Státní úřad pro jadernou bezpečnost

System for assessment and prognosis during a nuclear emergency in the Czech Republic

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Introduction

- NPP Dukovany — VVER-440 — 4 units
  in operation — 1985
- NPP Temelín — VVER-1000 — 2 units
  in operation — 2000
- Emergency planning zones (EPZ) defined on the base of scenarios of severe accidents

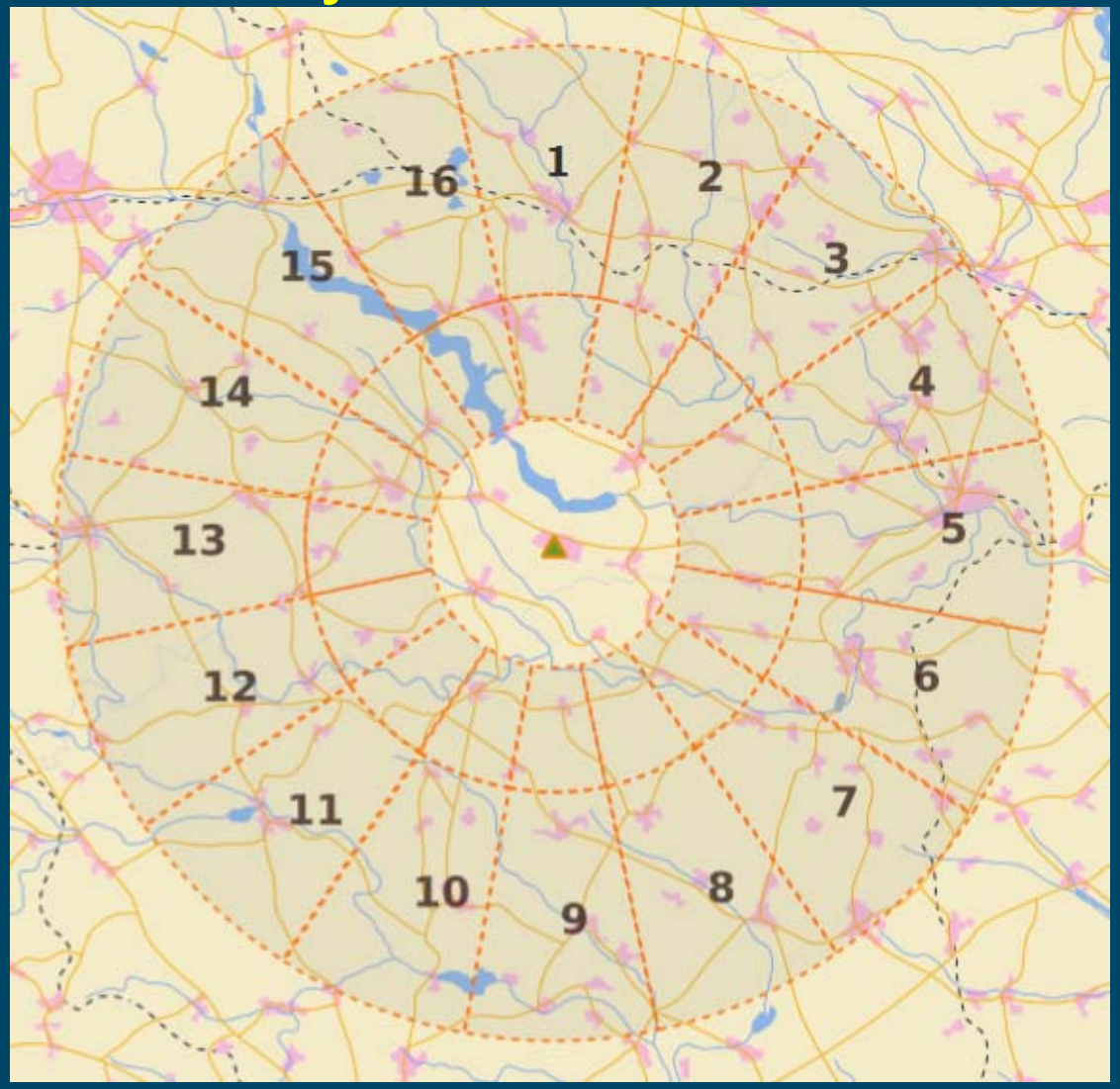
NPP Dukovany – EPZ

10 km inner

20 km outer

16 sectors

3 km safety area
(without residents)



