

International Conference on Effective Nuclear Regulatory Systems

Transforming experience into regulatory improvements

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IAEA Safety Standards and Guidelines for Preparedness and Response to Nuclear and Radiological Emergencies

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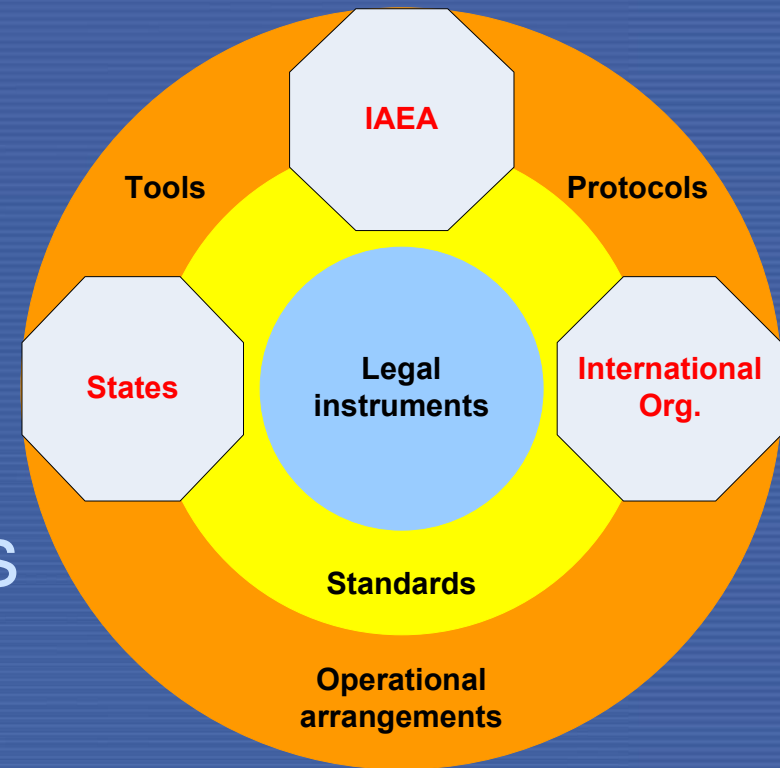


IAEA

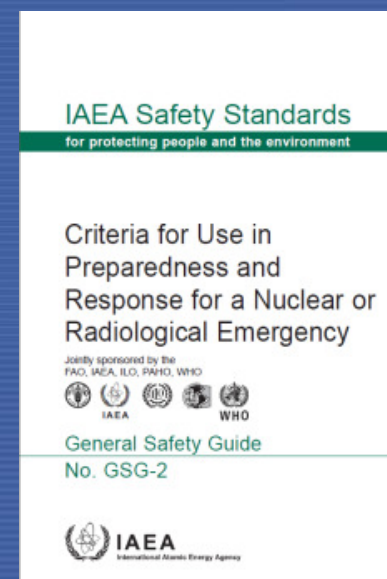
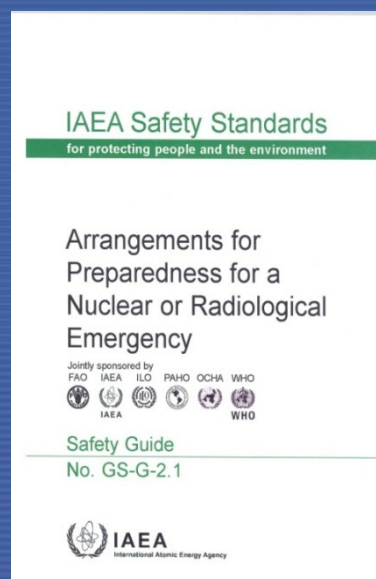
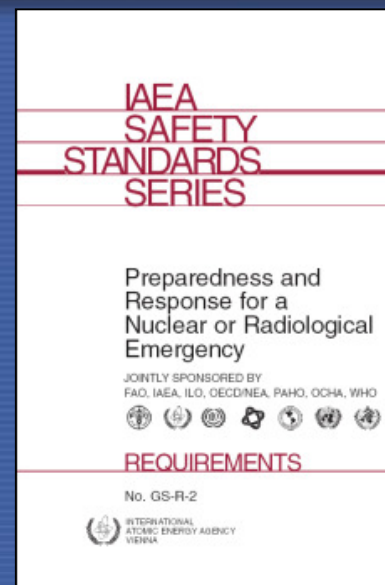
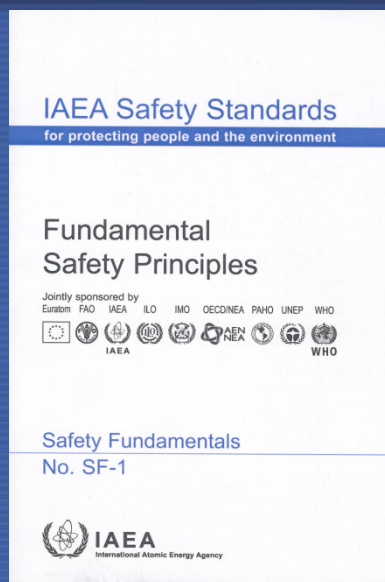
International Atomic Energy Agency

International EPR Framework

- Legal instruments
- **Safety Standards**
- Tools, protocols and operational arrangements



