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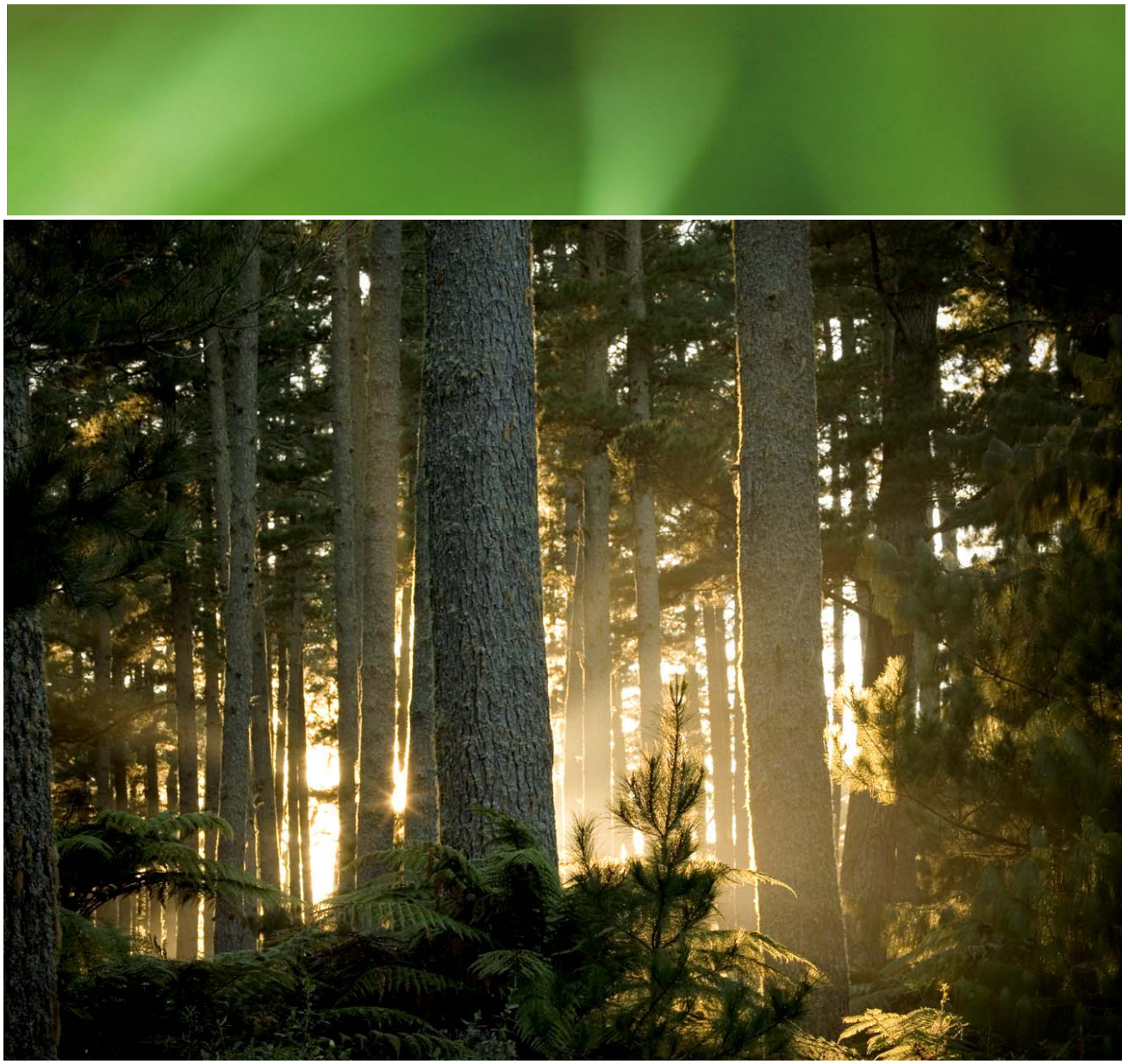
THIRD SIX-MONTHLY DEFLECTION TEST ASSESSMENT

Dave Page, Ian Simpson and Tripti Singh



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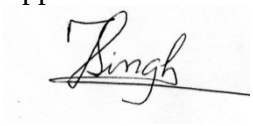

Project Leader

Date: April 2012

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After 137 weeks exposure the high moisture content (HMC) samples were assessed on 2nd -3rd April 2012 and the low moisture content (LMC) samples were assessed on 4th April (after 135 weeks exposure). The samples were removed from the tanks, weighed, measured and tested for deflection. The surfaces of each sample were tested with a blunt probe to assess the degree of damage done by decay fungi. Each sample was then given a decay rating according to the ASTM D 1758 decay rating system. Assessment results from HMC and LMC samples are summarised in Tables 1 and 2 respectively.

