FIELD TESTING OF WOOD PRESERVATIVES IN CANADA
II. COMMODITY TESTING AT KINCARDINE TERMITE TEST PLOT

Edward E. Doyle
Research Scientist
Forintek Canada Corp., Ottawa, Ontario

Summary

As part of the eastern field testing program, Forintek Canada Corp. established the first Canadian termite test plot at Kincardine, Ontario in 1988 to address an industry need for performance data on treated wood commodities exposed to attack by the eastern subterranean termite. CCA-C and ACA treated red pine, jack pine, lodgepole pine, eastern spruce and SPF lumber of various dimensions was obtained directly from the wood treating industries or purchased from retail outlets for installation in the test plot. The material represented a wide range of treatment penetrations and assay retentions. After four years in service, the performance of untreated controls shows a continuing high level of termite activity in the main plot area, but a lower level in an annex area. A fairly high incidence of surface grazing was observed on much of the CCA-C treated lumber in the main plot. Although this superficial attack resulted in only cosmetic damage in most cases, there were a number of test pieces in which termites had clearly broken through the treated zone and were attacking untreated wood within the treated shell. Since most of this attack was found on non-incised CCA-C treated lumber with very shallow preservative penetration, this material was considered to be vulnerable to termite attack. Incised CCA-C treated and non-incised ACA treated lumber which came closer to meeting the CSA080 standard for ground contact applications continued to perform well and was considered to be resistant to termite attack. Copper naphthenate field cut preservative was also found to provide good protection against termite attack.

Introduction

The Eastern subterranean termite, *Reticulitermes flavipes* (Kollar), is one of the most widespread and destructive termite species in North America, and is the only species to gain a significant foothold in Canada. The range of *Reticulitermes flavipes* is at present limited mainly to southwestern Ontario and parts of southern British Columbia. In Ontario, the initial

infestation was reported as early as 1929 in Point Pelee National Park. Since that time, the termites have spread through much of this area, with communities such as Windsor, Kincardine, Oxley and Guelph reporting some degree of infestation (1). Metropolitan Toronto, where termite activity was first reported in 1938 in the vicinity of the waterfront, has become the site of a major urban infestation. From the initial infested area, the termites have gradually spread through much of the southeast part of city, with isolated occurrences also being reported in the north and west sections (2).

As the termite infestation in Ontario continued to spread, property losses resulting from termite attack continued to grow, and in 1983, termite related losses were approaching $1.3 million annually in Toronto alone (2). Furthermore, these estimated losses did not take into account additional probable losses resulting from depreciated real estate values in areas of heavy termite infestation. In order to reduce these losses, the City of Toronto initiated a termite control program in 1965 which provided grants to homeowners to cover costs associated with the application of appropriate termite control measures. These measures included the chemical treatment of soil around homes as well as the elimination of wood/soil contact.

While both the Ontario Building Code and the National Building Code of Canada allow the use of preservative treated wood in areas of known termite activity for applications such as porch supports, below grade window frames, wood steps, etc., there was growing reluctance on the part of some municipal building inspectors, particularly in Toronto, to accept pressure treated wood as an acceptable means of eliminating wood/soil contact. As outlined in a brief presented to CWPA in 1984, these officials were concerned with the possible failure of builders to adequately protect the cut ends of treated wood with an acceptable field cut preservative as well as with the poor quality of much of the treated wood that they were finding on the market. These concerns were further compounded by a lack of field test performance data for treated wood commodities in termite infested areas. Because of these concerns, the Buildings and Inspections Department of the City of Toronto stated that "use of pressure treated wood is probably not an effective safeguard against termites" and recommended against its use in the city's termite control program until the problems and concerns relating to its use could be resolved (2).

In order to address these concerns and ensure the continued growth of markets for treated wood products in the termite infested areas of southern Ontario, the wood treating industry considered it necessary to demonstrate to these building department officials that wood

treated to the requirements of the CSA-080.2 standard (3) could provide effective termite resistance. At the request of the industry, Forintek Canada Corp. agreed to establish the test plot and generate the required commodity performance data. Results relating to the evaluation of potential test sites in Toronto, East York and Guelph for termite activity during the period 1985-86 have been previously reported (4,5). This paper describes the actual establishment of the test plot in Kincardine and summarizes the
performance results for the test material after four years of exposure testing.

