ENVIRONMENTAL CONSEQUENCES OF MAJOR NUCLEAR ACCIDENTS, THE IAEA OUTLOOK ON LESSONS LEARNED

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INTRODUCTION

The accident which happened at the Chernobyl nuclear plant in April 1986 was the most severe in the history of the nuclear power industry and caused an radioactive contamination of around 200 000 km² in Europe.

The IAEA, in its role of a specialised nuclear-related technical UN agency, has been involved in the investigation of Chernobyl accident consequences since early May 1986. During the 26 years since the accident happened, the IAEA has implemented a number of programmes to mitigate the environmental consequences in connection therewith.

The UN acknowledged the IAEA for the work it is doing on behalf of the countries affected by the Chernobyl accident and in 2007 the UN General Assembly called on the IAEA’s efforts in providing information and assistance in connection with remediation of agricultural and urban environment and the development of agricultural countermeasures and the monitoring of human exposures in areas affected by the Chernobyl accident.

The accident which happened at the Fukushima-Daiichi nuclear plant (Japan) in March 2011, also led to extensive contamination of the environment. Since the basic need of the accident the IAEA has been working extensively, serving as the international focal point for information, assistance and follow-up.

An IAEA Ministerial Conference on Nuclear Safety, devoted to the Fukushima Daiichi accident, took place in Tokyo in June 2011. The Conference adopted a Ministerial Declaration aimed at strengthening nuclear safety, emergency preparedness and radiation protection of people and the environment worldwide. That Declaration formed the basis of the IAEA Action Plan on Nuclear Safety, which was endorsed by the IAEA’s Member States in September 2011.

Current international arrangements

The Convention on Environmental Impact Assessment in a Trans-boundary Context (EcoPro, 1991) and The Protocol on Strategic Environmental Assessment (Kyiv, 2003) place an obligation on States which co-operate in the implementation of such a trans-boundary project and consult each other on major projects that may have a significant adverse environmental impact across boundaries.

The Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency (Vienna, 1990) establish a notification system for nuclear accidents which have a potential for transboundary release and set out an international framework for cooperation among Contracting Parties and with the IAEA to facilitate the prompt assistance and support in the event of nuclear accidents.

LESSONS LEARNED

A potential impact of major releases of radioactive materials from a nuclear facility on the public and the environment should be exhaustively analysed before the commissioning of a nuclear installation. A comprehensive assessment of scenarios of potential accidents and the associated estimates of public exposure are important elements of environmental and safety management.

In case of major releases to the environment, the off-site monitoring systems and programmes should ensure that the public exposure is adequately assessed and the public and decision makers are informed in a timely fashion, specifically:

- The operator’s monitoring systems and programmes should be considered as an integral part of the facility design and should have an adequate redundancy and robustness;
- The national environmental monitoring programme and radiation and toxicology data are insufficient for large-scale monitoring, particularly mobile thyroid counters and car-based WBCC, laboratory facilities and radiological assessment capacities should be increased;
- The staff involved in a large-scale monitoring programme must be appropriately trained and should be provided with the clear instructions on monitoring procedures, such as the sampling strategy, data reporting and interpretation.

Among the key factors governing the extent of public exposure are the following:

- Atmospheric conditions (e.g. vertical profiles of the wind direction and speed, air temperature, temporal-spatial pattern of emissions);
- Topographical characteristics, forestation, land use, features of the soil, agricultural practices, food production and distribution, etc.;
- Characteristics of water bodies and their role for the irrigation, supply of drinking water, fishery and seafood production;
- Human habits and features of living environment (e.g. food consumption rates, consumption of domestic foodstuffs, time spent indoor/outdoor, protective characteristics of houses);
- Effectiveness of protective measures, including their timely implementation.

These factors should be considered in the design of monitoring programmes, environmental assessments, planning and in the safety of facilities to provide for the assessment for their implementation and serves in a capacity of international focal point for the assistance, information-sharing and follow-up in the case of a nuclear emergency.

At the request of its Member States, the IAEA provides international peer reviews and advisory missions related to the radiological part of Environmental Impact Assessments, Safety Assessments, design and implementation of facilities for the mitigation of environmental monitoring programmes.

The IAEA Action Plan on Nuclear Safety includes a number of steps to make nuclear safety more robust and, in particular, facilitates the development of the advanced environmental assessment and monitoring methodologies, as well as further support by means of IAEA’s programmes of Models and Data for Radiological Impact Assessments (MODARIA).

A shared stock of environmental monitoring equipment, laboratory facilities and assessment capabilities (including the roster of qualified experts) could be created and maintained within the framework of existing international arrangements.