



FOREST AND WILDLIFE RESEARCH CENTER

FOREST PRODUCTS DEPARTMENT

Second Annual Evaluation of MSU/RTA Alternative Preservative Study



Submitted To:

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This report covers the second annual evaluation of the full length cross-ties exposed as part of the MSU/RTA alternative preservative study. A visual evaluation of the exposed top surface was conducted for all ties at both exposure sites. One tie from each treatment group, at both sites, was selected at random to be examined on all four surfaces and to be cross-cut near the inner spike holes for interior evaluation.

General Observations:

No unexpected results were found. Checking and/or splitting appeared worse at Site 2 probably due to more direct sunlight exposure. Ties at Site 1 appeared to be more moist/wet due to the increased shade and leaf litter at this site.

General photographs documenting the condition of the sites and some of the noted deterioration can be seen below (Figures 1 - 10). The tie number denotes the position of exposure as recorded on the plot-maps. Copies of the inspection forms as well as photographs of the segmented ties can be found in the appendix.



Figure 1 - An overall view of exposure Site 2 illustrating the conditions at the time of inspection.



Figure 2 - A general photograph demonstrating the exposure conditions at Site 1 after the inspection.

Site 1 - Dorman Lake Test Site



Figure 3 - Tie #17 (Cedarcide/red oak) showing splitting.



Figure 4 - Tie #151 (Nisus/white oak/borate/oil B) with heavy checking.

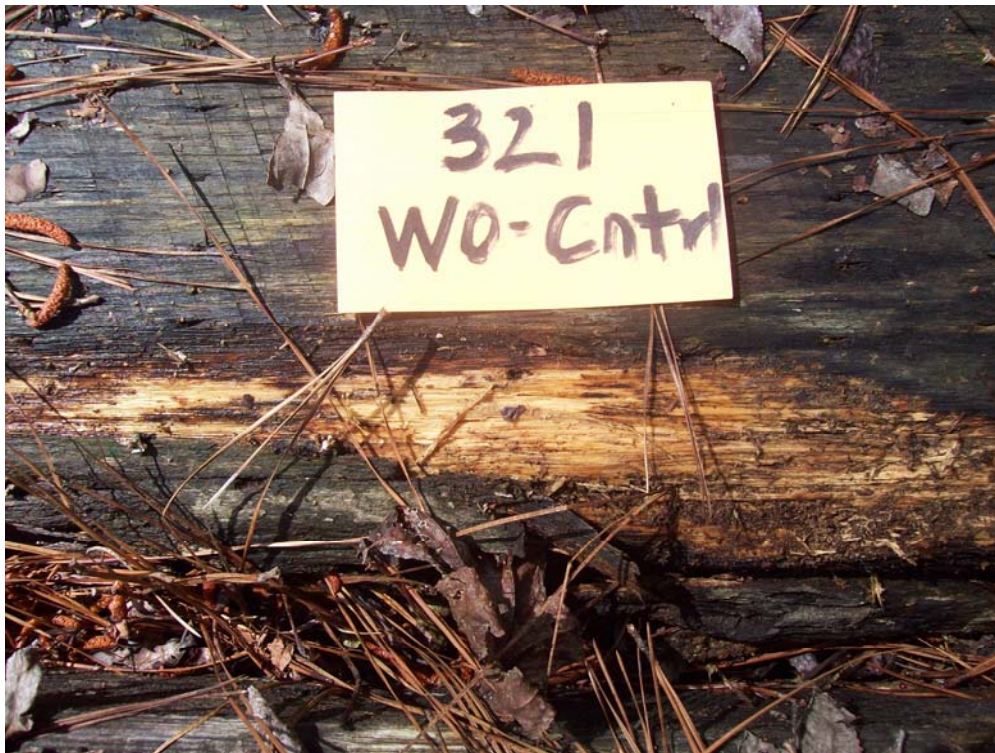


Figure 5 - Tie #321 (white oak/untreated) showing signs of obvious decay.



Figure 6 - Tie #51 (red oak/untreated) with penetrating decay pocket.



Figure 7 - Tie #52 (white oak/untreated) with live termites at the time of inspection.

Site 2 – Formosan Termite Research Facility



Figure 8 - Tie #84 (Lonza/red oak) with light decay.



Figure 9 - Tie #130 (Nisus/red oak/borate only) with checking.



Figure 10 - Untreated tie with decay.