Materials and Methods

Most of the material for installation in the test plot was provided by various wood treating plants in Canada following a request to the Technical Advisory Committee of the Canadian Institute of Treated Wood. This material consisted of various sized commodities (2"x4", 2"x6", 4"x4", 6"x6") of four species (jack pine, red pine, lodgepole pine and eastern white spruce) treated with either chromated copper arsenate (CCA-C) or ammoniacal copper arsenate (ACA) preservatives to the requirements of the CSA-080.2 standard (3) for ground contact applications. These requirements are 6.4 kg/m^3 assay retention and 10 mm penetration for lumber less than 114 mm in thickness. Incised as well as non-incised lumber was included. Samples of hem fir plywood treated with CCA-C to the requirements of the CSA-080.15 standard (6) and one lot of hemlock (2"x6") treated with an experimental ammoniacal copper/quaternary ammonium compound (ACQ) preservative were also included.

In addition to the material provided by the industry specifically for this purpose, additional pieces of CCA-C treated lumber (2"x4", 2"x6", 4"x4", 6"x6") were purchased at local lumber retailers to represent material that is currently available to the consumer. This material, which is often referred to as "pressure treated pine" by the retailers, had no indication as to whether it was treated to an above ground (4.0 kg/m^3) or ground contact (6.4 kg/m^3) specification. Generally found to be a mixture of jack pine, lodgepole pine, balsam fir and spruce, this material is referred to as spruce-pine-fir (SPF) in the report. None of this particular material was incised. Untreated controls consisted of red pine,jack pine and SPF (2"x3", 2"x4") and hemfir plywood.

Test specimens measuring 3.0 ft. (.91 m) in length were cut from each piece of treated lumber for actual installation in the test plot. The remaining length of lumber was then cut to provide both a 1.0 ft. (30.5 cm) assay section and a 4.0 ft. (1.22 m) end matched piece for installation

in the Petawawa field test plot.

Cores were removed from the assay section for treatment penetration and assay retention determinations. Treatment penetrations were measured after splitting the cores longitudinally and spraying with chrome azurol solution to stain the treated zones. For determination of assay retention, assay zones specified in the CSA-080.2 standard (3) were cut from each core, combined for each lot and then ground to 40 mesh in a Wiley mill. The resulting powders were analyzed for copper, chromium and arsenic by energy dispersive X-ray spectometry. Results are reported on an oxide basis.

The cut end of each piece of lumber intended for installation in the test plot was given a double brush coating of commercial copper naphthenate field cut preservative containing 2% copper. Each piece was identified with an appropriate lot and sample number. The lumber was installed in randomized order in an upright position approximately 18" (0.46 m) into the soil. A spacing of 24" (0.60 m) between rows and approximately 18" (0.46 m) between samples was used. Half of the pieces in each lot were installed with the pressure treated ends down while the remaining samples were placed with the cut ends down.

A complete description of all test material installed is given in Table 1, along with average assay retentions and treatment penetration data. The treatment penetration data given in the table includes the average penetration depth as well as the percentage of the core samples meeting either the proposed CITW PS1 provisional standard for decking (7), which specifies that 80% of the core samples from a lot or charge equal or exceed 5 mm penetration, or the CSA-080.2 standard (3) which requires that 80% of the core samples equal or exceed 10 mm penetration (or 13 mm for commodities with dimensions greater than 114 mm).

In a separate experiment, several additional samples were placed in test in order to evaluate the effectiveness of commercial copper naphthenate field cut preservative in protecting untreated wood from termite attack. This material consisted of bundles of untreated red pine sapwood stakes (3/4"x3/4"x10") in which half of the stakes in each bundle had been given a double brush coating of copper naphthenate. These test bundles were subsequently buried in the ground at various locations around the test plot area.

