



Bundesamt für Strahlenschutz

# Analysis of the Practicability of External Emergency Planning in Germany based on Experiences from the Fukushima Accident

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## 1. Introduction

Current off-site nuclear emergency planning in Germany is based on accident scenarios with relative short release durations (typically few hours). In this work off-site radiological consequences were assessed for several case studies with long lasting releases similar to the Fukushima Dai-ichi accident. Resulting doses were compared against dose reference levels in Germany and the current off-site nuclear emergency planning was evaluated based on these results.

## 2. Objectives

Aim of this study was to test the adequacy of current off-site nuclear emergency planning in Germany with regard to long lasting releases similar to the Fukushima Dai-ichi accident.

## 3. Method

The evaluation of current nuclear emergency planning in Germany in case of long lasting releases comprised the following steps:

- Selection of two release scenarios lasting 26-30 days
- Selection of two test sites in Germany (NPP Unterweser and NPP Philippsburg) and real weather data for two months in 2010
- Atmospheric dispersion calculations and radiological consequence assessment with decision support system RODOS
- Comparison of resulting doses against dose reference levels

## 4. Results

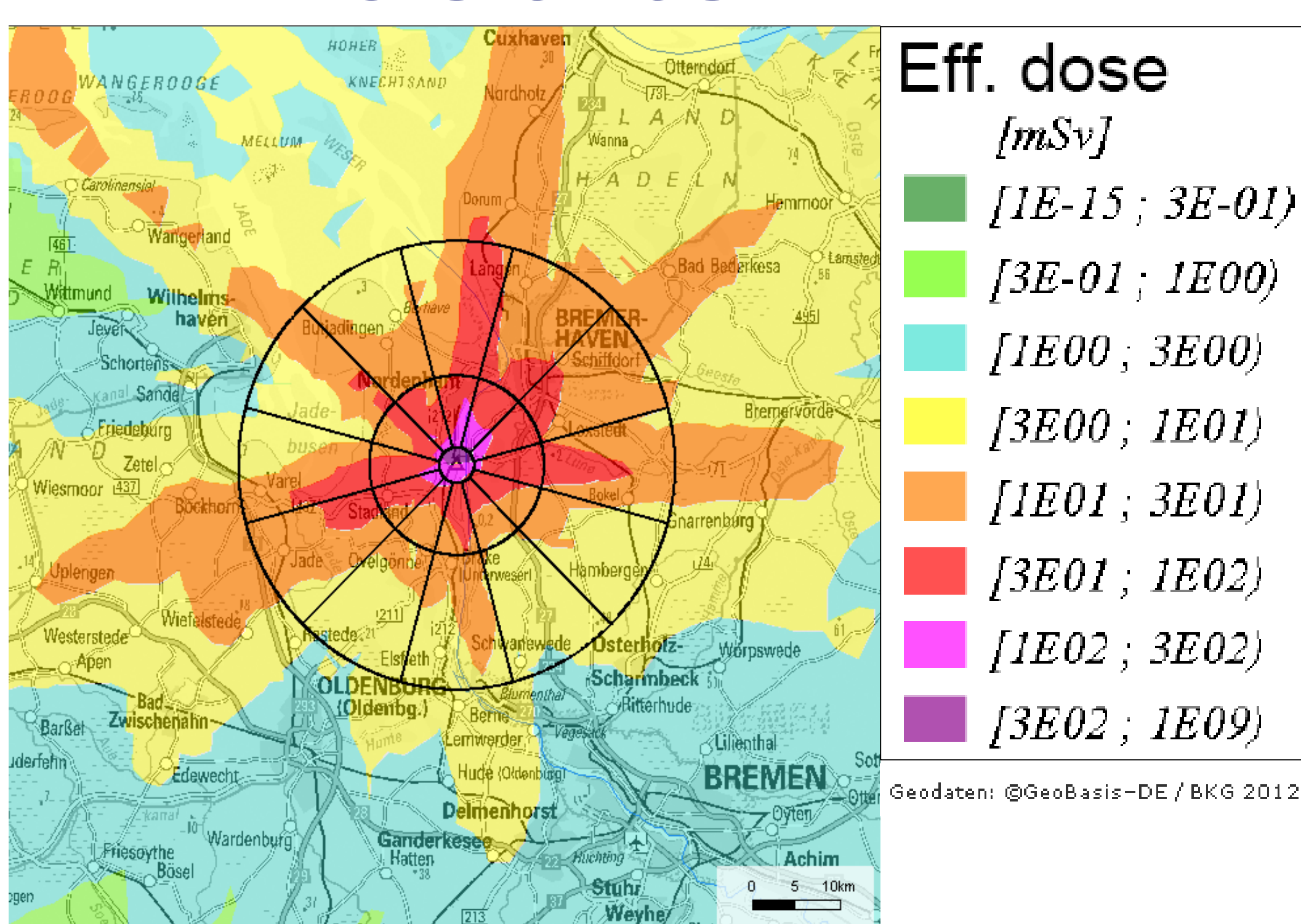


Fig. 1: Effective dose for adults from external exposure and inhalation integrated over 30 days, meteorological data for Dec. 2010, source term with constant emission over 30 days

