

MEASUREMENT, ASSESSMENT, AND EVALUATION
WITHIN THE INTEGRATED MEASUREMENT AND INFORMATION SYSTEM FOR
SURVEILLANCE OF THE ENVIRONMENTAL RADIOACTIVITY (IMIS)

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ABSTRACT

The Integrated Measurement and Information System for the Surveillance of the Environmental Radioactivity (IMIS) is currently being established. The field measurements involve existing Federal and State institutions and organisations. The measured radioactivity data as well as general data from the environment will constitute the foundation on which a series of assessment programs are built like contamination prognoses, models for assessment of radiation exposure, and models for precautionary measures. The data determined by measurement and calculation are so processed that in the case of an event a good evaluation is possible within a reasonable time.

INTRODUCTION

The Integrated Measurement and Information System for the Surveillance of the Environmental Radioactivity (IMIS) is currently being established. In the case of an event with radiological effects this system is determined to quickly supply comprehensive data which enable a rapid assessment of the situation. For this purpose all necessary steps, i.e. sampling, assessment, and representation of data, are coordinated and integrated in an optimal way.

MEASUREMENT

Basically, the Federal measurement networks and the State measurement institutions (Fig. 1) are included in the measurement programs. Those environmental areas showing the far-reaching distribution of radioactive substances (air, precipitation, gamma local dose rate, soil deposit, inland surface waters, North Sea and Baltic Sea) are controlled by the Federal measurement networks. The surveillance of the specific activity in other environmental areas, such as foodstuffs, drinking water, feedstuffs, etc., is carried out by State measurement institutions.

The measurement data determined by the Federal measurement networks are checked for their plausibility by the central laboratories of the Federal measurement networks. After that, the data are transferred to the Central Federal Agency for the Surveillance of the Environmental Radioactivity.

After having passed a first plausibility control, measurement data determined by the State measurement institutions are collected and transferred via the State data centers to the

Central Federal Agency. There they are selected according to environmental areas and forwarded to the guiding agencies carrying out synoptic plausibility checks. Then the data are sent back by the guiding agencies to the Central Federal Agency.

In the case of an event, the data - as far as they concern the air-ground-path - will arrive at the Central Federal Agency in the following chronological order, depending on the measuring method:

- Approximately two hours after measurement has been finished, the on-line-data of the Federal measurement networks will arrive, these include: gamma spectrometry, total-alpha-measurement, total beta-measurement, and gamma local dose rate
- The results of collective measurement (gaseous iodine, precipitation) are transferred daily after sampling and assessment have taken place.
- Within one day the results of the following measurements are also available: in-situ gamma spectrometry, alpha spectrometry, and H-3 measurements.
- It takes several days until the results from Sr-90 measurements are available.

The results of measurement carried out by the State measurement institutions will be available approximately one day later with exception of the Sr-90 measurements for which also several days will be necessary.

ASSESSMENT

On the basis of contamination measurements in different environmental areas prognoses are carried out for the contamination of those environmental areas where the surveillance cannot be effected at the time of the event (example: later ripening fruits).

For the estimation of current as well as future irradiation relevant exposure models are used. These models consider the specific environment of man (e.g. city, rural area, usual living habits (e.g. indoors, outdoors) breathing rates and consuming habits (food basket).

In the case of a radiological event appropriate precautionary measure ensure that the resulting exposure to man is kept below the established limits. These precautionary measures include:

- Prohibition or limitation of food and feedstuff etc.
- Recommendation of special rules of conduct for the population

In order to assess in advance the effectiveness of precautionary measure, models are being developed describing their effect on radioactive contamination or irradiation exposure, respectively

The model described above are integrated in the PARK model which is being developed by the Research Center for Environment

and Health (GSF). This model considers the chronologically registered report of data on the predicted diffusion and of measurement data. The PARK program consists of the sub-programs AUTOPARK, DIAPARK, and DOSISPARK.

- AUTOPARK automatically calculates for a certain time scale the predicted irradiation exposure for all German administrative districts every two hours in intensive operation.
- DIAPARK is more flexible. all available parameters can be exchanged by the user, e.g. the composition of the food basket can be altered, which leads to correspondingly longer computing time.
- DOSISPARK calculates dose values from measured or predicted contaminations.

EVALUTATION

The results from measuring programs and accordingly developed assessment programs as well as possible additional information are the basis for the situational assessment.