All test material has been rated annually for signs of termite attack. During this inspection, each piece is carefully removed from the ground, examined and then assigned a grading using a scale of 0-4 as recommended by the International Union of Forestry Research Organizations

(IUFRO). Ratings were however reported using the AWPA recommended scale of 0-10, as defined in the AWPA M7-83 standard (8), in order to permit direct comparison with other North American test data. A comparison of the rating systems is given in Table 2.

Although no attempt was made to rate the material for deterioration caused by fungi, the presence of such deterioration was noted in the records when encountered. All ratings were subsequently entered into Forintek's field test data base.

Results and Discussion

A high level of termite activity at Kincardine was confirmed by the bait stake technique used to evaluate the area in the summer of 1987. The results of this evaluation have been previously reported (9). Historically, termite activity at Kincardine was reported as early as 1954, when specimens were collected from beneath a rubbish pile adjacent to the railway tracks (10). The extent of the infestation in Kincardine was mapped in 1968 and the results of this investigation showed that the infestation was confined to an area south of the Penetangore River (11). The termite distribution map resulting from this study is shown in Figure 1 along with the location chosen for the test plot. The actual site is situated in a fenced area occupied by a Ministry of the Environment sewage outfall plant. Permission to use this area as a test plot was granted to Forintek Canada Corp. by Kincardine Town Council in 1987.

An examination of data in Table 1 reveals that, based on the results of the in-house analyses, there is a very wide range of treatment penetrations and assay retentions in the test material. In fact, only about one quarter of the industry supplied CCA-C and ACA treated lumber and none of the randomly selected CCA-C treated material actually met the assay requirement of the standard for ground contact use. In terms of meeting the above ground specification, the rate of compliance rises to 50% for the industry supplied material and 36% for the random selections. Results for treatment penetrations were similar, and very few of the test lots actually met the 10 mm penetration requirement specified in the standard for ground contact applications. In terms of meeting the PS1 provisional standard for decking (7), which requires a 5 mm penetration, approximately 30% of the test lots were found to comply. In general, most of the industry supplied material, including the lodgepole, jack and red pine samples, appeared to be well treated, while the randomly selected material from the local lumber yards and the spruce supplied by the industry appeared to be sub-standard. It should be noted, however, that less than the twenty cores actually specified in the standard were used to

determine the assay retentions and treatment penetrations for most of the test lots. Nevertheless, the low assay values and poor penetrations found should be cause of some concern, and may become an important factor in terms of the long term performance of this material.

The initial batch of test material (lot numbers 4245-4280) was installed in the main plot area in August 1988. This material included all of the CCA-C treated lodgepole pine, hemfir plywood and random selections (SPF), ACA treated red pine and jack pine, ACQ treated hemlock and untreated controls. Examination of untreated controls after three months confirmed the high level of activity observed earlier, with over 40% showing varying degrees of attack. In order to accommodate additional material supplied by the wood treating industry following the initial installation, a request was made to Kincardine Town Council to increase the size of the plot by adding additional fencing on one side of the original compound to create an "annex" area. This request was granted and the remaining test material (lot numbers 4283-4307), including the CCA-C treated jack pine, red pine and spruce, was installed in May 1989.

Performance results after approximately four years of exposure are shown in Table 1 as average AWPA ratings for each test lot. The results for untreated controls confirmed a continuing high level of activity in the main plot area and all of this material showed fairly advanced attack, characterized by extensive surface feeding and internal tunnelling. Average AWPA ratings of 4.2, 3.0, 4.8 and 3.8 were recorded for hemfir plywood, red pine, jack pine and SPF samples respectively. Similar controls installed in the annex area in 1989 were showing a much lower incidence of attack compared to the controls in the main plot. Approximately 40% of this material now showed signs of attack, and average AWPA ratings were 9.6 for red pine and 7.7 for SPF. It is suspected that the lower level of activity observed in the annex area is due to the fact that fairly extensive backfilling and grading was carried out in this area during installation of the fencing. This activity may have disrupted established termite foraging patterns in the area which will require some time to re-establish. Unfortunately, this observed difference in activity levels will complicate the interpretation and comparison of performance results between commodities in test.