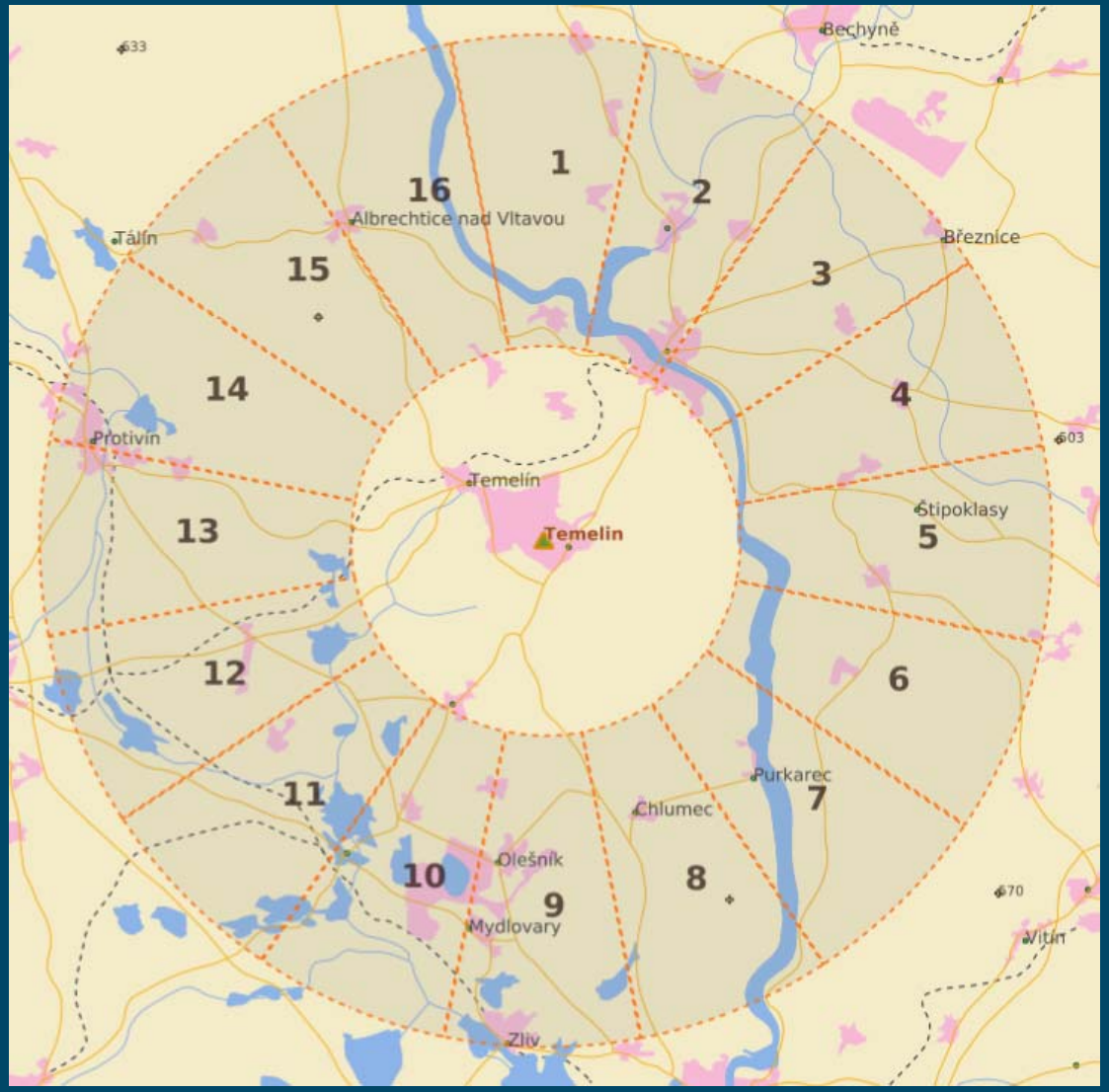
NPP Temelín – EPZ

5 km inner

13 km outer

16 sectors

2 km safety area
(without residents)



