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AEC-NASA TECH BRIEF

Effect Of Thermal Discharges On The Mass Energy Balance Of Lake Michigan

A report analyzing the impact of man made, thermal discharges on the mass energy balance of Lake Michigan considers the effects of electric utility generating stations and steel mills on the physical quality of the lake. The study was based on an extension of the heat exchange model developed by Edinger and Geyer for small lakes and cooling ponds. The Edinger and Geyer model was generalized by incorporating the effect of "atmospheric feedback". The feedback term is needed because the over-lake dew point and over-lake temperature are affected by the temperature of the water surface of a large lake. The generalized model is applicable to all bodies of water.

The study predicts that a thermal discharge increase of one gigawatt into Lake Michigan will increase the surface temperature by $.8 \pm .2 \times 10^{-3}$ °C and increase the water loss due to surface evaporation by .25 ± .06 cubic meters per second. The lake wide effects of man made discharge are negligible and will remain negligible for the rest of this century.

The report also presents the results obtained when the generalized model was applied to the other four Great Lakes.

The information contained in this report should be of interest to environmental and water resource engineers, designers of electrical power facilities and pollution control agencies.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Division of Technical Information
U. S. Atomic Energy Commission
Washington, D. C. 20545
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Patent status:

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