APPENDIX

Plot Map RTA Ties (Dorman)

Position Row 1 runs North - South (Eastern most row)

			May-10				
			Decay	Termite	Decay	Termite	Comments
1	wo-2	Cedar	10	10	x	x	Cut 5/10
2	wo-3		10	10			
3	wo-4		10	10			
4	wo-5		10	10			
5	wo-7		10	10			
6	wo-6		10	10			
7	wo-1		10	10			
8	wo-10		10	10			
9	wo-8		10	10			
10	wo-9		10	10			
11	wo-21		10	10			
12	ro-18		10	10	x	x	Cut 5/10
13	ro-19		10	10			
14	ro-20		10	10			
15	ro-7		10	10			
16	ro-6		10	10			
17	ro-5		10	10			alligator
18	ro-21		10	10			
19	ro-4		10	10			
20	ro-3		10	10			
21	ro-2		10	10			
22	ro-1		10	10			
23	5	Turada	9	10	x	x	Cut 5/10
24	6		10	10			
25	7		10	10			
26	4		10	10			
27	2		10	10			
28	9		10	10			
29	8		10	10			
30	10		10	10			
31	1		10	10			
32	3		10	10			
33	SROBC-7	Seaman	10	10	x	x	Cut 5/10
34	SROBC-7		10	10			
35	SROBC-7		10	10			
36	SROBC-7		10	10			
37	SROBC-7		10	10			
38	SROBC-7		10	10			
39	SROBC-7		10	10			
40	SROBC-5		10	10	x	x	Cut 5/10
41	SROBC-7		10	10			
42	SWOCEF		10	10	x	x	Cut 5/10
43	SWOCEF		10	10			
44	SWOCEF		10	10			
45	SWOCEF		10	10			

46	SWOCEF	10	10				
47	SWOCEF	10	10				
48	SWOCEF	10	10				
49	SWOCEF	10	10				
50	SWOCEF	10	10				
51	SROC-7	8	9	x	x	Cut 5/10	
52	SWOC-5	9	9	x	x	Cut 5/10	
53	SROBC-5	10	10				
54	SWOBCREF	10	10				
55	SWOBCREF	10	10				
56	SWOBCREF	10	10				
57	SWOBCREF	10	10				
58	SWOBCREF	10	10				
59	SWOBCREF	10	10				
60	SWOBCREF	10	10				
61	SWOBCREF	10	10			check	
62	SROC5	10	10	x	x	Cut 5/10	
63	SROC5	10	10				
64	SROC5	10	10				
65	SROC5	10	10				
66	SROC5	10	10				
67	SROC5	10	10				
68	SROC5	10	10				
69	SROC5	10	10				
70	SROC5	10	10				
71	SROBC5	10	10				
72	SROBC5	10	10				
73	SROBC5	10	10				
74	SROBC5	10	10				
75	SWOBCREF	10	10				
76	SWOCREF	10	10				
77	SROC5	10	10				
78	SROBC5	10	10				
79	SROBC5	10	10				
80	SROBC5	10	10				
81	SROBC5	10	10				
82	SWOBCREF	10	10				
83	SROBC5	10	10				
84	SROBC5	10	10				
85	wo-136	Lonza	10	10	x	x	Cut 5/10
86	wo-130		10	10			
87	wo-129		10	10			
88	wo-121		10	10			
89	wo-127		10	10			
90	wo-124		10	10			
91	wo-128		10	10			
92	wo-122		10	10			
93	wo-123		10	10			
94	wo-125		10	10			

95	ro-105	10	10	x	x	Cut 5/10	_____
96	ro-104	10	10				_____
97	ro-103	10	10				_____
98	ro-102	10	10				_____
99	ro-110	10	10				_____
100	ro-107	10	10				_____
101	ro-106	10	10				_____
102	ro-109	10	10				_____
103	ro-101	10	10				_____
104	ro-108	10	10				_____
105	wo-135	10	10	x	x	Cut 5/10	_____
106	wo-134	10	10				_____
107	wo-138	10	10				_____
108	wo-139	10	10				_____
109	wo-137	10	10				_____
110	wo-132	10	10				_____
111	wo-136	9	10				_____
112	wo-140	10	10				_____
113	wo-133	10	10				_____
114	wo-131	9	10				_____
115	ro-182	9	10				_____
116	wo-181	9	10				_____
117	ro-114	10	10	x	x	Cut 5/10	_____
118	ro-120	10	10				_____
119	ro-117	10	10				_____
120	ro-112	10	10				_____
121	ro-113	10	10				_____
122	ro-115	10	10				_____
123	ro-119	10	10				_____
124	ro-116	10	10				_____
125	ro-111	10	10				_____
126	ro-118	10	10				_____
127	P3RO7-39	KMG	10				_____
128	P3RO7-36		10				_____
129	P3RO7-37		10				_____
130	P3RO7-38		10				_____
131	P3RO7-23		10				_____
132	P3RO7-40		10				_____
133	P3RO7-26		10				_____
134	P3RO7-42		10				_____
135	P3RO7-35		10				_____
136	P3RO7-41		10	x	x	Cut 5/10	_____
137	P3WO7-5		10	x	x	Cut 5/10	_____
138	P3WO7-4		10				_____
139	P3WO7-6		10				_____
140	P3WO7-7		10				_____
141	P3WO7-11		10				_____
142	P3WO7-17		10				_____
143	P3WO7-20		10				_____

