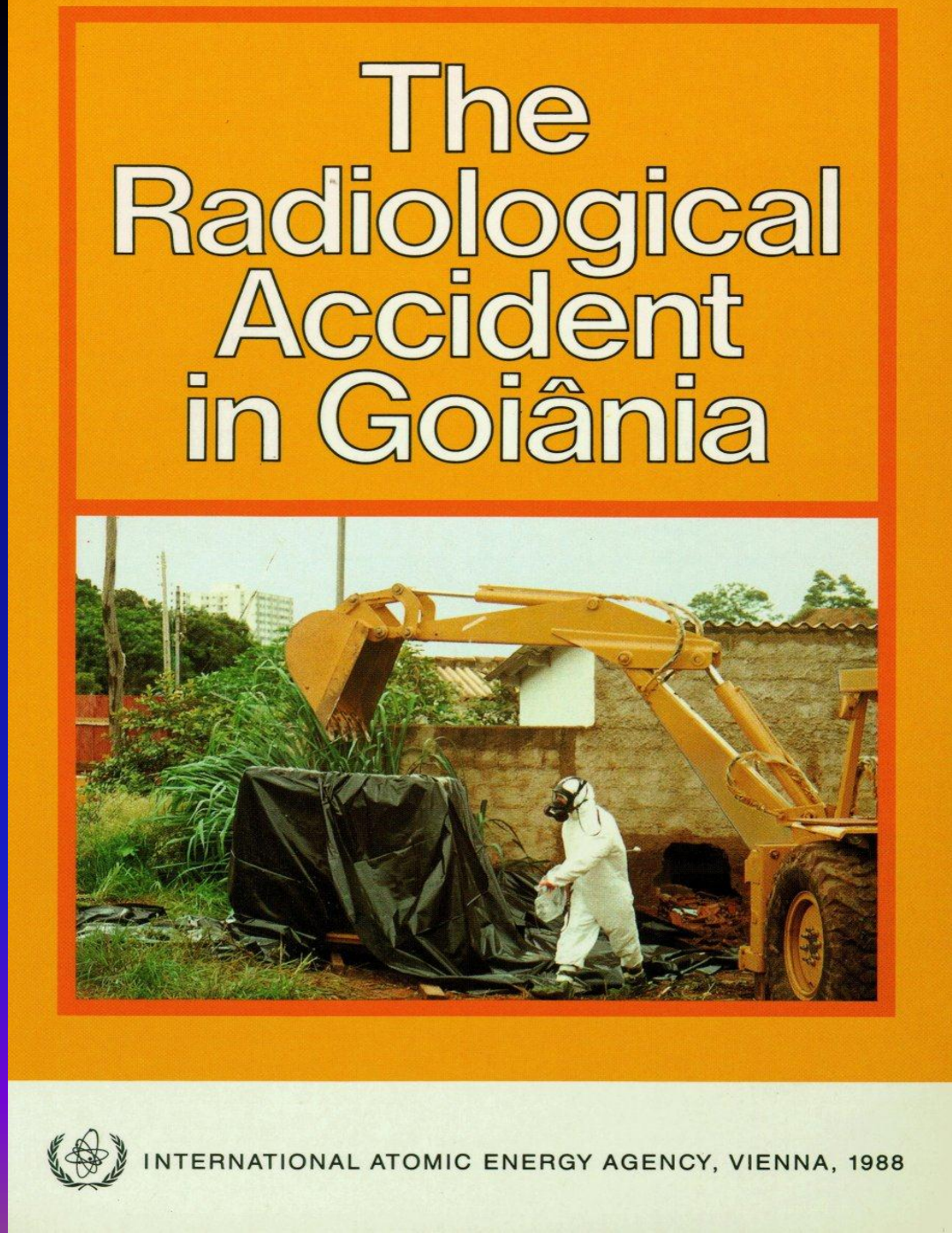
- Exempting?
- Mixing the soil?
- Scraping?....and creating a lot of rubble?