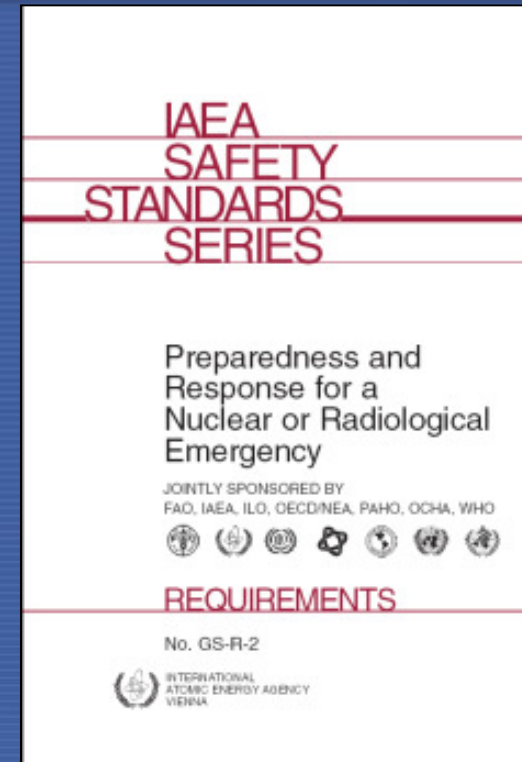
Safety Standards



Safety Requirements

Preparedness and Response for Nuclear or Radiological Emergency: Requirements GS-R-2 (2002)

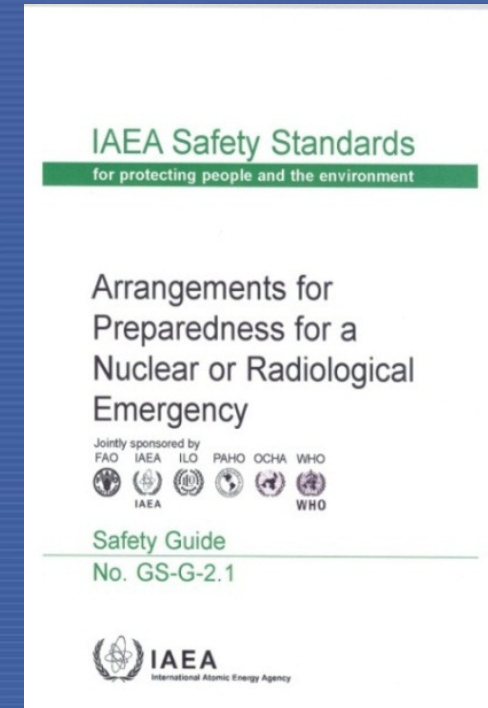
- establishes requirements for an adequate level of preparedness and response for a nuclear or radiological emergency in any State



Safety Guides

Arrangements for Preparedness for a Nuclear or Radiological Emergency: Safety Guide GS-G-2.1 (2007)

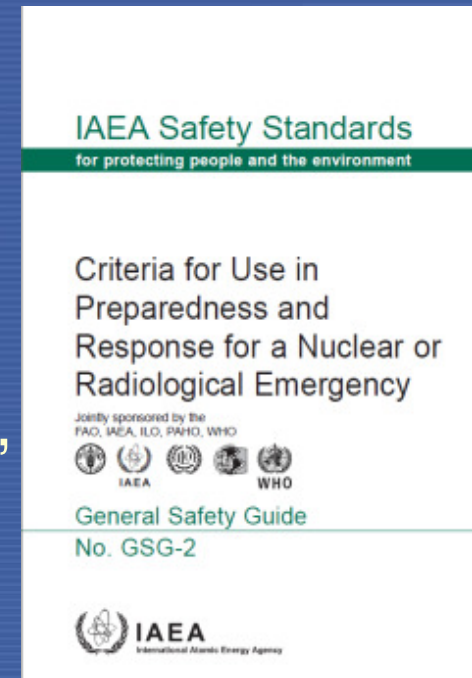
- Assists in fulfilling requirements for efficient emergency preparedness and response



Safety Guides (cont'd)

Criteria for Use in Planning Response to Nuclear and Radiological Emergencies: Safety Guide GSG-2 (2011)

- Generic criteria
- Operational Intervention Levels
 - Examples of default OILs for deposition, individual monitoring and food, milk and water contamination
- Emergency actions levels for LWRs
- On-scene observables
- Plain language explanation of actions vs OILs