Protective measures in EPZ

Urgent protective measures prepared:

- Sheltering + stable iodine prophylaxis (pills)
  implemented automatically in the whole EPZ after a signal of sirens – responsibility of the NPP operator
- Evacuation
  not supposed in the very early phase of an emergency
  - not enough time
  - uncertainty of weather conditions prediction

Protective measures in EPZ

Evacuation after sheltering

- prepared for people:
  - in the whole inner part of EPZ
  - in potentially affected sectors of the outer part of EPZ
- performed on the base of radiation survey in really affected area
  (dose rate and contamination monitoring)
- could be
  - reduced in the inner part of EPZ
  - extended beyond the EPZ if necessary

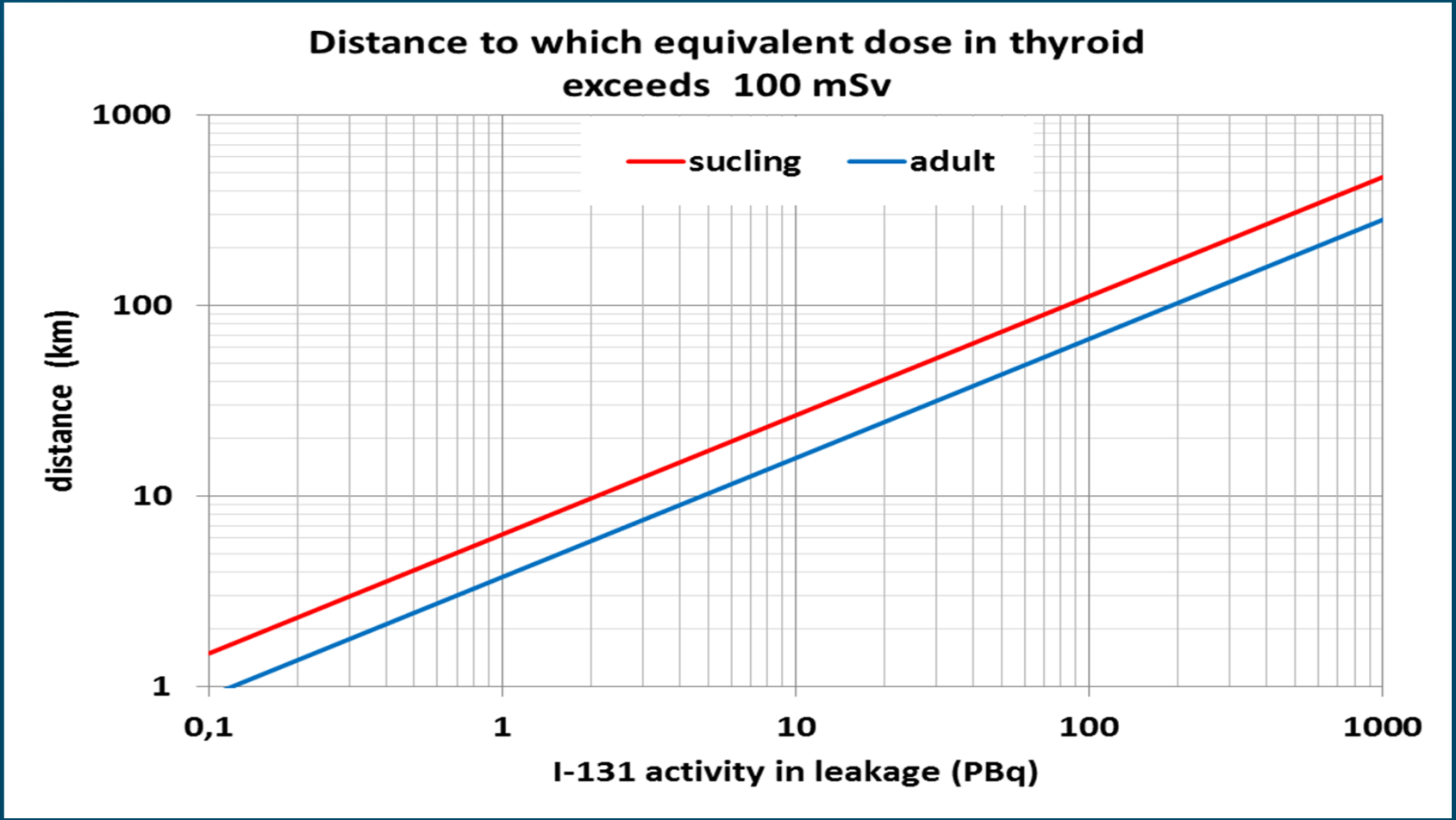
Assessment and prognosis during emergency