All rights reserved

'Contaminated' Rubble

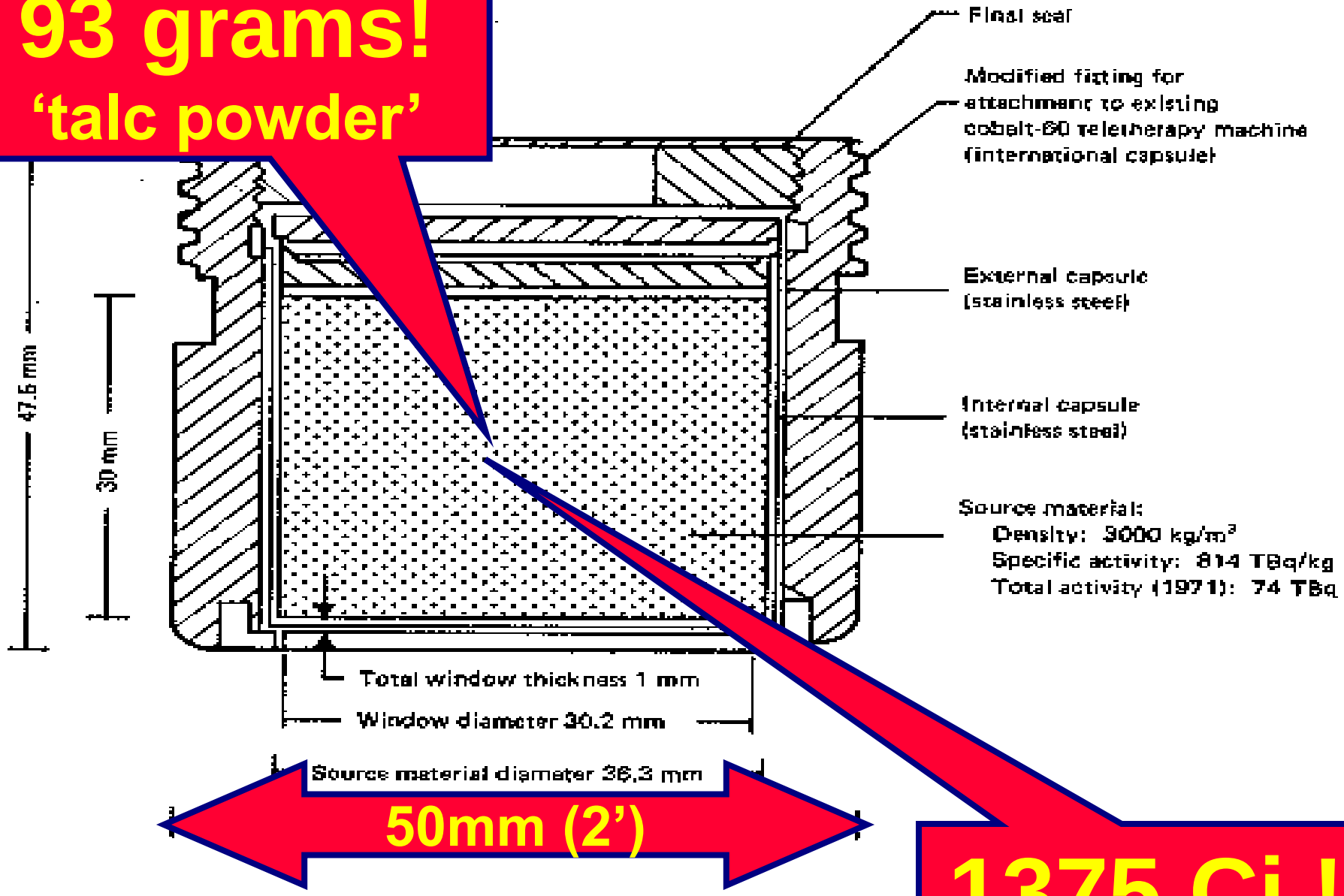
All rights reserved

Example



All rights reserved

93 grams!
‘talc powder’



50mm (2’)

1375 Ci !!

All rights reserved

13. Contaminated rubble from the demolition of R.A.'s house on 57th Street.

All rights reserved

22. *Stacking waste containers to be taken to the temporary storage site.*

All rights reserved

27. *Waste containers at the temporary storage site.*

All rights reserved

All rights reserved

All rights reserved

All rights reserved

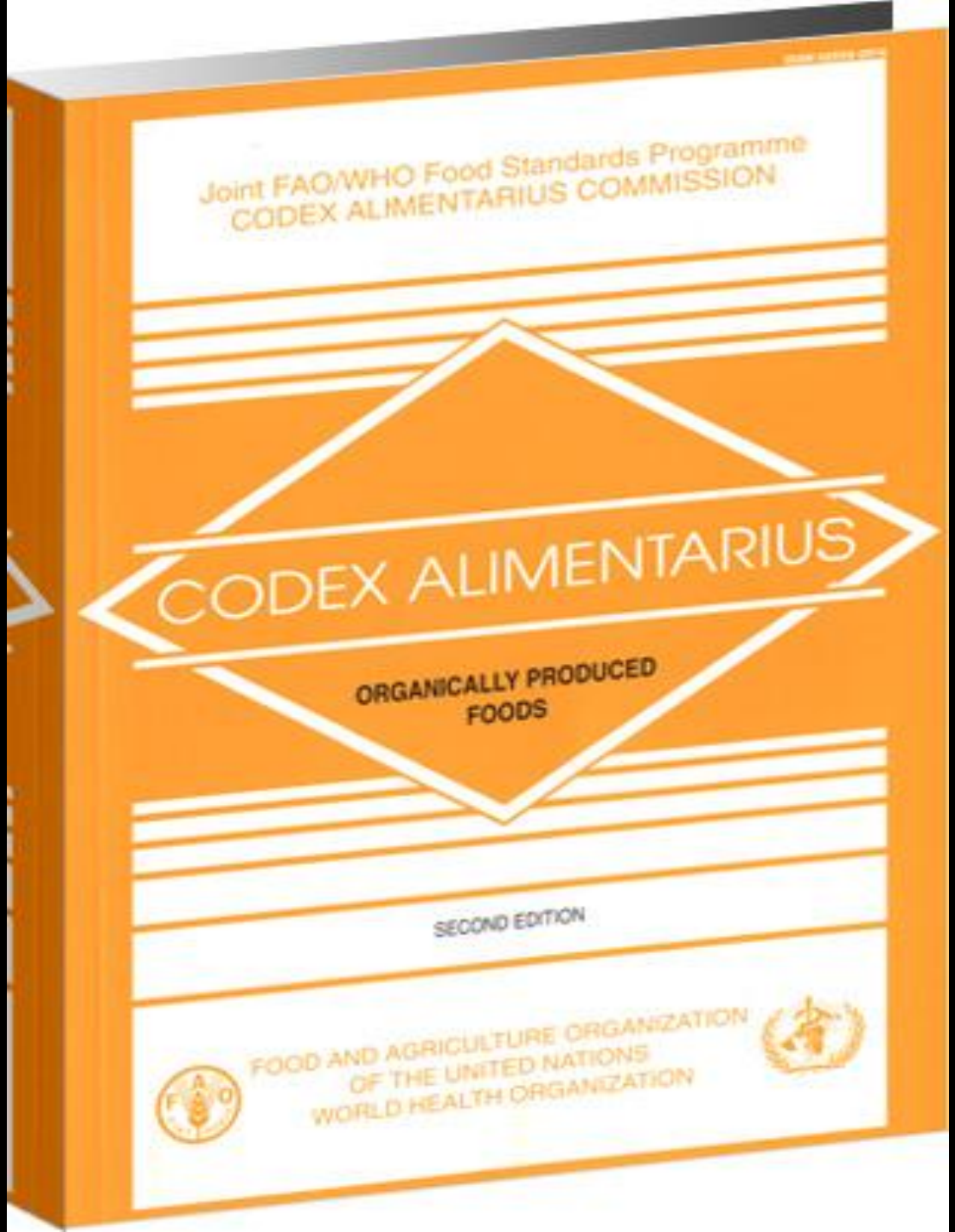
'Contaminated' Consumer Products

All rights reserved

- The control of acceptable levels of radioactivity in consumer products is not straightforward
- Some international intergovernmental agreements exist but they are incoherent and inconsistent.

