A Method for Studying Boron Redistribution and Leaching in Timber Framing

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Some history

- From 1950's pine framing was required to be treated to prevent risk from wood borer
- Boron treatment was dominant
- Any fungicidal benefit was not recognized in the preservative specification
- From mid 1990's there was an industry move to dry untreated framing
- By 1998 -99 concerns being raised about evidence of decay in buildings

Some history cont'd

- From 2001-2003 various reviews and changes were being implemented
- H1Plus treatments for framing (permethrin & iodocarb)
- December 2003; new Standards published [NZS3640, NZS3602] and Hazard Class 1.2 recognised
- H1.2 and H3.1 treatments for timber framing in different applications from 2004 - 2011
- March 14th 2011 , the Department of Building & Housing announced H1.2 as single framing hazard classes & all framing (external& internal walls) & roof trusses to be treated


FOR SALE
Spaceline

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Selection of timber

Commercial production

Kiln dried, machined, stress graded

Selected for high proportion of sapwood and minimal defects (knots)

Preservative treatment

- Disodium octaborate tetrahydrate dissolved in water
- Low uptake (target 70 L/m^3) Lowry schedule
- Target retentions in timber framing:
  - 0.40% m/m boric acid equivalent (BAE) on oven dry wt; ~1.6 kg/m^3 NZ Hazard Class 1.2
  - 0.80% m/m BAE

    ~3.2 kg/m^3 NZ Hazard Class 3.1 (painted product)

