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The Chernobyl Forum: major findings and recommendations

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Abstract

The accident at the Chernobyl NPP in 1986 was the most severe in the history of the nuclear industry, causing a huge release of radionuclides over large areas of Europe. The recently completed Chernobyl Forum concluded that after a number of years, along with reduction of radiation levels and accumulation of humanitarian consequences, severe social and economic depression of the affected regions and associated psychological problems of the general public and the workers had become the most significant problem to be addressed by the authorities. The majority of the affected land is now safe for life and economic activities. However, in the Chernobyl Exclusion Zone and in some limited areas of Belarus, Russia and Ukraine some restrictions on land-use should be retained for decades to come. Most of the 600,000 emergency and recovery operation workers and five million residents of the contaminated areas in Belarus, Russia and Ukraine received relatively minor radiation doses which are comparable with the natural background levels. Apart from the dramatic increase in thyroid cancer incidence among those exposed at a young age and some increase of leukaemia and solid cancer in most exposed workers, there is no clearly demonstrated increase in the somatic diseases due to radiation.

Keywords: Chernobyl accident; Health effects; Environmental radioactivity; Countermeasures

1. Introduction

The most severe accident in the history of the world nuclear industry occurred 26 April 1986 at Unit 4 of the Chernobyl nuclear power plant located 130 km to the north–east of Kiev, the

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capital of Ukraine. One of four RBMK type reactors with a graphite moderator, a thermal power of 3200 MW and an electrical power of 1000 MW each, was destroyed by two powerful explosions in the reactor core. The explosions were caused by gross breaches of the operating procedures by staff and technical inadequacies in the safety systems (INSAG, 1986, 1993).

Due to the explosions, the reactor closure head was lifted and the core exposed to air. The reactor caught fire and burned for 10 days. During that time, radioactive substances in the form of gases, vapours, aerosols and 'hot particles' were ejected from the burning reactor and dispersed over Europe, principally Belarus, Ukraine and Russia. The total release of radioactive substances was about 14 EBq, including 1.8 EBq of ^{131}I, 0.085 EBq of ^{137}Cs, 0.01 EBq of ^{90}Sr and 0.003 EBq of plutonium radioisotopes. The noble gases contributed about 50% of the total release (IAEA, 2006).

More than 200,000 km^2 of European territory received levels of ^{137}Cs[1] above 37 kBq m^{-2} (1 Ci km^{-2}). Over 70% of this area was in the three most affected countries, Belarus, Russia and Ukraine. No more than 20% of the radioactive release spread beyond Europe (De Cort et al., 1998). Most of the strontium and plutonium radioisotopes were deposited within 100 km of the destroyed reactor due to larger particle sizes.

About 350,000 emergency and recovery operation workers were initially involved in mitigation of the accident and cleaning up the affected areas in 1986–1987. Later, the number of registered 'liquidators' rose to about 600,000.

About five million people live in areas of Belarus, Russia and Ukraine that are contaminated with radionuclides due to the Chernobyl accident (above 37 kBq m^{-2} of ^{137}Cs). Amongst them, about 400,000 people lived in more contaminated areas – classified at the time by Soviet authorities as zones of 'strict radiation control' (above 555 kBq m^{-2} or 15 Ci km^{-2} of ^{137}Cs). Of this population, 116,000 people were evacuated in April–July 1986 from the vicinity of the Chernobyl NPP (s.c. Chernobyl Exclusion Zone) and some other highly affected areas to non-contaminated areas. Another 220,000 people were relocated in subsequent years (UNSCEAR, 2000).

The environmental and health consequences of the Chernobyl accident were assessed by some relevant national and international bodies and discussed at numerous professional meetings. The medical consequences of the Chernobyl accident were widely discussed at the Kiev conference in 1988 (IAEA, 1989), pursuant to the results of the IAEA Chernobyl project (IAC, 1991), and at the many conferences marking its 10th (Karaoglou et al., 1996; IAEA, 1996) and 15th anniversaries (International Conference, 2001). The health consequences were analysed comprehensively and in depth by UNSCEAR in its reports (UNSCEAR, 1988, 2000).

2. The Chernobyl Forum and its operation

Due to the unprecedented scale of the accident and the radioactive discharges it caused, and in spite of past comprehensive studies, this socially important issue continues to attract the attention of the public and the press. Because substantial contradictions in the interpretation of the consequences of the Chernobyl accident existed between the scientific community and the general public, and also amongst United Nations organisations involved, the IAEA initiated in early 2003 the establishment of the Chernobyl Forum aiming to retrospectively assess the environmental and health consequences of the accident and to advise Governments on future actions, such as environmental remediation and special health care as well as research activities

[1] In the mapping of the deposition, ^{137}Cs was chosen because it is easy to measure long-lived radionuclide, and it is of radiological significance.