TOWARDS CLEANER CREOSOTE

by

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High Temperature Creosote (HTC) used in the treatment of wooden transmission poles in Australia has been the subject of industrial complaints since its introduction in 1967. The complaints have been due mainly to soiling of clothing and equipment, and mild to severe skin sensitization from exposure to, or contact with, the creosote. These problems have led to the initiation of a program of research concerned primarily with investigations into the adverse characteristics of HTC and their elimination or mitigation. The programme is a joint research project being carried out by the Conservation and Biodegradation Section of the CSIRO Division of Chemical and Wood Technology in co-operation with Koppers Aust. Pty. Ltd. and the State Electricity Commission of Victoria.

Several components of creosote exude from treated wood and contribute to the formation of 'crud' on the surface of wood through their oxidation and/or polymerization. The complete removal of these components from creosote is both impractical and undesirable because: (i) the components are evenly distributed throughout the whole distillation range of creosote (ii) such 'crud'-forming components as diphenylene oxide, acenaphthene, fluorene and phenanthrene are highly fungitoxic and their removal will result in a reduction in the preservative efficacy of the creosote. It was decided, therefore, to develop a type of creosote in which the components remain permanently in the pole after treatment (i.e. 'crud'-free creosote), and which possesses characteristics of preservative efficacy and adequate penetrability.

The first such creosote, called Pigmented Emulsified Coloured Creosote (PECC), has been used to treat half-rounds of messmate in the CSIRO pilot scale impregnation plant. The results indicate that the penetration and retention of PECC compares favourably with those of HTC. Early treatments on a semi-commercial scale were equally promising, but, after a number of charges problems in penetration and distribution became evident and it was considered desirable to reformulate the PECC. Work in this direction led to the development of a 'super-stable' pigmented emulsified creosote, PEC 30. This stabilised formulation has been tested at extremes of temperature, under stress from acids and wood extractives, and in constant use during repeated vacuum-pressure impregnation cycles. The emulsion was found to be extremely stable under these conditions.

PEC 30 has been used in the treatment of quadrants of non-durable and 'royal' pole species at two temperatures, 60 C and 90 C, in comparison with standard HTC. Results have indicated that (i)

preservative retention and micro-distribution in the treated zone of PEC 30 and HTC are similar and that with both PEC 30 and HTC the retentions obtained at 60 C are not markedly different from those obtained at 90 C; (ii) wood treated with PEC 30 is cleaner, less oily and fumes less than HTC-treated wood; (iii) 'crudding' is less severe in wood treated with PEC 30 than that treated with HTC.

Laboratory bioassays have indicated that PEC 30 is as effective as HTC in protecting eucalypt blocks against decay; both PEC 30 and HTC were found to be superior in this respect than two low temperature creosotes which were tested at the same time. Further toxicity tests are underway in the CSIRO Accelerated Field Simulator

To date, some 140,000 litres of PEC 30 have been made and over 1000 full size poles have been treated to commercial loadings. In addition, 100 railway sleepers have been treated with PEC 30. Both poles and sleepers have pleasing clean surfaces and they will be installed in service and their performance closely monitored.

Future work on this project will consist of the assessment of variations in the physio-chemical properties of PEC 30 with continued use in vacuum/pressure impregnation schedules and toxicity tests in the CSIRO Accelerated Field Simulator of PEC 30 modified by the incorporation of insecticides and fungicides.