- SÚJB Emergency Centrum
- ESTE EDU (ESTE ETE) code, ESTE ANALYST code
- on-line NPP technological data
  → source term prognosis
  + actual information on the meteorological situation
  → prognosis of an impact to environment
  → assessment of the necessity of the evacuation
- final decision after receiving the measurement results (NPP teledosimetric system, early warning system, mobile monitoring groups, aerial monitoring)

Conservative assessment

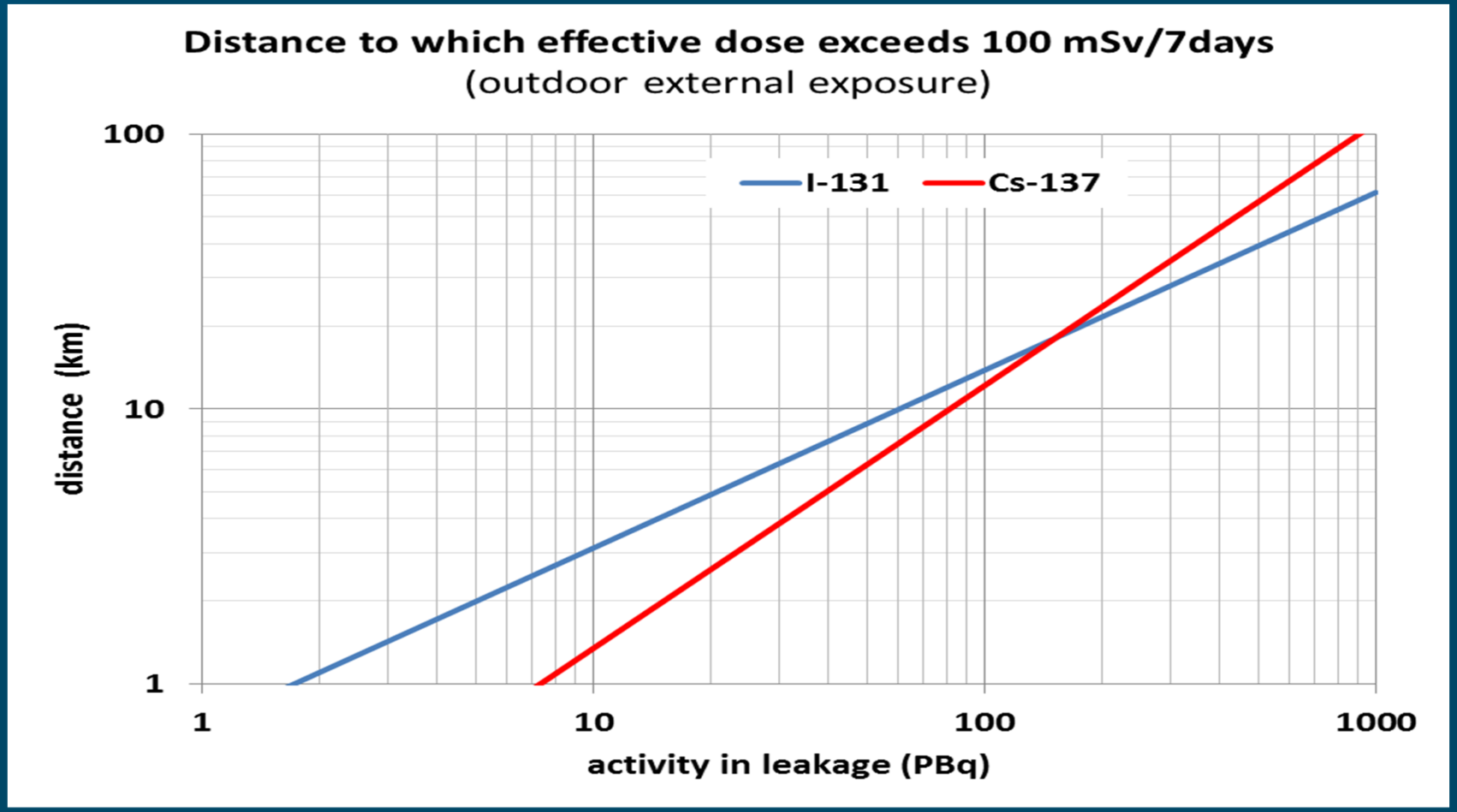
- ESTE ANALYST code
- Bad dispersion in atmosphere
  – weather category F, wind 2 m/s, no precipitation
- Model for the dose assessment
  + intervention levels for urgent protective measures
  → the dependence (for any NPP) of a distance (to which a dose exceeds an intervention level) on the released activity for:
- equivalent dose in thyroid
- effective dose during 7 days
- annual effective dose (one year after an accident)

