

Timber Mooring Pile Study after Nine Years Service

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Introduction

This trial was established in 1991 through the coordinated effort of the Queensland Port Authorities, Department of Transport and Forest Research Institute, Koppers Timber Preservation and CSIRO. It was set up in response to the conflicting performance results being experienced with treated timber in the sea where some treatments failed within five years while a few examples of others provided long service lives (Barnacle et al., 1986). This trial is unique, even by world standards, in that actual mooring piles rather than small specimens are compared. The mooring piles in trial are untreated turpentine (*Syncarpia glomulifera*) with bark on, PEC (pigment emulsified creosote) treated spotted gum (*Corymbia maculata*), CCA (copper chromium arsenic) treated spotted gum and slash pine (*Pinus elliottii*), and double treated (CCA+PEC) spotted gum, slash pine and blackbutt (*Eucalyptus pilularis*). Forty mooring piles were installed at each of three ports, and the latest inspection is after nine years exposure. Piles at Bundaberg and Cairns were inspected for marine borer attack in the tidal zone, with additional observations using underwater video. Full length inspection of the piles at Townsville occurred after they were pulled from the water. Most of the piles at Townsville have since been reinstated as fender piles.

Results

Results for the nine year inspection are provided in the table, and the key findings are:

- Marine borer attack was most severe at Townsville, and least at Bundaberg.
- *E. pilularis* and *C. maculata* piles treated with CCA and PEC (double treated) performed best, with no attack at Cairns and Bundaberg. At Townsville, nine of the 12 piles had light attack from *Sphaeroma* and *Martesia*.
- All PEC treated *C. maculata* and double treated *P. elliottii* piles at Townsville were attacked, but only lightly. Minor attack also occurred at Cairns, while at Bundaberg only one of the double treated *P. elliottii* piles was damaged by marine borers.
- CCA treated *P. elliottii* piles had most severe attack at Cairns and Townsville due to *Sphaeroma* in the tidal zone. Most piles had moderate *Sphaeroma* attack in the tidal zone, while in one pile at Cairns attack was heavier. Similar piles at Bundaberg were unattacked due to the apparent absence of *Sphaeroma*.
- CCA treated *C. maculata* piles mostly were in better condition than CCA treated *P. elliottii*, however, their condition was more variable. Some piles have moderate-heavy teredinid attack, which is of concern, because of the rapid rate at which these borers can destroy timber piles once established.
- All treated piles performed better than untreated turpentine piles.
- Teredinids were not found in any pile containing PEC.

The piles were given a performance rating on a scale from 0-4, where 4 is unattacked and 0 is destroyed. A score of 3.5 means light attack, 3 or 2.5 moderate or moderate-

heavy attack, and 2 means heavy attack and corresponds to the time when remedial action (such as placement of physical barriers) would be advised.

Table 1: Mean rating at each test site after nine years' exposure. L, S, T, M stands for *Limnoria*, *Sphaeroma*, teredinid and *Martesia* attack respectively.

Timber pile	Bundaberg	Townsville	Cairns
<i>C. maculata</i> CCA+PEC	4.0	3.7S, 3.7M	4.0
<i>E. pilularis</i> CCA+PEC	4.0	3.8S, 3.7M	4.0
<i>P. elliotii</i> CCA+PEC	3.9M	3.5S, 3.5M	3.5S
<i>P. elliotii</i> CCA	4.0	2.8S, 3.5M	2.7S, 3.9T
<i>C. maculata</i> CCA	3.8M, 3.9T	3.3S, 3.1M, 3.3T	3.4S, 3.8M, 3.3T
<i>C. maculata</i> PEC	4.0	3.5S, 3.5M	3.5S, 3.9M
<i>S. glomulifera</i> . Nil Treatment: Sapwood portion of piles	2.2M, 2.5T, 3.8L	0S, 0M	0.9S, 1.0M, 3.3T
Heartwood portion of <i>S.</i> <i>glomulifera</i> piles	3.3M	2.2S, 2.3M, 3.8T	2.9S, 3.0M,

This trial has revealed some pile types as inadequate for Queensland conditions. To make reliable distinctions between the other best four piling types (double treated *C. maculata*, double treated *E. pilularis*, double treated *P. elliotii*, and PEC treated *C. maculata*), continued monitoring is required. The results obtained will help develop H6 marine specifications located in Australian Standard 1604 Part 1. The piles are also being used as part of a long term study on the environmental fate of wood preservatives in the sea (Cookson et al., 1996).

References

- Barnacle, J.E., Cookson, L.J. and McEvoy, C.N. (1986). An appraisal of the vertical distribution of attack of untreated and treated wood by warm water sphaeromatids at some tropical sites - a discussion paper. Internat. Res. Group on Wood Pres. Document No. IRG/WP/4124.
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