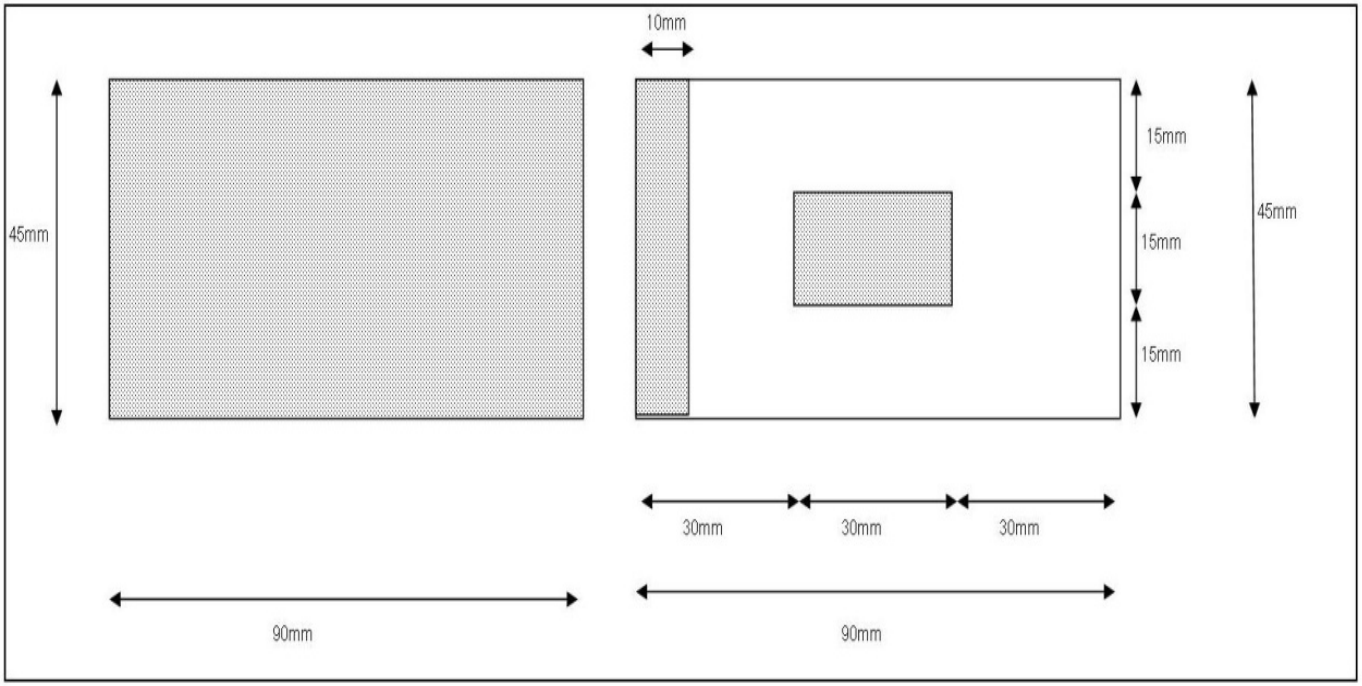
Wetting apparatus

100 g water/1 metre

Every 4 days

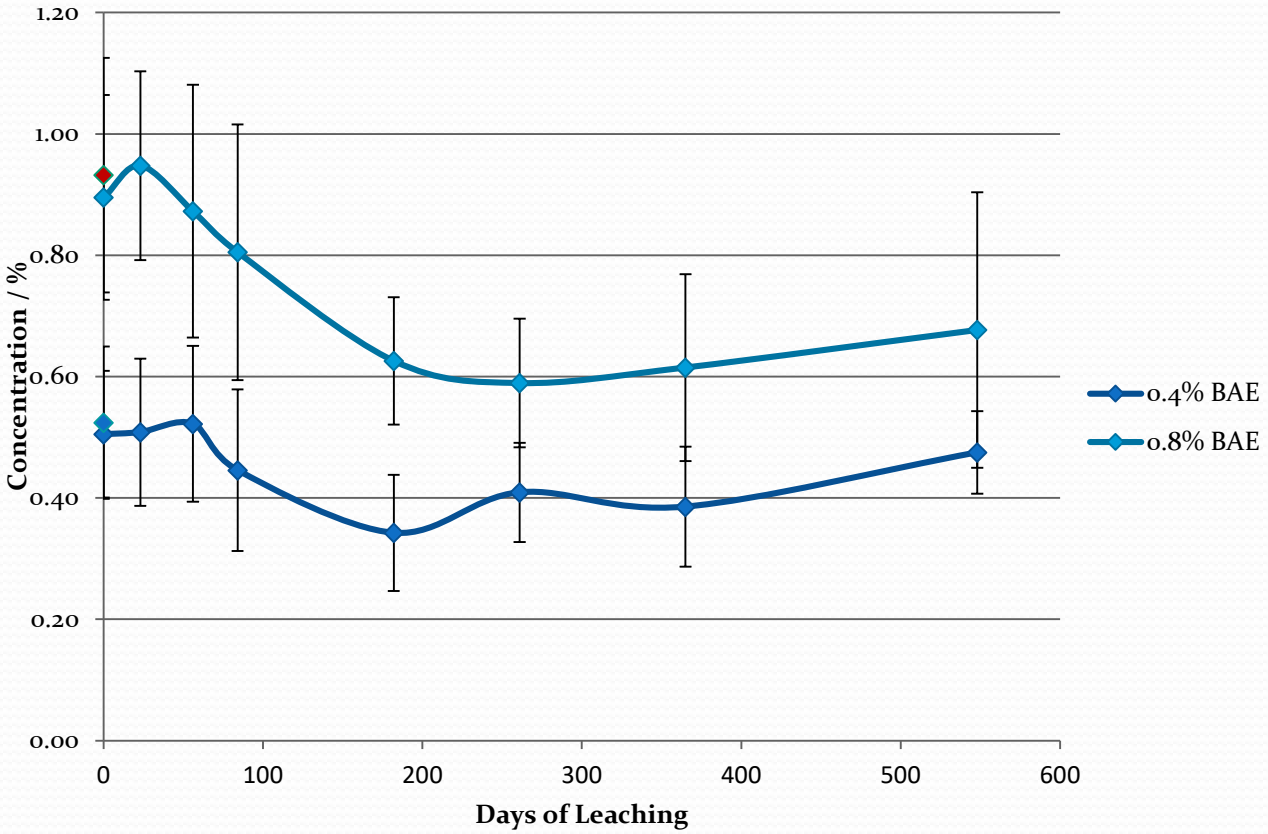
Sampling at 1,2,3,6,9,12 & 18 months

Moisture content and BAE concentrations (cross-section, central 1/9th core, surface zone)

