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RADIATION MONITORING NETWORK OF THE CZECH REPUBLIC

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SUMMARY

Radiation Monitoring Network of the Czech Republic (RMN) was established after the Chernobyl accident. It consists of technical centers, laboratories and monitoring groups of State Office for Nuclear Safety, National Radiation Protection Institute, nuclear power plants, hydrometeorological service, army and Civil Defense, research institutes and other institutions. The structure of RMN, its basic components and responsible institutions are described.

INTRODUCTION

Together with putting the first PWR type NPP in former Czechoslovakia into operation in 1979 the plans of measures concerning the protection of public in the case of a radiation accident on the NPP were introduced (1). These plans from the very beginning took into account the possibility of the maximum credible (over-project) accident with the melting of the core and almost complete release of radioactive materials from reactor into the environment. Supervision in the field of emergency planing is carried out by the Governmental Commission for Coordination of the Measures in Case of a Radiation Accident (GCRA). By the Directive of the GCRA Instruction for emergency monitoring directed at both the case of maximum credible accident and accident of smaller scale and their consequences were approved in March 1986. The existence of this Instruction and corresponding professional and technical of institutions responsible for monitoring manifested its positive impact especially in the situation after the Chernobyl accident. National and international experience gained after the Chernobyl accident led to some improvement and measures in the organization of the radiation monitoring and to the more precise definition of its conception.

The Chernobyl accident has clearly demonstrated how important it is to have adequate early warning and monitoring systems that provide competent authorities with timely information on any changes in radiation situation and that enable them to take appropriate protective measures and to inform the public. The effectiveness of such systems depends on the organisation and the skills of the competent authorities as well as on the provision of adequate instrumentation for measurement, data transmission and data analysis.

On the basis of the Chernobyl experience the Czechoslovak government decided in July 1986 to set up the Czechoslovak Radiation Monitoring Network. The Centre of Radiation Hygiene (CRH) of the Institute of Hygiene and Epidemiology in Prague was charged with the running of the headquarters of RMN i.e. Centre of Radiation Monitoring Network (CRMN). After the secession of the state in 1992 the CRMN is running the Radiation Monitoring Network of the Czech Republic. In 1995 the responsibility for radiation protection in CR was transferred from the Ministry of Health to the State Office for Nuclear Safety (SONS) and National Radiation Protection Institute (NRPI) was created on the basis of CRH. The Emergency Response Department of SONS is now running the CRMN with the support of NRPI in the provision of adequate means for measurement, data transmission and data analysis.

STRUCTURE OF RMN

The structure of RMN, its basic components and responsible institutions are schematically shown in Fig. 1. There are two modes of operation of RMN, that is routine operation in normal situation aimed at early detection of possible accident and intensive operation aimed at evaluation of consequences of such an accident. The routine operation is ensured by permanent components of RMN, in intensive operation also