Although most of the treated material in test is performing very well to date, there are signs of surface grazing on some of the CCA-C treated samples. This surface grazing, which consisted of shallow grooves approximately 1 mm in depth on the wood surface where termites had been feeding, was observed on almost 25% of the CCA-C treated samples in the main plot area. This material consisted largely of the random selections of treated SPF and the treated lodgepole pine. For example, almost every lot of CCA-C treated SPF (lot numbers 4256-

4266, 4274) had some evidence of surface grazing, with the percentage of pieces in the various lots showing attack ranging from 0-90%. Although this attack was superficial in most cases and resulted only in cosmetic damage at this time, test pieces exhibiting it were rated as "1" on the IUFRO scale (trace of attack). As a result, average AWPA ratings for this group of material ranged from 8.7-10, as shown in the table. All of this material was non-incised, and although the average assay retentions ranged from 0.5-6.1 kg/m^3 and average treatment penetrations from 1.0-11.3mm, most of it did not appear to be very well treated. For example, there were only two out of the twelve test lots that met a 5mm penetration requirement.

In at least six of the affected boards, termites had clearly penetrated the treated zone and were feeding on the untreated wood in the interior. The entry holes that were made were found in areas where the treatment penetration appeared to be minimal, and were usually found in areas where there was evidence of surface grazing. It thus appeared that by grazing on the surface, the termites were probing for weak spots in the treated shell where they could gain entry. In several cases, these entry holes were located in checks. Where such entry was observed, a IUFRO rating of "2" (moderate attack) was assigned to the test piece. These results after only four years in service clearly show that non-incised, substandard CCA-C treated lumber is vulnerable to termite attack.

Non-incised CCA-C treated lodgepole pine also showed extensive surface grazing, with over 50% of the test pieces showing evidence of attack. Again, this particular material appeared to be mostly substandard, with average assay retentions ranging from 1.7-5.4 kg/m^3 and average treatment penetrations ranging from 3.0-7.0 mm. In at least two pieces, termites had broken through the treated zone. Average AWPA ratings for this material ranged from 9.1-9.5. Incised CCA-C treated lodgepole pine was definitely outperforming the non-incised material, and showed little evidence of attack to date. Average AWPA ratings ranged from 9.9-10.

Other treated material installed in the main plot area included the CCA-C treated hemfir plywood, ACA treated red pine and jack pine and ACQ treated hemlock. All of this material was performing very well, with little evidence of even superficial attack. Except for one lot (#4267) with an average retention of 10.1 kg/m^3, most of the ACA treated material appeared to be substandard in terms of retention. These values ranged from 3.1-6.2 kg/m^3. However, all of the material had good treatment penetration, typical of ammoniacal based preservatives, with average treatment depths ranging from 5.2-15.0 mm. An average AWPA rating of 10.0 was assigned to all ACA treated test lots, except for one lot that was rated 9.9. Both the ACQ

treated hemlock and CCA-C treated plywood were well treated and had performance ratings of 10.0 and 9.9 respectively. None of the ACA and ACQ treated material was incised.

All of the CCA-C treated red pine, jack pine and spruce that were treated by the industry for this project was installed in the annex area where the level of termite activity was lower than in the main plot area. As a result, most of this material was seen to be performing well to date, although there were isolated occurrences of surface grazing by termites. For example, two lots of red pine, #4290 (4" x 4", non-incised) and #4288 (2" x 4", fine tooth incised), showed some signs of attack and had average AWPA ratings of 9.6 and 9.7 respectively. All of the rest of the material in this plot area, including the spruce which appeared substandard in terms of both assay retention and penetration, had average AWPA ratings of 9.9-10.0. As already mentioned, comparisons between the performances of this material with that of the material in the main plot area will be difficult until a similar level of termite activity is observed on the untreated controls.

Finally, no termite attack has been observed on the below ground cut ends of the test material that have been protected with copper naphthenate field cut preservative. In addition, no attack or even surface grazing has yet been observed on the red pine sapwood stakes that were protected by brush coating with copper naphthenate, although untreated stakes in the same bundles showed progressively advanced termite attack and destruction over the last four years. The almost complete lack of attack to date on these stakes may be attributable to the animal repellant characteristics of the naphthenate compounds, and this protection might be expected to continue until the concentration of naphthenates near the wood surface have been significantly reduced through leaching.