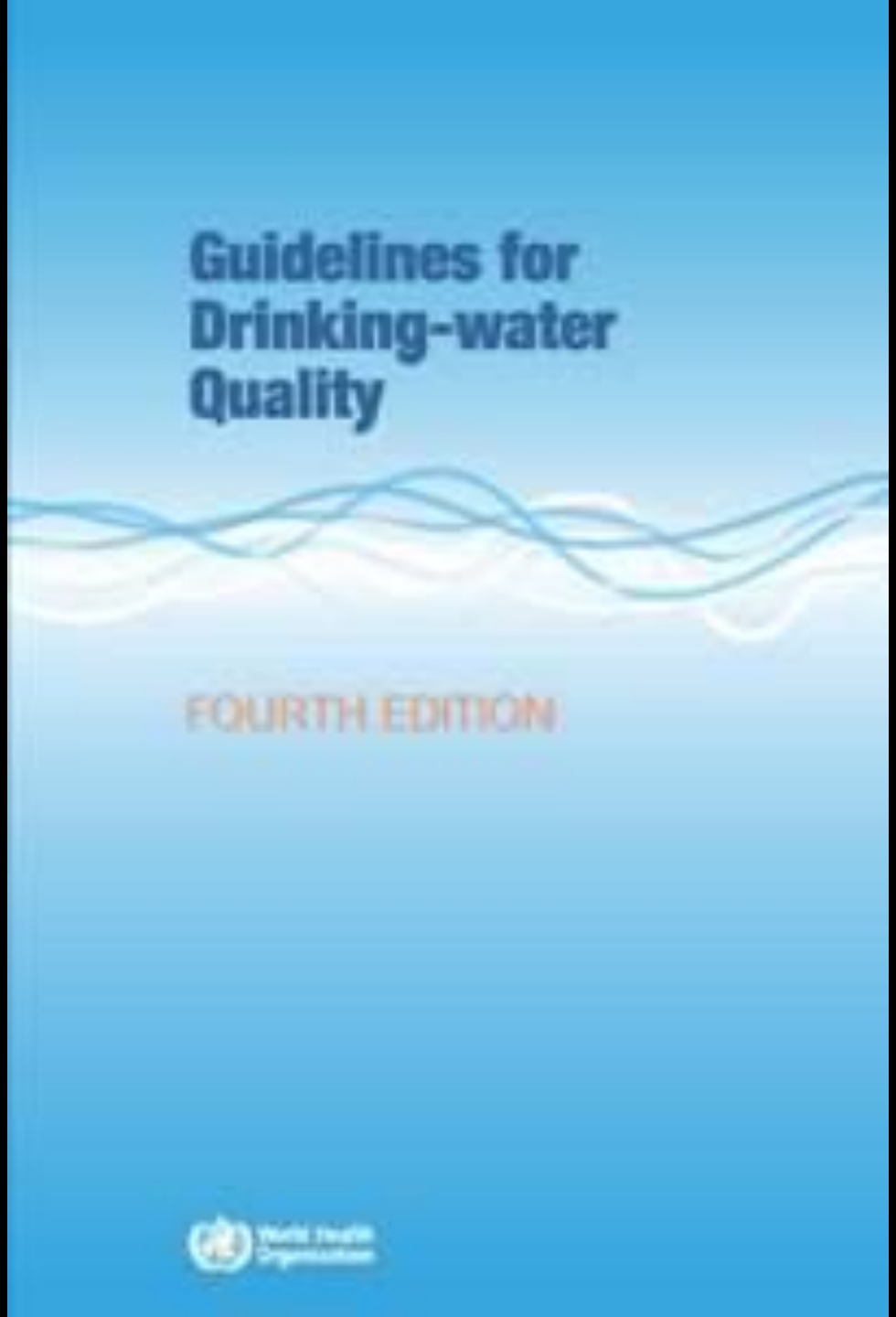
All rights reserved

Foodstuff



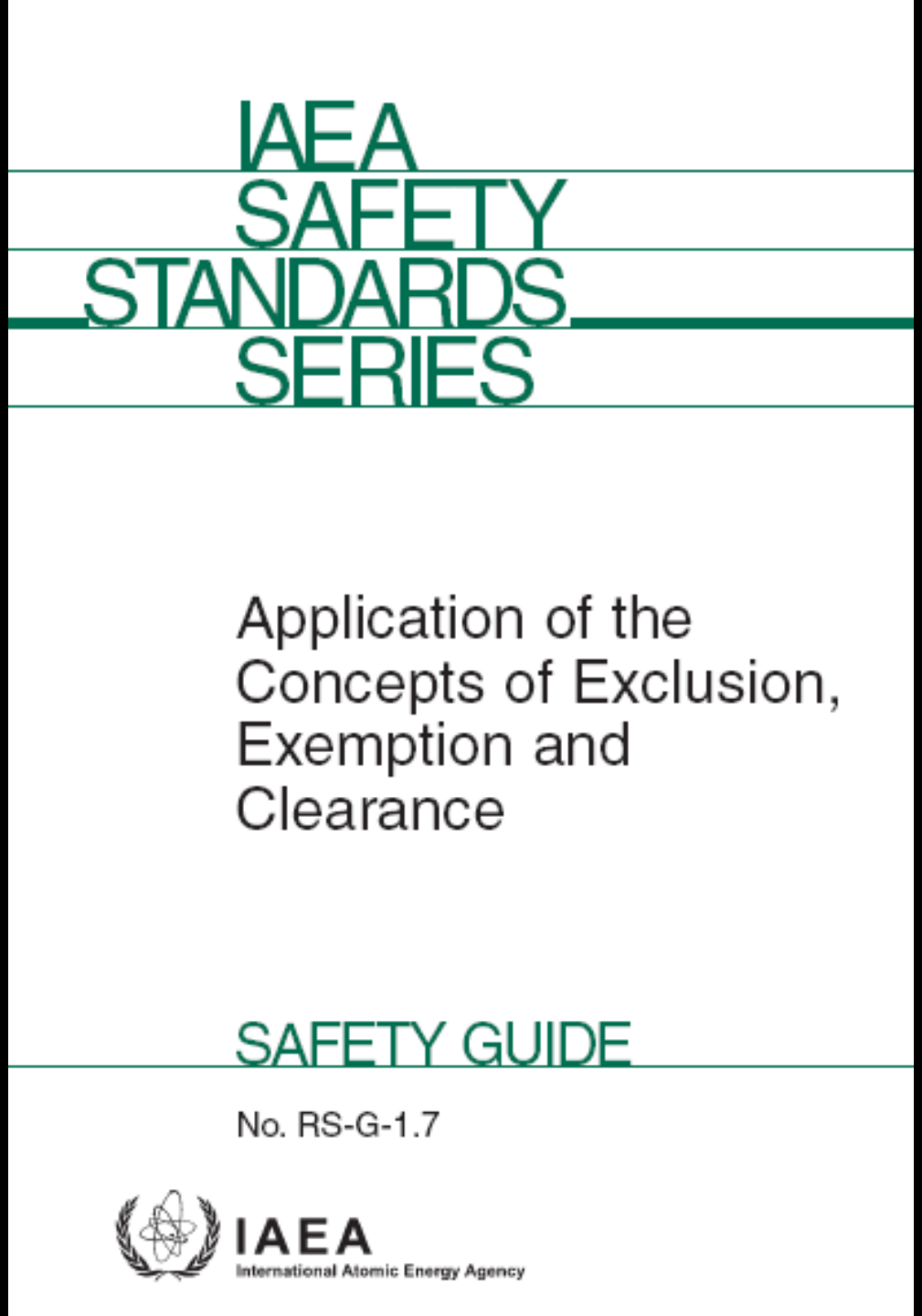
All rights reserved

Water



All rights reserved

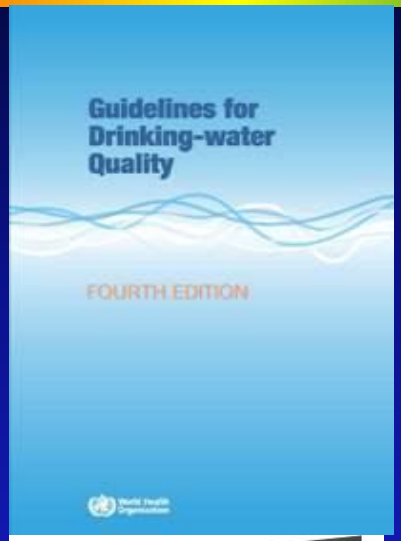
Non edible



All rights reserved

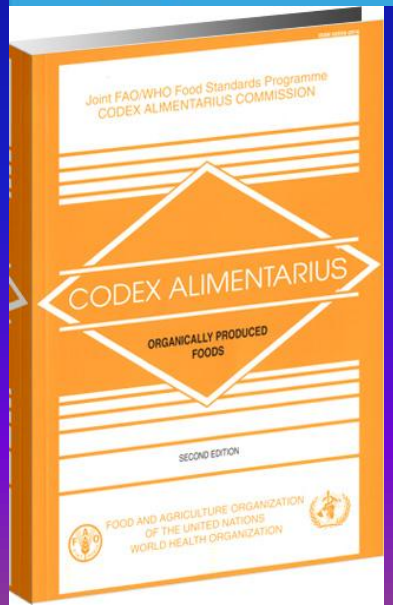
Incoherence in drinking liquids

+



= 10 Bq/l for ^{137}Cs

+



= 1000 Bq/l for ^{137}Cs

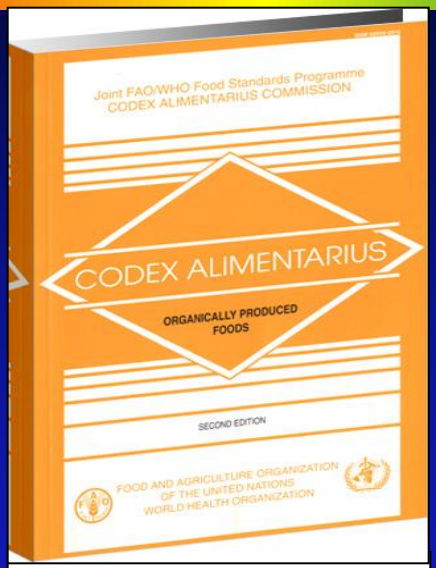
All rights reserved

If water is not safe, why is orange juice safe?

All rights reserved

Incoherence in non-edible vs. edible

+



= 1000 Bq/kg for ^{137}Cs

+

= 100 Bq/kg for ^{137}Cs

All rights reserved

Are these rice-paper room-divider screens safe?

All rights reserved

