The Impact of Nuclear and Fossil-Fuelled Power on the Aquatic Environment

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The objective of this report is to compare nuclear (NPP) and thermal power plants (TPP) in the extent to which they may exert effects on the aquatic environment.

Local thermal impact.
Both nuclear and thermal electric power plants use the steam-water energy cycle. Heated waters discharged into aquatic environment change physical-chemical properties of water, such as density, viscosity, surface tension, solubility of gases and steam pressure. The influence of heating on aquatic ecosystems is ambiguous, and at different levels of heating it may be both positive and negative. The most important ecological factor is the exclusion of excessive heat dumping exceeding the buffer (compensating) capabilities of the aquatic ecosystem.

Thermal loads can cause negative processes in local areas of aquatic environment, such as overgrowth of blue-green algae deteriorating the water quality, changes in the composition of plankton and dynamics of its numbers, disruptions of the structure of fish communities, and microclimatic changes.

Chemical contamination.
Thermal releases are superimposed on chemical discharges (phosphorus and nitrogen compounds, metals, petroleum products and others). It is a combination of thermal releases and chemical contamination leads to local disturbances of ecological equilibrium, such as accelerated eutrophication, changes in the species structure of aquatic ecosystem. As a rule, nuclear and gas power plants prove to be cleaner than coal and fuel-oil TPPs in the extent to which they create chemical contamination of aquatic ecosystems.

Mechanical impact.
Among the important factors of the impact on aquatic biota are injuries to aquatic organisms in the water-intake facilities and condensers of the cooling system of power plant, resulting in mass death of plankton and young fish.

Radioactive contamination.
Among specific features of NPPs are discharges to the aquatic environment of low-level radioactive waters in fixed amounts producing no significant effects on the aquatic biota.

Ecological monitoring of marine environment in the area of Leningrad NPP.
The results of long-term ecological monitoring (1976-1997) are considered. The main impact factors for marine environment are heated waters, chemical discharges, mechanical stress, and
changes of gidrological regime. The non-radioactive factors of NPP impact on marine environment are more significant than radioactive contamination.

**Regional and global aspects.**
The most serious ecological effects of fossil-fuelled power plants are disturbances of the natural ecological cycles of sulphur, nitrogen and carbon dioxide in the biosphere. The progressive increase in the atmospheric carbon dioxide may lead to the greenhouse effect and pronounced climatic changes. Unlike fossil-fuelled power plants, nuclear power plants does not disturb of environment on regional and global levels.

**Conclusion.**
Experience of over 40 years in operating the enterprises of nuclear power engineering shows that in normal operation, radioactive contamination in the areas around NPPs is very low, as compared to the natural background, and practically has no significant effect on doses to the population and natural biota. Therein lies an important ecological advantage of NPPs over fossil-fuelled TPPs, since releases from TPPs contaminate the environment significantly.

**BIBLIOGRAPHY.**


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