Conclusions

Based on the results of four years of observation, the following preliminary conclusions might be made at this time:

The Kincardine test plot has shown a continued high level of subterranean termite activity in the main plot area since it was established four years ago, making it an excellent site for evaluating the termite resistance of treated commodities.

Non-incised, CCA-C treated lumber with very shallow preservative penetration showed a

significant amount of surface grazing by termites. In a number of cases, termites were observed to have broken through the treated zone and were actively feeding on the untreated wood within the interior. Such material was considered to be vulnerable to termite attack.

Incised CCA-C treated lumber, which came closer to meeting the CSA-080.2 standard for ground contact application, remained generally sound. This material was considered to be resistant to termite attack.

Non-incised ACA and ACQ treated lumber which showed good preservative penetration appeared to be very resistant to attack.

Copper naphthenate field cut preservative has been very effective to date in providing termite resistance to untreated wood and cut ends of treated wood.

Acknowledgements

The author wishes to thank the Kincardine Town Council and G.O.Anderson, Chief Building Inspector, Town of Kincardine, for their interest and assistance in this project and for providing use of the test site. He also wishes to thank the Canadian Institute of Treated Wood, Domtar Inc.(Wood Preserving Division), Timber Specialties Ltd. and Hickson Building Products Ltd. for providing the test material and Forestry Canada for financial support. Special thanks also to Dr.J.K.Grace, formerly of the University of Toronto, for assisting in the initial evaluation of the test site, and to B.Spicer, R.Dubois and J.Doyle for technical assistance.

References

1. Kirby,C.S. 1967. Termites in Ontario, with Particular Reference to the Toronto Region, Information Report O-X-56, Forest Research Laboratory, Ontario region, Sault Ste. Marie, Ontario.

2. McLaughlin,S.G. 1983. Termites in Toronto. A Review and Evaluation of Toronto's Termite Control Program, City of Toronto Planning and Development Dept., Toronto, Ontario.

3. Canadian Standards Association. CSA-080.2-M89. 1989. Preservative Treatment of Lumber, Timber, Bridge Ties and Mine Ties by Pressure Processes. CAN/CSA-080 Series M89. CSA, Rexdale, Ontario.

4. Doyle,E. 1986. Establishment of a Termite Test Plot for Treated Wood in Ontario: Part I - Site Selection and Evaluation. Report to the Canadian Forestry Service. Forintek Canada Corp., Ottawa, Ontario.

5. Doyle,E. 1987. Establishment of a Termite Test Plot for Treated Wood in Ontario: Part II - Site Selection and Evaluation. Report to the Canadian Forestry Service. Forintek Canada Corp., Ottawa, Ontario.

6. Canadian Standards Association. CSA-080.15-M89. 1989. Preservative Treatment of Wood for Building Foundation Systems, Basements and Crawl Spaces by Pressure Processes. CAN/CSA-080 Series M89, Wood Preservation, CSA, Rexdale, Ontario

7. Canadian Institute of Treated Wood. 1988. CITW Interim Standard PS1. Preservative Treatment of Dimension Lumber 2 inch Nominal Thickness for Above Ground Residential Use. Canadian Institute of Treated Wood, Ottawa, Ontario.

8. American Wood Preservers Association. 1983. M7-83 Standard Method of Testing Wood Preservatives by Field Tests with Stakes. AWPA Standards. AWPA, Washington, D.C.

9. Doyle, E. 1988. Establishment of a Termite Test Plot for Treated Wood in Ontario: Part III - Site Selection and Evaluation. Report to the Canadian Forestry Service. Forintek Canada Corp., Ottawa, Ontario.

10. Urquhart,F.A. 1954. A New Locality for the Termite in Ontario, Can. Ent. 86:576.

11. Gray, D.E. 1969. *Lenzites Trabea* - Invaded Wood Used as a Subterranean Termite Survey Tool in Ontario, BWPA Termite Symposium Proceedings, British Wood Preserving Association, London, England. 117-126.

