
MACROFOULING IN THE MARINE CONDUITS OF THE THERMOELECTRIC POWER

STATIONS OF LIGURIA

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Resumé - On fait comparer la salissure des conduites de trois Centrales thermo-électriques, situées en Ligurie, où on employe des différentes méthodes antisalissures: chlorination, réglage de la vitesse de l'eau et shock thermique.

Between 1970 and 1975 the fouling of the three thermoelectric power stations of ENEL in Liguria was examined both by means of the immersion of atoxic panels and by direct examination at the moment of the drying of the conduits.

The interest of the study derives, in particular, from the different ecological conditions in which the stations were sited and from the different antifouling systems used. The stations of Genoa (gas chlorination) and La Spezia (thermic shock) draw port water for their cooling systems whilst Vado Ligure (water velocity and hypochlorite) draws directly from the sea at 400 m from the shore. In the zone preceding chlorination in the Genoa station, the macrofouling is composed of Hydroids, Ctenostomata and Chilostomata Bryozoans, Serpulids, Barnacles, Ascidians, Bivalves and Anhipods but Mussels are dominant; after chlorination Serpulids are dominant, other organisms being scarce. In Vado L. the final community seems to be characterised by the dominance of Mussels and Barnacles in all conduits except those in which the water flows at a velocity of 2,5 m/s. A water velocity over 2 m/s is sufficient to prevent settlement only if the walls of conduits are perfectly smooth, without angles, protusions etc. In La Spezia the fouling outside differs greatly from that in the conduits where Mussels are practical

ly absent and in which Serpulids (S. concharum and H. elegans) and Barnacles are dominant. The greater seasonal differences in fouling were found outside the conduits on monthly panels: Hydroids, Barnacles, Serpulids, Bryozoans etc. were dominant. The maximum accumulation of fouling was found to be at that of Genoa both in terms of the monthly panels and the annual substrata. Furthermore, the fouling of Genoa differed netly in that there was massive presence of Z. verticillatum in the zones preceding chlorination and that Serpulids were strongly dominant in the zone subject to chlorination. At Genoa, Serpulids in the course of 1 year reach a thickness of 35 cm and a wet-weight up to 1165 g/dm². The fouling characteristic common to all three power stations is the presence of a rich population of T. mesembryanthemum for almost the entire year, especially on new substrata, as this species is favoured by the velocity of the water. Good prevention of fouling was not achieved by chlorination, probably because an intermittent system was used irregularly. In fact, tests carried out in our Laboratory show that the settlement of Serpulids is prevented by continuous chlorination which ensures 0,2-0,3 ppm of residual Cl₂, whilst 600 ppm would be theoretically necessary to kill 50% of the adults of H. elegans in 5-6 hrs. This explains the strong dominance of Serpulids (as is already known from literature) in sea water subjected to chlorination. The main effect of the thermal shock system used at La Spezia seems to be that of the elimination of Mussels from the conduits, whilst in the discharge conduits of Vado L., where more or less the same temperatures are obtained (but not intermittently) the Mussels settle and grow normally. Finally, the hot water of the power station may create zones which are suitable for the invasion of tropical species, as has happened with Balanus tintinnabulum at Vado L.
