MARINE BIOLOGICAL STUDIES IN RELATION TO THE OPERATION OF THE TORRENS ISLAND POWER STATION.

a thesis by

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prepared in association with the Department of Zoology, Faculty of Science and submitted to

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MASTER OF SCIENCE

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PROLOGUE

During the period from April, 1972 to April, 1975, I was employed in a temporary position as a marine biologist by the Electricity Trust of South Australia. I conducted research on two matters of concern to the Electricity Trust : the control of fouling by sessile animals in the cooling water ducts of the Torrens Island Power Station and the ecological effects of thermal effluent from the power station on the surrounding areas. The Electricity Trust agreed to the proposal that the results obtained during these studies may be used in the preparation of a thesis for the degree of Master of Science. This thesis is the result.

SUMMARY

Experiments were conducted to determine the effect of dosing seawater with chlorine on rates of settlement of sessile animals, with the aim of finding the optimum dose to prevent fouling in the cooling water ducts of the Torrens Island Power Station. Frosted glass plates were exposed in troughs containing running seawater. Six troughs were dosed with chlorine, five continuously and one intermittently, while two troughs were controls. Rates of settlement of fouling organisms on the plates were examined. The results showed that chlorine was effective in reducing rates of settlement. Of particular interest from the practical viewpoint was the fact that a low continuous dose of chlorine (0.2 ppm) was more effective in minimizing fouling than a higher dose (6 ppm) applied intermittently (10 minutes every 4 hours). Not only were rates of settlement lower but in addition, those animals which did settle in the troughs receiving the continuous dose were stunted in growth while those that settled in the trough receiving the intermittent dose grew normally.

The effect of the thermal effluent on epifauna of the Torrens Island area was examined by placing glass plates, held in specially constructed brass frames, at six different locations. A regular series of observations on plates exposed for two, four and eight weeks were made. Animals present on the plates were counted and the weights of growth measured. From the data on weights of growth, it was concluded that the thermal effluent had little effect on the total production of the epifauna. However, considerable differences in weights of growth were observed at two adjacent locations in the cooler water, one in turbulent water and the other in still water. Much greater weights of growth were found on plates from the turbulent water where three species were very abundant, apparently favoured by the greater current speeds.

Amongst the other species present, a variety of effects of the warmed water on distribution and abundance were noted. Several species showed seasonal differences in occurrence, settlement being found in spring in areas influenced by the warmer water and during summer in other areas. Some species were favoured by the warmed water, some were little affected in abundance, while others were adversely affected. When the positive effects of the thermal effluent were balanced against the negative effects, there was little evidence of any damage to the epifauna caused by the thermal effluent.

DECLARATION

I, William Muir Host, declare that this thesis contains no material which has been accepted for the award of any other degree or diploma in any university and that, to the best of my knowledge and belief, the thesis contains no material previously published or written by another person, except when due reference is made in the text of the thesis.

Signed .. ...

W. M. Host

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