Scenario	Areas where reference levels exceeded		
	Maximum distance (km)	Size (km <sup>2</sup> )	# of affected sectors
Fukushima, June 2010	≈ 75	≈ 560	11
const. emission, June 2010	≈ 45	≈ 740	12
Fukushima, Dec 2010	≈ 60	≈ 1200	12
const. emission, Dec 2010	≈ 95	≈ 2400	12

Table 1: Summary of radiological consequences with respect to the protective action “sheltering” (cells marked in red indicate consequences which exceed the emergency planning)

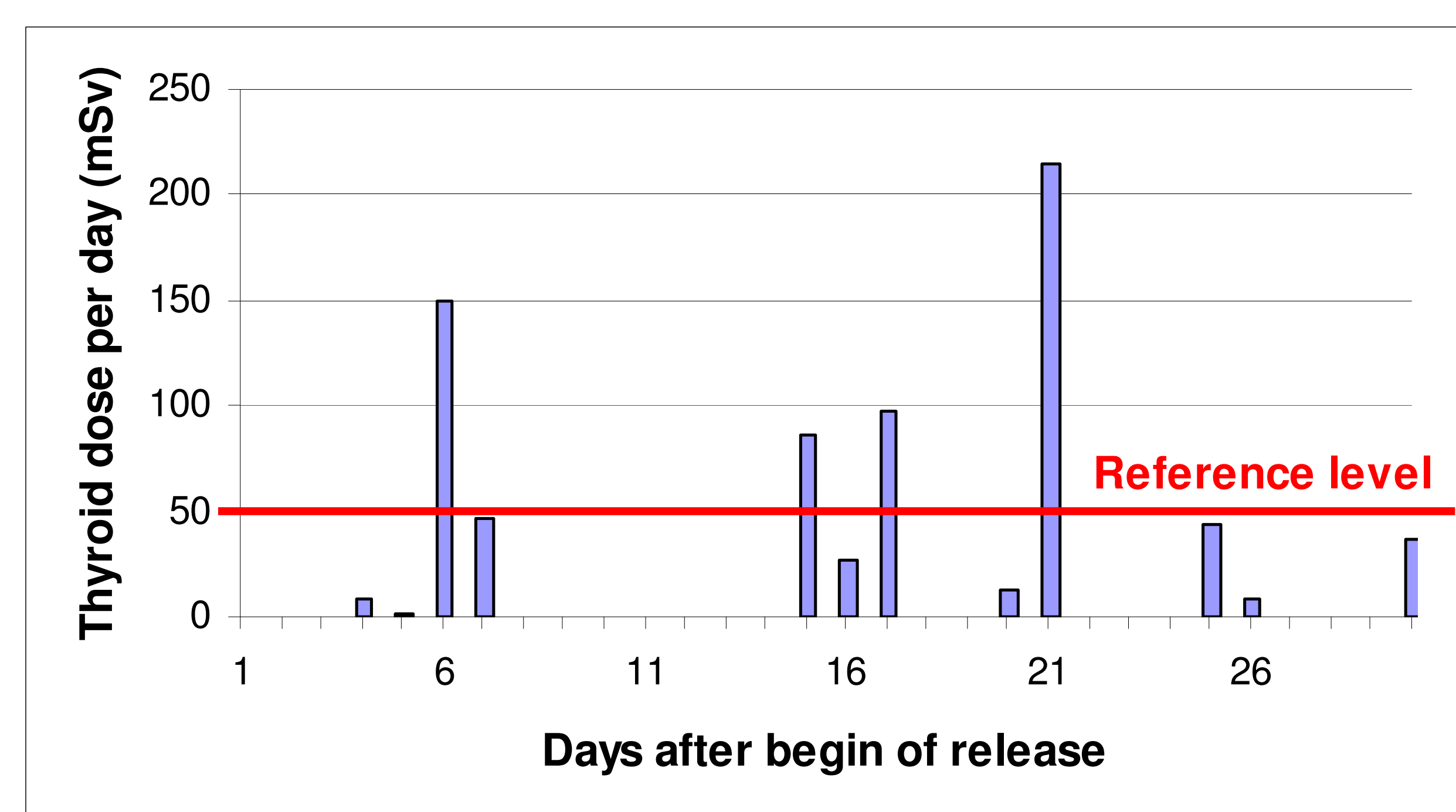


Fig. 2: Thyroid dose per day for infants from inhalation of radioiodine approx. 8 km north-east of NPP

## 5. Conclusions

Current nuclear emergency planning in Germany has some shortcomings in case of severe and long lasting releases:

- The size of areas, where reference levels for protective actions are exceeded, can by far exceed the emergency planning areas.
- The concept of implementing protective actions only within a few sectors becomes problematic if all sectors are affected.
- The concept of “sheltering” may not be applicable at all.
- A single intake of stable iodine is often not sufficient for protecting the population against large thyroid doses.
- Reference levels for protective actions may not be exceeded in any 7-day-interval (for which some of the reference levels are currently defined in Germany), but the dose over the total release period may exceed the reference level.