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NRPA Bulletin

Radioactive Contamination in the Arctic: Main Sources

Three major sources have contributed to the widespread radioactive contamination of the Arctic area. Fallout from atmospheric testing of nuclear weapons represents the major source, followed by routine releases from the Sellafield reprocessing plant in the UK, and fallout from the Chernobyl accident. These are the main conclusions in an AMAP report published in June 1997.

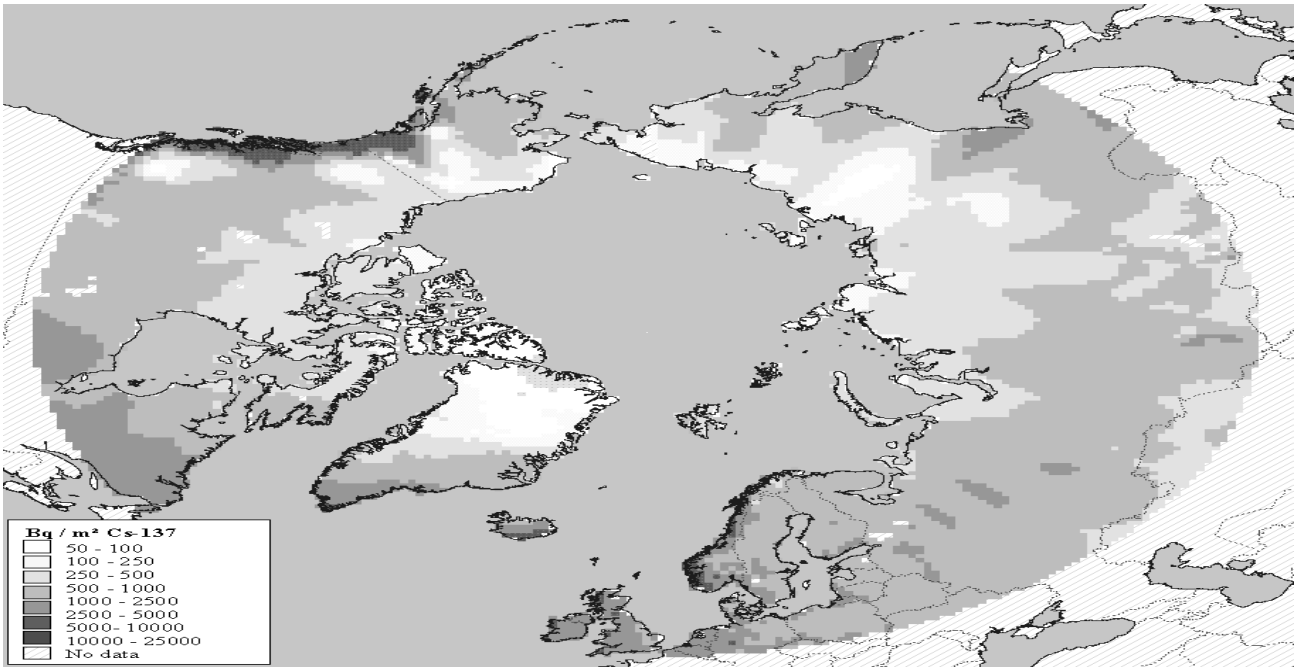

Figure 1 Estimated spatial distribution of ^{137}Cs fallout from nuclear weapons testing

Testing of nuclear weapons

A total of 520 atmospheric nuclear explosions took place up to 1980, with global releases of radioactive materials. For the Arctic area, AMAP estimates that about 35 10^{15} Bq of ^{137}Cs and 22 10^{15} Bq of ^{90}Sr were deposited; the spatial distribution of this fallout onto land is shown in Fig.1.

Due to international concern over contamination on the Arctic environment, The Arctic Monitoring and Assessment Programme was established in 1991. AMAP is undertaking an assessment which include the assessment of the radioactive contamination of the Arctic and its radiological consequences.

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Figure 2, releases of ^{137}Cs from Sellafield and contamination of the Barents Sea and the East Greenland Current

Releases from Seallafield

Releases from the reprocessing plant in Sellafield, UK, started in 1952 and continue up to present day, with major releases between 1974 and 1982. The total release of ^{137}Cs is about 41 10^{15} Bq with about 15 10^{15} Bq reaching Arctic marine areas. The releases from Sellafield and the subsequent contamination levels in the Barents Sea are shown in Figure 2. A lag time of 4-5 years between release in to the Irish Sea and the appearance of enhanced levels of radiocaesium in the Barents Sea has been observed.

Chernobyl accident

As a result of the Chernobyl accident in 1986, radioactive contamination of the North and Baltic Seas provided indirect contamination to the Arctic marine environment via transport pathways along the Norwegian coast. The actual amount of radiocaesium deposited in the Arctic marine areas is not known, but probably small taking into consideration the fallout pattern on land. The present input of ^{137}Cs to the Arctic marine area from the Baltic is of the order 5 10^{13} Bq/y and the total transport is about 1 10^{15} Bq .

Future threats
The greatest threat to human health and the environment in the Arctic is associated with potential accidents in the civilian and military nuclear sectors. Of most concern is the potential for accidents during power plant operation, the handling and storage of nuclear weapons, the decommissioning of nuclear submarines and disposal of spent nuclear fuel from vessels.