GERMANY, Federal Republic of

Steps for safety

by Manfred V. Banaschik and Karl-Heinz Berg

In the Federal Republic of Germany, a monitoring system for radioactive fallout was put on special alert as soon as the Chernobyl accident was officially acknowledged on 28 April, after detection of abnormal increase of radioactivity in Scandinavia.

A significant increase of radioactivity then also was detected in all parts of the country, first in the air and in the rain, then on the ground in pastures, on vegetables (salad, spinach), in sheep and cow milk, in cattle, sheep, and game meat. Measurements, initially concentrated on iodine-131 and caesium-137, varied considerably:

- Air values reached 100 becquerel per cubic metre for a limited time.
- Ground values were in the range of 1000 to 10 000 becquerel per square metre, but exceeded 10 000 becquerel per square metre in special cases.
- In foodstuff (where only iodine-131 is of significance as it concentrates in the thyroid), values of up to 1000 becquerel per liter of fresh cow milk and per kilogram of vegetable were measured at some locations.

In the FRG, activity levels measured from the north to the south of the country generally increased in the range of an order of magnitude. Because of increased activity values measured all over the territory and of the uncertainty in respect to the future trends of radioactivity (due to the lack of detailed information about the accident), a number of precautionary protective measures were recommended by the authorities. In particular, they were aimed at restricting the direct consumption of fresh agricultural products such as milk and vegetables.

The Radiation Protection Commission of the FRG recommended as limiting values 500 becquerel per liter of milk, and 250 becquerel per kilogram of foliage vegetables.

The restrictions were to ensure that radiation risk was kept at a minimum even in case of continuous daily consumption of milk and of an equivalent amount of vegetables. Since in some cases these values were considerably exceeded, affected fresh milk was withdrawn from the market and vegetables ready for harvest had to be destroyed in substantial amounts. Subsequently, consumers also refused to buy fresh food which was actually fit for consumption.

Following an overall assessment of the impact of the Chernobyl accident fallout, the additional radiation dose is expected to be in the order of the annual natural background radiation.

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It is currently estimated that the financial losses in the Federal Republic of Germany amount to several hundred million Mark due to destruction of food, confiscation of food, and restriction of food production. The FRG is presently in the process of preparing compensation for those who suffered financial losses.

On the basis of the information on the Chernobyl accident so far available, a safety assessement of FRG's nuclear power plants was launched. The first investigations, concluded in June 1986, did not reveal any need for additional measures to be taken for power plants in operation or under construction. According to the information presently available, the accident at Chernobyl has shown no new phenomena or surprising new events. Consequently, existing built-in precautions, the excellent operational experience record, and the results of reactor safety research confirm our well-balanced reactor safety concept. Generally speaking, there is no need for additional safety precautions nor for new activities in reactor safety research. The accident may, however, intensify research on the further improvement of prevention of accidents and mitigation of their consequences.

A comprehensive response, however, requires more detailed information on the causes and sequences of the accident than presently available. According to information so far

FRG nuclear programme

In the Federal Republic of Germany, nine pressurized-water reactors (PWRs) and seven boiling-water reactors (BWRs) are in operation. They contribute to about 36% of the overall electricity power production. At present, three PWRs are under construction and two PWRs as well as one prototype gas-cooled high-temperature reactor (THTR 300) are being commissioned. A small gas-cooled high-temperature reactor (AVR) has been in operation since 1967. The construction of the prototype fast breeder reactor SNR 300 is almost completed. A small fast breeder reactor (KNK II) has been in operation since 1973. Utilization of nuclear energy in a country as densely populated as the Federal Republic of Germany requires high safety standards. The principal aim of reactor safety is to protect the public and the environment against any release of radioactive materials contained in nuclear reactors. This protection is accomplished by using separate passive barriers to contain radioactive materials and engineered safety features to ensure operational safety. These passive safety barriers are:

- Fuel cladding
- Pressure vessel and piping
- Reactor containment.

The design basis of the safety concept for nuclear power plants comprises a well-balanced combination of engineered safety features:

- Proven design, comprehensive quality assurance, and control measures during component manufacturing and plant construction
- In-service inspection during operation;
- Engineered safety equipment for limitation of consequences of incidents, aimed at controlling both the spectrum of potential incidents as well as to prevent release of fission products.

The main objective of this safety concept is to prevent any accidents in nuclear power plants leading to release of radioactive fission products into the environment.