144	P3WO7-2		10	10				
145	P3WO7-8		10	10				
146	P3WO7-3		10	10				
147	Woctrl-21		8	9			live termites	
148	Roctrl-43		10	10				
149	WO122	Nisus	10	10				
150	WO14		10	10				
151	WO128		10	10			check	
152	WO61		10	10				
153	WO5		10	10				
154	WO1		10	10				
155	WO71		10	10			check	
156	WO98		10	10				
157	WO139		10	10				
158	WO135		10	10				
159	WO144		10	10				
160	WO126		10	10				
161	WO131		10	10				
162	WO138		10	10				
163	WO130		10	10				
164	WO125		10	10				
165	WO29		10	10				
166	WO52		10	10	x	x	Cut 5/10	
167	WO137		10	10				
168	WO134		10	10	x	x	Cut 5/10	
169	WO44ctrl		9	10			fruiting body	
170	WO94ctrl		9	10				
171	RO6ctrl		9	10				

172	RO-51ctrl	10	10				
173	RO21	10	10				
174	RO22	10	10				
175	RO15	10	10			check	
176	RO62	10	10				
177	RO46	10	10				
178	RO2	10	10				
179	RO24	10	10				
180	RO20	10	10	x	x	Cut 5/10	
181	RO37	10	10	x	x	Cut 5/10	
182	RO31	10	10				
183	RO59	10	10				
184	RO89	10	10				
185	RO13	10	10				
186	RO58	10	10				
187	RO57	10	10				
188	RO12	10	10				
189	RO56	10	10				
190	RO25	10	10				
191	RO43	10	10				
192	RO10	10	10				
193	RO54	10	10	x	x	Cut 5/10	
194	RO38	10	10				
195	RO45	10	10				
196	RO16	10	10				
197	RO72	10	10				
198	RO77	10	10				
199	RO40	10	10				
200	RO55	10	10				
201	RO18	10	10				
202	RO3	10	10				
203	WO49	10	10	x	x	Cut 5/10	
204	WO121	10	10				
205	WO68	10	10				
206	WO11	10	10				
207	WO65	10	10				
208	WO92	10	10				
209	WO60	10	10				
210	WO47	10	10				
211	WO90	10	10				
212	WO69	10	10				
213	MRO8	Merichen	10	10	x	x	Cut 5/10
214	MRO8		10	10			
215	MROB8		10	10	x	x	Cut 5/10
216	MROB8		10	10			
217	MROB8		10	10			
218	MROB8		10	10			
219	MROB8		10	10			
220	MROB8		10	10			

221	MROB8	9	10			
222	MROB8	10	10			
223	MROB8	10	10			
224	MWO8ctrl	7	10			
225	MWO8ctrl	10	10			
226	MRO8ctrl	10	10			
227	MRO8	10	10			
228	MRO8	10	10			
229	MRO8	10	10			
230	MRO8	10	10			
231	MRO8	10	10			
232	MRO8	10	10			
233	MRO8	10	10			
234	MRO8	10	10			
235	MWOB8	10	10	x	x	Cut 5/10
236	MWOB8	10	10			
237	MWOB8	10	10			
238	MWOB8	10	10			
239	MWOB8	10	10			
240	MWOB8	10	10			
241	MWOB8	10	10			
242	MWOB8	10	10			
243	MWOB8	10	10			
244	MWOB8	10	10			

Row 2 runs North - South (West row)

May-09

		Decay	Termite	Decay	Termite	Comments
245	6	10	10	x	x	Cut 5/10
246	14	10	10			
247	79	10	10			
248	73	10	10			
249	75	10	10			
250	?	10	10			
251	80	10	10			
252	?	10	10			
253	62	10	10			
254	82	10	10			
255	68	10	10			
256	74	10	10			
257	37	10	10	x	x	Cut 5/10
258	26	10	10			
259	53	10	10	x	x	Cut 5/10
260	59	10	10			
261	52	10	10			
262	48	10	10			
263	45	10	10			
264	67	10	10	x	x	Cut 5/10
265	51?	10	10			

