Appendix I

DESCRIPTION OF POSTULATED EMERGENCY SCENARIOS DERIVED ON THE BASIS OF A HAZARD ASSESSMENT PERFORMED IN A STATE

Note: In all cases, the nuclear or radiological emergency should not be assumed to occur in isolated locations but in areas with population densities and land use, such as those in Europe, for example.

I.1. Postulated Emergency 1: General emergency at a nuclear power plant combined with a severe natural event (earthquake and tsunami), located on the coast within a State

Scenario: A severe earthquake and tsunami cause the loss of all external power and practically the entire alternative power supply to the plant, at a site comprising six boiling water reactors (BWRs). Severe core damage occurs at three Units, which are operating at full power at the time of the accident, and a large amount of radioactive material is released into the environment over the period of one week (for example, in the range of 100-400 PBq for I-131 and 7-20 PBq for Cs-137). The infrastructure in the region is severely damaged by the earthquake and tsunami, and there are many casualties.

Expected situation at the end of the emergency response phase: People within 20 km of the site and other designated areas have been evacuated, and those within 20 – 30 km have been instructed to shelter before being advised to voluntarily evacuate. While in some areas, the people were advised to return after the immediate hazard was gone, in others they were relocated instead. People were relocated in additional areas beyond 30 km where hot spots were identified. Restrictions on the distribution and consumption of food and non-food commodities and the consumption of drinking water are in place within designated areas within a radius of over 100 km, and efforts are ongoing to identify if these restrictions are still needed. Emergency response organization is still functioning in full response mode (24/7). People are eager to know if they are safe, what the authorities will do next and when they can return to their normal life.

I.2. Postulated Emergency 2: General emergency at a nuclear power plant located in a neighbouring State

Scenario: The loss of all external power and practically the entire alternative power supply occurs at the plant, as a result of sabotage, at a site comprising six boiling water reactors (BWRs). Severe core damage occurs at three Units, which are operating at full power at the time of the malicious act, and a large amount of radioactive material is released into the environment over the period of one week (for example in the range of 100 - 400 PBq for I-131 and 7-20 PBq for Cs-137). The nuclear power plant is located at a distance of 10 km from the border.

Expected situation at the end of the emergency response phase: Following agreements with the accident State, similar protective actions are instituted in the neighbouring State (see *Expected situation at the end of the emergency response phase* in the description of the Postulated Emergency 1), leading to a similar situation at the end of the emergency response phase.

I.3. Postulated Emergency 3: Emergency at a radiotherapy unit involving the accidental overexposure of patients

Scenario: The misuse of a computerized treatment planning system, to allow for the non-standard use of multiple shielding blocks during radiotherapy, leads to patients being exposed for substantially longer treatment times than prescribed. A total of 28 patients suffering from prostate cancer and cancer of the cervix are overexposed over a period of 8 months before the mistake is identified, by which time 8 people have died as a consequence.

Expected situation at the end of the emergency response phase: Radiotherapy at the unit in question is halted and investigations are initiated to identify the cause for the overexposures. Arrangements are put in place to identify all those who were affected, to examine them and assess their doses and to treat the affected individuals. The government requests assistance under the terms of the Convention on Assistance in the Case of a Nuclear or Radiological Emergency regarding identification of the causes of the accident, dose assessment and medical treatment. As this is the only radiotherapy facility within the area, there is already pressure from the public and the government to re-open the radiotherapy unit so that those in need can continue with their treatment.

I.4. Postulated Emergency 4: Unintentional dispersion of radioactive material in the public domain

Scenario: Radioactive material from a radiotherapy unit (containing a dangerous radioactive source of around 50 TBq Cs-137) is widely dispersed in the public domain as a consequence of an unintentional act. Fragments are distributed among several families, and the remnants of the source assembly are sold for scrap. Severe exposure of members of the public occurs, causing medical symptoms of overexposure before the accident is recognized.

Expected situation at the end of the emergency response phase: The major quantity of the dispersed source is located and isolated. Areas where the source has been dispersed are mapped, evacuated and cordoned off. Access control is in place. Monitoring is ongoing. A holding area for members of the public who may be exposed or contaminated is designated, where a team of experts carry out medical triage and identifies people requiring hospitalization. Monitoring and bioassay are undertaken to identify those in need of intensive medical care. Other persons are monitored and found to be contaminated either internally or externally. Decontamination actions are instituted to bring all potential sources of contamination under control, and the need for further decontamination is under consideration. People are anxious to know if they are safe, what the authorities will do next and whether it will be possible at all for them to recover from what happened and go back to their property.

I.5. Postulated Emergency 5: Recovery of stolen dangerous source

Scenario: A vehicle transporting the head of a teletherapy unit with a Co-60 source (approximate activity 111 TBq) is stolen. The vehicle is stolen on its way to a radioactive waste storage facility by a group of armed individuals, who assault the driver of the vehicle and drive the vehicle and radioactive source in an unknown direction.

Expected situation at the end of the emergency response phase: Following notification of the event, the regulatory body confirms the activity of the source and prepares and distributes advice to the civil protection authorities on the potential risks of handling the radioactive source, the immediate actions to be taken by responders and the public should they come across the source and the telephone numbers to contact if the source is found. The police locate the vehicle and an empty source casing. Following monitoring, using vehicle-based monitors, unusual levels of radioactivity are measured in the field around 1 km from the abandoned vehicle. The area is evacuated and cordoned off. Investigation identifies all individuals who have handled the source, and dose assessment and medical examination are initiated.