Guidance values in Japan

Guideline values for food and drink intake restrictions

(Nuclear Safety Commission)

	Radioactive Iodine(^{131}I)	Radioactive Cesium	Uranium	Total of ^{238}Pu, ^{239}Pu,^{240}Pu,^{242}Pu ,^{241}Am,^{242}Cm,^{243} Cm,^{244}Cm
Drinking water	> $3x10^2$Bq/kg	> $2x10^2$Bq/kg	> 20Bq/kg	> 1Bq/kg
Milk, dairy products				
Vegetables and fruits	> $2x10^3$Bq/kg (excluding root vegetables and potatos)	> $5x10^2$Bq/kg	> $1x10^2$Bq/kg	> 10 Bq/kg
Grains	-			
Meat, Egg, Fish, etc				

All rights reserved

New radiation limits in Japan

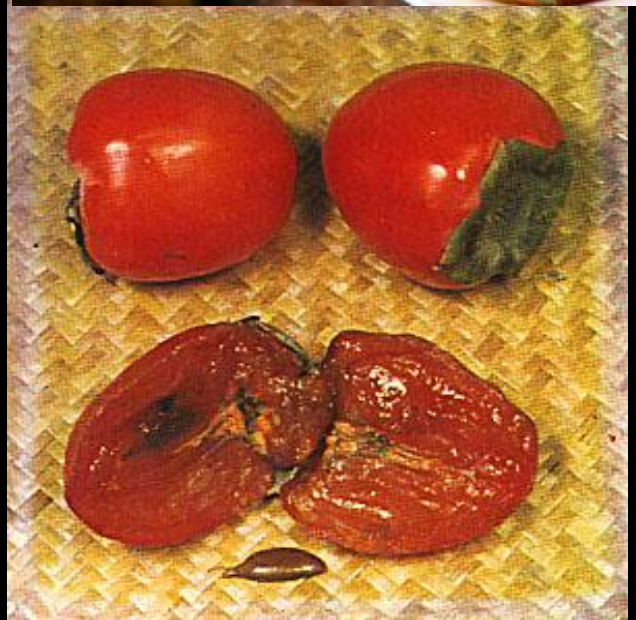
- On 22 December 2011 the Japanese government announced new limits for cesium in food.