266	?		10	10			
267	88		10	10			
268	46		10	10			
269	12		10	10			
270	20		10	10			
271	31		10	10			
272	17		10	10			
273	4		10	10			
274	10?		10	10			
275	16		10	10			
276	5		10	10			
277	27		10	10			
278	36		10	10			
279	24		10	10			
280	?		10	10			
281	22		10	10			
282	39		10	10			
283	25		10	10			
284	?		10	10			
285	WO30	Enviro	10	10	x	x	Cut 5/10
286	RO6		10	10	x	x	Cut 5/10
287	RO7		10	10			
288	RO8		10	10			
289	RO9		10	10			
290	RO1		10	10			
291	RO2		10	10			
292	RO3		10	10			
293	RO4		10	10			
294	RO5		10	10			
295	RO10		10	10			
296	6	BioP	10	10			
297	1		10	10			
298	7		10	10			
299	8		10	10			
300	9		10	10			
301	10		10	10			
302	2		10	10			
303	3		10	10			
304	4		10	10			
305	5		10	10			
306	12		10	10			control?
307	9469		10	10			
308	9459		10	10			
309	9460		10	10			
310	9471		10	10			
311	9472		10	10			
312	9470		10	10			
313	9464		10	10			
314	11		9	10			control?

315	9468		10	10			
316	9466		10	10			
317	9467		10	10			
318	roctrl	Enviro	10	10			
319	roctrl		10	10			
320	woctrl		10	10			
321	woctrl		8	10		fruiting body	
322	WO22		10	10			
323	WO23		10	10			
324	WO24		10	10			
325	W025		10	10			
326	WO27		10	10			
327	WO28		10	10			
328	WO29		10	10			
329	WO21		10	10			
330	WO26		10	10			
331	MWO8	Meri	10	10			
332	MWO8		10	10			
333	MWO8		10	10		check	
334	MWO8		10	10			
335	MWO8		10	10			
336	MWO8		10	10			
337	MWO8		10	10			
338	MWO8		10	10			
339	MWO8		10	10			
340	MWO8		10	10			
341	MWO8		10	10	x	x	Cut 5/10/heart rot

Plot Map RTA Ties (McNeill)

Position Row 1 runs East - West (Northern most row)

			Apr. 10				
			Decay	Termite	Decay	Termite	Comments
1	1	Turada	9	10	x	x	cut 4/10
2	2		10	10			
3	3		10	10			
4	4		10	10			
5	5		10	10			
6	6		10	10			
7	7		10	10			
8	8	DK	9	10			DK present upon delivery
9	9		10	10			
10	10	DK	9	10			DK present upon delivery
11	11RO	Envirosafi	10	10			pic 09
12	15RO		10	10			
13	14RO		10	10			
14	13RO		10	10			large check
15	12RO		10	10			
16	20RO		10	10			
17	19RO		10	10			
18	18RO		10	10			
19	17RO		10	10			
20	16RO		10	10	x	x	large check/cut 4/10
21	35WO		10	10	x	x	cut 4/10
22	34WO		10	10			
23	33WO		10	10			
24	32WO		10	10			
25	31WO		10	10			
26	40WO		10	10			
27	39WO		10	10			
28	38WO		10	10			
29	37WO		10	10			
30	36WO		10	10			large check
31	SROC5	Seaman	10	10	x	x	cut 4/10
32	SROC5		10	10			
33	SROC5		10	10			
34	SROC5		10	10			pic 09
35	SROC5		10	10			
36	SROC5		10	10			
37	SROC5		10	10			
38	SROC5		10	10			
39	SROC5		10	10			
40	SROC5		10	10			
41	SROBC5		10	10	x	x	split/cut 4/10
42	SROBC5		10	10			
43	SROBC5		10	10			
44	SROBC5		10	10			
45	SROBC5		10	10			