Criteria in Establishing Protection Strategy

**Reference level
of residual dose between
20 mSv - 100 mSv**

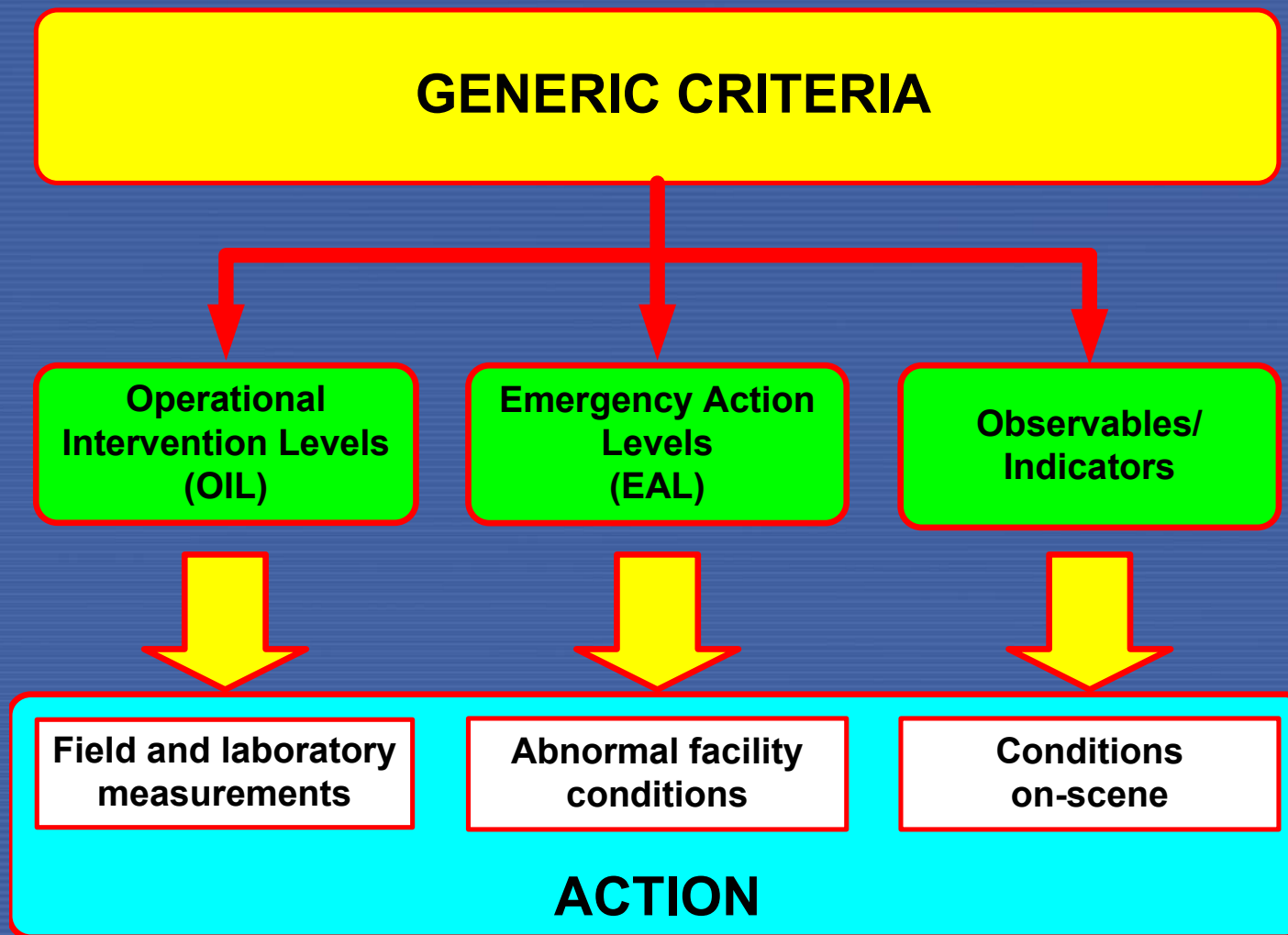


**Generic Criteria of projected or received
dose warranting specific protective
actions**

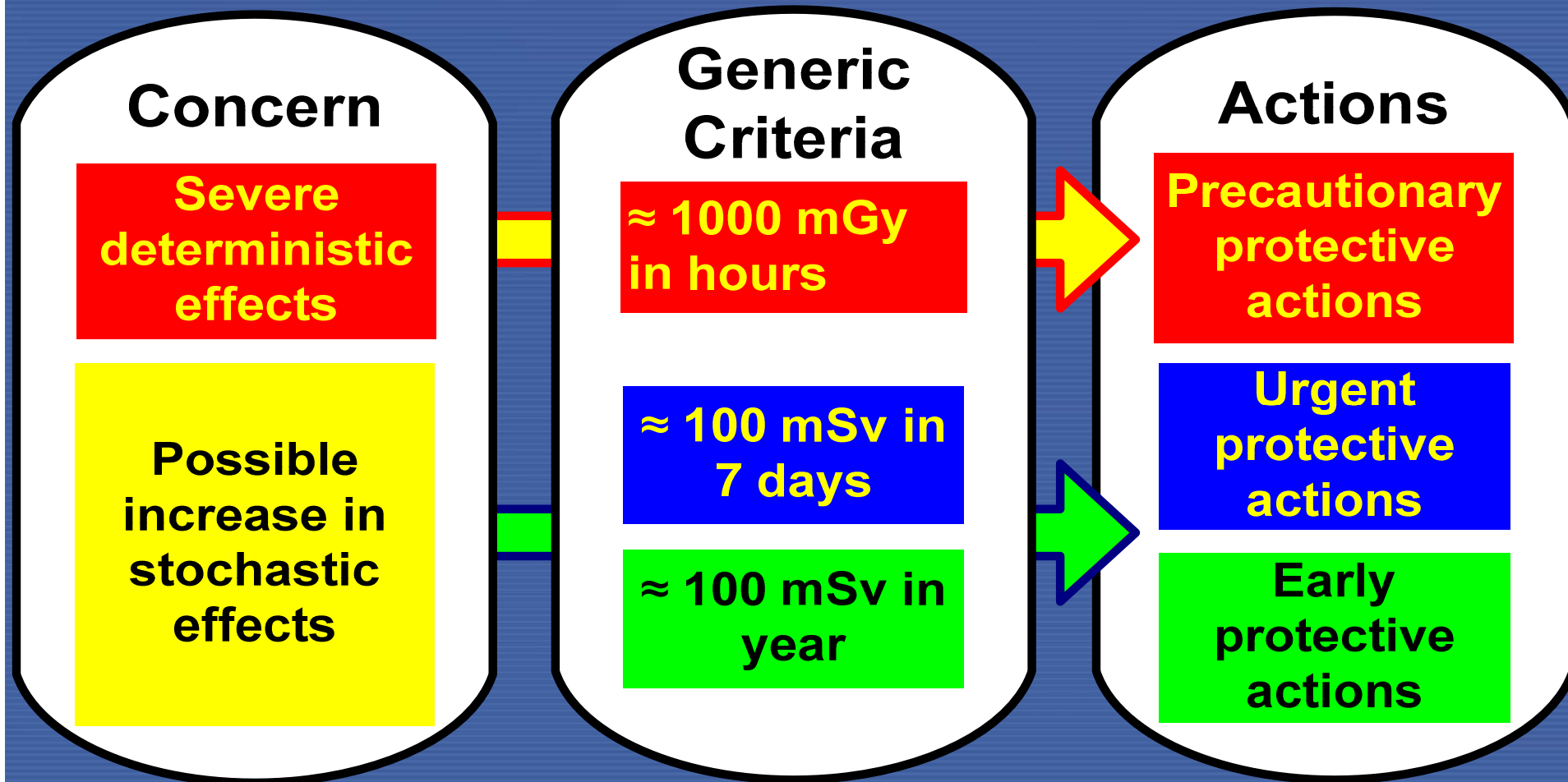


**Default triggers:
measurable parameters or observables
(e.g. OILs, EALs)**

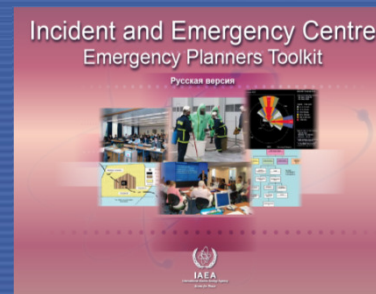
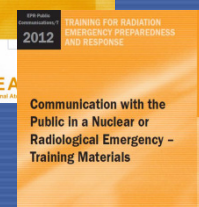
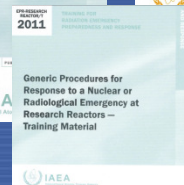
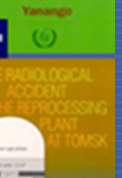
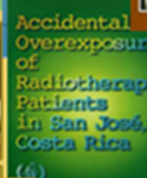
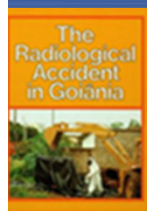
