EMERGENCY PLANNING FOR THE ROMANIAN CANDU REACTOR OF CERNAVODA; THE ENVIRONMENTAL APPROACH

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INTRODUCTION

Cernavoda Nuclear Power Plant (CNPP) emergency exercise "AXIOPOLIS" was carried out in August 1995. Environmental Radioactivity Laboratory (ERL) of the Institute of Environmental Research and Engineering is responsible for the dose calculations and monitoring of the radioactivity in the environment following an off- site event at CNPP. The response actions were performed at local and national level by various Civil Protection structures coordinated by the Central Commission for Nuclear Accident (CCANCOC). CCANCOC is scientifically advised by groups of experts such as the dose assessment and radioactivity monitoring group where ERL plays a key role.

SCENARIO OVERVIEW

The scenario was designed by CNPP Emergency Planning Section. It is considered that the reactor has been operated at full power for about 10 months and the pre-equilibrium core conditions allow for maximum fission product released to containment. Reactor safety systems are poised and no maintenance is underway. Tritium levels in the reactor building are higher than normal and pressure heat transfer pump alarms for very high vibrations.

Vibrations cause a damage in the heat transfer balance piping which separates. A large loss of coolant (large LOCA) accident takes place. Shut down systems 1 and 2 trip. Containment is sealed. Emergency cooling systems fires. Dousing commence as a result of the containment pressure rise.

Scenario accident is built to test various emergency procedures both on-site and off-site. There is a contaminated casualty in the plant and the rescue and medical teams have to deal accordingly. The Main Control Room licensed staff demonstrated their ability to correctly evaluate the radiation incident, the emergency condition of the plant and the amount of radioactivity in the containment. Emergency Operation Center and the Command Unit were activated by the Shift Supervisor in a timely manner. For the off-site response of the authorities up to the phase of sheltering some area residents, the accident source term as given by *CERP* (*Cernavoda Emergency Response Projection*) code had to be modified.

INTERVENTION LEVELS AND CALCULATIONS

Intervention levels for sheltering as recommended by the regulatory body (National Commission for Nuclear Activities) are of in between 3 to 30 mSv for whole body and/or 30 to 300 mSv for thyroid, lung, skin where these values represent the external plus the committed dose through intake during the first 24 hours. The source term provided by CNPP and the given dispersion conditions did not led to calculated values within the above ranges. However for the need to check the response of local authorities sheltering was recommended and simulated in the town of Cernavoda. Calculations were performed by ERL representatives in CCANCOC using *PC COSYMA*, *RASCAL* and Gaussian dispersion models. **Figure 1** presents a *RASCAL* evaluation in the conservative condition of fast (10 minutes) release.

COMMUNICATIONS AND FIELD DATA

Communications from CNPP to CCANCOC were performed via facsimile and telex lines. Source term, meteorological site conditions and *CERP* projected doses, as given by CNPP, are presented as "fill in", previously prepared, forms. Field radiation monitoring is performed by teams of Cernavoda Environmental Radioactivity Station (CERS) and of Constanta County Civil Defense. The teams run a previous established route taking gamma dose rate readings in several locations focused on the centerline of the radioactive plume. The teams send the information to CERS by radio. CERS sends the information by public telephone to ERL. Environmental sampling is performed by the survey teams at request from ERL and gamma spectroscopy is performed on location at CERS in Cernavoda.

Cernavoda Environmental Radioactivity Station (CERS) plays an important role in the off-site response. When activated by Constanta County Civil Defense or ERL, the station switches on emergency program. Atmospheric aerosoils are sampled for 10 minutes, three times per hour and inspected for global beta activity. Frequent readings of the gamma dose rate meters are performed. The Iodine monitor and the Noble Gases

monitor are powered. Gamma spectroscopy is performed upon air, atmospheric depositions, soil samples collected by the field teams. All the above data are sent to ERL.

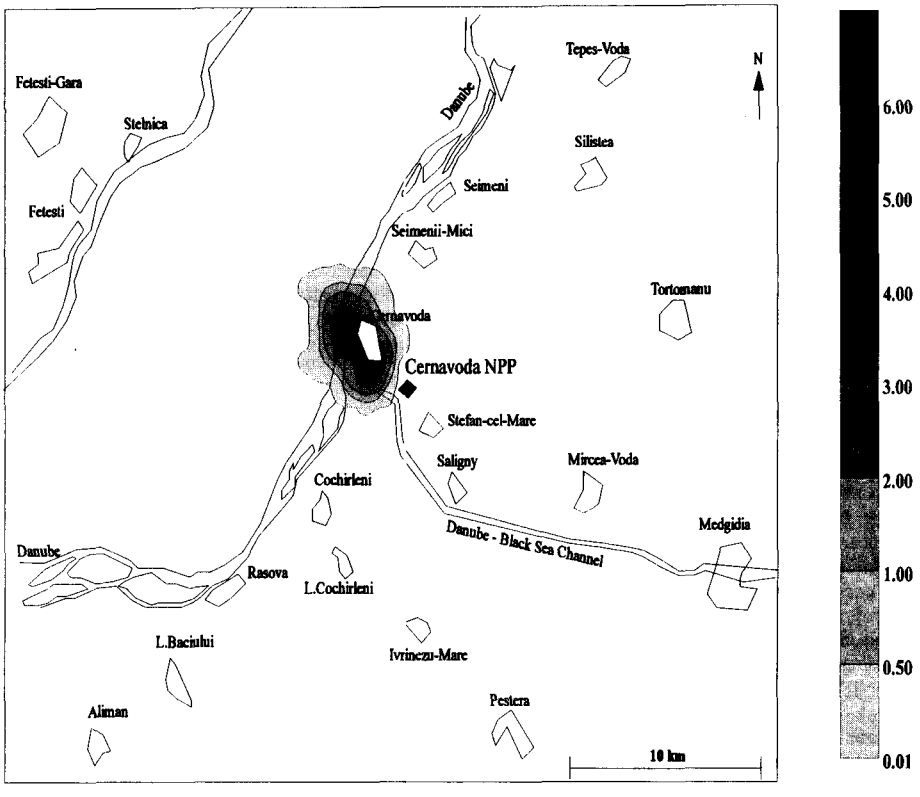

Figure 1.
Thyroide dose (mSv) 10 minutes after the start of the stack level emission.
Source term: I-131: 50 TBq, Xe-133: 200 TBq, release time: 10 minutes.
Meteorological data: 8 m/s wind blowing from SE toward NW , stability class D.

CONCLUSIONS

"AXIOPOLIS" 1995 tested emergency procedures both on-site and off-site CNPP. The capacity of the NERSN stations and field teams to carry out the emergency environmental radioactivity survey was tested. Dose predictions were performed by ERL within CCANCOC and as a back up, at the laboratory location. Countermeasures were issued by the dose assessment group coordinated by ERL within CCANCOC.

While radioactivity measurement equipment of NERSN stations (Ministry of Waters, Forests and Environmental Protection) generally complies with the requirements, there is a need for more consistent meteorological field data in the area. Communications is to be improved at all levels as reliability of public telephone lines is always low. The exercise has to be prepared and attended to each year as it was proved that only the players who practiced the procedures before, could give a satisfactory response.

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