46	SROBC5		10	10				
47	SROBC5		10	10				
48	SROBC5		10	10				
49	SROBC5		10	10				
50	SROBC5		10	10				
51	SWOCREF		10	10	x	x	cut 4/10	
52	SWOCREF		10	10				
53	SWOCREF		10	10				
54	SWOCREF		10	10			large check	
55	SWOCREF		10	10				
56	SWOCREF		10	10				
57	SWOCREF		10	10				
58	SWOCREF		10	10				
59	SWOCREF		10	10				
60	SWOCREF		10	10				
61	SWOBCREF		10	10	x	x	cut 4/10	
62	SWOBCREF		10	10				
63	SWOBCREF		10	10				
64	SWOBCREF		10	10				
65	SWOBCREF		10	10				
66	SWOBCREF		10	10				
67	SWOBCREF		10	10				
68	SWOBCREF		10	10				
69	SWOBCREF		10	10				
70	SWOBCREF		10	10				
71	SROBC7		10	10	x	x	cut 4/10	
72	SROBC7		10	10				
73	SROBC7		10	10				
74	SROBC7		10	10				
75	SROBC7		10	10				
76	SROBC7		10	10				
77	SROBC7		10	10				
78	SROBC7		10	10				
79	SROBC7		10	10				
80	SROBC7		10	10				
81	ctrlSROC7		8	9	x	x	cut 4/10	
82	ctrlSWOC5		9	10	x	x	cut 4/10	
83	ctrlSWOC5		9	10			pic 09/active DK/FB	
84	209	Lonza	9	10	x	x	cut 4/10	
85	206		10	10				
86	204		10	10				
87	201		10	10				
88	208		10	10				
89	203		10	10				
90	205		10	10				
91	207		10	10				
92	210		10	10				
93	202		10	10				
94	240	Nisus	10	10	x	x	cut 4/10	

95	237	10	10			
96	243	10	10			
97	238	10	10			
98	245	10	10			
99	239	10	10			
100	247	10	10			
101	241	10	10			
102	233	10	10			
103	242	10	10			
104	203	10	10	x	x	cut 4/10
105	227	10	10			
106	207	10	10			
107	200	10	10			large check
108	229	10	10			
109	206	10	10			
110	216	10	10			
111	220	10	10			
112	212	10	10			
113	222	10	10			
114	217	10	10	x	x	cut 4/10
115	264	10	10			
116	287	10	10			
117	253	10	10			
118	283	10	10			
119	219	10	10			
120	276	10	10			
121	292	10	10			
122	269	10	10			
123	289	10	10			pic 09
124	225	10	10	x	x	cut 4/10
125	204	10	10			
126	234	10	10			
127	215	10	10			
128	231	10	10			
129	213	10	10			
130	205	10	10			
131	208	10	10			
132	210	10	10			large check
133	226	10	10			
134	305	10	10	x	x	cut 4/10
135	201	10	10			
136	313	10	10			
137	294	10	10			
138	308	10	10			
139	301	10	10			
140	291	10	10			
141	309	10	10			
142	296	10	10			
143	314	10	10			

144	236	Lonza	10	10				
145	232		10	10				
146	238		10	10				
147	234		10	10				
148	231		10	10				
149	233		10	10				
150	235		10	10				
151	239		10	10				
152	240		10	10				
153	237		9	10	x	x	cut 4/10	
154	272	Nisus	10	10	x	x	cut 4/10	
155	223		10	10				
156	256		10	10				
157	297		10	10				
158	295		10	10				
159	267		10	10				
160	299		10	10				
161	261		10	10				
162	214		10	10				
163	275		10	10				
164	281	Lonza	10	10				
165	282		10	10				
166	315	Nisus	10	10				
167	316		10	10				
168	249		10	10				
169	248		9	10			pic 09/DK active	

Row 2 runs East - West (middle row)

		Apr. 10		Decay	Termite	Decay	Termite	Comments
170	220	Lonza	10	10	x	x	cut 4/10	_____
171	218		10	10	_____	_____	_____	_____
172	214		10	10	_____	_____	_____	_____
173	219		10	10	_____	_____	_____	_____
174	212		10	10	_____	_____	_____	_____
175	217		10	10	_____	_____	_____	_____
176	216		10	10	_____	_____	_____	_____
177	211		10	10	_____	_____	_____	_____
178	213		10	10	_____	_____	_____	_____
179	215		10	10	_____	_____	_____	_____
180	224		10	10	x	x	cut 4/10	_____
181	228		10	10	_____	_____	_____	_____
182	221		10	10	_____	_____	_____	_____
183	222		10	10	_____	_____	_____	_____
184	230		10	10	_____	_____	_____	_____
185	225		10	10	_____	_____	_____	_____
186	226		10	10	_____	_____	_____	_____
187	229	10	10	_____	_____	_____	_____	
188	223	10	10	_____	_____	_____	_____	
189	227	Cedarcide	10	10	_____	_____	_____	_____
190	19W		8	10	x	x	cut 4/10	_____ spike plate
191	20W		10	10	_____	_____	loose plate	_____
192	15W		10	10	_____	_____	_____	_____
193	16WC		10	10	_____	_____	_____	_____
194	18W		10	10	_____	_____	_____	_____
195	17W		10	10	_____	_____	shake	_____
196	10R		9	10	x	x	cut 4/10	_____
197	9RC		10	10	_____	_____	_____	_____
198	8R		10	10	_____	_____	_____	_____
199	11W		10	10	_____	_____	_____	_____
200	12W		10	10	_____	_____	_____	_____
201	13W		10	10	_____	_____	_____	_____
202	14W	10	10	_____	_____	_____	_____	
203	11R	10	10	_____	_____	cross grain/shake	_____	
204	12R	10	10	_____	_____	_____	_____	
205	13R	10	10	_____	_____	_____	_____	
206	14R	10	10	_____	_____	_____	_____	
207	15R	10	10	_____	_____	_____	_____	
208	16R	10	10	_____	_____	_____	_____	
209	17R	10	10	_____	_____	_____	_____	
210	22R	10	10	_____	_____	_____	_____	
211	22W	10	10	_____	_____	_____	_____	
212	MWOB8	Merichem	10	10	x	x	cut 4/10	_____
213	MWOB8		10	10	_____	_____	_____	_____
214	MWOB8		10	10	_____	_____	_____	_____