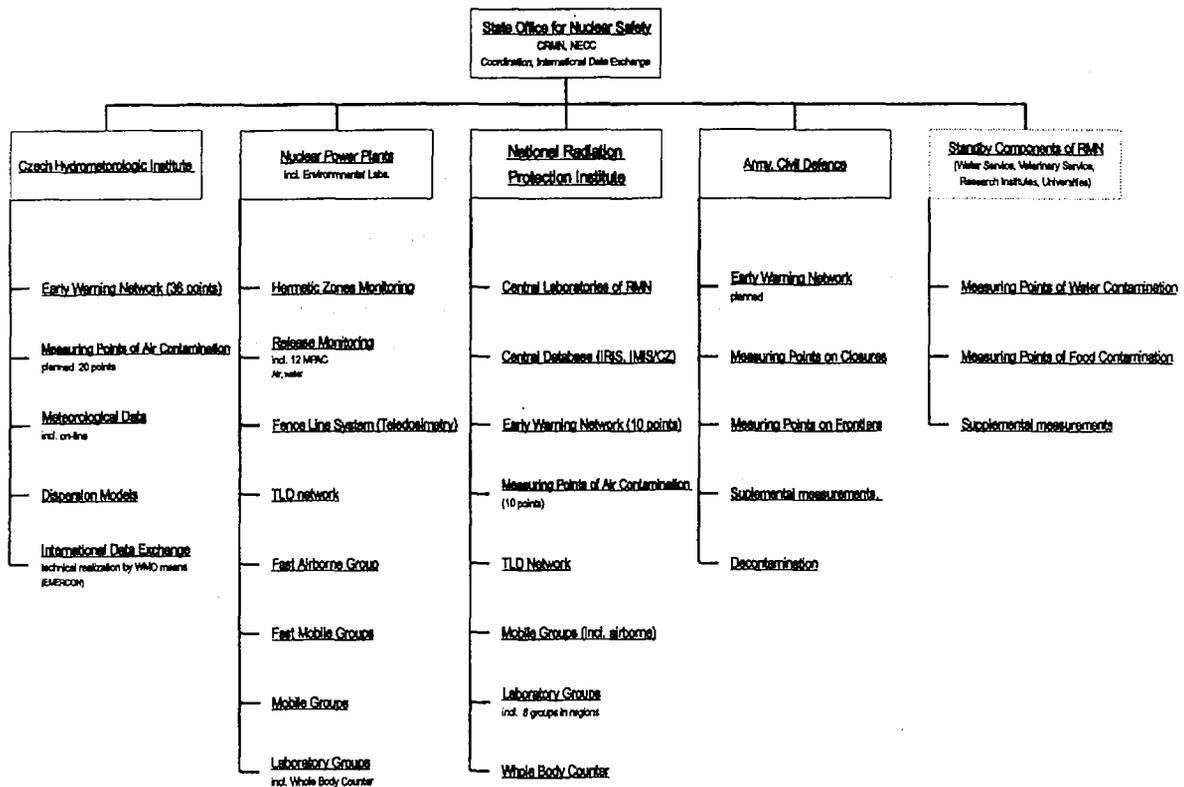


Fig. 1: Structure of Radiation Monitoring Network in the Czech Republic.

the standby components are involved and the mobile groups equipped by permanent components are activated.

The CRMN is planning and coordinating the activities of a network consisted of laboratories and monitoring groups of State Office for Nuclear Safety (SONS), National Radiation Protection Institute (NRPI), nuclear power plants, hydrometeorological service, research institutes and other institutions. The environmental radiation levels are in normal situation monitored in principle by several subnetworks in which some or all permanent components of RMN participate:

1. Network of Measuring Points of Air Contamination (MPAC) consisting up to now of 10 stations of NRPI and stations of of NPP's (4 in Dukovany and 8 in Temelín) - has two main functions:
 - continuous direct measurement of gamma dose rate as a part of Early Warning Network (EWN)
 - continuous aerosols and iodine sampling by high volume air samplers with changing of filters once a week
 - fallout sampling with sampling period of one month.
2. By the end of 1995 the fully automated EWN with 48 measuring points (38 stations of Czech Hydrometeorological Institute- CHMI and MPACs of NRPI - see Fig.2) ensuring continuous gamma dose rate measurements will be operating and on-line connected to the central computer in NRPI. In the second phase about 15 additional measuring stations of Czech Army and Civil Defence will be equipped for continuous gamma dose rate measurements and connected to EWN.

Teledosimetry systems around NPP's including 20 to 48 measuring points operated by environmental laboratories of each NPP will continuously measure and evaluate gamma dose equivalent rate. Data transfer to central computer in NRPI is planned.
3. Territorial TL-dosimeters network (TLD) - 183 measuring points distributed on the whole territory of CR (see Fig. 3). The monitoring interval is in normal situation 3 months. Besides it a more dense network is deployed around each NPP (altogether 82 dosimeters for 2 NPP's) with the same monitoring interval.