The assessment is done by considering the following aspects:

- classifying the situation
 - * observation of the time - and site related process of contamination
 - * comparison with courses of contamination of preceding events
- evaluating the situation
 - * comparison with environmental radiation exposure and its range of variation
 - * estimation of possible radiation damage and comparison with existing manmade exposure risks.

SUMMARY

The establishment of an Integrated Measurement and Information System for the Surveillance of the Environmental Radioactivity provides a system which guarantees the early detection of a radiological event with its consequences for Germany and which by its optimal use produces a rapid, early, and complete assessment of the situation.

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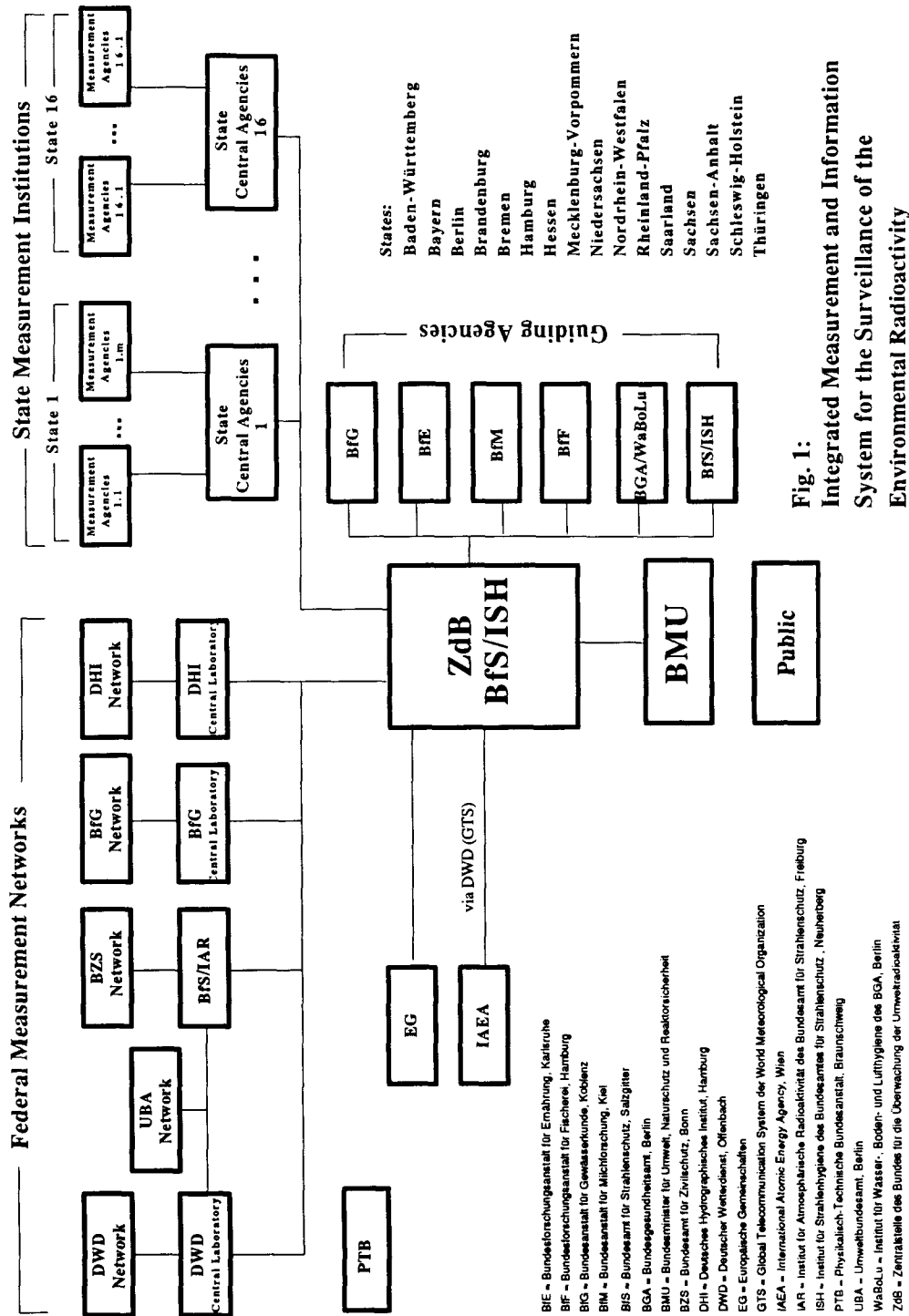


Fig. 1:
Integrated Measurement and Information
System for the Surveillance of the
Environmental Radioactivity