TABLE 1 – HIGH MOISTURE CONTENT SAMPLES CONDITION AFTER 108 and 137 WEEKS EXPOSURE

Treatment Group Code	After 108 weeks exposure			After 137 weeks exposure		
	Moisture Content %	Index of [1] Condition	Deflection (mm)	Moisture Content %	Index of [1] Condition	Deflection (mm)
C61H	43[2]	6.5 (1)[3]	3.04	34[1]	5.6 (3)[3]	3.70
C62H	32[2]	6.5 (1)	2.94	23[1]	5.6 (2)	3.67
C63H	41	7.6	2.31	38[1]	7.0 (1)	2.65
C64H	39	7.8	2.22	40	7.9	2.28
B61H	31[2]	6.5	2.92	25[1]	6.1	3.28
B62H	35	8.0	2.40	32	7.9	2.44
B63H	37	8.2	2.16	32	8.4	2.24
B64H	49	8.1	2.24	45	8.3	2.22
C31H	44[2]	6.9	2.93	34[1]	5.7 (3)	3.93
C32H	34[2]	6.3	3.06	25[1]	5.5 (2)	3.92
C33H	42	7.8	2.64	37	7.4	2.97
C34H	37	8.3	2.46	30[1]	7.3 (1)	2.84
B31H	29[2]	6.0	3.62	24[1]	5.6 (1)	3.79
B32H	36	8.5	2.32	35	8.7	2.37
B33H	38	9.2	2.32	36	9.6	2.35
B34H	42	8.9	2.19	39	9.2	2.22
B3H[4]	52	10.0	3.88	47	10.0	4.00
U3H	31[2]	5.1 (4)	4.11	26[1]	3.6 (9)	5.42
UMH	37	8.5	2.39	32[1]	7.8 (1)	2.71

[1] Index of Condition is the average decay rating for all of the samples in a group.
[2] Extensive decay in some samples from this group reduced their weight, therefore moisture content calculations based on weight are likely to be inaccurate.
[3] Figures in parenthesis are the number of samples that have failed in that group.
[4] This group was framing grade timber, all other groups were clears grade sapwood.

TABLE 2 – LOW MOISTURE CONTENT SAMPLES
CONDITION AFTER 107 and 135 WEEKS EXPOSURE

Treatment Group Code	After 107 weeks exposure			After 135 weeks exposure		
	Moisture Content %	Index of [1] Condition	Deflection (mm)	Moisture Content %	Index of [1] Condition	Deflection (mm)
C62L[2]	21	5.4 (2)[3]	3.75	20	5.0 (3)[3]	4.21
C64L[2]	23	7.3	2.52	21	7.1	2.64
B62L	25	7.5	2.61	25	7.3	2.76
B64L	31	8.0	2.39	31	8.1	2.43
C32L[2]	22	7.3	3.15	20	5.8 (1)	3.29
C34L	25	8.0	2.21	25	7.9	2.31
B32L	27	8.1	2.18	28	8.2	2.21
B34L	32	8.4	2.39	30	8.6	2.39
B3L[4]	34	10.0	3.84	36	10.0	4.01
U3L[2]	22	5.0 (3)	4.21	21	4.6 (3)	4.24
UML[2]	25	8.1 (1)	2.99	26	7.7 (1)	3.09

[1] Index of Condition is the average decay rating for all of the samples in a group.
[2] Decay in a few samples in this group reduced their weight and calculated moisture content.
[3] Figures in parenthesis are the number of samples that have failed in that group.
[4] This group was framing grade timber, all other groups were clears grade sapwood.

After assessment the samples were returned to their original position in the stacks. The HMC samples were lightly sprayed with water when they were re-installed but the LMC samples were not.

The moisture content of relatively sound samples in the HMC groups remained largely unchanged through the 108-137week exposure period. Most of the samples remain slightly above fibre saturation point but a few samples in the upper layer of each tank were much wetter due to condensation dripping from the top of the tank. Similarly, the moisture content of sound LMC samples remained similar to that of the previous assessment. A few samples in the lower layers of the stack appeared wetter but most of these contained significant decay.

Fresh decay mycelium was widespread through the three HMC tanks containing samples treated with copper naphthenate. This was spreading on both treated and untreated surfaces, particularly on wetter samples in the upper layers and on sample ends that had been wet by condensation drips. In the HMC tanks containing boron treated samples there were occasional patches of fresh mycelium on untreated samples and on samples that had only been treated on one edge. On decaying samples that had been treated on one or both edges there was a distinct strip of “decay free” wood between the obviously decaying wood and the edges that had been treated.

The decay fungus used to infect the LMC samples, *Gloeophyllum sepiarium*, has produced very little mycelium on the surfaces of the samples hence the first indication of decay development is colour changes in the wood or the appearance of fruiting bodies on the surface.

A further seventeen samples from the HMC tanks failed during deflection testing. Six of these were untreated samples including one that had not been pre-infected but eight were from groups that had been treated with copper naphthenate on one or two edges. Only one sample from the boron treated groups has failed so far and that was treated on one edge only. In the LMC stack two further samples failed, both treated with copper naphthenate on two edges.

In the HMC tanks the largest increases in decay and deflection, apart from the untreated controls, have occurred in the copper naphthenate treated samples, particularly those treated on one or two edges. A few samples treated on three or four sides with copper naphthenate or on one edge with boron have also deteriorated enough to increase average decay ratings and deflection for those groups.

In the LMC stack, the copper naphthenate groups treated on two edges show substantial decay rating changes but the only major deflection change was in the group that had been pre-decayed for eight weeks before being treated on two edges. In the group that had been pre-decayed for eight weeks and treated on four sides with copper naphthenate, six samples contained internal decay which was located by probing the ends but was not obvious on other sample surfaces.

Copper naphthenate treated samples are continuing to deteriorate more rapidly than boron treated samples. Although deflection in samples treated with copper naphthenate on four sides has not increased greatly the spread of mycelium on treated surfaces and the failure of a sample in one group indicates that more rapid deterioration is likely. For boron treated samples those treated on one edge show increases in decay and deflection but those treated on two or three surfaces remain largely unchanged, although they often contain obvious decay. The boron H1.2 treated comparative samples and samples coated on four sides with boron remain largely unchanged.