Fig. 2 Early Warning Network (EWN) in the Czech Republic

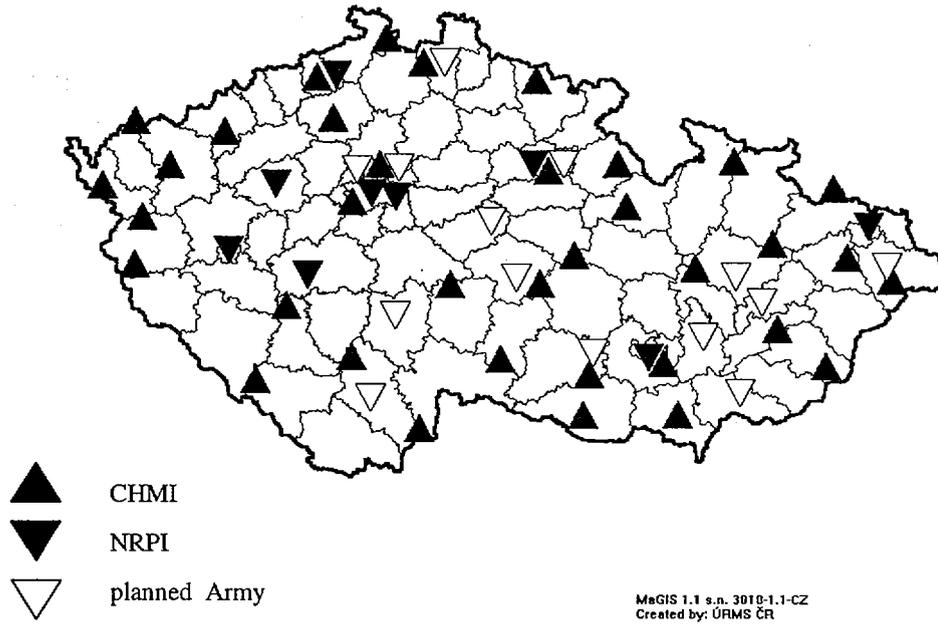
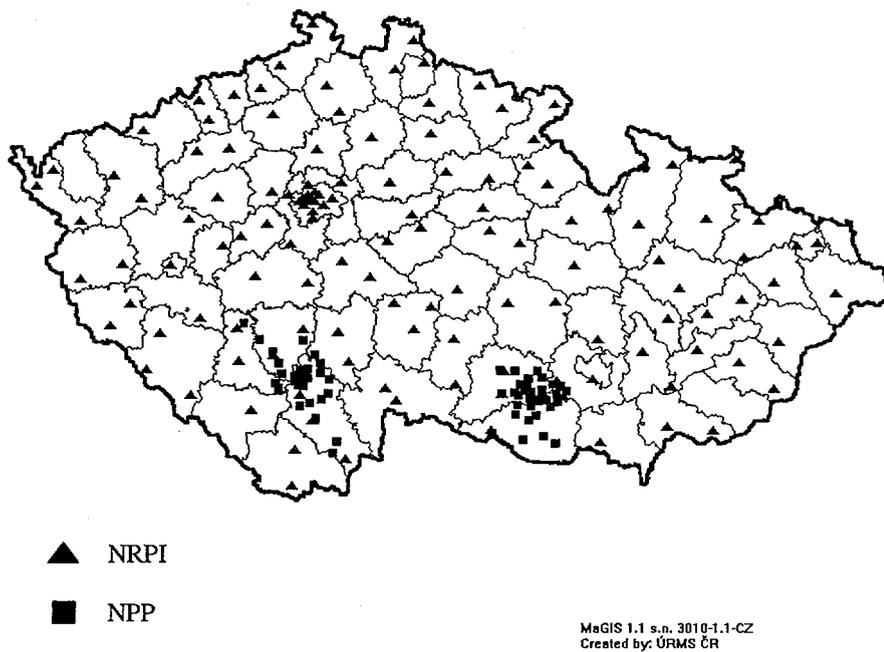


Fig. 3 TLD Network in the Czech Republic



4. Network of 12 laboratories equipped with gas spectrometry (mainly with semiconductor HPGe detectors) and some of them with alpha spectrometry and radiochemistry that provide the data concerning the specific activity of radionuclides in various environmental entities.

Laboratory measurements of samples of food and feeding stuff are performed on the basis of predefined sampling programs. The samples are collected if possible at the production sites. The most important difference between routine and intensive operation is the frequency of sampling, e.g. monthly sampling in routine operation versus daily sampling during intensive operation. The available laboratory capacities (including standby components of the RMN) enable the increase of the sampling and measurement frequency by about two orders of magnitude. During intensive operation additional samples are collected at stores to verify and enforce necessary food bans that may have to be applied.

To determine dose due to internal contamination of people in the most possible direct way with the minimum assumptions, the whole body counters in NRPI and NPP's are used.

CONCLUSION

Conformable with similar networks abroad, Radiation Monitoring Network (RMN) in Czech Republic is conceived as integrated system of a number of components that serve for:

- continuous monitoring of radiation situation on the territory of the Czech Republic
- detecting an abnormal radiological situation due to domestic source and raising the alert
- detecting a nonnotified accident abroad with consequences on the territory of the Czech Republic and raising the alert
- monitoring the evolution, determining the components of any radioactivity discharge
- first express estimation of accident extent
- forecasting of accident development and of dispersion of radionuclides in the vicinity of source
- acquisition of groundwork for decision upon evacuation and other countermeasures and remedial actions
- assessment and forecast of contamination for regulation of food and water consumption
- review of enforced countermeasures based on actual monitoring data and refined forecast.

The data on radiation situation obtained by the all components of RMN are collected and evaluated by the CRMN and presented as the Annual Reports on the Radiation Situation on the Territory of CR.

REFERENCE

1. Bučina, I., Kunz, E., Metke, E., Morávek, J. *Osnovnyje položenija monitoringa okružajuščeje sredy v slučaje radiacionnoj avariji na AES v ČSSR*, in *Emergency Planning and Preparedness for Nuclear Facilities*, IAEA-SM-280/69, Vienna, 1985.