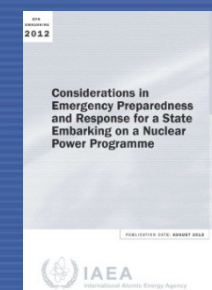
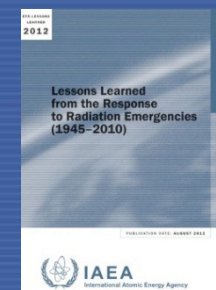
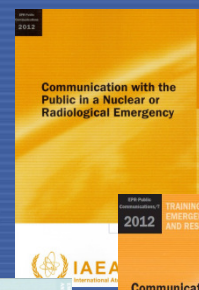
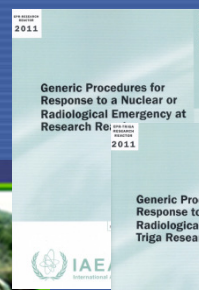
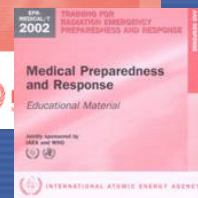
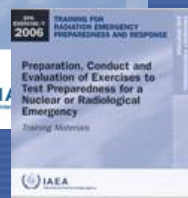
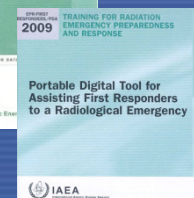
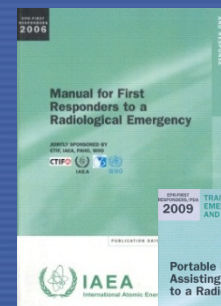
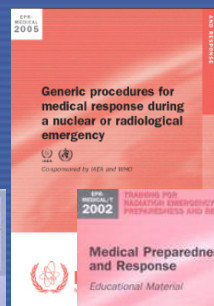
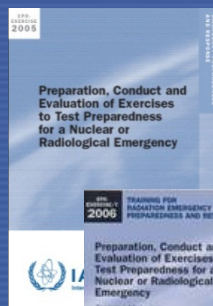
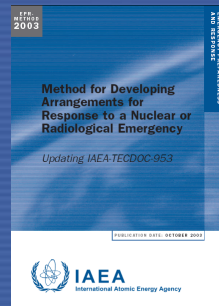
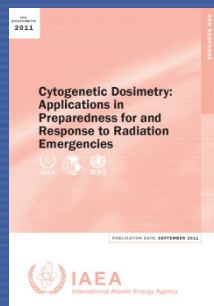
System of Generic & Operational Criteria



Background and Rationale



Supporting Guidelines



Example of Latest Developments (1)