  (The new norms were enforced in April 2012).

- Rice, meat, vegetables, fish: **100 Bq/Kg** (500 Bq/Kg),
- Milk, milk-powder, infant-food: **50 Bq/Kg** (200 Bq/Kg)
- Drinking water: **10 Bq/Kg** (200 Bq/Kg)

All rights reserved

These kakis (persimmons) contain 90 Bq/kg, but when dried they contain 110; are they edible?



All rights reserved

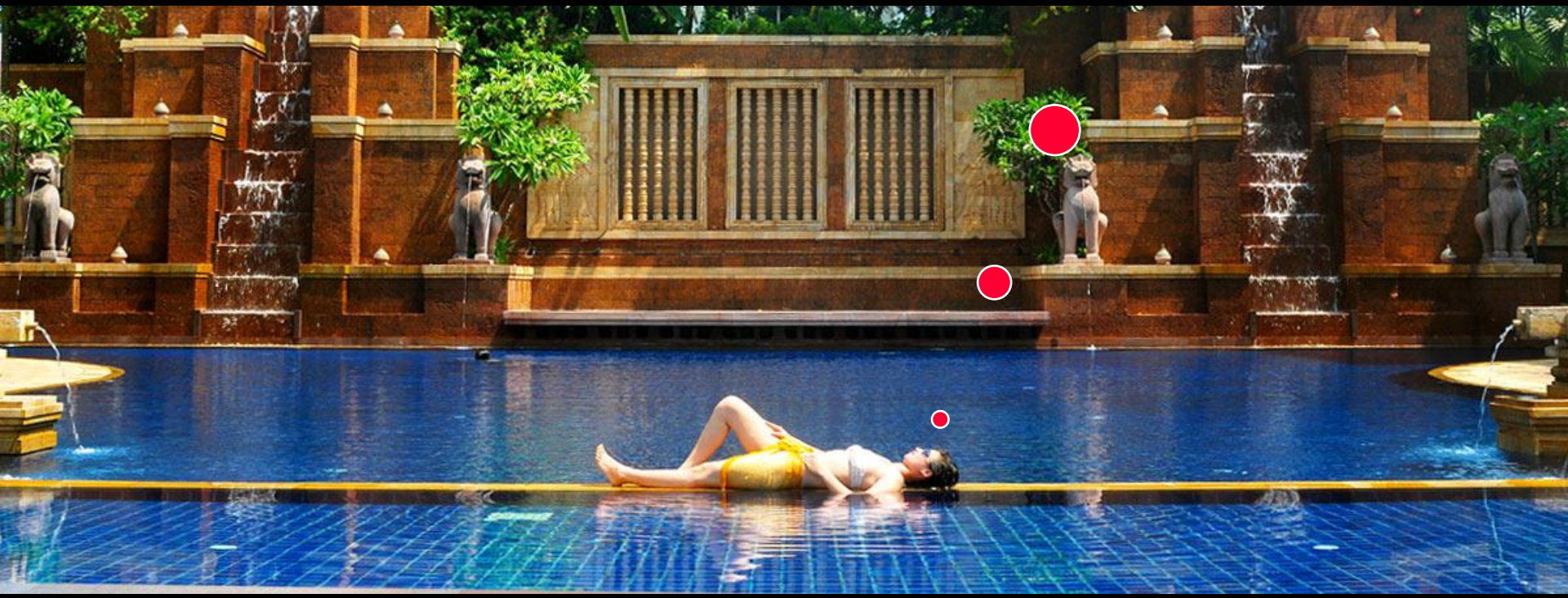
Is it safe?

The Minister does not drink water from the Fukushima Prefecture every day!

This water is safe; I drank it!

Deputy Minister Yasuhiro Sonoda

All rights reserved



All rights reserved

We were told this water is contaminated; shall we use it?

All rights reserved

Related News: Environment · Asia · Japan · Commodities · Health Care · Retail

Want to save this for later? Add it to your Queue!

Radioactive Cesium in Meiji Milk Spurs Recall

Q

By Kanoko Matsuyama and Yuriy Humber - Dec 6, 2011 8:32 AM GMT-0300

“Meiji Step”

powdered milk formulated for babies older than nine months

All rights reserved

lanacion.com

Martes 22 de enero de 2013 | 16:21

Japón: encuentran un pez con 2500 veces el nivel legal de radiactividad

Fue hallado cerca de la central nuclear accidentada de Fukushima durante 2011 por un terremoto y posterior tsunami

TOKIO.- Un pez atrapado con la finalidad de realizar un control cerca de la central nuclear accidentada de Fukushima presenta un nivel impresionante de contaminación radioactiva, casi 2.500 veces superior al límite legal fijado por Japón, anunció el viernes el operador de esta instalación atómica.

La compañía Tokyo Electric Power (TEPCO) declaró que midió en un pez llamado "murasoi" una cantidad de cesio radioactivo igual a 254.000 becquereles por kilo, o sea 2.540 veces el límite de 100 becquereles/kg definida para los productos marinos por el gobierno.

Japan find a fish with 2500 times the legal level of radioactivity.

La Nación, Buenos Aires, Tuesday, January 23rd, 2013

All rights reserved

Deceit! - 詐欺!

- Highly ‘contaminated’ fish = 254,000 bequerel/kilo
- Even assuming that a 1 year old Japanese baby eats 1 kilogram! of THIS fish!!....
- …such a fish-greedy baby would have ingested 254,000 bequerels of ^{137}Cs and, as a result, would have committed a dose of

$250{,}000 Bq \times 2.1\ 10^{-8}\ Sv\ Bq^{-1} = \underline{0.5\ mSv}$ over 70 years

…namely, the same dose that the baby would incur,

in one go, if the parents travel with him by plane to Argentina to visit a relative!

