IMPLICATIONS FROM THE CHERNOBYL-ACCIDENT FOR OFF-SITE RESPONSE TO TRANSBOUNDARY CONTAMINATION

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ABSTRACT

The paper reviews the performance of radiation monitoring- and meteorological systems, communication problems, and the suitability of countermeasures taken. Socio-economic consequences and legal aspects are discussed, together with actions needed in order to improve crisis management in a similar accident in the future.

THE NEED FOR PREPAREDNESS

Since the nuclear reactor accident at Chernobyl, USSR, in April 1986, it is evident that a certain level of preparedness is required also at off-site distances hitherto considered too remote to be affected. For instance, the Austrian Province of Salzburg (population: 452 000) located about 1300 km from Chernobyl, is among the most heavily contaminated areas of Western Europe due to wash-out effects during the passage of the plume (WH86).

By 1990 the 382 nuclear power plants presently operating world-wide will probably be increased by another 118 new plants . Therefore the probability of a major accident will increase due to the combined effect of aging old plants, larger total number of plants and the lack of international standards for operator training and quality control for hardware components. The following results summarize the experience in the Province of Salzburg, Austria and involvement with international agencies in order to identify potential areas of improvement with regard to cost-effective crisis management (St88).

PERFORMANCE OF RADIATION MONITORING- AND METEOROLOGICAL SYSTEMS

The nation-wide installed radiation monitoring-system provided most valuable information on the temporal and local distribution of the external gamma dose rate. Differences in

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mounting the probes caused in some instances a spread of data and misinformation about the actual situation at ground-level. Since no institutions had previously been designated as regional radiation laboratories, different institutions had to provide ad hoc-analytical capacity for the large number of samples to be measured. Due to the lack of official guidelines for sampling and insufficient centralized dissimination of results, costly duplication was unavoidable. Differences in sampling methods, hardware counting equipment and analytical methods resulted in some problems of comparability among individual results.

Complex topographical conditions, together with unusual weather phenomena added to the uncertainty of meteorological predictions of localized wash-out effects. Consequently, large gradients of nuclide surface deposition over short distances, typical for the present situation, were not foreseen.

Action needed: calibration of automatic radiation monitoring network to assure description of the situation at ground level; establishment of a national inventory of radiation monitoring systems (hard- and software); regular national radiation monitoring intercomparison exercises; definition of graded sampling plans for different scenarios of environmental radioactive contamination (e.g. for different seasons, urban vs. agricultural vs. forest areas, mountainous regions vs. planes); improved meteorological models predicting rain-out effects as well as the trajectory of dispersing contamination. The International Atomic Energy Agency (IAEA) and the World Meterological Organization are conducting a joint program on atmospheric transport modelling to improve national predictions of transboundary releases.

COMMUNICATION PROBLEMS

At the regional level communication worked most efficiently in the form of a "coordination committee", comprised of local public health authorities, radiation protection experts and representatives of farmers and food industries. Close collaboration with the local media, the installation of a 24 hour-telephone service and numerous public lectures provided the basic information to the public.

At the national level communication functioned best through personal contacts between individual scientists. Official inter-office information exchange was subject to sometimes serious deficiencies due to overburdening of the system (e.g. insufficient number of telephone lines, unidentifiable individual responsibilities, significant time-delays in urgently needed decisions). Since the existing national "Radiation Protection Commission" was not called into session, occassionally interpretation of national regulatory directives was varied from province to province, e.g. concerning the use of fresh grass as animal fodder or the method of waste-disposal of contaminated whey.

At the international level special trade connections with

neighbouring West Germany were reflected in general decisions, e.g. Austria also excluded East Germany from the import restrictions concerning food from all other COMECON-countries but included Jugoslavia although it is not a COMECON-member; or: food limits for cheese and beef were adjusted to EC-levels to faciliate trading. While detailed information on quantity and nature of the release was ultimately communicated to affected States, the initial delay reduced confidence in the reliability of the data made available. The lack of prompt and credible information resulted in the implementation of some countermeasures which may not have been considered necessary in the face of the actual levels of contamination.