- Actions to Protect Public in Emergency due to Severe Conditions at Light Water Reactors (EPR-NPP Public Protective Actions, 2013)
 - Provides tools and criteria to be used as basis at preparedness stage for protection of public in response to emergency involving actual or projected severe damage to fuel in reactor core or spent fuel pool at light water reactor (LWR) or spent fuel pool
 - Could also be of direct use in response to emergency

Describes in Details

- Emergency Classification System
 - Alert, Site Area Emergency, General Emergency
- Response Time Objectives for actions upon declaration of General Emergency
- Emergency Zones and Distances
- Protective actions and other response actions in different Emergency Zones and Distances

Addressed Protective Actions

- Iodine Thyroid Blocking
- Sheltering
- Evacuation
- Relocation
- Prevention of inadvertent ingestion
- Decontamination of individuals
- Food, milk and water restrictions
- Identification/management of exposed/contaminated
- International trade
- Stopping or relaxing response actions

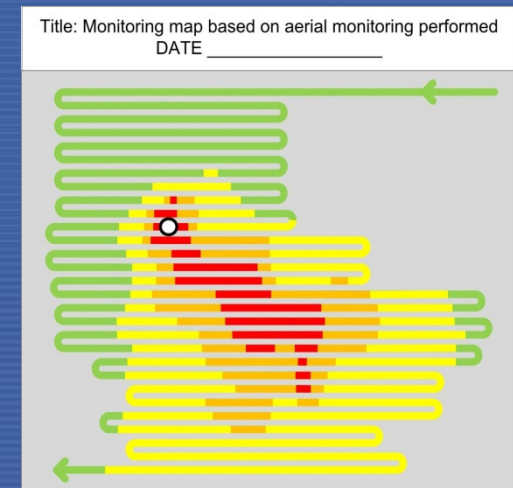
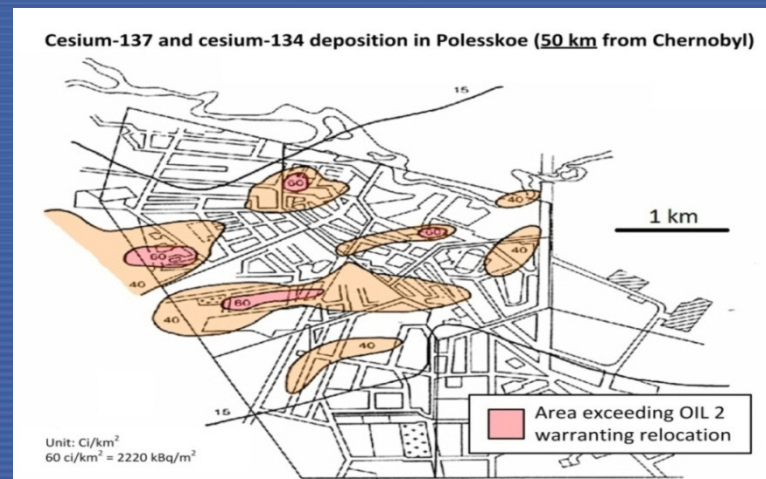
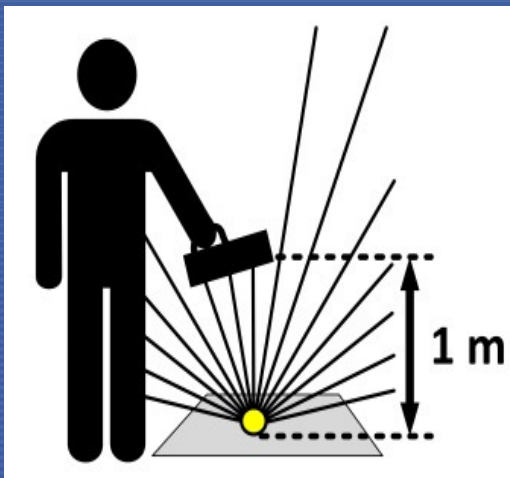
Operational Intervention Levels (OILs) used after a release

...need to be developed in advance

- Needed for immediate decisions
- No time to develop during emergency
- Difficult to develop and justify criteria during emergency
 - Difficulty in gaining public trust

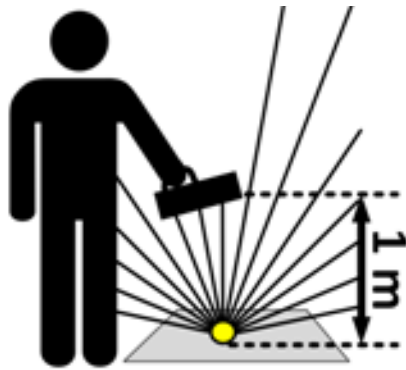
Application OILs

- Provided:
 - Numerical values for default OILs
 - Plain language explanations for OILs
 - Strategy for identification/dealing with contamination and hotspots



Default OILs Are Provided For:

Dose rate above the ground

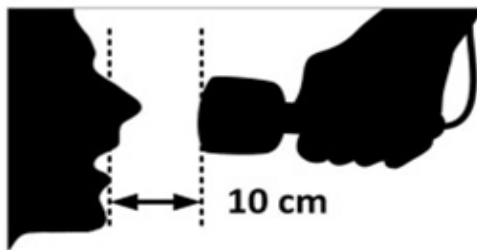


For:
Evacuation
Relocation
Food restrictions

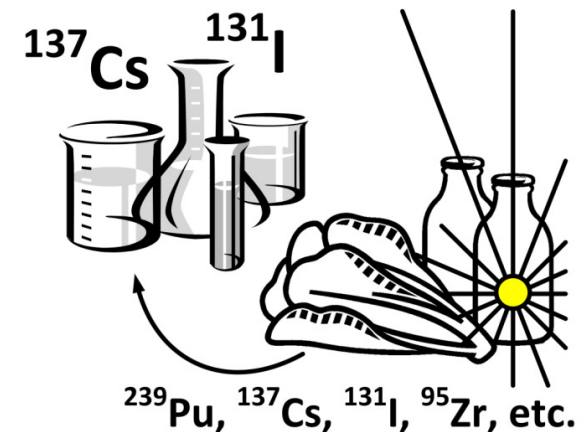
**Dose rate from
the thyroid**



**Dose rate
from skin
contamination**



**Food, milk
and water
Cs-137 and
I-131 concentrations**



Unit and Quantity Confusion

Contamination

Cs-137 Bq/cm²

Bq

Dose

I-131 Bq/kg

Sv

cps

R/h

High doses



Am I
safe ?



In food

In water

In soil

On ground

μSv/h

Activity

High

concentrations

Sv/h

Above the safety
limit

mSv/h

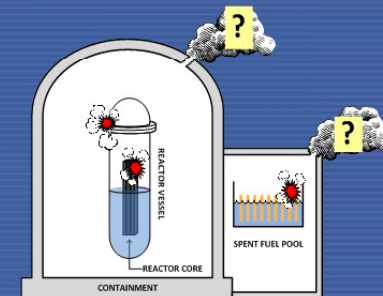
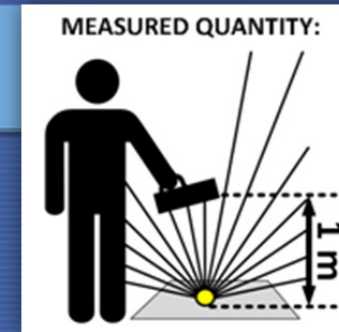
Example Typical Public Questions and Concerns in a Nuclear Emergency

- What dose I may have received and what it means to my health?
- What could be the consequences for my health?
- Can children play outside?
- Should I take measures to decontaminate my home
- What does radiation levels 20 times above normal mean?

Communication with Public and Decision Makers

Measured quantity

QUANTITY	HEALTH HAZARD IN PERSPECTIVE Only for the conditions and behaviour of the public described on the charts	
$\mu\text{Sv/h}$	POSSIBLY DANGEROUS TO HEALTH Register for medical examination.	
$\mu\text{Sv/h}$	HEALTH CONCERNS The danger to the health is low. As a precaution register for medical screening.	
$\mu\text{Sv/h}$	PROVISIONALLY SAFE Safe if certain specified limitations are followed.	
$\mu\text{Sv/h}$	SAFE There are no hazards to health.	



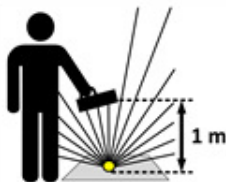
Health hazard in perspective



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ONLY USE AFTER COMPLETING THE CHECKLIST ON THE BACK.



LIVING IN THE AFFECTED AREA CHART 1

- For a release of radioactive material from a LWR or RBMK
- For all members of the public (including children and pregnant women)
- Based on the dose rate at 1 m above ground level.

DOSE RATE
at 1 m above
ground level

HEALTH HAZARD

Living normally in the affected area for:

7 days

1 month

1 year

10 000 $\mu\text{Sv/h}$

POSSIBLY DANGEROUS
TO HEALTH
(check OIL1 and OIL2)

POSSIBLY DANGEROUS
TO HEALTH
(check OIL1 and OIL2)

5 000 $\mu\text{Sv/h}$

HEALTH CONCERNS
(check OIL1 and OIL2)

POSSIBLY DANGEROUS
TO HEALTH
(check OIL1 and OIL2)

2 000 $\mu\text{Sv/h}$

1 000 $\mu\text{Sv/h}$

PROVISIONALLY SAFE**
FOR 7 DAYS, PROVIDING
ACTIONS ARE TAKEN TO
REDUCE INGESTION OF
RADIOACTIVE MATERIAL

HEALTH CONCERNS
(check OIL1 and OIL2)

500 $\mu\text{Sv/h}$

PROVISIONALLY SAFE** FOR
1 MONTH, PROVIDING ACTIONS
ARE TAKEN TO REDUCE INGESTION
OF RADIOACTIVE MATERIAL

HEALTH CONCERNS
(check OIL1 and OIL2)

100 $\mu\text{Sv/h}$

Read footnote * for measurements
between 25 and 100 $\mu\text{Sv/h}$

25 $\mu\text{Sv/h}$

10 $\mu\text{Sv/h}$

SAFE FOR EVERYONE,**
PROVIDING FOOD, MILK AND DRINKING WATER ARE SAFE

1 $\mu\text{Sv/h}$

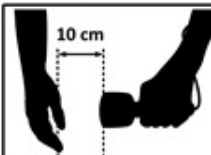
**NATURAL
BACKGROUND
DOSE RATE**



* Areas showing a dose rate of 25 to 100 $\mu\text{Sv/h}$ during the first 10 days after the release are safe (according to international safety standards), providing food, milk and drinking water are safe.
** Safe according to international safety standards - For further information read the back of this chart



ONLY USE AFTER COMPLETING THE CHECKLIST ON THE BACK.