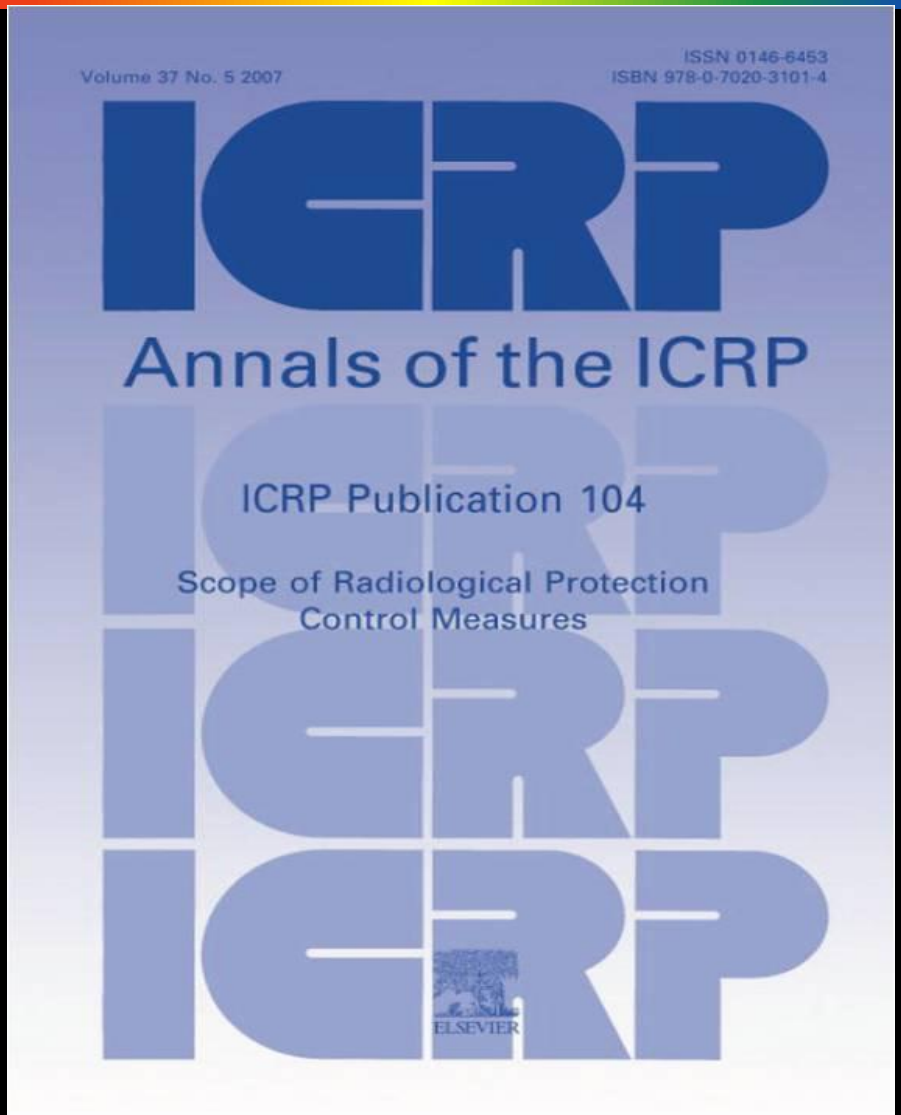
All rights reserved

All rights reserved

I seems that even climbing this mountain will not solve the problem of 'contamination' ?

All rights reserved

ICRP 104 may be helpful



All rights reserved

9.

Issues on Psychological Effects

All rights reserved

Probably the big lesson of Fukushima

- **The confusing situation created by the ‘contamination’ of the habitat is responsible of the only serious health effect attributable to Fukushima:**

psychological effects!

All rights reserved

- Psychological effects are dominant in the Fukushima aftermath.
- They are health effects in their own right
- However, they are ignored in radiation protection recommendations and standards

All rights reserved

Japan's Reconstruction Agency

- A recently published report by Japan's Reconstruction Agency(*) indicates that stress has emerged as the biggest factors in ill health for Japanese people.

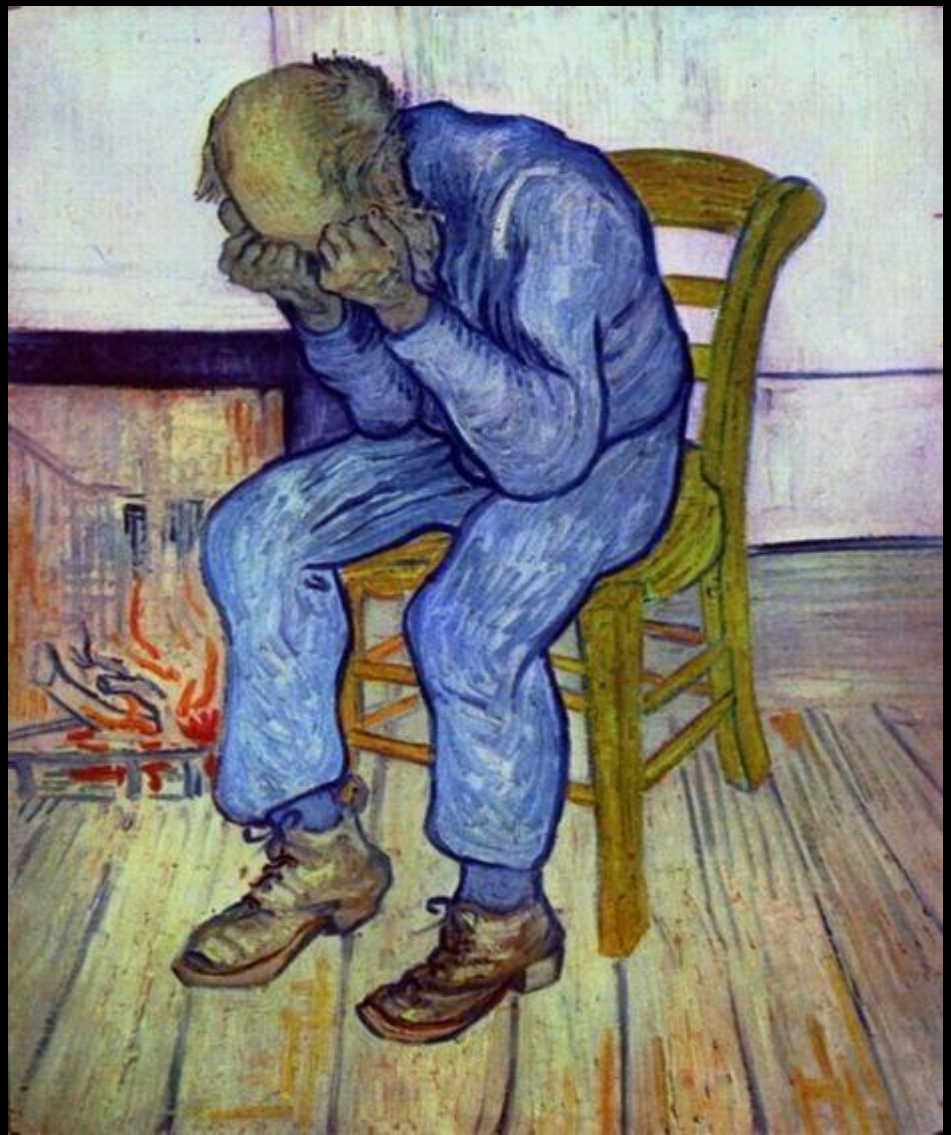
(*) Committee on earthquake-related death (震災関連死に関する検討会) of the Japan's Reconstruction Agency (復興庁). *Report on the earthquake-related death in the Great East Japan Earthquake* (available only in Japanese) (東日本大震災における震災関連死に関する報告). August 24, 2012 (平成24年8月21日)

