



Policy Support on Radiation Protection

AS ALL OTHER MEMBER STATES of the European Union, Belgium has to guarantee, to both its own population and the other countries, that it respects high levels of radiological safety every day. This includes, among others, the monitoring of the levels of radioactivity in the environment, especially near nuclear installations, and emergency preparedness. In this respect, the know-how of SCK•CEN in radiation protection, measurement techniques, and emergency planning is offered to and used by the Federal Authorities.

Objectives

- to support and advise the Belgian authorities on specific problems concerning existing and potential hazards from exposure to ionizing radiation in normal and accidental situations;
- to improve and support nuclear emergency-response decisions in industrial areas from an economic point of view.

Programme Our 1997 programme built on three main pillars. For the federal service for the protection of the population against ionizing radiation (DBIS/SPRI), SCK•CEN continued its share of the radiological survey programme near the Belgian nuclear installations. For the Ministry of Internal Affairs, and in collaboration with AVN, SCK•CEN wrote an expertise report about the organization of the off-site nuclear emergency planning in Belgium. Finally, in the framework of a PhD thesis in Applied Economic Sciences, we developed and applied methodologies to provide valuable information to decision-makers, in particular for irreversible emergency-response decisions (such as evacuating or shutting down a neighbouring chemical plant) that must be taken under considerable uncertainty. We paid special attention to the decision problem of evacuating an industrial area when the latter is threatened by a nuclear alarm.

Achievements The radiological surveillance of the Belgian territory was continued in 1997. By order of DBIS/SPRI, we monitored the radioactivity of rainwater, airborne dust, water, and sediments of the rivers Scheldt and Nete, of

soil around the Flemish nuclear sites, and of milk, mosses, aquatic plants, and fish. Furthermore, we published reports on the survey of the triennial low-water period of the upper river Meuse (1995)—a very suitable period for intensive sampling—and on the radioecological impact of 30 years of activity at Chooz A.

Also for DBIS/SPRI, SCK•CEN—in collaboration with IRE and the private company Cons-Ervi—was invited on several occasions to advise on technical and scientific aspects of the Telerad monitoring network. Our main contribution regarded the setting of alarm levels for gamma dose rate on the various types of monitors.

SCK•CEN and AVN were consulted by the Belgian Ministry of Internal Affairs for advice on nuclear emergency planning: we transferred a report to the authorities in September 1997. This report contains advice on the spending of funds, comments on the emergency plan of the Belgian sites, procedures for the organization of the evaluation cell and measurement cell, and a generic table of contents for Emergency Plans of other services acting within the Belgian emergency organization.

As regards the allocation of funds, SCK•CEN and AVN organized a contact meeting at the superior institute for emergency planning (HIN/ISPU) at Florival for representatives of the provinces, of the army, and of various services within the federal administration. On the basis of the emergency plans available, we generated a list of potential needs; then, using a formal scheme for priority determination, used by five independent members of the contractors and IRE, we generated a final list of needs and priorities. We advised to give priority to the creation of a dynamic structure based on conventions between all possible partners and the authorities, and on working procedures for all intervening cells in the emergency organization. We also stressed the importance of education, training, maintenance, and all other permanent tasks to maintain a vivid emergency system.

The study of the compatibility between the emergency plan of the nuclear sites and that of the authorities for all aspects related to the evaluation cell and the measurement cell resulted in a list of actions for all sites, and in

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the advice to foresee a similar exercise for the emergency plans at the provincial level. In dialogue with the members of both cells, we wrote organizational procedures. During this first step towards a working manual, we listed shortcomings and more detailed procedures or instructions needed. We also advised to repeat this exercise for the other cells in the Belgian emergency organization: the crisis committee, responsible for the decision-making, and the information cell, responsible for informing international organizations and the media. We also wrote a generic emergency plan for all services involved in nuclear emergency planning. Finally, we added a list of observed shortcomings to the Royal Decree describing the nuclear emergency plan for the Belgian territory.

At present, SCK•CEN intends to improve the collaboration with IRE and AVN and with the authorities (DBIS/SPRI, the Federal Agency for Nuclear Control, the Ministry of Internal Affairs) in order to guarantee the functioning of the Telerad network, the continuation of an efficient surveillance programme, and the realization of the suggestions related to emergency planning made during the 1997 study.

A PhD project applied the "options thinking" concept—so far only used in the context of capital investment and environmental decision—to nuclear emergency-response decisions in industrial areas. The results so far are very promising, so this approach will be further developed at a theoretical level in 1998. Furthermore, a survey in (petro)chemical factories will assess particular parameters of the model, thus increasing the practical applicability of the models developed.

Partners, sponsors, and customers

Scientific partners AIB-Vinçotte Nuclear (AVN) — Institut des radioéléments (IRE) — Wetenschappelijk Instituut Volksgezondheid/Institut Scientifique de la Santé Publique, Louis Pasteur (WIV-LP) — Universitaire Faculteiten Sint-Ignatius Antwerpen (UFSIA)

Customers Dienst voor Bescherming tegen Ioniserende Stralingen/Service de protection contre les radiations ionisantes (DBIS/SPRI) — Ministry of Internal Affairs

Scientific output

Publication in 1997

N. PAUWELS, F. HARDEMAN, K. SOUDAN, "Assessing the Economic Impact of the Decision to Evacuate an Industrial Area. Do the Existing Models Apply?," *Annalen van de Belgische Vereniging voor Stralingsbescherming* 22:2, 171-194 (1997).

Presentations delivered in 1997

N. PAUWELS, B. VAN DE WALLE, F. HARDEMAN, K. SOUDAN, "Emergency Response in Industrial Areas. A Multiple-Objective Two-Stage Decision Tree Analysis," Eighth int. conf. on the Foundations and Applications of Utility, Risk and Decision-Making (FUR VIII): Mons, Belgium, July 1-5, 1997.

N. PAUWELS, B. VAN DE WALLE, F. HARDEMAN, K. SOUDAN, "A Multiple Attribute Decision Tree Model for Nuclear Emergency Response in Industrial Areas," Joint int. meeting EURO XV/INFORMS XXXIV: Barcelona, Spain, July 14-17, 1997.

N. PAUWELS, Th. ZEEVAERT, "Decision-Aiding in Nuclear Site Decommissioning. A Flexibility Approach," First European ALARA Network Workshop: Saclay, France, December 1-3, 1997.

Thesis published in 1997

F. VAN LAER, N. PAUWELS, K. SOUDAN, "Risico-analyse van nucleaire installaties. PC-COSYMA: Analyse van de economische parameters voor België," final-year thesis, Commercial Engineering (Universitaire Faculteiten Sint-Ignatius Antwerpen), June 1997.

Reports published in 1997

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M. LOOS, F. HARDEMAN, P. DEBOODT, Ph. ANTOINE, J.-J. VAN BINNEBEEK, H. VAN HOVE, H. DRYMAEL, D. DEGUELDRE, "Studie betreffende nucleaire noodplanning (Toestand 1997)," contract KNT9097912, expert report for the Ministry of Internal Affairs (August 1997). (In Dutch and in French).

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