RADIOACTIVE MATERIAL ON THE SKIN CHART 2

- For a release of radioactive material from a LWR or RBMK
- For all members of the public (including children and pregnant women)
- Based on the dose rate at 10 cm from bare skin (hands or face).

DOSE RATE
above background at
10 cm from bare skin
(hands or face)

HEALTH HAZARD

100 $\mu\text{Sv/h}$

POSSIBLY DANGEROUS TO HEALTH
(check OIL4)

50 $\mu\text{Sv/h}$

10 $\mu\text{Sv/h}$

HEALTH CONCERNS
(check OIL4)

1 $\mu\text{Sv/h}$

SAFE * FOR EVERYONE

0.1 $\mu\text{Sv/h}$



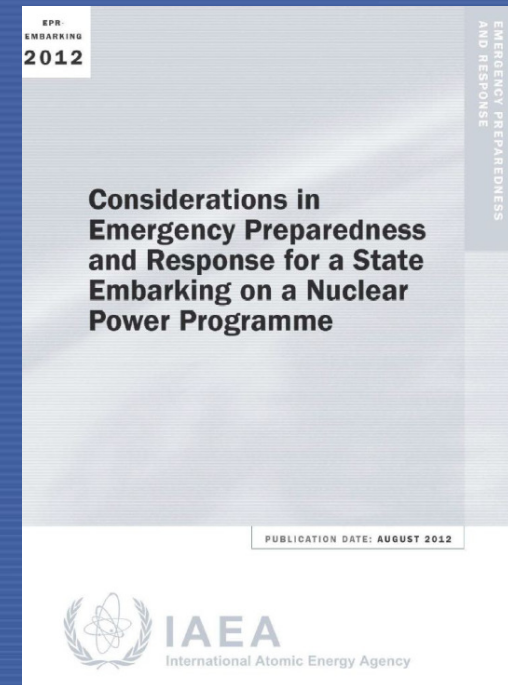
IT IS SAFE TO TREAT THIS PERSON
by taking simple universal precautions



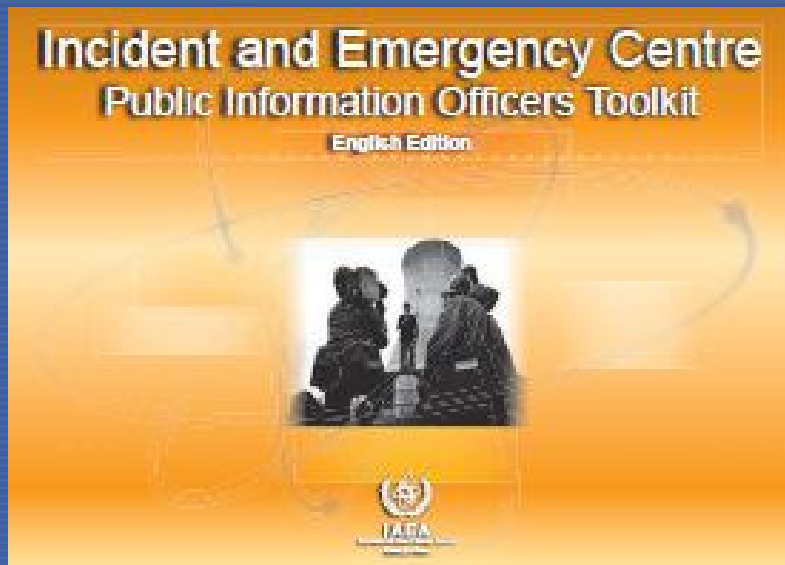
* Safe according to international safety standards - For further information read the back of this chart

Example of Latest Developments (2)

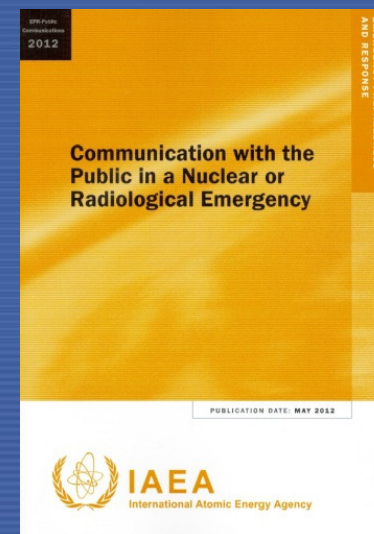
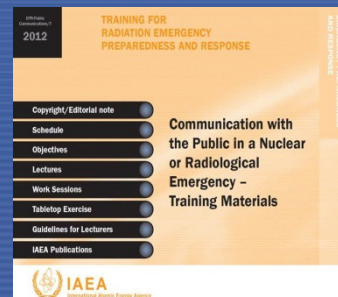
- Specific assistance in building effective emergency preparedness and response capabilities and arrangements for countries embarking on use of nuclear power
 - Guidance
 - Training materials



Example of Latest Developments (3)