Action needed: installation of a national system for retrieval and dissimination of radiation data with telex/telefax-capability; design of institutional mechanisms capable of making policy decisions on national radiation protection measures; internationally, adherence to and compliance with the convention on Eary Notification of a Nuclear Accident in co-ordination with the IAEA.

SUITABILITY OF COUNTERMEASURES

The information about the arrival of the plume was transmitted rapidly to the public via the broadcasting network. During the following ten hours only small amounts of dry deposition occurred. The official advice given at that time emphasized reduced contact with the ground, and limitations on the consumption of certain food stuffs grown outdoors. The resulting economic damages could have been minimized by providing group-specific advice on countermeasures, such as: intensified harvest of food stuff or animal fodder; covering of unripe vegetation or food stored outdoors with protective foils; closing of all openings of green-houses and stables; prohibition of the use of contaminated rain water or compost; advice to wear protective masks during dust-creating work.

Action needed: collection of international experiences concerning practically applicable profilactic measures to minimize impact of fallout-contamination for different population groups (consumers, farmers, trade, industry); development of agreed levels of intervention; implementation of the Convention on Assistance in the Event of a Nuclear Accident or Radiological Emergency, including the development of a data bank on experts, materials, and equipment available in the event of an emergency.

SOCIO-ECONOMIC CONSEQUENCES

The fallout contamination affected most of all food producers (farmers, industries) and consumers. The milk industry suffered the heaviest losses (54% of the total direct damages), followed by stock farming (16%) and vegetable farming (5%). Based on the Austrian upper limits of radionuclide concentration in food the total costs due to damages amounted in Salzburg to about USS 13/person, resulting in a collective dose reduction of at least 50% had no action been taken. These costs were due to

the need for additional uncontaminated animal fodder for cattle and sheep, the destruction of contaminated vegetables and fruit, the blending of milk with varying degrees of contamination, the changing of the production ratio of milk, butter, and cheese, the disposal of contaminated whey, the use of contaminated game, pork and beef as powdered animal fodder and the cost of food additives to lower cesium-uptake by cattle. The supply of suitable raw materials was particularly difficult for producers of bottled food for babies, which had to rely to a large extent on imports.

The consumers reacted with a change of their dietary characteristics, e.g. less demand for milk products, sheep and game, but increased demand for food products from knowingly uncontaminated areas, such as Spain, Israel and Africa.

Action needed: legislative measures to provide for compensation of losses to food producers complying with national regulatory standards; provision for emergency fodder storage; development of techniques for waste disposal or re-cycling of contaminated agricultural products; increase of analytical capacity of existing laboratories (e.g. automatic sample changers).

LEGAL ASPECTS

Immediately following the accident, review of the question of compensation for damages revealed the lack of any multilateral agreement to which the Soviet Union was party which would provide a mechanism for compensating non-nationals for deleterious transboundary effects of a radiological release. While the Paris Convention on Third Party Liability in the Field of Nuclear Energy and the Vienna Convention on Civil Liability for Nuclear Damage both address this issue, neither are comprehensive, insofar as they deal only with civil liability and not State responsibility and limit the types of damage for which recovery is available, and neither are widely adhered to (14 parties to the geographically-limited Paris Convention; 10 parties to the Vienna Convention).

Action needed: harmonization of the existing compensation conventions; increased adherence to bilateral and multilateral agreements covering both civil liability and State responsibility.

REFERENCES

WH86 World Health Organization (WHO): Chernobyl reactor accident, Rep.No. ICP/CEH 129, Copenhagen (1986).

St88 Steinhäusler,F., Hofmann,W., Daschil,F. and Reubel,B.: Chernobyl and its radiological and socio-economic consequences for the Province of Salzburg, Austria, Environment International, Special Issue "Chernobyl" (in press).