TABLE 1

PERFORMANCE OF DIMENSIONAL LUMBER IN SERVICE AT
KINCARDINE TERMITE TEST PLOT

LOT #	COMMODITY DESCRIPT.[1]	SPECIES[2]	NO. IN TEST	AVG. ASSAY RETENTION KG/M[3]	AVG. TRT. DEPTH, MM (STD DEV)	% OF CORES WITH PENETRATIONS >5MM	% OF CORES WITH PENETRATIONS >10MM[3]	AVG. AWPA RATING
UNTREATED CONTROLS								
4245	PLYWOOD 5/8"X6"	HEMFIR	6					4.2
4254	2 X 4	RP	16					3.0
4255	2 X 3	JP	20					4.8
4280	2 X 4	SPF	6					3.8
4307P	2 X 4	RP	10					9.6
4307S	2 X 4, 2 x 3	SPF	20					7.7
CCA-C TREATED LUMBER								
4256[4]	2 X 4,NON-INCISED	SPF	6	0.9	2.3(2.3)	33	0	9.3
4257	2 X 4,NON-INCISED	SPF	6	1.8	3.7(2.9)	33	0	9.5
4258	2 X 4,NON-INCISED	SPF	6	5.9	11.3(4.2)	100	67	10.0
4259	2 X 6,NON-INCISED	SPF	4	4.4	7.0(7.1)	50	50	9.7
4260	2 X 6,NON-INCISED	SPF	4	0.9	2.0(0.0)	0	0	9.5
4261	2 X 6,NON-INCISED	SPF	4	1.1	3.5(0.7)	0	0	9.8

LOT #	COMMODITY DESCRIPT.[1]	SPECIES[2]	NO. IN TEST	AVG. ASSAY RETENTION KG/M[3]	AVG. TRT. DEPTH, MM (STD DEV)	% OF CORES WITH PENETRATIONS >5MM	% OF CORES WITH PENETRATIONS >10MM[3]	AVG. AWPA RATING
4262	4 X 4,NON-INCISED	SPF	4	1.5	8.5(0.7)	100	0	9.3
4263	4 X 4,NON-INCISED	SPF	6	0.5	1.0(0.0)	0	0	9.3
4264	4 X 4,NON-INCISED	SPF	6	6.1	9.7(4.9)	67	67	9.7
4265	6 X 6,NON-INCISED	SPF	4	5.9	4.0(0.0)	0	0	9.0
4266	6 X 6,NON-INCISED	SPF	4	N/A[5]	N/A	N/A	N/A	9.0
4274[6]	2 X 6,NON-INCISED	SPF	10	0.9	3.2(1.8)	20	0	8.7
4275	2 X 4,NON-INCISED	LPP	10	1.7	3.0(2.9)	20	0	9.5
4276	2 X 6,NON-INCISED	LPP	10	5.4	7.0(6.9)	40	40	9.1
4277	4 X 4,NON-INCISED	LPP	10	1.8	3.4(3.9)	20	20	9.2
4278	4 X 4,INCISED 6MM	LPP	10	5.9	10.0(4.7)	100	40	9.9
4279	4 X 4,INCISED 13MM	LPP	10	4.7	10.0(1.9)	100	80	10.0
4286	2 X 4,NON-INCISED	JP	10	4.8	7.4(5.2)	60	20	9.9
4285	2 X 6,NON-INCISED	JP	10	4.2	4.7(5.0)	30	20	10.0
4283	6 x 6,INCISED	JP	10	6.8	8.8(4.2)	90	20	10.0
4284	2 X 6,FINE TOOTH INCISED	JP	10	3.6	7.7(4.6)	60	40	10.0