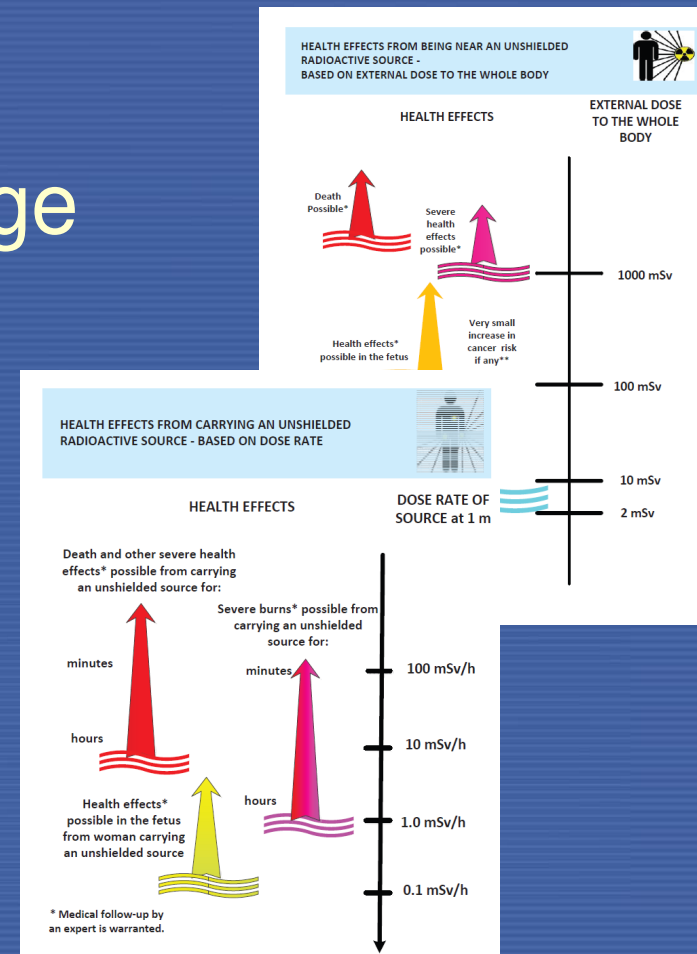


- Communication with the Public in a Nuclear or Radiological Emergency
 - EPR-Public Communications, 2012
 - CD with lectures, work sessions and exercise for 1-week course
 - Explanatory materials



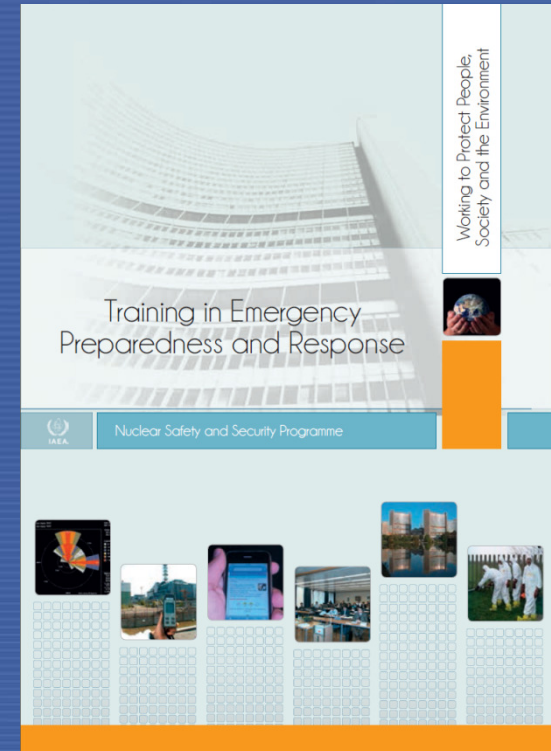
Explanatory Materials

- Specific emphasis on provision of plain language explanation

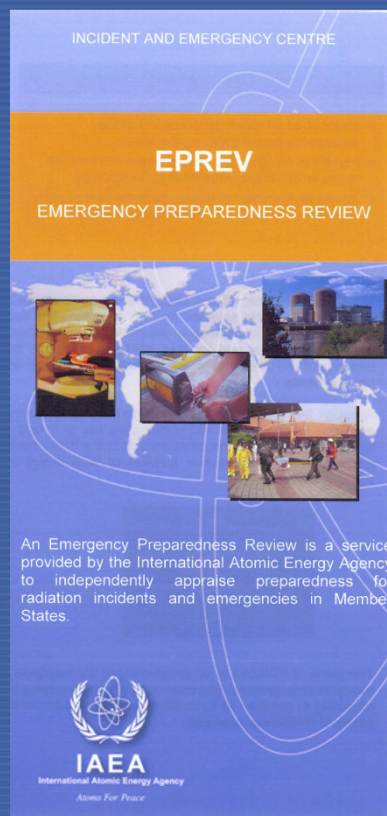


Assistance in Implementation of Safety Standards and Guidelines in EPR

- National, regional and interregional training events
 - For all categories of those involved in EPR
- Exercises
 - National
 - ConvEx exercises
- Capacity Building Centres (CBC) in EPR area



Emergency Preparedness Review (EPREV)



- To independently appraise national capabilities in emergency preparedness and response

Incident and Emergency Centre



Focal point for EPR
and custodian of
IAEA Incident and
Emergency System

Implementing IAEA
functions in EPR



Conclusion

- Application of IAEA Safety Standards and guidelines assists in development of efficient EPR infrastructure and contributes to harmonized response
- IAEA is ready to assist in application of Safety Standards and guidelines

Thank you !