All rights reserved

The psychological aftermath of Fukushima

All rights reserved

Depression

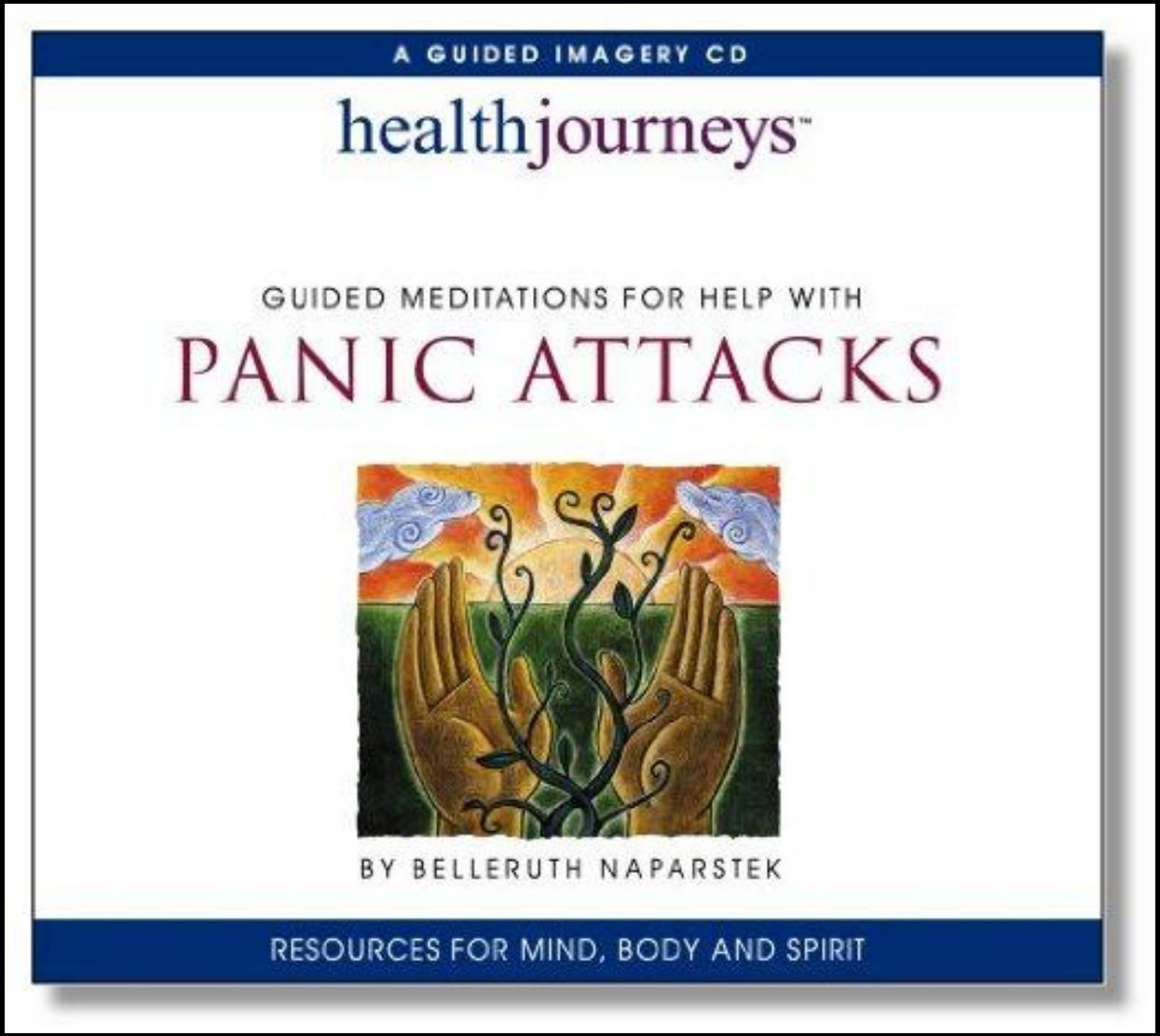


All rights reserved

Grieving

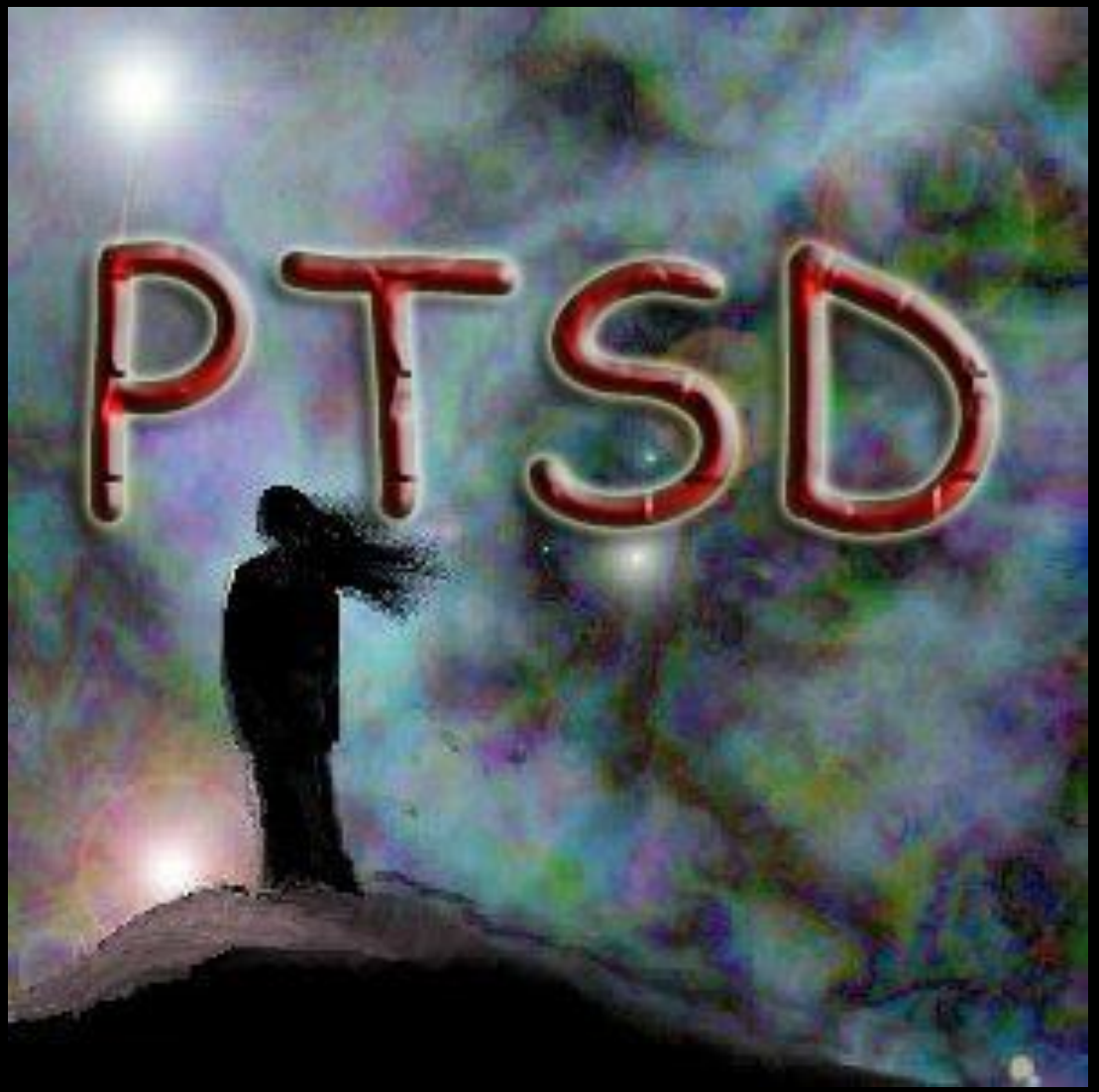
All rights reserved

Chronic anxiety



All rights reserved

Post-traumatic Stress Disorder



All rights reserved

Insomnia

All rights reserved

Severe headaches

All rights reserved

Smoking and alcoholism

All rights reserved

Anger

All rights reserved

Desperation

All rights reserved

Parents' Anguish

All rights reserved

Stigma

All rights reserved

Stigma

All rights reserved

Stigma

A mark of disgrace associated with being associated with '*contamination*'

- 汚名　：Polluted name
- 烙印　：Mark
- 恥　：Shame
- 不名誉　：Dishonour
- 不面目　：Humiliation
- 差別　：Discrimination

All rights reserved

All rights reserved

10.

Issues on Communication

All rights reserved

We should humbly recognize our failures in communication

- Public communication of radiation protection policy after an accident is still an unsolved problem.

All rights reserved

A number of lessons have been reconfirmed on various issues:

1. The relevant role of the media in a serious accident.
2. The importance of sharing information regularly.