LOT #	COMMODITY DESCRIPT.[1]	SPECIES[2]	NO. IN TEST	AVG. ASSAY RETENTION KG/M^3	AVG. TRT. DEPTH, MM (STD DEV)	% OF CORES WITH PENETRATIONS >5MM	>10MM[3]	AVG. AWPA RATING
4287	6 X 6,INCISED	RP	10	9.7	14.8(2.0)	100	90	10.0
4288	2 X 4,FINE TOOTH INCISED	RP	10	3.5	6.3(5.3)	50	20	9.7
4289	4 X 4,FINE TOOTH INCISED	RP	10	10.0	13.5(4.5)	100	80	9.9
4290	4 X 4,NON-INCISED	RP	10	10.1	13.3(3.9)	90	90	9.6
4291	4 X 4,INCISED	RP	10	10.8	14.2(3.3)	100	80	10.0
4292	2 X 4,NON-INCISED	RP	10	2.9	6.8(6.8)	80	0	10.0
4293	2 X 4,NON-INCISED	S	10	1.8	2.6(2.7)	10	10	10.0
4294	2 X 6,NON-INCISED	S	10	1.2	2.9(4.3)	10	10	10.0
4295	4 X 4,NON-INCISED	S	10	1.9	2.0(1.5)	10	0	9.9
4296	4 X 4,INCISED 6MM	S	10	2.7	1.3(0.9)	0	0	9.9
4297	4 X 4,INCISED 13MM	S	10	2.8	1.7(1.3)	10	0	10.0
4298	6 X 6,INCISED 13MM	S	10	4.8	3.6(0.9)	20	0	10.0
ACA TREATED LUMBER								
4267	2 X 4,NON-INCISED	RP	10	10.2	15.0(2.2)	100	100	10.0
4268	2 X 4,NON-INCISED	JP	10	3.4	6.8(4.5)	60	20	10.0

LOT #	COMMODITY DESCRIPT.[1]	SPECIES[2]	NO. IN TEST	AVG. ASSAY RETENTION KG/M^3	AVG. TRT. DEPTH, MM (STD DEV)	% OF CORES WITH PENETRATIONS >5MM	>10MM[3]	AVG. AWPA RATING
4269	2 X 6,NON-INCISED	RP	10	4.2	8.2(5.4)	60	40	10.0
4270	2 X 6,NON-INCISED	JP	10	3.2	5.2(2.3)	60	0	9.9
4272	4 X 4,NON-INCISED	RP	10	6.2	8.2(5.3)	80	40	10.0
4273	4 X 4,NON-INCISED	JP	10	3.1	7.0(5.2)	60	20	10.0
ACQ TREATED LUMBER								
4271	2 X 6,NON-INCISED	HEMLOCK	10	1.5[7]	7.4(5.3)	80	20	10.0
CCA-C TREATED PLYWOOD								
4246-48	5/8" X 6"	HEMFIR	12	8.4 - 9.9	N/A			9.9

1 NOMINAL SIZE (INCHES)

2 SPECIES: RP=RED PINE, JP=JACK PINE, SPF=SPRUCE PINE FIR, LPP=LODGEPOLE PINE, S=EASTERN SPRUCE

3 FOR COMMODITIES WITH DIMENSIONS EXCEEDING 114MM, THIS FIGURE REPRESENTS THE NUMBER OF CORES WITH PENETRATIONS EQUAL TO OR EXCEEDING 13MM.

4 NOTES: LOT NUMBERS 4256-4266 WERE SELECTED RANDOMLY FROM LOCAL LUMBER RETAILERS; ALL REMAINING TREATED MATERIAL WAS PROVIDED BY THE WOOD TREATING INDUSTRY SPECIFICALLY FOR USE IN THE TEST PLOT.

5 N/A - DATA NOT AVAILABLE

6 LOT NUMBER 4274 WAS TREATED TO AN ABOVE GROUND SPECIFICATION (4.0 KG/M3)

7 COPPER RETENTION ONLY

TABLE 2

TERMITE ATTACK GRADING SYSTEMS

IUFRO RATING	AWPA RATING	DESCRIPTION
0	10	Sound
1	9	Trace of attack
2	7	Moderate attack
3	4	Heavy attack
4	0	Failure by attack

FIGURE 1: Termite distribution in Kincardine as reported in 1968 study, and location of present test plot.