215	MWOB8		10	10				
216	MWOB8		10	10				
217	MWOB8		10	10				
218	MWPB8		10	10				
219	MRO8		10	10				
220	MRO8		10	10	x	x	cut 4/10	
221	MRO8		10	10				
222	MRO8		10	10			pic 09	
223	MRO8		10	10				
224	MRO8		10	10				
225	MRO8		10	10				
226	MRO8		10	10				
227	MWOB8		10	10				
228	MWOB8		10	10				
229	MRO8		10	10				
230	MRO8		10	10				
231	MWO8		10	10				
232	MWO8		10	10	x	x	cut 4/10	
233	MWO8		10	10				
234	MWO8		10	10				
235	MWO8		10	10				
236	MWO8		10	10				
237	MWO8		10	10				
238	MWO8		10	10				
239	MWO8		10	10				
240	MWO8		10	10				
241	MROB8		10	10	x	x	cut 4/10	
242	MWO8		10	10				
243	MROB8		10	10				
244	MROB8		10	10				
245	MROB8		10	10				
246	MROB8		10	10				
247	MROB8		10	10				
248	MROB8		10	10				
249	MROB8		10	10				
250	MROCONT		10	9			pic 09/termite dmg	
251	MWOCONT		10	9			pic 09/DK	
252	MWOCONT		10	10				
253	72	BioPres	9	10			pic 09/DK top side	
254	76		10	10				
255	75		10	10				
256	67		10	10				
257	68		9	10			DK top side	
258	69		9	10			DK top side	
259	71		10	10				
260	74		9	10			DK top side	
261	82		10	10				
262	77		10	10				
263	93		10	10				

264	?		9	10				DK top side
265	66		10	10				
266	65		10	10				
267	73		10	10				
270	1	KMG	10	10				
271	14		10	10				
272	12		10	10				
273	16		10	10				
274	15		10	10				
275	18		10	10				
276	19		10	10				
277	10		10	10				
278	30		10	10				pic 09
279	33		10	10				
280	34		10	10				
281	24		10	10				
282	27		10	10				
283	28		10	10				
284	29		10	10				
285	32		10	10				
286	13		10	10				
287	31		10	10				
288	9		10	10				
289	25		10	10				
290	22		10	10				
291	44		10	10				pic 09
292	11	Koppers	10	10				
293	?		10	10				
294	?		10	10				
295	?		10	10				
296	19		10	10	x	x		cut 4/10
297	15		10	10				
298	?		10	10				
299	?		10	10				
300	47		10	10	x	x		cut 4/10
301	44		10	10				
302	41		10	10				
303	55		10	10				
304	60		10	10				
305	43		10	10				pic 09
306	51		10	10				
307	76		10	10				
308	65		10	10				
309	61		10	10	x	x		cut 4/10
310	70		10	10				
311	72		10	10				
312	71		10	10				
313	77		10	10				
314	64		10	10				

315 2?		10	10			
316	34	10	10	x	x	cut 4/10
317	38	10	10			
318	33	10	10			
319	29	10	10			
320	32	10	10			
321 ?		10	10			
322	31	10	10			
323	35	10	10			
324	23	10	10			
325	66	10	10			
326	67	10	10			
327 ?		10	10			
328	61	10	10			
329	7	10	10			
330	8	10	10			
331 WO		9	10			pic 09/DK
332 WO		10	10			pic 09
333 RO		10	10			
334 RO		9	10			pic 09/DK
335 ctrl	Enviro	10	10			
336 ctrl		10	10			

Site 1 - Dorman Lake Test Site (bottom/cross-section)



Figure 1 - Tie #341 (Merichem/white oak/CuNap)



Figure 2 – Tie #341 (Merichem/white oak/air dried/CuNap) at the time of inspection contained suspected pretreatment heart rot.