Conservative assessment (1)



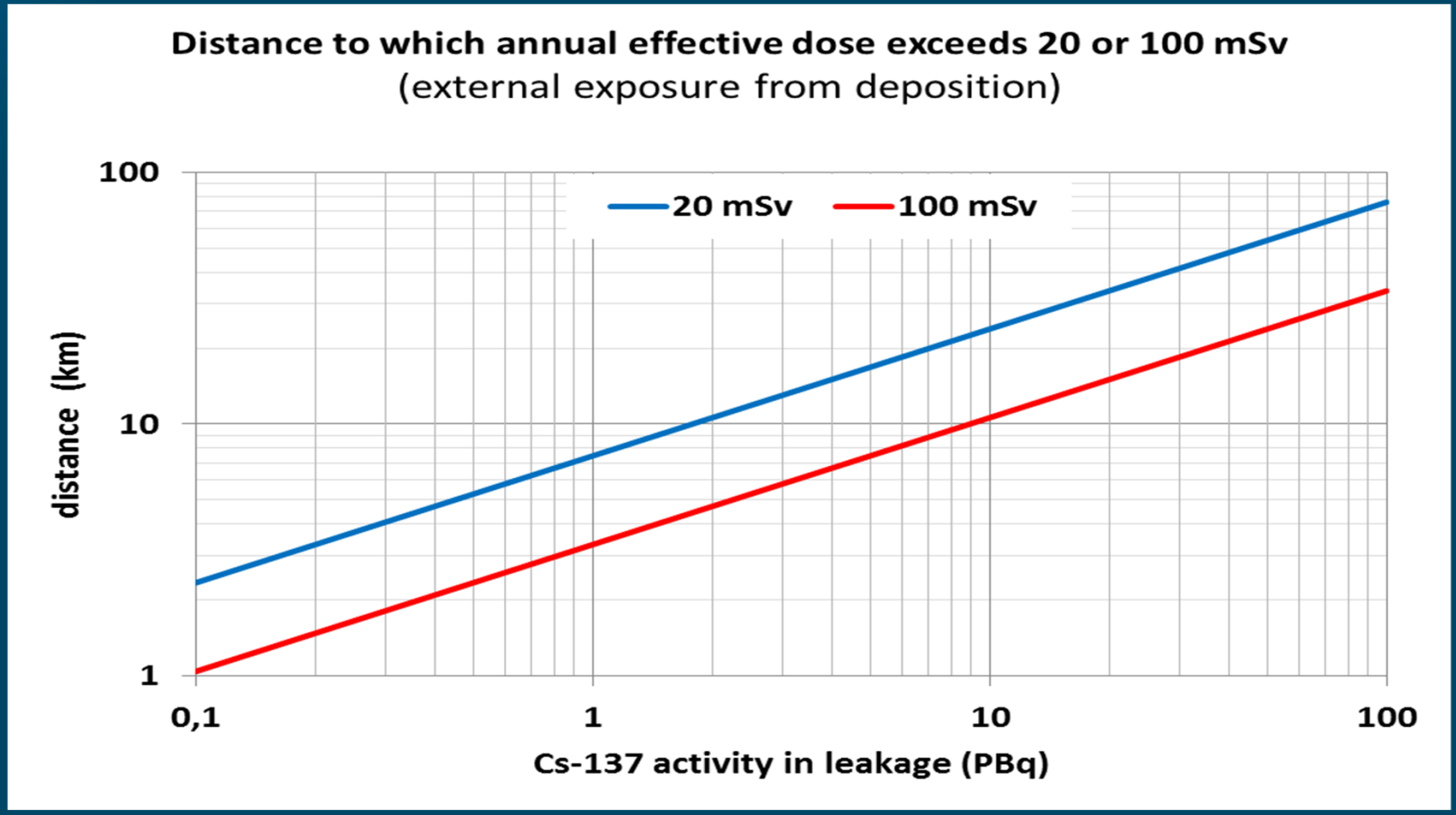
ESTE ANALYST code for weather category F, wind 2 m/s, no precipitation

