RODOS SYSTEM IN THE SLOVAK REPUBLIC –
ITS IMPLEMENTATION AND ADAPTATION

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Introduction

Experience gained after the Chernobyl accident clearly demonstrated the importance of improving administrative, organisational and technical emergency management arrangements in most of the European countries. The tragic events in the US in September 2001 also obliged to pay more attention to emergency management.

Significant progress has been achieved in the information technological (IT) and methodological areas of emergency management and response through national initiatives and with support of the EC under its 4th and 5th Framework Programmes. Many tools are now available for operational use and their application in practice, such as the installation of gamma monitoring systems in East and West European countries, the collection and evaluation of their data under EURDEP, the further development and installation of the decision support system RODOS for (pre-) operational use in many East and West European countries, the realisation of the prototype data and information exchange system, and the development of tools and methods for exchanging data and information between neighbouring countries. Most of these new methods and IT tools can be equally applied everywhere in Europe and thus contribute to a more and more common and coherent approach for off-site emergency management and response in Europe.

Key futures of RODOS

RODOS - **R**eal-time **O**n-line **D**ecisi**o**n **S**upport system for multi-user operation in national/regional emergency centres responsible for off-site nuclear emergency management. RODOS provides continuously updated comprehensive, consistent and timely information as

input to decision-making in local/national/ regional /European scales, in the early and later phases of an accident on all types of emergency actions and countermeasures.

Information processing in RODOS is performed in four levels and is following:

- LEVEL 0 $\Rightarrow$ OSY (operating subsystem):
  acquisition, storage and checking of data from radiological monitoring networks and measurements and their presentation together with geographical information,
- LEVEL 1 $\Rightarrow$ ASY (analysing subsystem):
  continuously updated diagnosis and prognosis of the radiological situation using meteorological data and forecasts, source term predictions, and monitoring data,
- LEVEL 2 $\Rightarrow$ CSY (countermeasure subsystem):
  estimation of the extent and duration of countermeasures together with their radiological and economic consequences,
- LEVEL 3 $\Rightarrow$ ESY (evaluating subsystem):
  evaluation and ranking of countermeasure options by balancing their respective benefits and disadvantages including practicability, acceptance and socio-political aspects.

Implementation of the RODOS in the Slovak Republic

With support of the European Commission's (EC) ECHO programme "Implementation of the RODOS Decision Support System for Off-Site Emergency Preparation and response in the Emergency centres in Poland and the Slovak Republic", RODOS system version 3.13 was implemented in the Slovak Republic with main objective to accelerate the implementation of the system within national emergency preparedness arrangements [1].

Within the ECHO project, the National Centre of RODOS was established at the Nuclear Regulatory Authority of the Slovak Republic (NRA SR). VUJE was established as technical support organization and interactive user. As a data supplier and passive user were established the Slovak Centre for Radiation Monitoring, Slovak Hydro-Meteorological Institute (SHMI), Jaslovske Bohunice and Mochovce NPP's.

Lessons learnt from the RODOS installation in the Slovak Republic and similar projects in other countries are following:

- select a well-experienced HP provider for installing and configuring the hardware and system software firewall during installation and test phase (FZK access),

- early start of customisation (collection of site and country specific data, conversion to appropriate formats),

- established communication lines to the data providers and transfer of data (real-time meteorological data and forecasts),

- fast communication lines to remote users (>128kB/s),

- qualified personnel available (UNIX administrator, experience with format conversion and real-time data),

- intensive training in RODOS operation,

- full engagement of the ERC staff during installation and operation.

Adaptation to local-national conditions and integration of the RODOS system to the existing administrative emergency management structures

After implementation of the RODOS system the adaptation to local conditions has continued. Connecting to the ECHO project the national project "Further development and preparation of the RODOS integration to the emergency planning and management in the Slovak Republic" supported by the government of the Slovak Republic was established. Within this project the following main tasks were performed or are in progress:

- creation and updating of RODOS databases,

- adaptation of the RODOS system to the on-line data sources,

- comparison of the RODOS modules for assessment of the accident situation with models developed and operationally used in the Slovak Republic,

- integration of the guidelines for the RODOS system to the existing emergency procedures,

- training programme and plan for the integration of the RODOS system to the emergency planning and crisis management.