Figure 3 - Tie #286 (Envirosafe/red oak).



Figure 4- Tie #286 (Envirosafe/red oak).



Figure 5 - Tie #285 (Envirosafe/white oak).



Figure 6 - Tie number 285 (Envirosafe/white oak).



Figure 7 - Tie #264 card mislabeled – actually Kop 67 (Koppers/white oak/creosote petroleum).



Figure 8 - Tie #264 card mislabeled – actually Kop 67 (Koppers/white oak/creosote petroleum).



Figure 9 - Tie #259 (Koppers/red oak/creosote petroleum solution).



Figure 10 - Tie #259 (Koppers/red oak/creosote petroleum solution).



Figure 11 - Tie #257 (Koppers/red oak/P2 creosote).



Figure 12 - Tie #257 (Koppers/red oak/P2 creosote).



Figure 13- Tie# 245 (Koppers/white oak/P2 creosote).



Figure 14 - Tie# 245 (Koppers/white oak/P2 creosote).



Figure 15 - Tie #136 (KMG/red oak).



Figure 16 - Tie #136 (KMG/red oak).



Figure 17- Tie #137 (KMG/white oak).



Figure 18 - Tie #137 (KMG/white oak).



Figure 19- Tie#166 (Nisus/white oak/borate/oil B).



Figure 20 - Tie#166 (Nisus/white oak/borate/oil B).



Figure 21- Tie #168 (Nisus/white oak/borate/oil A).



Figure 22 - Tie #168 (Nisus/white oak/borate/oil A).



Figure 23- Tie #180 (Nisus/red oak/borate/oil B).



Figure 24 - Tie #180 (Nisus/red oak/borate/oil B).



Figure 25- Tie #193 (Nisus/red oak/borate).



Figure 26 - Tie #193 (Nisus/red oak/borate).



Figure 27- Tie #181 (Nisus/red oak/borate/oil A).



Figure 28 - Tie #181 (Nisus/red oak/borate/oil A).



Figure 29 - Tie #203 (Nisus/white oak/borate).



Figure 30 - Tie #203 (Nisus/white oak/borate).



Figure 31- Tie #213 (Merichem/red oak/CuNap).



Figure 32 - Tie #213 (Merichem/red oak/CuNap).



Figure 33 – Tie #235 (Merichem/white oak/borate/CuNap).



Figure 34 – Tie #235 (Merichem/white oak/borate/CuNap).



Figure 35 - Tie #215 (Merichem/red oak/borate/CuNap).



Figure 36 - Tie #215 (Merichem/red oak/borate/CuNap).



Figure 37 - Tie #117 (Lonza/red oak).



Figure 38 - Tie #117 (Lonza/red oak).



Figure 39 - Tie #105 (Lonza/white oak).



Figure 40 - Tie #105 (Lonza/white oak).



Figure 41 - Tie #95 (Lonza/red oak).



Figure 42 - Tie #95 (Lonza/red oak).



Figure 43 - Tie #85 (Lonza/white oak).



Figure 44 - Tie #85 (Lonza/white oak).



Figure 45 Tie #62 (Boatright/red oak/creosote 5pcf).



Figure 46 - Tie #62 (Boatright/red oak/creosote 5pcf).



Figure 47 Tie #54 (Boatright/white oak/borate/creosote to refusal).



Figure 48 - Tie #54 (Boatright/white oak/borate/creosote to refusal).



Figure 49 - Tie #51 (Boatright/red oak/untreated control).



Figure 50 - Tie #51 (Boatright/red oak/untreated control).



Figure 51 Tie #52 (Boatright/white oak/untreated control).



Figure 52 - Tie #52 (Boatright/white oak/untreated control).



Figure 53 Tie #42 (Boatright/white oak/creosote to refusal).



Figure 54 - Tie #42 (Boatright/white oak/creosote to refusal).



Figure 55 - Tie #33 (Boatright/red oak/borate/creosote 7pcf).



Figure 56 - Tie #33 (Boatright/red oak/borate/creosote 7pcf).



Figure 57 - Tie #40 (Boatright/red oak/borate/creosote 5pcf).



Figure 58 - Tie #40 (Boatright/red oak/borate/creosote 5pcf).



Figure 59 - Tie #12 (Cedarcide/red oak).



Figure 60 - Tie #12 (Cedarcide/red oak).



Figure 61 - Tie #1 (Cedarcide/white oak).



Figure 62 - Tie #1 (Cedarcide/white oak).



Figure 63 - Tie #23 (Turada).



Figure 64 - Tie #23 (Turada).

Site 2 – Formosan Termite Research Facility



Figure 1 - Tie #1 (Turada).