Conservative assessment (2)



ESTE ANALYST code for weather category F, wind 2 m/s, no precipitation

Conservative assessment (3)



ESTE ANALYST code for weather category F, wind 2 m/s, no precipitation
2000 hours outdoor and 7000 hours indoor (attenuation 10x)

Possible severe accident impact

The role of optimization

- in the emergency preparedness
- in a decision making process of the urgent protective measures

Defining distances for implementing individual urgent protective measures

- on the base of credible and highly realistic models for radionuclide dispersion
- with reasonable grade of conservatism
- using the IAEA criteria

Possible severe accident impact

It is highly necessary

- to provide public with understandable, credible and consistent information about emergency preparedness processes
- to very well justify and optimize any potential changes in current systems

At the moment, no urgent need for significant changes in EPZ of NPPs in the Czech Republic is identified. We assume that with all above described information and monitoring systems, enough time and relevant data will be available for reliable and cost-effective decision making with minimized negative impact to the life of people living in the environs of NPPs.

Generic criteria and reference levels

In emergency situations the reference level will be expressed as the total residual dose to an individual as a result of the emergency that the regulator would plan not to exceed, either acute (and not expected to be repeated) or, in case of protracted exposure, on an annual basis.

(ICRP 103, Para 238)

20-100 mSv: Reference level set for the highest planned residual dose from a radiological emergency.

(ICRP 103, Table 5)

Generic criteria and reference levels

IAEA GSR Part 7

Table II.2.

(projected dose)

TABLE II.2. GENERIC CRITERIA FOR PROTECTIVE ACTIONS AND OTHER RESPONSE ACTIONS IN AN EMERGENCY TO REDUCE THE RISK OF STOCHASTIC EFFECTS

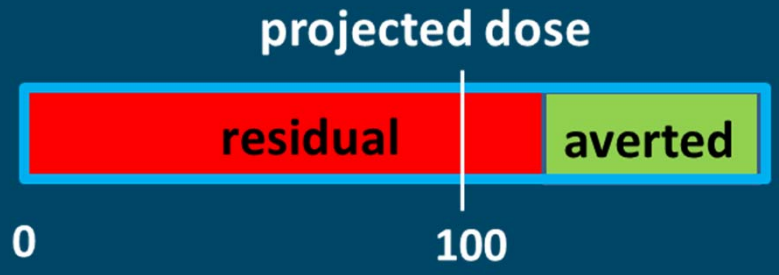
Generic criteria		**Examples of protective actions and other response actions**[a]
Projected dose that exceeds the following generic criteria: Take urgent protective actions and other response actions		
$H_{thyroid}$	50 mSv[b] in the first 7 days	Iodine thyroid blocking[c]
E[d] H_{fetus}[e]	100 mSv in the first 7 days 100 mSv in the first 7 days	Sheltering[f]; evacuation; prevention of inadvertent ingestion; restriction on food, milk and drinking water[g] and restriction on food chain and water supply; restriction on commodities other than food; contamination control; decontamination; registration; reassurance of the public
Projected dose that exceeds the following generic criteria: Take early protective actions and other response actions		
E[d] H_{fetus}[e]	100 mSv per annum 100 mSv for the full period of in utero development	Temporary relocation; prevention of inadvertent ingestion; restriction on food, milk and drinking water[g] and restriction on food chain and water supply; restriction on commodities other than food; contamination control; decontamination; registration; reassurance of the public

Generic criteria and reference levels

Is the generic criterion for projected effective dose in IAEA GSR Part 7

in compliance with

the main ICRP 103 requirement for total residual dose?



Thank you for your attention