The important part of the project is also participation in the international exercises (DSSNET, DEKO) of the users and R&D community.

During this phase of RODOS integration to the existing administrative emergency management structures version 4.0F of RODOS with several patches and significant updates have been installed and tested. New version 5.0 of RODOS was installed in April 2003 and used for the 3rd DSSNET exercise preparation and performance as a concerted action of many institutes (UJD, VUJE, Slovak Weather Service, FZK) [2]. All relevant Slovak geographical

data and statistical data on grids were adopted and implemented into the RODOS Geographical Information System (RoGIS). New site and plant characteristics data for both Jaslovske Bohunice and Mochovce were implemented into the RODOS Fix-Database. The database of source terms for reactor unit types VVER 440/V213 and VVER 440/V230 was created, tested and fully integrated to the RODOS system. Update of the databases for RODOS modules FDMT, LCMT, EMERSIM and EARLYCONS with taking into account new Slovak legislation was completed. Specification, adaptation and design of the meteorological on-line data transfer to the Real-time database of the RODOS system has been completed. Within this part of the project the development of the ALADIN to RODOS interface has been completed and implemented. Verification of the dispersion modules ATSTEP and MATCH and their comparison with Real-time Accident Release Consequence (RTARC) system was completed. Update of the emergency procedures and their integration to the national emergency arrangements was completed. The guidelines for preparation scenarios, organizing and evaluation of emergency exercises with RODOS system was developed by VUJE and adopted by UJD SR. The training courses for RODOS users and operators were prepared and conducted by VUJE for participants of Nuclear Regulatory Authority of the Slovak Republic, NPP Jaslovske Bohunice, NPP Mochovce, Slovak Centre for Radiation Monitoring, Slovak Hydro-Meteorological Institute, Slovak Army, organizations from Ministries of Health, of Interior, of Environment, of Economy and of Soil Management.

Lessons learnt from the (pre-) operational use of RODOS in national emergency centres are following:

- Transition phase (at least up to two years after installation):

    - completion of network connections to data providers and remote users,

    - customisation of RODOS to local and national conditions;

- Maintenance and support phase:

    - support in case of problems with hardware, software and network connections (telephone and E-mail hotline with FZK),

    - extension of users and databases, new system software or hardware components, new RODOS versions/patches,

    - realisation of user requests, support in emergency exercises, cyclic training of operators and users.

The RODOS system has been used during three international exercises, conducted by FZK (Germany), within the DSSNET project under 5th Framework Programme of European Union aiming at facilitating the communication between the users and R&D community. RODOS was also used as a main tool during the Regional Emergency Exercise „DEKO 2001", conducted by NRA SR in cooperation with VUJE, where Hungarian, Polish and Slovak National RODOS centres, KFKI (Hungary), OSSKI (Hungary), IAE (Poland) and VUJE (Slovak Republic) took part. Testing of the National RODOS centres of three participating countries took place [3].

Conclusions

As RODOS could become a standard tool for emergency preparedness in the EU and CEE region lessons learned within projects mentioned in the paper were valuable contribution to other similar international and national projects. Effective working arrangements and links have been established between some institutes having competence in various aspects of emergency preparedness and response in about 20 European countries, with Forschungszentrum Karlsruhe as main responsible institute for system development and DSSNET project co-ordination. This network contributes to the more cost-effective use of resources for the further improvement of decision support for nuclear emergencies. More importantly, it will enhance trust and confidence between people, which is essential for responding effectively and coherently to any future nuclear accident that may have implications on a European scale.

References

[1]   T. Duranova, K. Janko, Implementation of pre-operational version of RODOS in Slovakia. International Conference "Nuclear Energy in Central Europe 2000, Bled, Slovenia, September 11-14, 2000.

[2]   T. Duranova, Preparation, scenario, structure and performance of the 3rd DNNET exercise. 4th Meeting of the DSSNET members, Krakow, Poland, 3 and 4 July 2003.

[3]   T. Duranova, Description and evaluation of the DEKO 2002 – Parallel RODOS Exercise. VUJE report RODOS/TS/19/01/00_a, 2002.