3. The significance of social networking.
4. The value of involving non-radiation experts.
5. The impact of sharing information with the medical profession and, fundamentally, with teachers.

All rights reserved

Epilogue

All rights reserved

1. **Many issues** have arisen from the Fukushima accident experience.

2. We have the **ethical duty** of:

- learning from these issues and
- resolving their challenges.

All rights reserved

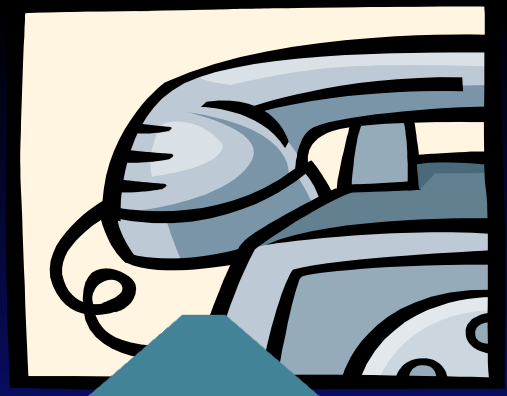
Before any another large accident occurs...

…we ought to ensure that:

- risk coefficients be properly interpreted;
- health effects be not attributed to low exposures;
- confusion on quantities and units be clarified;
- the hazard of internal exposure be elucidated;
- rescuers and volunteers be protected with an *ad hoc* system;
- the protection level of the public and children be apparent;
- comprehensible policies on public monitoring be available;
- the issue of what is ‘contamination’, and what is not, be resolved;
- the psychological problems caused by radiation be faced;
- radiation protection communication be improved.

All rights reserved

Av. del Libertador 8250
Buenos Aires
Argentina



+541163231758

Thank you!

有難うございます!

agonzalez@arn.gob.ar

All rights reserved