RADIOECOLOGICAL PROBLEMS
OF REHABILITATING ARCTIC SEAS

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Systematized information on nuclear and radiation hazardous objects scuttled in the seas of the Western Arctic – nuclear powered submarines, objects with and without spent nuclear fuel, the reactor bays of nuclear powered submarines, a nuclear powered icebreaker, and solid radioactive wastes – is presented. Together with technical data, the results of ranking objects according to their degree of radiation hazard, information on the status of the radioecological conditions at the scuttling sites, information about the effectiveness of existing protective barriers impeding the flow of radioactive substances into the surrounding seas is presented. An assessment is made of possible variants for rehabilitating sea water areas, including keeping scuttled objects on the sea bottom, raising such objects, salvaging and re-disposal at great depths taking account of international requirements and Russian normative and legal base.

Arctic ices are melting. The winter extension zone of polar ice in the Scandinavian seas has decreased by approximately 25% during the past century. In 2005, the Bering Sea remained almost completely unfrozen during the winter. This is unprecedented. If this continues, the Northern Arctic Ocean could become navigable year round in the next decade. In this connection, variants are being examined for developing shipping lanes in the Arctic and along the Russian sea coast, which is free of piracy and is the shortest distance between Europe and Southeast Asia. Prospects are opening up for shipping freight from the western coast of Canada and the USA to Europe and vice versa. Consequently, the significance of the Arctic not freezing is enormous and indisputable.

This opens up great possibilities for our country. On the one hand, rejuvenation of northern shipping will help restore the weak economy of remote regions, while on the other hand it will help to establish mutually profitable bilateral relations between Russia and the West and between the West and Southeast Asia. Russia plays a special role in preserving Arctic ecosystems. About one third of the entire area of the Arctic – one of the largest biosphere reserves and an ecological filter – lies in the Russian sector. Diversity and abundance of organisms are characteristic for the part near the Atlantic; large schools of North Atlantic fishes (herring, cod, haddock, sea bass, pollack, and others) are observed during the summer. Several types of whales, primarily, finback and Greenland right whales, live in the Northern Arctic Ocean. The cold seas of the Arctic, rich with fish and animals, are a large source of food and enormous mineral resources lie hidden on the bottom [1].

The enormous natural resources require that this region be treated with great care. However, the events occurring in the last century in connection with the nuclear arms race have already damaged the Arctic – individual regions of the Arctic are radioactively contaminated, dangerous solid radioactive wastes, including sunken/scuttled nuclear powered submarines

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Sources of Radioactive Contamination in the Arctic. In 1960–1970, the practice of dumping the radioactive wastes into the oceans was generally accepted in countries using the atomic energy. The first such operation was performed by the USA in 1946 in the northeastern Pacific Ocean, where low-level wastes were dumped 80 km from the California coast. The belief that these measures were safe was so strong that there were no reliably recorded data either about the activity of the wastes or about their radionuclide composition. Other countries soon adopted the same practice: Great Britain, which has been dumping low-level wastes in the North Atlantic since 1949; New Zealand and Japan, which have been performing such operations near their own shores in the Pacific Ocean since 1954–1955; Belgium, which selected the English Channel next to the French coast, and many other countries have been dumping radioactive waste since 1960. In 1959 USA also dumped into the Atlantic Ocean, for the first time, the vessel of a disassembled nuclear reactor from the nuclear powered submarine Seawolf. In all, 14 countries dumped radioactive wastes in 47 regions of the Atlantic and Pacific oceans in the period 1946–1982 (primarily during the period of the London convention).

In 1959–1993, the Soviet Union, later the Russian Federation, discharged liquid and solid radioactive wastes into the Arctic (Barents and Kara Seas). Only the wastes produced during the operation of nuclear powered submarines and ice-breakers were dumped. This was done in specially selected regions away from intense shipping and fishing; solid wastes were dumped near the eastern coast of the archipelago Novaya Zemlya. The highest activity of the wastes dumped in the Kara Sea occurred in 1967 – about 26 PBq, but this activity has decreased as a result of radioactive decay and now does not exceed 4 PBq (Fig. 1) [3, 4].