Figure 2 - Tie #1 (Turada).



Figure 3 – Tie #20 (Envirosafe/red oak).



Figure 4 – Tie #20 (Envirosafe/red oak).



Figure 5 – Tie #21 (Envirosafe/white oak).



Figure 6 – Tie #21 (Envirosafe/white oak).



Figure 7 – Tie #31 (Boatright/red oak/creosote 5pcf).



Figure 8 – Tie #31 (Boatright/red oak/creosote 5pcf).



Figure 9 - Tie #41 (Boatright/red oak/borate/creosote 5pcf).



Figure 10 - Tie #41 (Boatright/red oak/borate/creosote 5pcf).



Figure 11 - Tie #51 (Boatright/white oak//creosote to refusal).



Figure 12 - Tie #51 (Boatright/white oak//creosote to refusal).



Figure 13 - Tie #61 (Boatright/white oak/borate/creosote to refusal).



Figure 14 - Tie #61 (Boatright/white oak/borate/creosote to refusal).



Figure 15 - Tie #71 (Boatright/red oak/borate/creosote 7pcf).



Figure 16 - Tie #71 (Boatright/red oak/borate/creosote 7pcf).



Figure 17 - Tie #81 (red oak/untreated).



Figure 18 - Tie #81 (red oak/untreated) with decayed areas outlined.



Figure 19 - Tie #82 (white oak/untreated) with decayed areas outlined.



Figure 20 – Tie #84 (Lonza/red oak).



Figure 21 – Tie #84 (Lonza/red oak).



Figure 22 - Tie #94 (Nisus/red oak/borate/oil A).



Figure 23 - Tie #94 (Nisus/red oak/borate/oil A).



Figure 24 - Tie #104 (Nisus/red oak/borate/oil B).



Figure 25 - Tie #104 (Nisus/red oak/borate/oil B).



Figure 26 - Tie #114 (Nisus/white oak/borate/oil B).



Figure 27 - Tie #114 (Nisus/white oak/borate/oil B).



Figure 28 - Tie #124 (Nisus/red oak/borate).



Figure 29 - Tie #124 (Nisus/red oak/borate).



Figure 30 - Tie #134 (Nisus/white oak/borate/oil A).



Figure 31 - Tie #134 (Nisus/white oak/borate/oil A).



Figure 32 - Tie #153 (Lonza/white oak).



Figure 33 - Tie #153 (Lonza/white oak).



Figure 34 - Tie #154 (Nisus/white oak/borate).



Figure 35 Tie #154 (Nisus/white oak/borate).



Figure 36 - Tie #317 (Koppers/red oak/ P2 creosote).



Figure 37 - Tie #317 (Koppers/red oak/ P2 creosote).



Figure 38 - Tie #310 (Koppers/white oak/creosote petroleum solution).



Figure 39 - Tie #310 (Koppers/white oak/creosote petroleum solution).



Figure 40 - Tie #300 (Koppers/red oak/creosote petroleum solution).



Figure 41 - Tie #300 (Koppers/red oak/creosote petroleum solution).



Figure 42 - Tie #296 (Koppers/white oak/P2 creosote).



Figure 43 - Tie #296 (Koppers/white oak/P2 creosote).



Figure 44 - Tie #278 (KMG/red oak).



Figure 45 - Tie #278 (KMG/red oak).



Figure 46 - Tie #277 (KMG/white oak).



Figure 47 - Tie #277 (KMG/white oak).



Figure 48 - Tie #241 (Merichem/red oak/borate/CuNap).



Figure 49 - Tie #241 (Merichem/red oak/borate/CuNap).



Figure 50 - Tie #232 (Merichem/white oak/CuNap).



Figure 51 - Tie #232 (Merichem/white oak/CuNap).



Figure 52 - Tie #220 (Merichem/red oak/CuNap).



Figure 53 - Tie #220 (Merichem/red oak/CuNap).



Figure 54 - Tie #212 (Merichem/white oak/borate/CuNap).



Figure 55 - Tie #212 (Merichem/white oak/borate/CuNap).



Figure 56 - Tie #196 (Cedarcide/red oak).



Figure 57 - Tie #196 (Cedarcide/red oak).



Figure 58 - Tie #190 (Cedarcide/white oak) with decayed areas marked.



Figure 59 - Tie #190 (Cedarcide/white oak) with decayed areas marked.



Figure 60 - Tie # 180 (Lonza/white oak).



Figure 61 - Tie # 180 (Lonza/white oak).



Figure 62 - Tie #170 (Lonza/red oak).



Figure 63 - - Tie #170 (Lonza/red oak).

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No Applicable Standards

Reference: RTA Crosstie Folder.