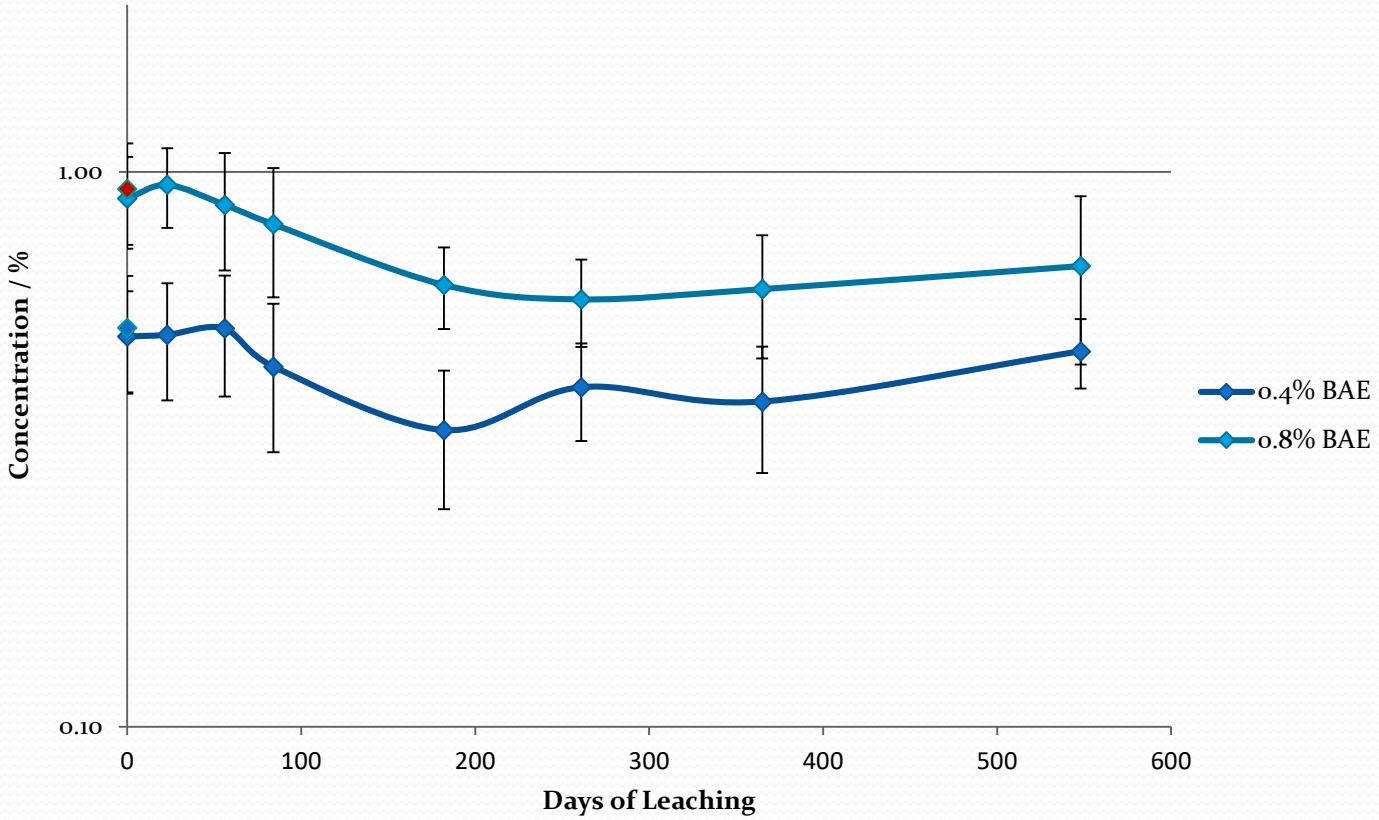

10mm
45mm
15mm
15mm
15mm
45mm
30mm
30mm
30mm
90mm
90mm

Overall average % moisture content (and % moisture content range)

Days exposed	Cross-section	Central 1/9th core	Surface (edge)
0	9.9 [9.2 – 10.7]	8.9 [7.8 – 9.3]	8.8 [8.1 – 9.1]
23	23.1 [15.1 – 29.6]	14.7 [12.6 – 19.8]	21.3 [15.0 – 26.6]
56	38.4 [29.5 – 45.7]	22.0 [17.0 – 36.6]	39.4 [25.7 – 50.7]
84	46.7 [37.3 – 53.4]	26.8 [14.3 – 38.9]	45.4 [40.9 – 55.0]
182	50.9 [44.2 – 55.8]	38.6 [24.4 – 47.2]	54.7 [51.3 – 61.3]
261	48.5 [38.8 – 57.0]	34.6 [21.5 – 56.4]	55.4 [47.1 – 63.3]
365	52.4 [42.9 – 60.7]	39.2 [21.5 – 56.4]	58.3 [54.1 – 62.7]
548	55.0 [43.4 – 67.5]	40.7 [22.3 – 66.4]	59.6 [55.4 – 67.1]



Comparison of 0.40% m/m BAE (H1.2) and 0.80% m/m BAE (H3.1)results



Comparison of 0.40% m/m BAE (H1.2) and 0.80% m/m BAE (H3.1) using a log scale (for BAE concentration)

Conclusions

- Methodology was able to simulate a leak event
  - leaching could occur
  - the moisture content increased
  - moisture level would be suitable for decay to develop
- Boron redistributed within the timber cross-section
- Losses from surface zone where water applied to edge
- Overall, a BAE loss of approximately 30% from cross-section over the first 6-8 months of the testing then the BAE levels levelled off

Acknowledgements

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